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ROLE OF CARBONACEOUS MATERIALS IN POLYMER MATRIX COMPOSITES FOR FRICTION APPLICATIONS

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by

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B.S., Southern Illinois University, 2013

A Thesis
Submitted in Partial Fulfillment of the Requirements for the
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THESIS APPROVAL

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in the field of Mechanical Engineering and Energy Processes

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The purpose of this research was to study the friction performance characteristics of a Copper, Antimony, and sulfide free environmentally automotive friction material using different allotropes of graphite as a replacement. Model brake friction materials were created and tested on a full scale brake dynamometer using the Society of Automotive Engineers J2430 test and Brake Effectiveness Evaluation Procedure. The dynamometer testing revealed the graphite replacement to have higher average effectiveness values when compared to the baseline friction material currently in production. The model samples generally had higher wear rates but some were comparable to the baseline and would be acceptable in real world applications. Some of the model samples displayed stable characteristics under varying load and linear braking velocity conditions, ultimately passing the criteria required. The model samples (RD18670A/B/C/D/E/F/G) displayed average effectiveness values of 0.425, 0.435, 0.4125, 0.425, 0.475, failed test, and 0.35 respectively, which is on average a substantial gain over the baseline effectiveness value average of 0.3125. Sample RD18670F proved to be the most promising replacement for the baseline 1999 Ford Crown Victoria friction lining. This is due to a higher average effectiveness value of 0.5,

during both the high speed and low speed testing, than the baseline friction lining material of 0.325. Also, RD18670F displayed comparable wear rates to the baseline test, with 0.384mm lost inboard and 0.650 lost outboard, representing a difference of only 0.074mm and 0.2mm respectively from the baseline.

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CHAPTER 1

INTRODUCTION

Friction materials are used in the automotive industry as current brakes and clutches to convert the kinetic energy of a moving vehicle to thermal energy through the contact of two surfaces. Thousands of raw materials are used to create friction materials, but most materials fall into a few different categories. The three main categories of friction materials used in automotive applications include sintered metal, ceramic, and organic which are defined by their binder and other constituents. A binder, or matrix, acts as a glue to keep all ingredients together to be able resist mechanical and thermal stresses the material is subjected to under engagements. The binder could be a synthetic resin, metallic constituent, or a combination of metallic and organic components. While synthetic resins are typically inexpensive to produce, they suffer from vulnerability to thermal load/stresses that can lead to instability and failure, while sintered metal friction materials do not suffer as much from this “thermal load” due to the metal binder’s higher thermal stability when compared to polymers. Ceramic friction materials use the same premise as the sintered metals but use ceramic fibers to reinforce the ceramic matrix.

Modifiers must be added to brake lining materials to optimize the coefficient of friction. While all materials in brake formulations can be argued to be somehow modifying friction, the modifier materials are having the strongest impact on friction level. Typically metal and sulfides are used as a modifier but copper demonstrates chronic toxicity to marine life at realistic environmental concentrations[1]. Antimony,

iron, and molybdenum zinc sulfides are also used as solid lubricants. To avoid such an issue, graphite can be substituted to some extent for these lubricants within the pad formulation as a modifier. The variety of graphite available on the market requires a systematic study, since they have different structure, morphology and purity. Amorphous and fine flake graphite is created by the heating of carbon to 2600°-3000℃ and is used in brake lining applications as a modifier and “replacement for asbestos”. Graphite acts as a friction modifier since it is a lubricant and a cushion friction particle, so changing properties of the graphite such as particle size can have an impact on multiple dependent variables within the system. By increasing the size of the graphite particle, the contact area within the brake lining increases against the rotor of the vehicle typically resulting in lower coefficient of friction but more less fade and wear due to thermal conductivity.

Modifiers are crucial to alter characteristics resulting in a level of effectiveness in respect to wear, fade, and vibration resistance. How the graphite lubricates the pad can affect the aforementioned properties as well as system properties such as thermal conductivity, wear rate, and mechanical properties. By altering these properties through brake pad material formulation, favorable properties can be increased while minimizing negative properties. Graphite is a favored material due to its temperature resistance above 427℃ where asbestos fails through dehydratio n, crystallization, and frictional wear. By modifying the graphite’s shape and orientation, one can control the properties of the material. Different shapes, blends, and purity of graphite will vary the contact area within the pad. Graphite allotropes are also typified by their thermal conductivity, which

is relevant when replacing metallic copper. Graphite allotropes also participate in reduction reactions of metal oxides.

The objective of this work is to introduce maximum amounts of graphite as the primary friction modifier in place of metal sulfides and copper to reduce the hazardous particulate caused by wear while retaining a similar or better friction coefficient and wear rate. This was achieved by formulating friction materials with the aforementioned graphite variations followed by testing using Society of Automotive Engineers J2430 standard on a full scale automotive brake dynamometer.

For this thesis to be successful, the friction material formulated had to meet standards set by the automotive community to declare the material to be safe for application. Specifically, the material had to satisfy SAE J2430, Brake Evaluation Effectiveness Procedure (BEEP), while exhibiting favorable friction and wear properties. The tests must also be passed with minimal wear to the friction material and rotor to allow the friction material to be economically feasible and long lasting for potential consumers.

CHAPTER 2

LITERATURE REVIEW

Fully metallic friction materials were used typically in racing applications for many years. Metallic linings are made from powdered metal that is sintered into the desired geometry, a process using heat and pressure. These materials pose an issue due to their high requirement of brake pedal force, and an increase in wear on the contact surface. These materials also require heating to become fully effective in their use and are typically very noisy compared to counterparts. In the majority of passenger vehicles, trucks, and trains, “organic materials” have made fully metallic friction linings obsolete from the current production point of view[2].

With advantages realized in the differing friction materials, the synthetic lining was developed. Synthetics consist of non-organic, nonmetallic, and non-asbestos materials; these typically include synthetic materials such as fiberglass and aramid fibers. Organic materials consist of semi-metallic, low-metallic, and non-asbestos organic/ceramic friction lining materials. Sintered friction lining materials use a metal alloy as the binding matrix within the material to resist higher temperatures and physical stresses. Fiberglass was introduced into friction materials as a replacement for the health hazardous asbestos material. Similar to asbestos, fiberglass has structural strength and an ability to resist heat. Fiberglass is expensive and typically has a lower coefficient of friction when exposed to higher temperatures. Aramid fibers represent another candidate for asbestos replacement. They are five times stronger than steel but weighs about half of what an equal volume of fiberglass weighs. Aramid reinforced

linings perform in between the characteristics of semi metallic and organic linings without aramid fibers and are used “heavily” in organic friction lining materials. Aramid reinforced materials perform similar to semi metallic materials when cold and close to organic linings without aramid fibers when heated, but with better wear resistance and longevity than typical organic materials[2].

Bonding in linings (a high temperature adhesive) attaches the backing plate to the friction material to the pad with high strength adhesive. These types of linings have less issue with material cracking than riveted linings due to lack of stress points created by the rivets, resulting in an even distribution of any physical stresses the lining encounters. The downside of bonded linings is their inability to flex between the pad and the lining, sometimes causing noise. Bonded linings also have longer service life due to more material being between the metal backing and the contact surface[2].

Mold bonded linings use an adhesive that is applied to the backing plate of the lining, and the uncured lining material is poured on top in a mold. The material then is subjected to heat and pressure, such as that applied by a hot press, to cure the lining material onto the backing plate. The material is then able to move into spherical holes in the back of the plate, creating a faux rivet. Many high performance friction materials are created this way to avoid the stress-cracking issue associated with rivets while still offering a secure bonding to the backing plate, reducing the risk of delamination[2].

Unidirectional composites and composite laminates are the most commonly used composites, dominantly by the use of glass fibers. Carbon reinforced polymers, carbon ceramic composites, and nanocomposites can be considered the most

advanced composites currently available for use in friction applications in the automotive industry[3].

Brake lining material is of utmost importance within the automotive brake industry and suffers from properties such as heat fade and wear. They are typically formulated of more than ten constituents, and more than three thousand different materials have been used in different brands[4]. There are four main types of non-asbestos organic brake pads that are currently used: i) semi-metallic ii) low metallic iii) non-asbestos organic (sometimes also called ceramic pads if the content of ceramic is high) and iv) hybrid material pads. Semi-metallic formulations typically consist of steel chip (wool), iron powder in amounts higher than five weight percent, Zircosil, barites, synthetic graphite, rubber, steel wool, and phenolic resin. Semi-metallic brake pad friction material typically has improved thermal fade resistance, recovery, wear resistance through enhanced mechanical properties, and stable friction coefficients[5]. For these reasons a semi-metallic formulation has been chosen as the basis for this project.

The SAE J2430/BEEP test procedure is a single-ended inertia dynamometer test supported by the USA brake industry for evaluating the performance of brakes[4]. Not having a reference material, the tests give a high degree of flexibility and repeatability along with an ease of comparison of materials. The BEEP test was introduced by the Brake Manufacturing Council (BMC) friction materials committee and allows for a reliable framework to assess the actual performance of a friction material. This framework indicates that a vehicle will “pass” the Federal Motor Vehicle Safety Standard (FMVSS1235) field test if brake samples pass the BEEP test. The criterion that

determines if a material passes or fails the test was introduced by the University of Michigan Transportation Research Institute.

Despite the amount of research studies conducted on the mechanisms of friction in automotive brake linings, the phenomenon is still not completely understood[6]. Also despite the abundance of research studies, most are not publicly available. This is due to formulations of friction linings being a closely guarded industry secret, leading to most research and discoveries staying in house. Materials used in friction applications must exhibit a balance of properties, so no one material is chosen solely on frictional characteristics. Some properties include wear resistance, strength, rigidity, corrosion resistance, and fatigue life[7]. Polymer matrix composites are widely used in automotive, air, and railway transport systems as brake linings/shoes. A polymer matrix composites are comprised of a variety of short continuous fibers bound together by an organic polymer matrix. The polymer matrix composite represents a wearable and replaceable part within in a friction couple; typically mated against a pearlitic gray cast iron, steel, or aluminum matrix composite material[8]. This polymer matrix composite is rubbed against the rotating mated surface, and energy is dissipated in the related friction process[9].

The performance of an automotive friction material is determined by the variety of constituents within the friction material. Solid lubricants play a crucial role in reducing the wear of the friction couple, optimizing the friction level, and controlling brake induced vibrations. Examples of solid lubricants include graphite, MoS_2, Sb_2S_3, ZnS, CuS, and soft metals have been used [10].

Formerly, asbestos fibers were widely used in friction materials due to low cost, fitness for matrix, and good mechanical properties. Asbestos came under scrutiny due to the associated health hazards which lead to researchers engaging in finding a replacement. Asbestos exposure can lead to Asbestosis, a progressive lung disease caused by asbestos fibers lodging in the lungs and irritating air sacs within the lung[11]. Formulations of current automotive brake lining materials in the USA, Europe, and Japan have gone through significant changes through the recent decade to reflect the requirements of safer transportation along with environmental needs[9]. The first replacement friction material for asbestos was semi-metallic materials which are now the most popular choice. These semi-metallic friction materials contain metallic fibers and powders which can lead to accelerated wear due to abrasion and plowing to the friction surface counterpart. Another popular modern friction material is referred to as non-asbestos organic which uses mineral, inorganic, and organic fibers in place of the more abrasive metallic fibers [12]. The most recent development in friction materials is the use of ceramic fibers and fillers which have proved promising. Non-asbestos organic and low-metallic friction materials are typically found containing at least 5 weight percent of copper powder, low-metallic materials up to 30 weight percent, within the formulation.

In March of 2010, Washington State issued Senate Bill 6557 with a goal to limit the use of hazardous constituents such as copper in the formation of brake friction materials. California has also issues Senate Bill SB 346 which requires the reduction of copper in automotive friction materials to not surpass 0.5 weight percent within the formulation by January 1, 2023[13]. Many states are following suit and passing laws that

limit the use of copper resulting in a need for an environmentally friendly modifier for friction materials.

Automotive brake pads consist of a variety of constituents used to optimize wear and friction properties. Typically a brake friction material formulation consists of binders, fillers, friction modifiers, and reinforcements. Copper is a typical reinforcing element and modifier for friction materials for its ability to mitigate wear while improving thermal conductivity, both favorable properties within the friction industry. As automotive brake friction materials are worn, there is a release of wear particles from the pad and linings that is mostly released as airborne particulates. A friction process is always accompanied by the development and release of debris[8]. Approximately 147 million vehicles release an estimated thirty thousand metric tons of particulates yearly along with a forty percent recent increase of copper use within the friction materials[14].

Introduction of copper into the marine environment can be the cause of many different industrial sources such as mining, manufacturing processes, agro chemicals, and the automotive industry[15]. It has been reported that 35 to 50 percent of ear debris becomes airborne and contains several hazardous elements that may interact with the DNA of living organisms, causing carcinogenesis[16]. Typically a brake pad material is formulated with metallic components such as copper which is released into the air as the brake pad is worn, contributing to copper contamination in marine coastal environments. While copper is an essential element for the basic metabolism of aquatic organisms, it becomes toxic when levels reach a critical value. Copper is only third to mercury and silver as the most toxic metals for marine life and the effects of copper on marine life have been extensively studied[1]. The particulate that is released from the

friction material can be classified as airborne and non-airborne, both being a concern. Nano-sized airborne particulate can be inhaled and cause damage to the respiratory system through oxidative stress and inflammation due to reactivity with biomolecules and tissues. Due to the airborne nanoparticles small size the sedimentation rate is very low, allowing for vast distances to be travelled by the toxic particles[14]. The non-airborne particulate has been shown to leach in the presence of acid rain, simple organic acids, and humic acids which allows for distribution into bodies of water, adversely effecting life within that area[17].

One response to the health concerns has been the study of the elimination of copper and antimony trisulfide in favor of ceramics and lubricants to mitigate the loss of favorable properties of copper. While there are typically fluctuations within the rest of the formulation when making such modifications, the results reflecting the use of ceramics showed a decrease in friction and substantial increases in wear rates as high as 300 percent with a low of 100 percent. Phenolic resin can also release volatile organic compounds when exposed to temperatures higher than 300℃, this has led to the attempt to substitute geopolymers for the phenolic resin within the friction material[15]. While these methods have reduced the wear debris in both size and hazardous content, the results still do not meet the standards outlined by the aforementioned bills that will be enacted. This reflects the need for a more suitable replacement for copper and over hazardous metals that does not suffer such drastic performance losses.

While graphite has not been extensively researched for commercial application, it has shown promise when used as the primary material in race applications. It is also

growing in the electronics field as filler for thermal control in microchips, a similar theory for a different application. It exhibits a high thermal conductivity along with excellent wear properties, but suffers from low coefficient of friction when not in optimal operating temperatures. The relatively low cost and favorable properties make graphite favorable for mass production over allotropes of carbon such as graphene and carbon nanotubes[18].

Low Copper containing brake friction materials have been studied, but were found to have a slightly lower than average friction level when compared to baseline materials. These materials also exhibited higher wear than the wear detected on baseline materials, but were not susceptible to thermal fade. The low Copper automotive friction materials also exhibited speed sensitivity, warranting further investigation and formulation of a new friction material[19].

CHAPTER 3

EXPERIMENTAL PROCEDURE

The samples to be examined are labeled RD1870A-D, for simplicity the graphite samples will be referred to as Graphite A-D. Graphite A is a natural form graphitic carbon screen veined graphite material with mixed needle like and some thick flaky platelets. Graphite B is a granular synthetic graphite material which is produced from heat treatment processing of petroleum based coke. This differs from Graphite A by retaining the needle like grains but replacing the thick flaky platelets with isotropic grains. Graphite C is a proprietary two phase blend that consist of natural graphite and graphite nanoplatelets. The morphology is primarily needle like with platy formations also appearing with graphite nanoplatelets dusting the surfacing when viewed under high magnifications. Graphite D is also a proprietary blend composed mostly of synthetic graphite with a morphology consisting of isotropic to needle like particles coated with smaller particles with a flaky structure.

Manufacturing organic brake pads requires five steps which will be discussed in detail:

1. Weighing of raw materials
2. Mixing ingredients
3. Mold Preparation
4. Hot Pressing
5. Post Curing

The prepared mixture represents a low metallic automotive brake lining formulation and all constituents are listed in Table 1.

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Table 1 Friction Material Sample Formulations

	Graphite A	Graphite B	Graphite C	Graphite D	Graphite E	Graphite F	Graphite G	Baseline
Constituent	**Mass (g)**	**Mass (g)**	**Mass (g)**	**Mass (g)**	**Mass (g)**	**Mass (g)**	**Mass (g)**	**Mass (g)**
Graphite	137.6	137.6	137.6	103.2	137.6	137.6	77.6	12
Binders	60	60	60	45	60	60	60	60
Lubricants	24	24	24	18	24	24	24	12
Abrasives	28	28	28	21	28	28	56	36
Reinforcing Constituents	112	112	112	84	112	112	128	116
Fillers	24	24	24	18	24	24	40	24
Others	14.4	14.4	14.4	10.8	14.4	14.4	14.4	140
Total	400	400	400	300	400	400	400	400

Weighing

The weighing process is accomplished by accurately weighing the constituents using an OHAUS Explorer Pro analytical balance shown in Figure 1 having an accuracy of ±0.005g to the desired percent weight of the formulation. Weighing the constituents as accurately as possible allows for reproducibility of the experiment. A constituent was added to a plate, the scale was tarred, and this was repeated for all constituents of the phase. This allowed each phase's constituents to be added at once into the mixer and mixed for the desired time of the respective phase.

Figure 1 Analytical Balance

Mixing

The mixing process should guarantee that the weighted ingredients of the pad are homogeneously disturbed within the pad. The constituents are added into the Model 2786 Stephan Machinery Co. mixer with a dual blade as shown in Figure 2, and mixed for the desired amount of time to create a homogeneous powder, ensuring that the properties of the pad will be consistent throughout. In this case the ingredients are solid substances such as powders and fibers. The ingredients are mixed in a specific order since this has a relevant impact on the final homogeneity and properties of pads. In phase one, constituents indicated in Table 1 were added into the Stephan mixer on high speed for six minutes. The constituents indicated in Table 1 as phase two were then added to the mixture all at once and the mixer was ran again on high speed for six minutes. In phase three, the final constituent graphite, was added to the mixture and ran on high speed for three minutes. Graphite serves as the constituent to be varied using seven different types indicated as type RD1870A through F, which are vein, synthetic, a blend of vein and nanoplatelets, a synthetic graphite blend respectively, and the last three are undisclosed due to the proprietary nature of the material.

Figure 2 Mixer and Mixing Blade

Table 2 Graphite Sample Specificationsis the specifications of the graphite samples as provided by the graphite supplier, to give some insight in to the makeup of the sample materials. Sample E-G were not provided for reasons due to proprietary nature of the materials.

Table 2 Graphite Sample Specifications as Provided by Asbury Graphite, inc.

Technical Name	**Call Name**	**C-Content(%)**	**Particle Size(angstrom)**	**Surface Area(m^2/g)**	**d(angle)**	**2-theta(deg)**	**Phase Name**
RD18670A	Sample A	1.3	239.16	1.12	3.3372	26.691	Graphite(0,0,2)
RD18670B	Sample B	3.17	179	0.94	3.3682	26.44	Graphite(0,0,2)
RD18670C	Sample C	1.22	56	7.92	4.26	20.83	Graphite(0,0,2)
RD18670D	Sample D	0.23	203.4	1.86	3.3613	26.496	Graphite(0,0,2)
RD18670E	Sample E	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
RD18670F	Sample F	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
RD18670G	Sample G	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided

Hot Pressing

Steel pad backing plates are used to act as the interface between the applied pressure of the caliper and the brake pad material. This ensures a more uniform distribution of force throughout the pad material while resisting mechanical damage. A 1999 Ford Crown Victoria pad backing plate, as shown in Figure 3, was prepared by applying approximately 1mm of Henkel Bondy pad glue and allowed to set for twelve hours in preparation for hot pressing. The Henkel Bondy pad glue will adhere the pressed powder to the pad backing plate. To prepare the 1999 Crown Victoria mold, as shown in Figure 3, the backing plate was inserted into the mold and any openings that could allow the mixture to get under the pad backing were plugged using paper towel. The mold was sprayed on the interior with Mann Ease Release 200 silicone lubricant to

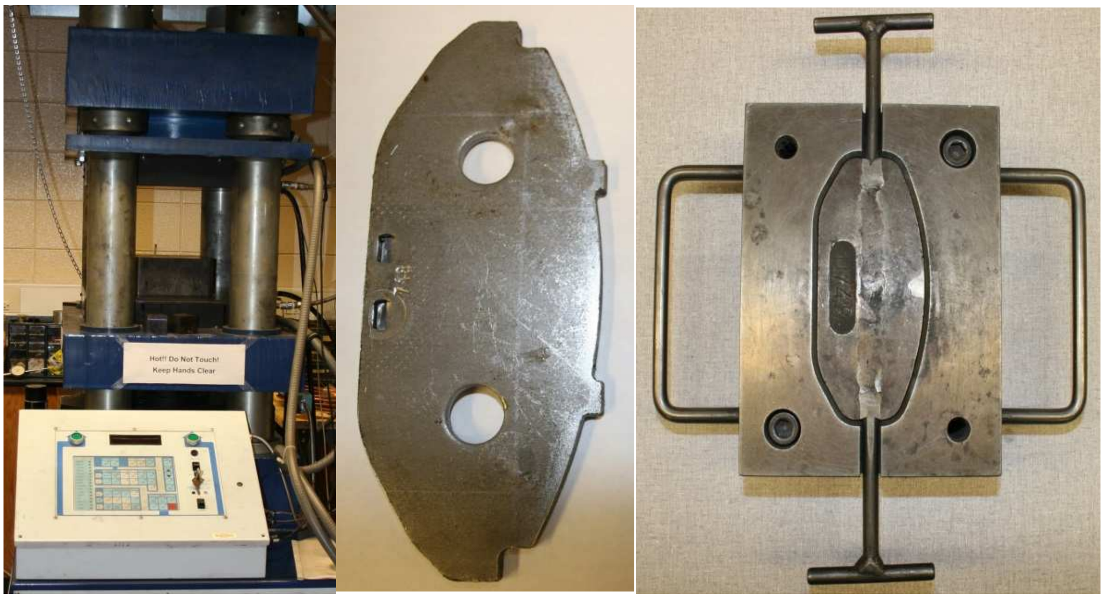


Figure 3 Hot Press, Backing Plate, Mold

the sides of the mold and bottom of the ram to allow for easy removal and minimizing of particles sticking to the mold. Hot pressing a material is done at high pressure and heat to compact a powder into a solid sample through sintering and creep processes. The process also promotes cross-linking reactions of the phenolic resin matrix which hold the material together allowing the powder mixture to achieve the shape required for the brake pad. The sample mixture was then hot pressed in a hot press shown in Figure 3, at about 45 Newtons and 180℃ for twenty minutes. A fter pressing the mixture under the aforementioned parameters, the mold was cleaned of any residue using P400 sandpaper to ensure longevity of the mold. This also prepared the mold for subsequent use to create the second brake pad following the same procedure.

Post-Curing

The newly pressed brake pads were then post-cured in a Fischer Scientific Isotemp programmable furnace shown in Figure 4 to expedite the cross-linking reactions of the resin and align the polymer's molecules which improves the mechanical properties under stress and strain. To do this the furnace was programmed to ramp to 180℃ within thirty minutes and hold the specified temperature for four hours. Once the program completed these steps, the furnace was set to shut down and cool.

Figure 4 Programmable Fischer Scientific IsoTemp Furnace used for curing of organic friction materials

Machining

Figure 5 Finished Friction Material with Hole for Thermocouple

When the curing was completed, subtractive manufacturing took place to achieve certain characteristics that are desirable in brake pads used in daily commutes. To achieve a planar surface for machining, the surface of the brake pad was faced using a Bridgeport mill to create an evenly flat surface. The edges were machined down to a chamfer, using a milling machine and angled jig to achieve a 15° angle to allow for a less abrupt transition when meeting a disc rotor along with favorable properties in the resultant material pull while braking . The center of the pad was then slit in the y-axis using a surface grinder with a depth reaching halfway through the pad. These subtractive manufacturing methods allow for less noise and vibration when the brakes

are applied. Lastly, using a drill press, a 1/8 inch hole was drilled through the outboard pad to allow for insertion of a Type-K thermocouple for a means to monitor pad temperature during testing. The final product produced to be used in testing with the components of the brake pad labeled Figure 5.

Testing and data collection occurs on a Link Engineering full scale brake dynamometer such as the one shown in Figure 7. The material underwent the Society of Automotive Engineers standardized J2430 test and Brake Effectiveness Evaluation Procedure, and the raw data was extracted into a custom made template specifically for this test to allow interpretation and direct comparison of the samples.

Figure 7 Link Engineering Full Scale Brake Dynamometer

After the baseline was established using the SAE J2430 test and BEEP evaluation, the formulation of the proprietary material began by first completely

replacing the 20 weight percent copper content with the same weight percent of the sample graphite. The material was then analyzed using a full scale brake dynamometer utilizing SAE J2430 testing procedure, outsourced to Link Engineering. The post mortem surface of the friction material was then be examined by use of Scanning Electron Microscopy (SEM) to see how the material reacted at the surface during the engagements. After repeating the aforementioned scope of the project to achieve a stable material with acceptable friction performance properties, the testing concluded. The BEEP evaluation, J2430 test, and SEM are indicative of a material that performs equally or better than the baseline, testing and formulation will conclude. If a negative result is obtained due to pad failure or not meeting the aforementioned criteria, possible solutions will be explored and a new formulation will be created and repeat this procedure until a stable formula is achieved.

With the sample material tested on the dynamometer using the SAE J2430 test, the “post mortem” surface of the friction lining material can then be analyzed to understand the friction mechanisms. This is done with a FEI Quanta 450 FEG Scanning Electron Microscope (SEM) as shown in Figure 8 , which creates an image of the sample with a focused beam of electrons. The electrons interact with atoms within the sample to give various signals related to topography and composition. The sample is then analyzed using energy dispersive x-ray spectroscopy (EDX) utilizing the same microscope pictured in Figure 8. EDX uses the interaction of electrons and sample leading to x-ray excitation allowing us to obtain a chemical characterization of the sample. Each element generates a specific x-rays with particular energy. Essentially a high energy beam is focused onto the sample and may displace an electron in the inner

shell of the atom and eject it. An electron from a higher energy shell fills the hole and the difference in energy between the higher energy shell and the lower energy shell is released in the form of an x-ray which is detected by an energy-dispersive spectrometer.

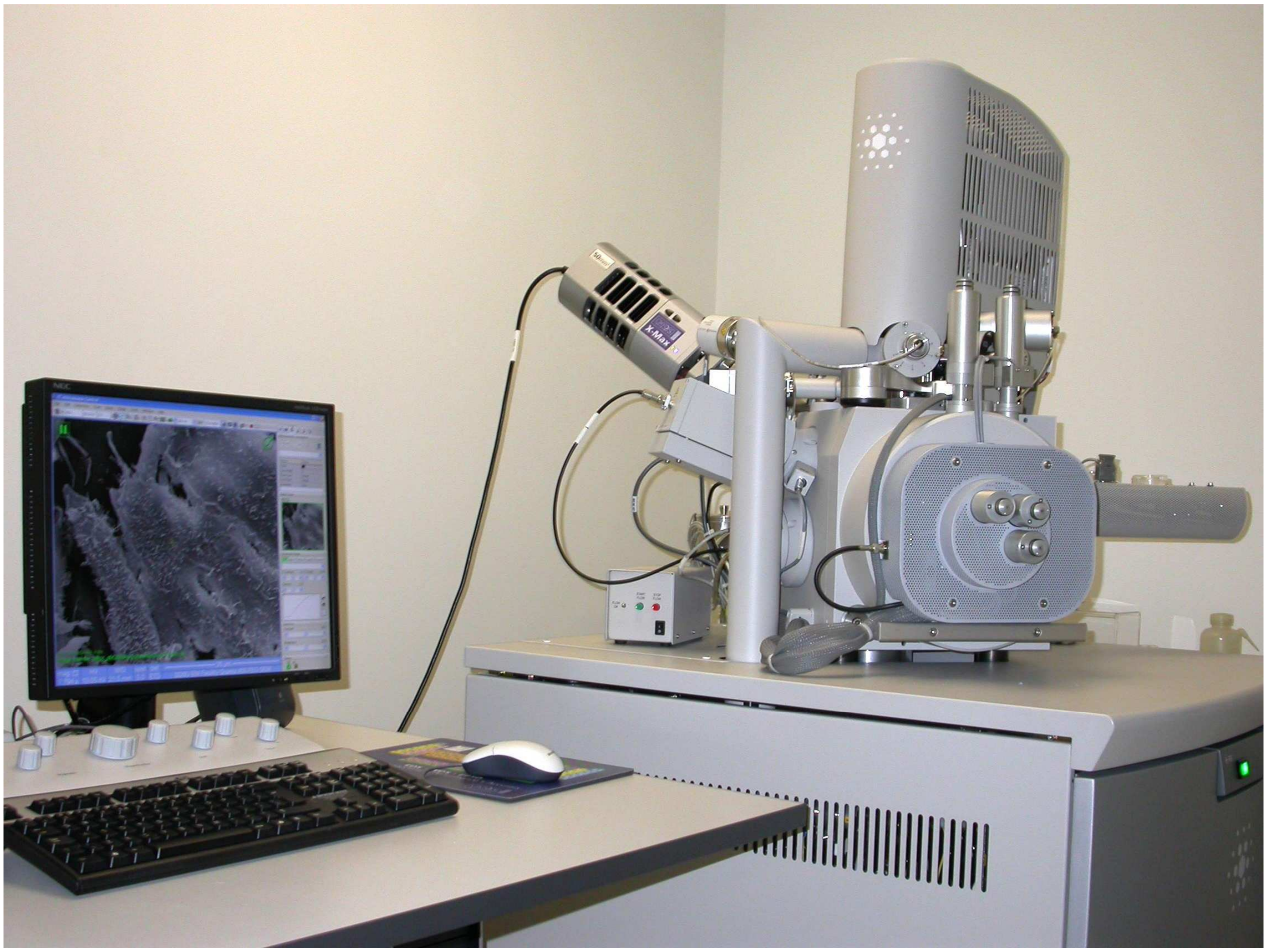


Figure 8 FEI Quanta 450 FEG Scanning Electron Microscope with Inca X-ray microanalysis system used for inspection of friction materials

CHAPTER 4

RESULTS AND DISCUSSION

The copper containing baseline material displayed in Figure 10 displayed acceptable frictional performance, along with no thermal fade or speed sensitivity. Figure 9 gives a visual understanding of the SAE J2430/BEEP testing procedure. The effectiveness space window is derived from the vehicle dynamics and hydraulic system pressure limits within the system. The tested vehicle must be able to meeting the stopping distance criteria without exceeding the limits of the pedal force, meaning a certain realistic driver input via the brake pedal needs to result in a certain stopping distance to be considered a passing result by FMVSS. The stopping distance is represented by the regressed specific torque, more generally the average amount of friction measured in dynamometer SAE recommended J2430 procedure in Figure 9, creating a resistance to the motion of the rotor resulting in deceleration. Pedal force is represented by pressure limits, or a realistic amount of pressure that can be applied to the material against the rotor to create the needed deceleration. The line labeled as “UMTRI” in Figure 9 represents the maximum of the deceleration value between the front and rear axle, while the others are the minima in each respective axle. It can be concluded then that the average regressed specific torque of the tested material must fall into the window for a set amount to meet the criteria.

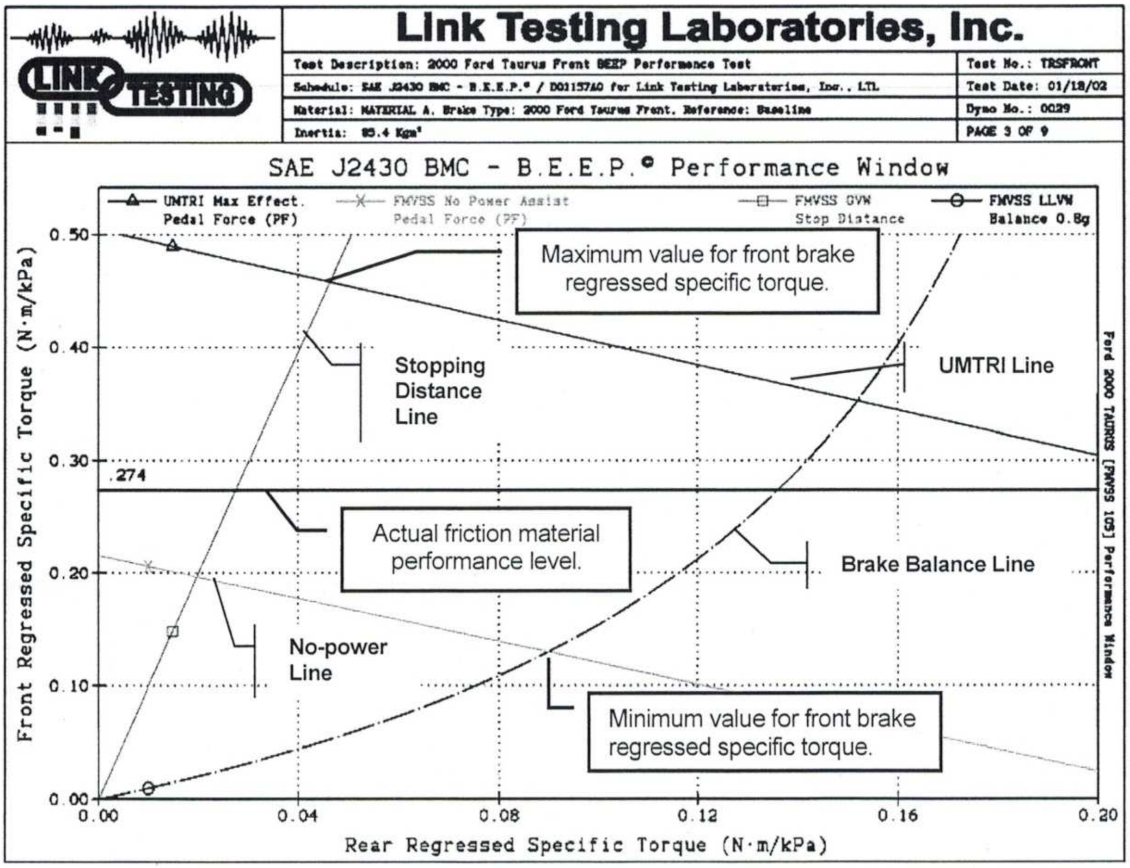


Figure 9 Understanding the SAE J2430/BEEP Test

With this understanding, it can be seen in the preliminary results represented by Figure 10 and Figure 11 that the 1999 Ford Crown Victoria baseline pad material passed the BEEP. The data points shown in Figure 10 for each numbered engagement stop are computed average values over the course of a single braking engagement. More specifically, this is an engagement with the effectiveness value 0.31 for engagement in the first low speed effectiveness test shown in Figure 10.

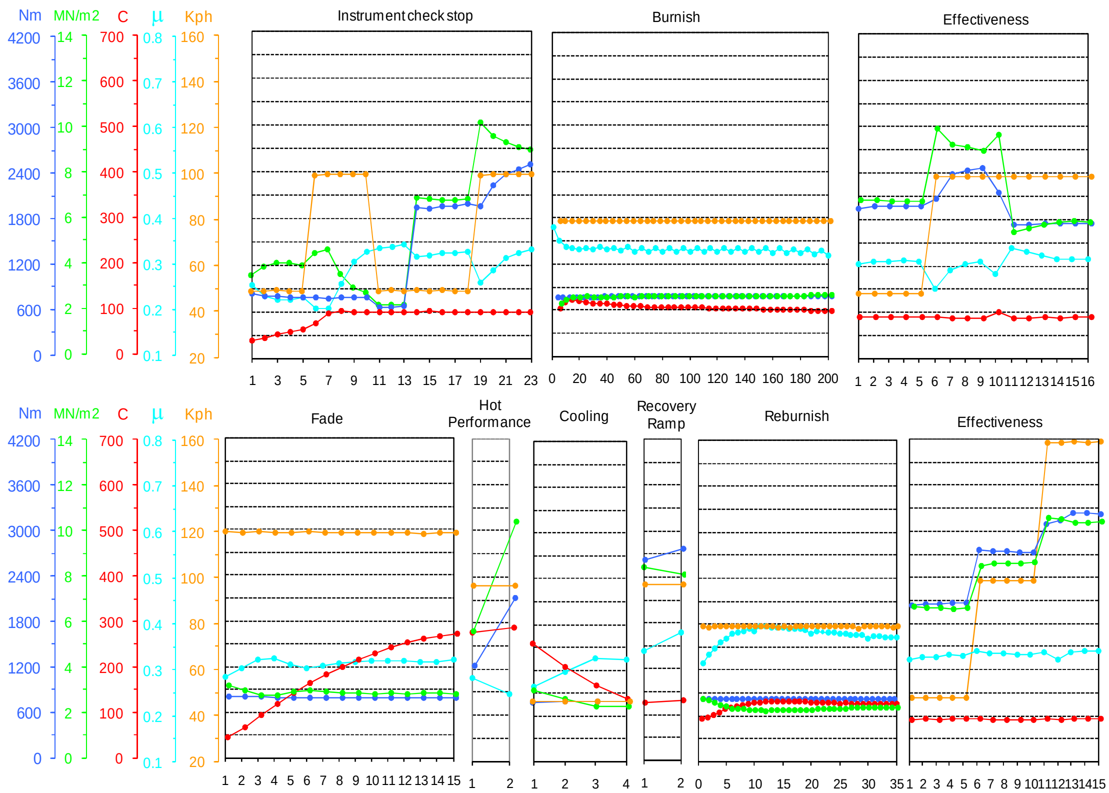
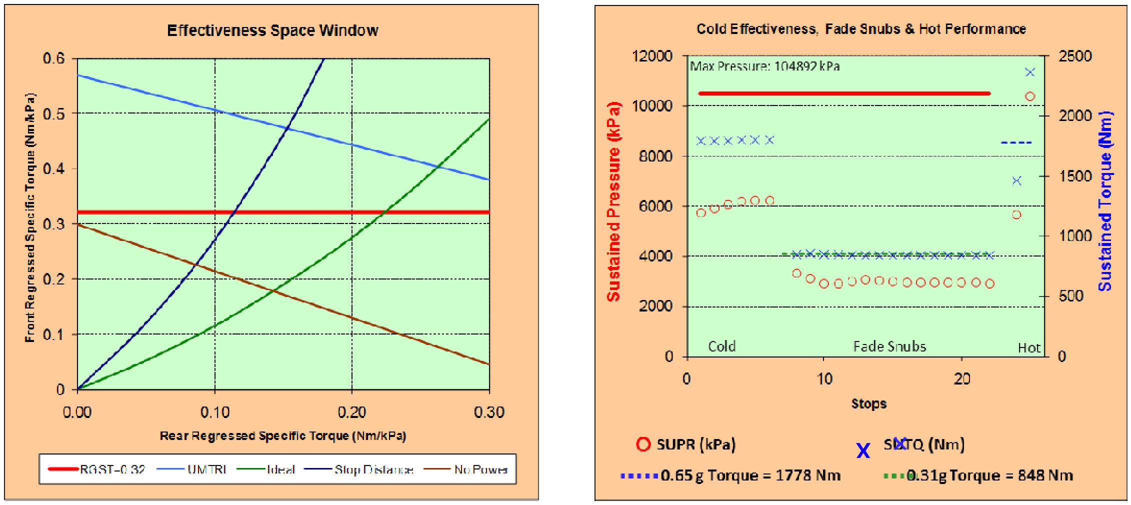


Figure 10 SAE J2430 Template with Averaged Data Measured for 1999 Ford Crown Victoria Baseline Sample



BEEP Criteria	Parameter	Unit	Minimum level	Maximum level	Tested Material	Criteria assessment
Effectiveness Space	Between limits	Nm/kPa	0.179	0.473	0.32	meets criteria
Cold Effectiveness	Below maximum pedal force	N		500	272	meets criteria
Fade Snubs	Below maximum pedal force	N		500	111	meets criteria
Hot Performance Criteria #1	Torque above 60% of Cold Effec:	Nm	1078		1465	meets criteria
Hot Performance Criteria #2	Torque above 0.5g Deceleration	Nm	1367		2364	meets criteria
Structural Integrity	Integrity above minimum	%	90		100	meets criteria

Figure 11 The Relevant BEEP Data Summarized for 1999 Ford Crown Victoria Baseline Test Shown in Figure 10

As can be seen in Figure 12, many data points are and averaged for each engagement shown in Figure 10. As obvious from Figure 12, torque varies throughout the engagement and is proportional to effectiveness because torque is a function of friction coefficient, and the calculated effectiveness. So when there is a rise in torque as shown, this correlates to a rise in effectiveness and vice versa. Temperature is also sampled throughout the whole engagement, along with the pressure exerted by the caliper piston. These data are also recorded as average values in the J2430 template shown in Figure 10..

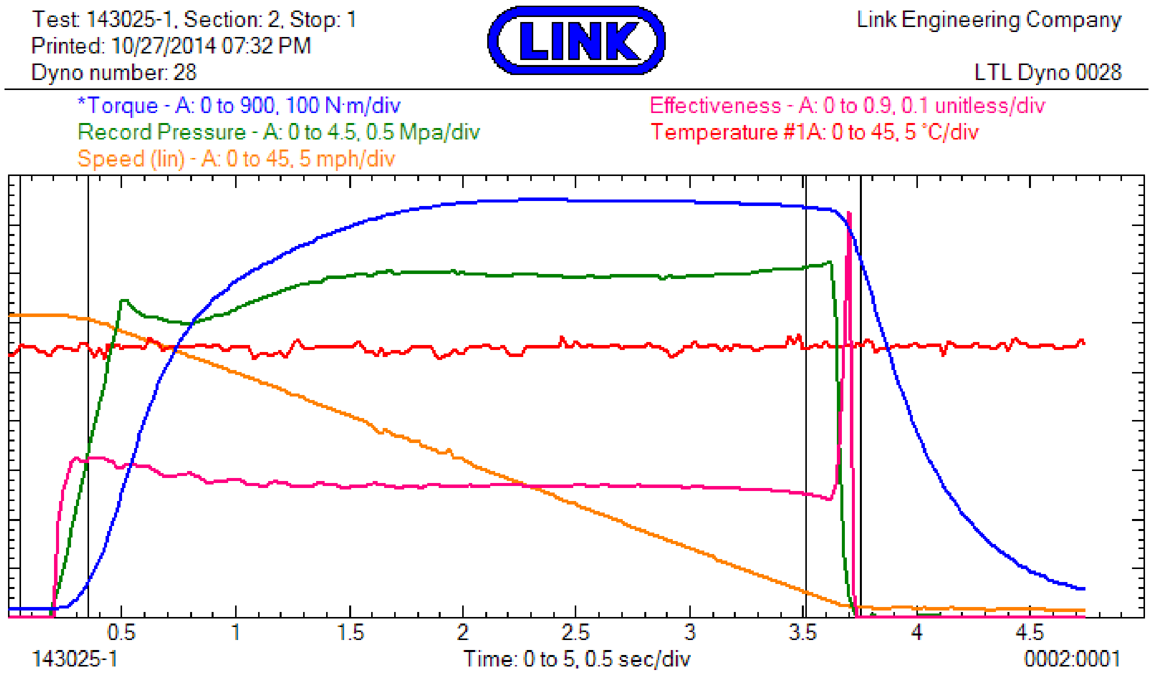


Figure 12 Single Engagement of SAE J2430 Test

By further examining Figure 12, it can also be seen that the average data values are obtained in between the time limits of 0.35 seconds to 3.5 seconds. It can be seen in Figure 12 that the torque rises to a semi-stable value only after approximately 2 seconds. This correlates to the effectiveness of the material. The temperature is also seen to be stable around 28ºC throughout the engagement. Piston pressure (normal force) also varies slightly at the beginning of the engagement to reach a semi-steady state after approximately 1.5 seconds. The deceleration is linear throughout the stop, starting at about 50kph and coming to almost a complete stop at about 1kph. The stop shown in Figure 12 is controlled by a constant normal force (piston pressure) over an engagement lasting 2.5 seconds. Stable effectiveness values along with steady temperature gradients are indicative of a stable material. The J2430 test begins with

twenty-three instrument check stops consisting of twelve 50kph and eleven 100kph engagements at a deceleration of $3m/s^2$, to ensure the equipment is functioning properly. As obvious from Figure 10 all sensors work properly. Burnish, or “run-in”, engagements are then applied for two hundred stop engagements at 80kph to 3kph at a deceleration of $3m/s^2$. Burnishing is performed to ensure the contact surface is free of contaminates and a uniform contact surface between the friction material and the rotor is present. Sixteen “first effectiveness” engagements are then performed to show the response of the brake material to two different speeds of 50kph and 100kph with deceleration values of $6.4m/s^2$. These engagements are initiated when the pad material cools to 100ºC after the previous engagement and “first effectiveness” consist of five engagement stops at 50kph followed by eleven engagement stops performed at 100kph, this is done to a complete stop or 3kph as shown in Figure 12. It can be deduced from Figure 10 that the effectiveness change with speed and brake did not show speed sensitivity. No considerable change in effectiveness due to varying speed was reported, since the effectiveness was stable with a low deviation value. Next, fifteen 120kph stop engagements to 56kph at a deceleration rate of $3m/s^2$ are performed an initial temperature of 55ºC to test the materials resilience to thermal fade, a phenomena that happens when a materials performance characteristics decrease when exposed to high temperatures. Immediately after the fade section, another two stop engagements take place from 100kph to 3kph to test the material at a lower braking speed at high temperatures. Four low speed engagements at 50kph to 3kph at $3m/s^2$ are performed when the material reaches 120ºC to test the materials characteristics while heated. Another set of 35 burnish engagements starting at 80kph to 3kph at a deceleration of

$3m/s^2$ take place to get the material back at stable characteristics for a relevant last effectiveness test. The final effectiveness test makes five engagements at 50kph, 100kph, and 160kph with an initial temperature of 100ºC. This second effectiveness brake test is to test the materials resilience to dynamic conditions (varying speeds) and temperatures with increased thermal and mechanical stresses.

Table 3 shows a detailed wear report for a typical SAE J2430 test. From thiese data, the average wear throughout the test of both the sample friction material and rotor can be examined. For a friction material to be sucessful, it must exhibit favorable friction properties but also have the accpetable wear resistance to provide an acceptable lifetime for consumer vehicles. The baseline lost an average of 0.31mm and 6.4g on the inboard pad, 0.45mm and 5.8g on the outboard pad, with a loss of 0.0130mm to the surface of the rotor. Figure 13 gives a visual representation of the thickness loss measured after dynamometer test of the baseline material. The variation in outboard and inboard pad material loss could be the result of varying pressure in the caliper pistons creating unequal normal loads onto the rotor, or possibly lack of hemogeneity within the friction material.

Table 3 Wear Report as obtained from J2430 test of the "baseline material"

Inboard Pad (mm)

	1	2	3	4	5	6	7	8	Average
Initial	14.14	14.08	14.09	14.23	14.02	14.16	14.17	14.08	14.12
Final	13.82	13.78	13.73	13.71	13.79	13.91	13.93	13.84	13.81
Loss	0.32	0.30	0.36	0.52	0.23	0.25	0.24	0.24	0.31

Outboard Pad (mm)

	1	2	3	4	5	6	7	8	Average
Initial	14.44	14.34	14.30	14.40	14.41	14.61	14.68	14.54	14.47
Final	13.85	13.81	13.79	13.75	14.13	14.35	14.27	14.19	14.02
Loss	0.59	0.53	0.51	0.65	0.28	0.26	0.41	0.35	0.45

Pad Weight (grams)

	Inboard Pad	Outboard Pad
Initial	542.6	545.1
Final	536.2	539.3
Loss	6.4	5.8

Rotor Thickness (mm)
4 equally spaced positions

	Position 1	Position 2	Position 3	Position 4	Average
Initial	28.067	28.067	28.067	28.067	28.0670
Final	28.054	28.054	28.054	28.054	28.0540
Loss	0.0130	0.0130	0.0130	0.0130	0.0130

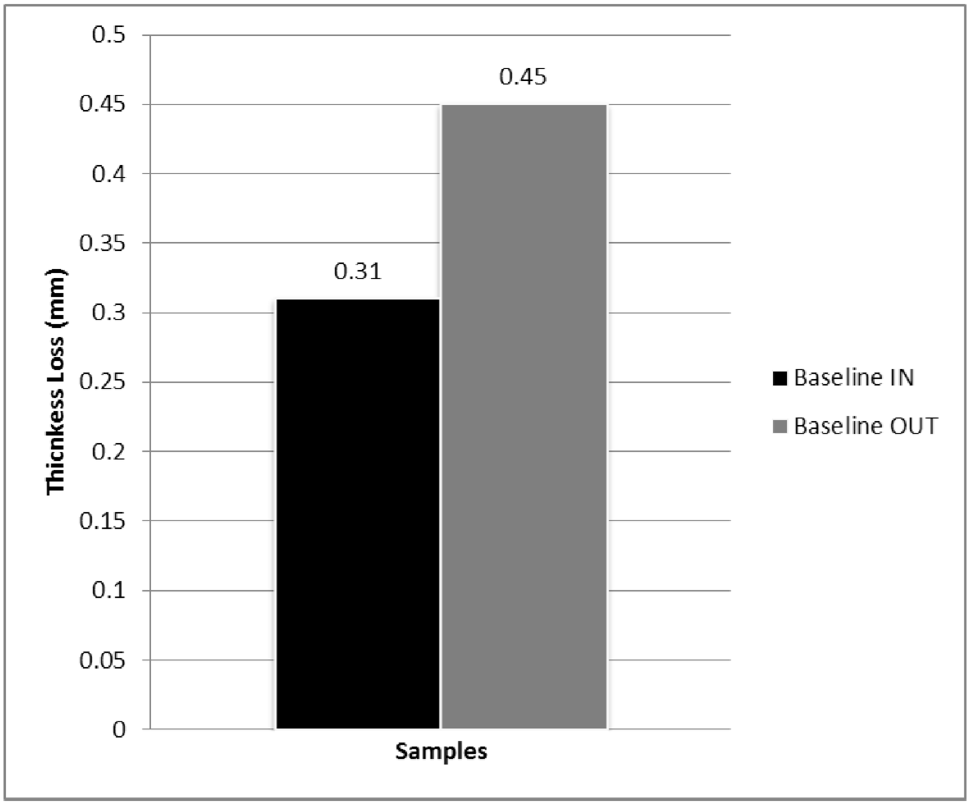


Figure 13 Thickness Loss of “baseline” pad samples tested in J2430 dynamometer procedure

Figure 14 shows the baseline pad after being subjected to the last engagement stop in the SAE J2430 dynamometer test. The friction layer is typified by uniform and well developed patches/ friction layers on the surface. This can be concluded due to the consistent appearance/shade of the friction layer in the image, which is indicative of a stable friction lining material[15].

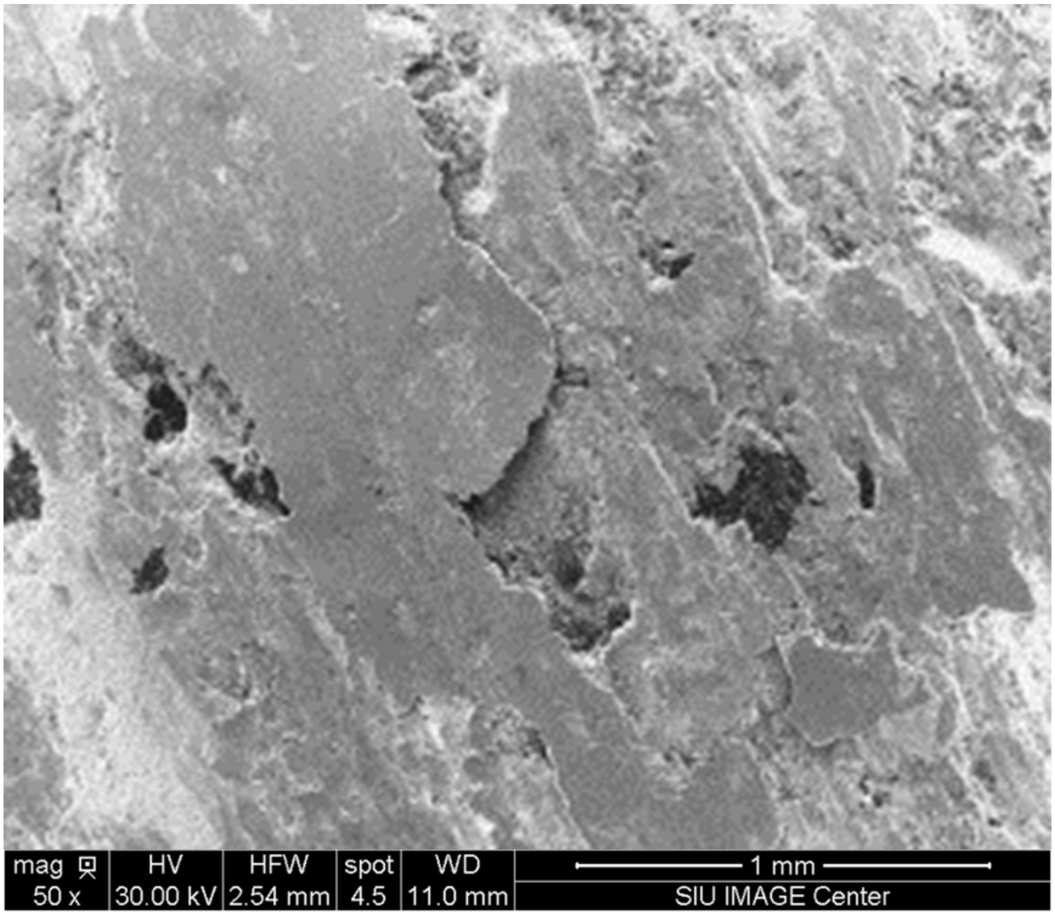


Figure 14 Surface of baseline pad after J2430 Dynamometer test. Sample was inspected after last engagement stop of “Second Effectiveness”.

Figure 15 shows the data. Recorded for sample A containing RD18670A graphite. Figure 16 summarizes the BEEP data. RD18670A exhibited favorable properties, by examining the effectiveness (μ) charts, it can be seen that the material is stable when held at a constant braking velocity, but when exposed to a dynamic velocity it becomes unstable such as in the first effectiveness test. This is apparent due to the effectiveness drop off that occurs when the braking velocity increases, and a drop in effectiveness is displayed. This is amplified in the high speed testing where the material is exposed to

50-160 kph, where a considerable drop in effectiveness is apparent. This is most likely the result of chemical interactions happening at the surface or heterogeneity of the material, affecting the friction layer that is formed between the rotor and the friction lining material. Chemical processes such as oxidation can occur along with physical processes such as glazing, resulting in the decrease in effectiveness. Any fluctuation in effectiveness is not ideal, but is common in many applications as shown in the baseline sample of a copper containing formula in Figure 15 J2430 test of sample A with graphite RD18670A . Sample RD18670A exhibited a greater effectiveness and stability under sustained load than the baseline, along with a climb in effectiveness under sustained load. Sample RD18670A did exhibit lower effectiveness when the varying speed test was applied, beginning with a greater effectiveness than the baseline until the 100kph and 160kph stops which resulted in fade.

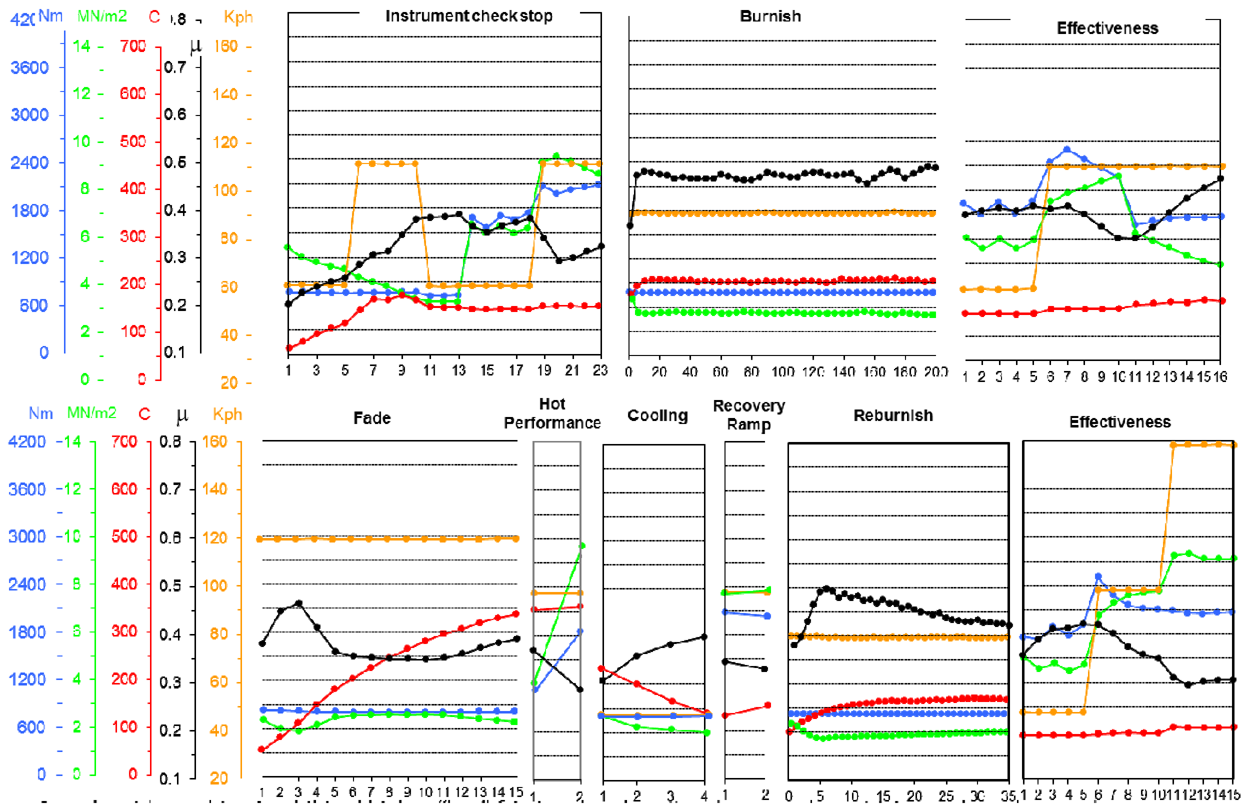
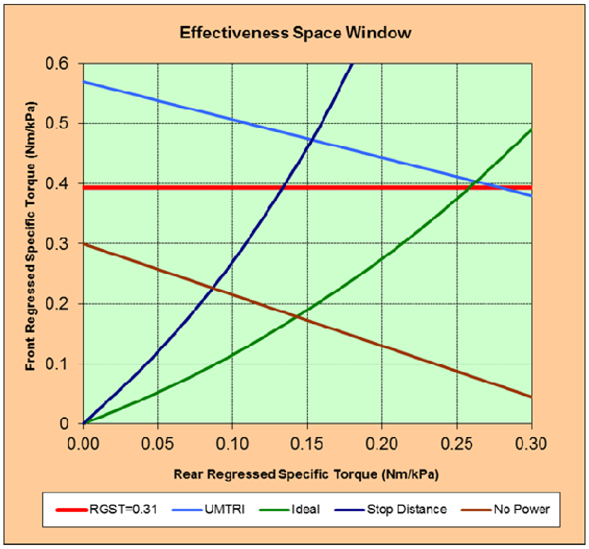
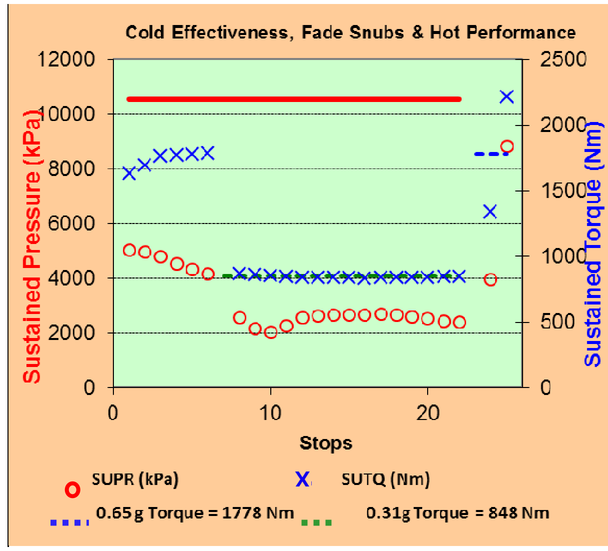


Figure 15 J2430 test of sample A with graphite RD18670A

From Figure 16 and the previous explanation of interpreting the BEEP evaluation, it can be seen that sample A containing RD18670 A graphite passed the BEEP. The tested material had a 0.39 Nm/kPa effectiveness space which lies within the limits of the window in the effectiveness space in Figure 16. Cold effectiveness at 198N and fade snubs at 85N were both substantially below the required threshold of 500N. Torque values for both hot performance criterion were well above the required values and the material showed no physical signs of failing, allowing a 100 percent structural integrity mark.





BEEP Criteria	Parameter	Unit	Minimum level	Maximum level	Tested Material	Criteria assessment
Effectiveness Space	Between limits	Nm/kPa	0.179	0.473	0.39	meets criteria
Cold Effectiveness	Below maximum pedal force	N		500	198	meets criteria
Fade Snubs	Below maximum pedal force	N		500	85	meets criteria
Hot Performance Criteria #1	Torque above 60% of Cold Effect	Nm	1042		1339	meets criteria
Hot Performance Criteria #2	Torque above 0.5g Deceleration	Nm	1367		2211	meets criteria
Structural Integrity	Integrity above minimum	%	90		100	meets criteria

Figure 16 Sample A with graphite RD18670A BEEP

Comparing Figure 16 to the baseline wear report in Table 3 Wear Report, it can be seen that the wear of friction material A is over double that of the baseline value 0.31mm with a 0.717mm average loss on the inboard pad. The difference in the outboard pad is not as dramatic a difference as the inboard pad shows, with a 0.615mm loss compared to the 0.45mm loss of the baseline. The thickness losses are more uniform when comparing pad to pad on their respective sides, which could be a matter of different piston pressures within the caliper but many possibilities for this variation are possible. Sample A containing graphite sample RD18670A formulation wore the rotor more aggressively than the baseline pad material at 0.031mm, at nearly triple the rate

compared to 0.0130mm. Figure 17 summarizes the thickness loss of sample A in contrast to the baseline sample.

Table 4 Sample A with graphite RD18670A wear report

Inboard Pad (mm)									
	1	2	3	4	5	6	7	8	Average
Initial	15.240	15.193	15.168	15.277	15.225	15.592	15.301	15.277	15.284
Final	14.235	14.492	14.522	14.562	14.608	15.293	14.517	14.305	14.567
Loss	1.005	0.701	0.646	0.715	0.617	0.299	0.784	0.972	0.717
Outboard Pad (mm)									
	1	2	3	4	5	6	7	8	Average
Initial	14.739	14.650	14.682	14.667	14.752	14.840	14.810	14.721	14.733
Final	13.930	14.047	14.061	14.121	14.248	14.334	14.204	13.995	14.118
Loss	0.809	0.603	0.621	0.546	0.504	0.506	0.606	0.726	0.615
Pad Weight (g)									
	Inboard Pad		Outboard Pad		Rotor Weight				
Initial	553.9		552.7		10684.70				
Final	547.2		546.3		10675.70				
Loss	6.7		6.4		9.00				
Rotor Thickness (mm)									
4 equally spaced positions									
	Position 1		Position 2		Position 3		Position 4		Average
Initial	27.959		27.964		27.956		27.969		27.962
Final	27.933		27.929		27.929		27.933		27.931
Loss	0.026		0.035		0.027		0.036		0.031

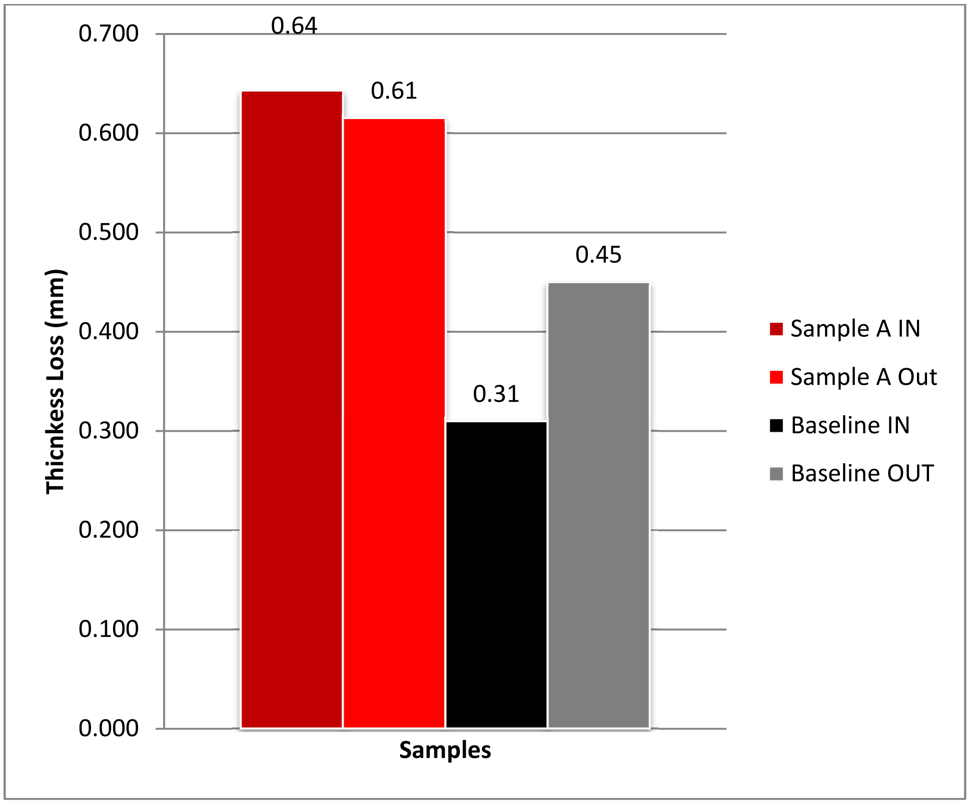


Figure 17 Comparison of baseline and sample A containing graphite RD18670A thickness loss after J2430 dynamometer test

Examining the materials using Scanning Electron Microscopy (SEM) and Electron Spectroscopy (EDX), some conclusions about the different samples characteristics during engagement can be made.

Figure 18 shows a fifty times magnification of the post mortem surface of the friction material containing graphite sample RD1870A. The darker areas in the image are the “lower level” organic material matrix and graphite, the grayish areas are plastically deformed chips and form the “upper level”. From the energy dispersive microanalysis shown in Figure 19, it can be seen that the most prevalent element in the “elevated” surface was Fe which was detected on all. Plastically deformed steel chip

covered an easily visible friction layer. The friction layer also contains oxygen, magnesium, silicon, sulfur, zinc, antimony, barium, and manganese. This layer is obviously a mixture of the aforementioned compounds. Friction changes as a consequence of different friction layer development which is revealed in SEM and EDX.

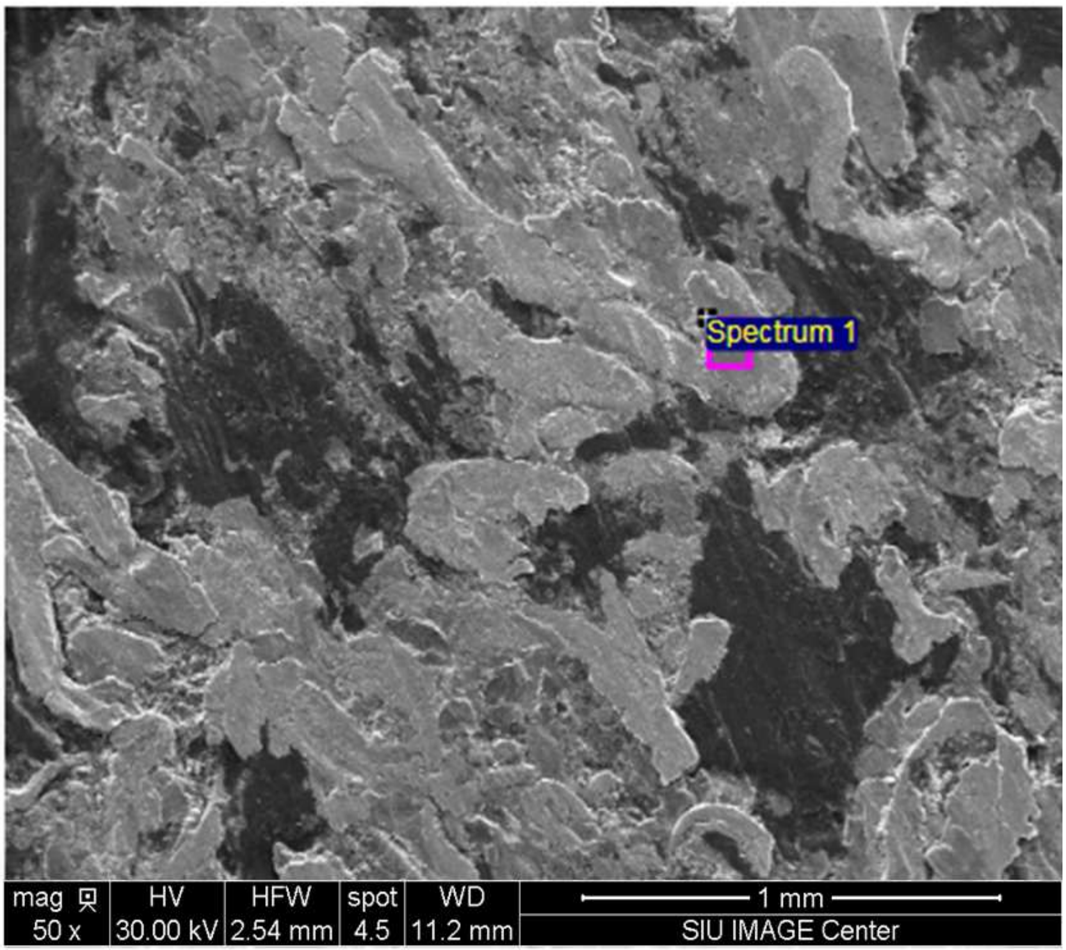


Figure 18 Surface of Pad A Test in J2430 Dynamometer Procedure after Last Engagement Stop of “Second Effectiveness”.

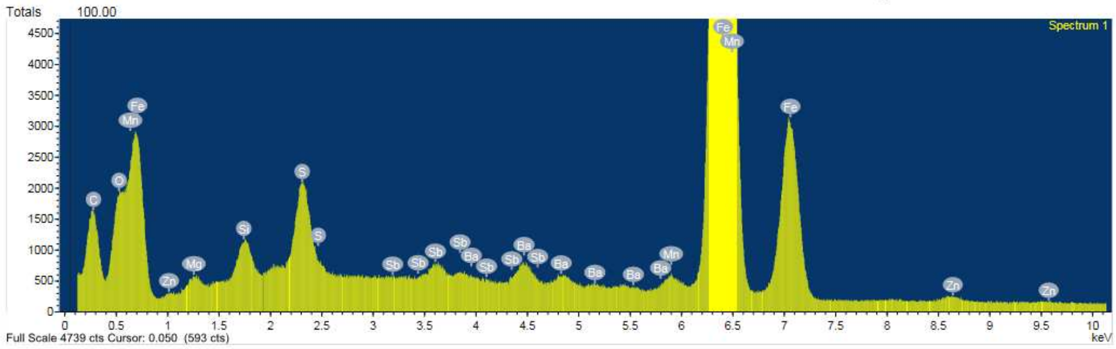


Figure 19 Energy-Dispersive X-ray Microanalysis of sample pad A showing the presence of iron, oxygen, magnesium, silicon, sulfur, zinc, antimony, barium, and manganese in the spot indicated by a cross in Figure 18.

Although many elements are present in the friction layer (Figure 19), the elements form compounds in a complex thermo-chemical processes within the friction layer. Friction loading of the lining material causes structural and chemical changes within the surface layer. The energy exerted into the friction lining material during the braking engagements creates a change of elemental and surface layer composition, along with other changes leading to the formation of a friction-induced structure layer. This friction-induced surface layer determines the functional/performance characteristics of the lining material[20].

The SAE J2430 test data for sample B containing graphite RD18670B represented in Figure 20. Sample B displayed a better frictional stability than the baseline sample, with a higher effectiveness value. RD18670B also suffered from less effectiveness decreases during the middle portion of the 100 Km/h engagements which subsequently led to ascending to a higher average effectiveness value than the

baseline test material. Some instability can be seen in the fade portion of the test, with an initial spike in effectiveness, followed by a sharp decrease in performance that leveled out again at a higher effectiveness value that necessary to surpass the baseline. Although this result in fade appears promising, it is not ideal to have a material that will give a high initial braking torque and fade down to less stopping/declaration capability.

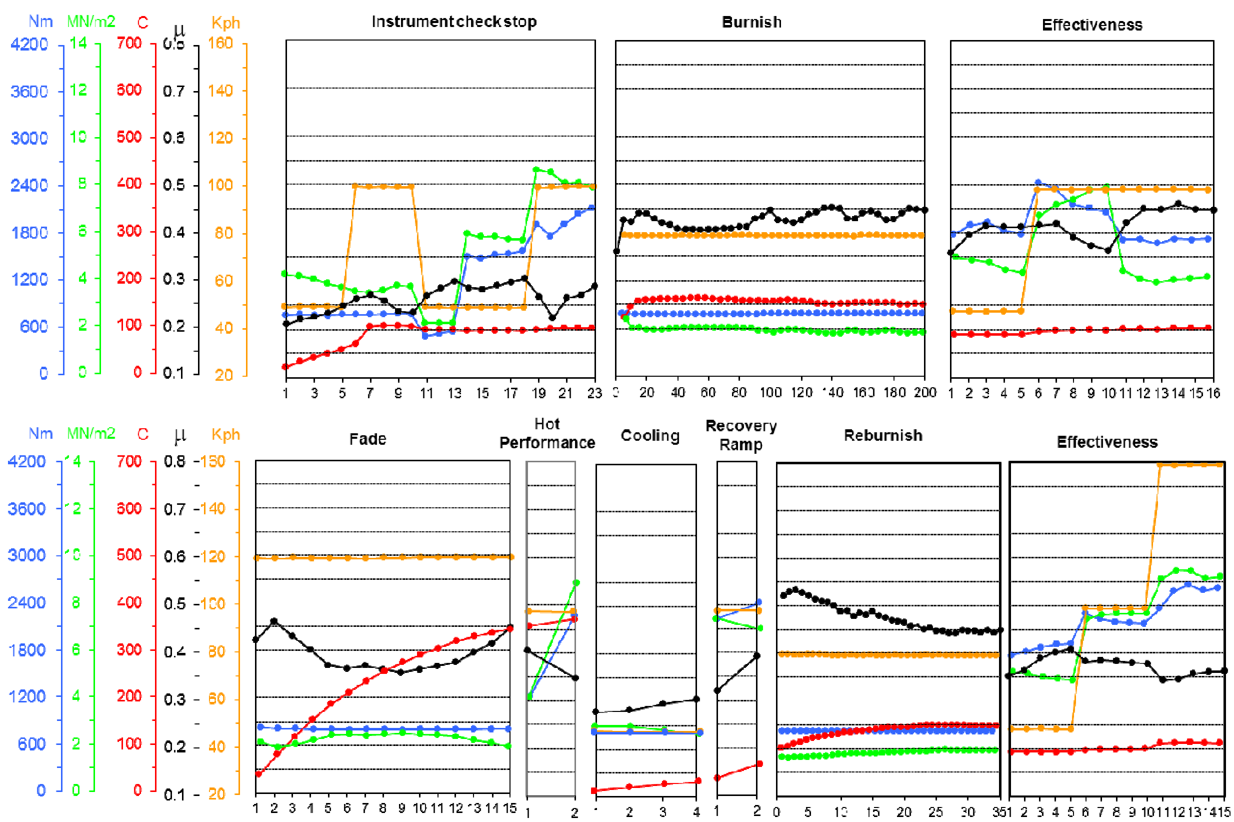
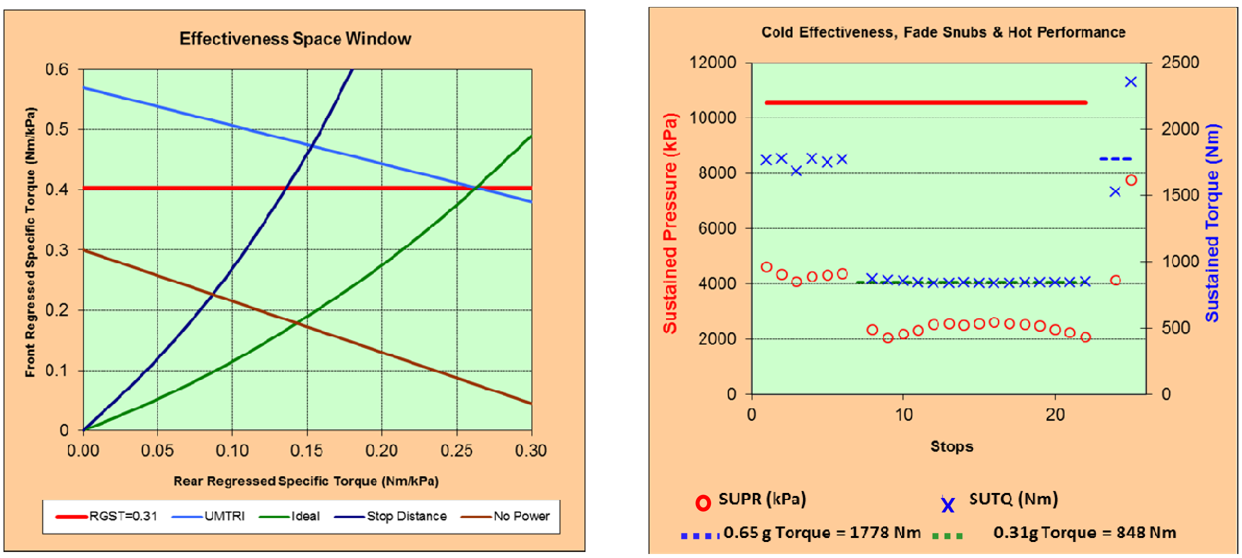


Figure 20 J2430 test of sample B containing RD18670B graphite

Sample B also passed the BEEP evaluation as seen in Figure 21, falling within all acceptable ranges throughout the test. It can be interpreted that sample B lies on the higher spectrum of the regressed specific torque values.



BEEP Criteria	Parameter	Unit	Minimum level	Maximum level	Tested Material	Criteria assessment
Effectiveness Space	Between limits	Nm/kPa	0.179	0.473	0.40	meets criteria
Cold Effectiveness	Below maximum pedal force	N		500	182	meets criteria
Fade Snubs	Below maximum pedal force	N		500	80	meets criteria
Hot Performance Criteria #1	Torque above 60% of Cold Effect	Nm	1053		1529	meets criteria
Hot Performance Criteria #2	Torque above 0.5g Deceleration	Nm	1367		2357	meets criteria
Structural Integrity	Integrity above minimum	%	90		100	meets criteria

Figure 21 Sample B containing graphite RD18670B BEEP Evaluation

The wear data obtained from sample B and reported in Table 5 reveals higher than baseline wear values on the inboard and outboard pad at 0.800mm and 0.792mm compared to 0.31mm and 0.45mm, respectively. The wear on the rotor was more in line with the baseline data, 0.019mm to 0.0130mm that is close to the rotor wear rate of the

baseline. Figure 22 gives a visual representation of this thickness loss when compared to the baseline.

Table 5 RD18670B Wear Report

Inboard Pad (mm)									
	1	2	3	4	5	6	7	8	Average
Initial	16.163	16.179	16.174	16.224	16.271	16.267	16.278	16.189	16.218
Final	15.273	15.446	15.487	15.478	15.469	15.493	15.449	15.248	15.418
Loss	0.890	0.733	0.687	0.746	0.802	0.774	0.829	0.941	0.800
Outboard Pad (mm)									
	1	2	3	4	5	6	7	8	Average
Initial	15.820	15.776	15.680	15.697	15.777	15.836	15.855	15.885	15.791
Final	14.997	14.905	14.849	14.758	15.001	15.134	15.199	15.144	14.998
Loss	0.823	0.871	0.831	0.939	0.776	0.702	0.656	0.741	0.792
Pad Weight (g)									
	Inboard Pad		Outboard Pad		Rotor Weight				
Initial	550.4		546.3		10675.70				
Final	544.5		541.1		10667.80				
Loss	5.9		5.2		7.90				
Rotor Thickness (mm)									
4 equally spaced positions									
	Position 1		Position 2		Position 3		Position 4		Average
Initial	27.933		27.929		27.929		27.933		27.931
Final	27.907		27.909		27.913		27.920		27.912
Loss	0.026		0.020		0.016		0.013		0.019

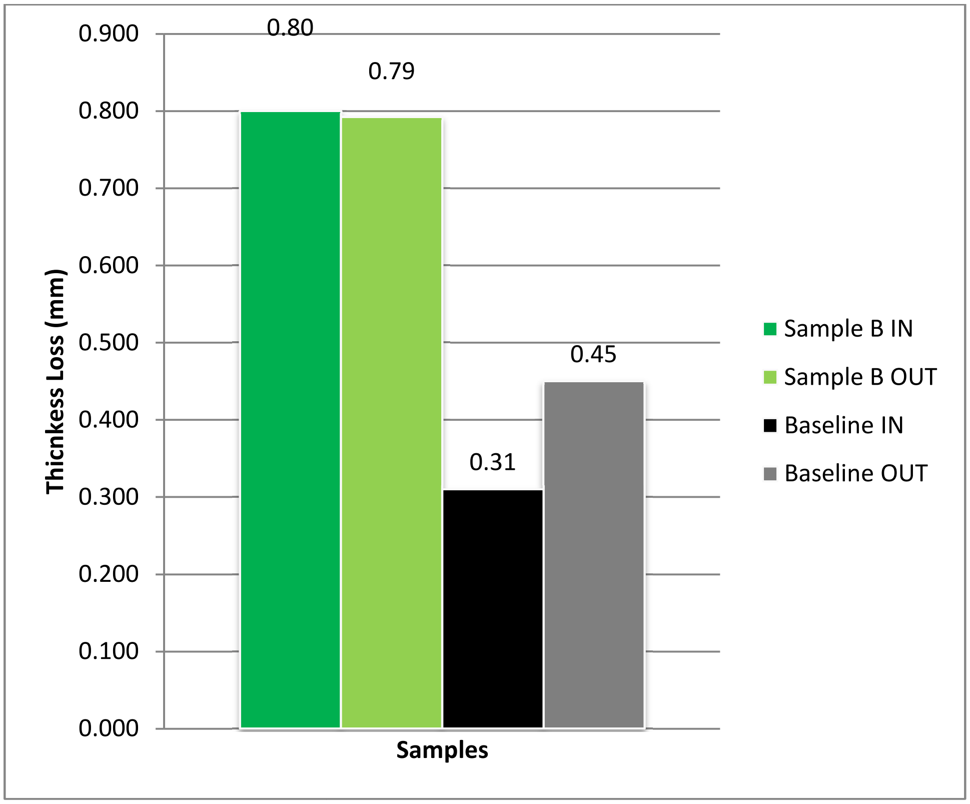


Figure 22 Comparison of baseline and sample B containing graphite RD18670B thickness loss after J2430 dynamometer test

Figure 23 shows an SEM image of the sample pad B containing graphite RD18670B after the SAE J2430 dynamometer test. A well-developed friction layer is apparent due to the even distribution of abrasion marks in the direction of the friction motion. The darker areas are the “lower level” of the friction layer comprised of the organic matrix composite, and the gray areas are the “upper level” comprised of the sample graphite.

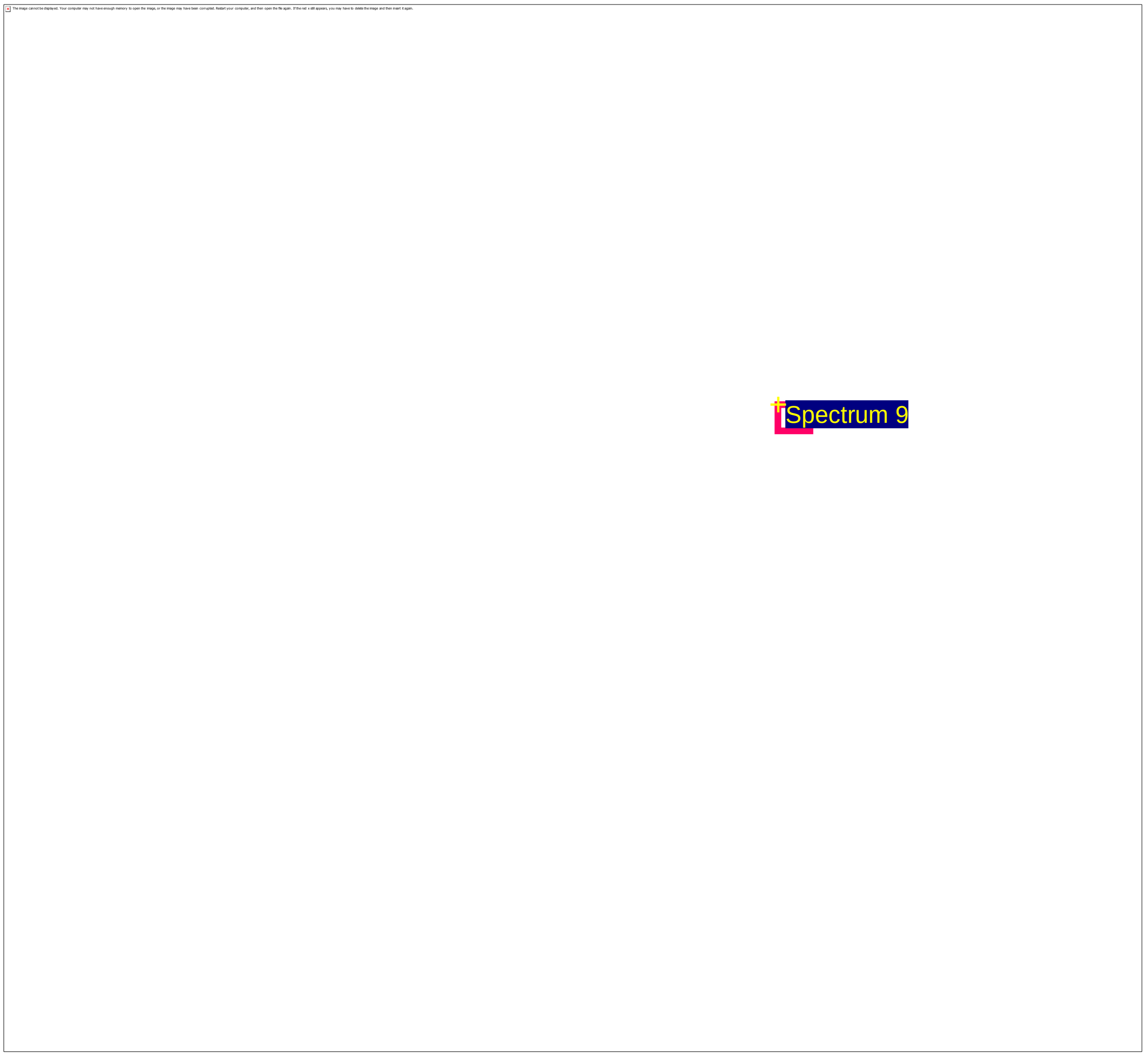


Figure 23 Surface of pad B tested in J2430 dynamometer procedure after the last engagement of “second effectiveness”.

Figure 24 is the EDX spectrum taken from spot 9 shown in. One can see that the darker “lower level” of the friction surface is made primarily of carbon. The traces of iron present in Figure 24 are possibly transferred from the pearlitic cast iron rotor, or from the steel chip within the friction lining material.

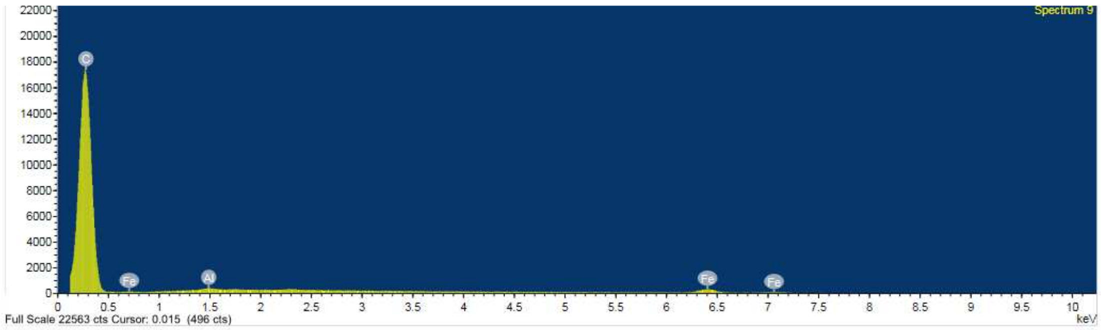


Figure 24 Energy-Dispersive X-ray Microanalysis of spot 9 (Figure 23) in sample pad B showing the presence of carbon, iron, and aluminum in the spot indicated by a cross in Figure 23

In the “first effectiveness” engagements sample C containing RD18670C graphite kph displayed higher effectiveness values at 50 kph and 100 when compared to the baseline sample (Figure 25). Sample C displayed a steady rise of effectiveness at a leveling effectiveness value at 0.425, with a less dramatic drop than the baseline when exposed to the 100 KPH engagements. The sample went on to reach almost 0.5 effectiveness value which far surpasses the baseline peak of just under 0.35. Fade testing proved promising, with a linear increase to a maximum value of 0.41 and stabilizing at 0.38 exceeding the baseline value of roughly 0.31. The high speed effectiveness test ranging from 50 KPH to 160 KPH displayed higher effectiveness values, but instability with a larger deviation from average than the baseline sample.

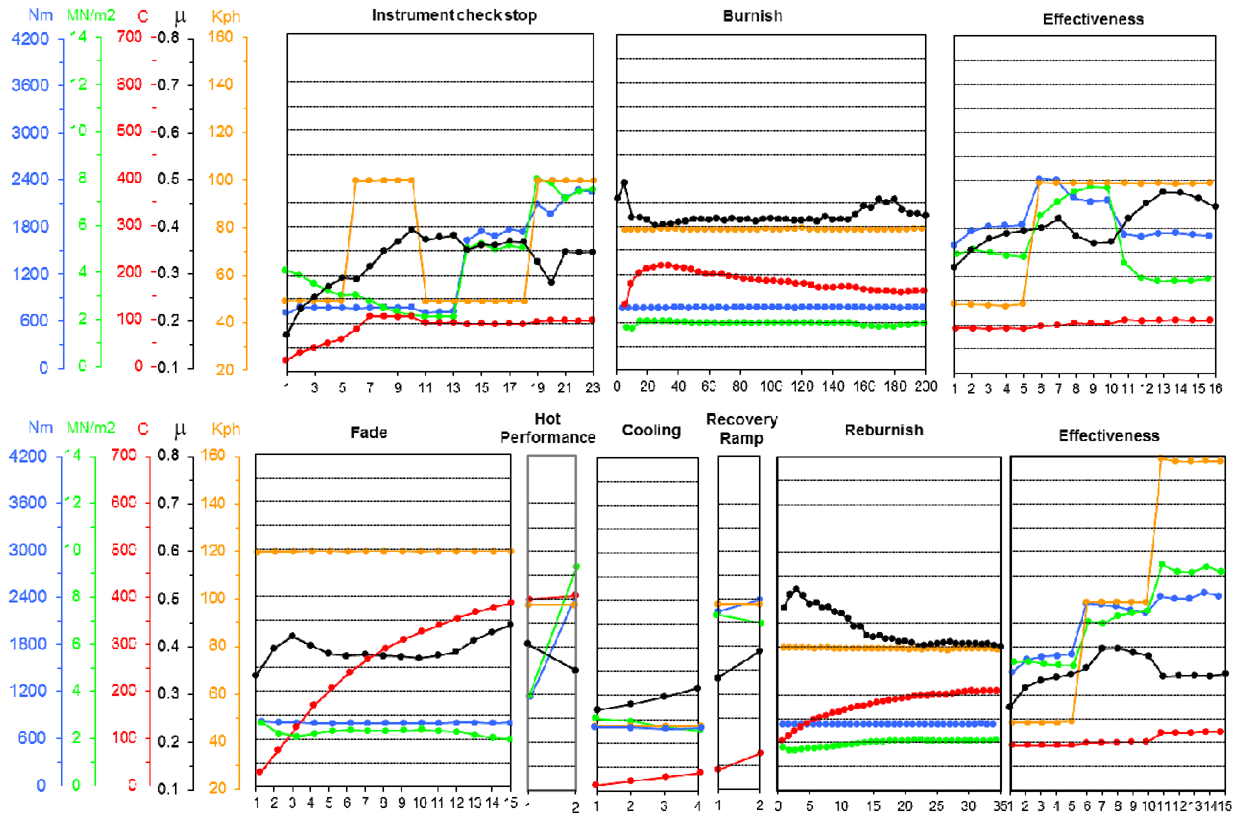
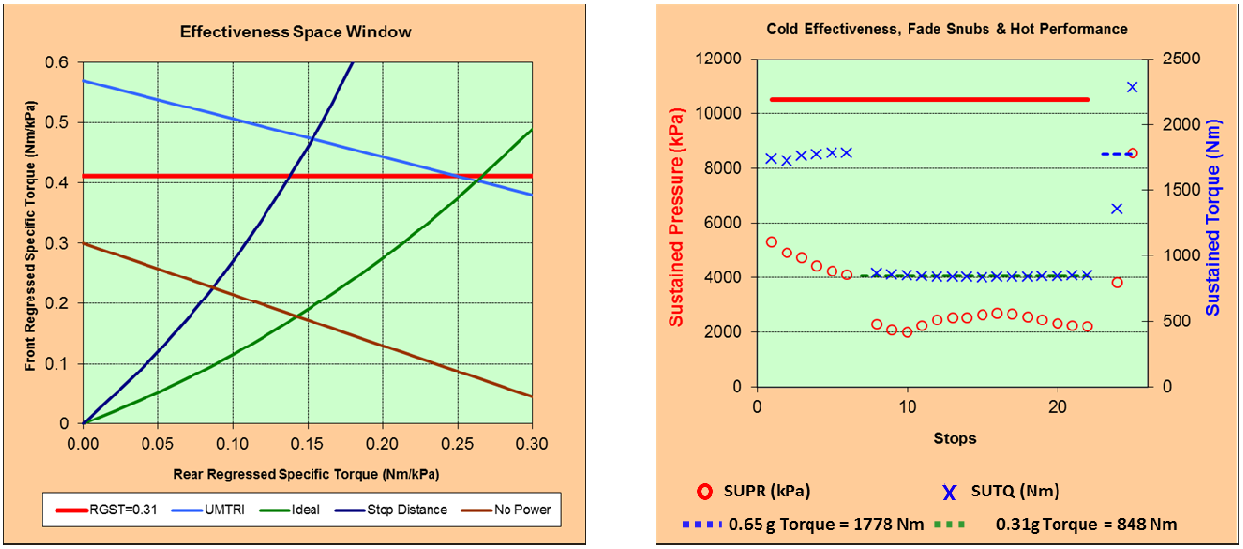


Figure 25 J2430 test of sample C with graphite RD18670C

The BEEP evaluation given in Figure 26 shows passing results. The average value was acceptable to pass the evaluation since the average fell into the effectiveness space window. Cold effectiveness and fade snubs were substantially below the required value and less than that of the baseline, resulting in a positive result. Hot performance values were well below the threshold, and nearly identical to the baseline along with 100 percent structural integrity intact at the end of testing.



BEEP Criteria	Parameter	Unit	Minimum level	Maximum level	Tested Material	Criteria assessment
Effectiveness Space	Between limits	Nm/kPa	0.179	0.473	0.41	meets criteria
Cold Effectiveness	Below maximum pedal force	N		500	197	meets criteria
Fade Snubs	Below maximum pedal force	N		500	80	meets criteria
Hot Performance Criteria #1	Torque above 60% of Cold Effect	Nm	1056		1356	meets criteria
Hot Performance Criteria #2	Torque above 0.5g Deceleration	Nm	1367		2285	meets criteria
Structural Integrity	Integrity above minimum	%	90		100	meets criteria

Figure 26 Sample C with graphite RD18670C BEEP

Wear data reported in Table 6 gave an average of 0.731mm and 0.727mm to the inboard and outboard pad respectively. This again is more than the baseline but less wear on the rotor was exhibited. These pad friction material wear values are much larger than the baseline material wear and would display shorter longevity for the average consumer. Figure 27 is a visual representation of the thickness lost during testing in comparison with the baseline material.

Table 6 Sample C with graphite RD18670C Wear Report

Inboard Pad (mm)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Initial	15.200	15.113	15.139	15.274	15.278	15.174	15.144	15.221	15.193
Final	13.874	14.208	14.391	14.723	14.717	15.499	14.155	14.128	14.462
Loss	1.326	0.905	0.748	0.551	0.561	-0.325	0.989	1.093	0.731
Outboard Pad (mm)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Initial	15.348	15.275	15.308	15.371	15.192	15.299	15.239	15.217	15.281
Final	14.675	14.548	14.422	14.330	14.411	14.593	14.707	14.749	14.554
Loss	0.673	0.727	0.886	1.041	0.781	0.706	0.532	0.468	0.727
Pad Weight (g)									
	Inboard Pad		**Outboard Pad**		**Rotor Weight**				
Initial	550.3		557.4		10667.80				
Final	543.4		548.9		10658.50				
Loss	6.9		8.5		9.30				
Rotor Thickness (mm)									
4 equally spaced positions									
	Position 1		**Position 2**		**Position 3**		**Position 4**		**Average**
Initial	27.907		27.909		27.913		27.920		27.912
Final	27.894		27.899		27.910		27.911		27.904
Loss	0.013		0.010		0.003		0.009		0.009

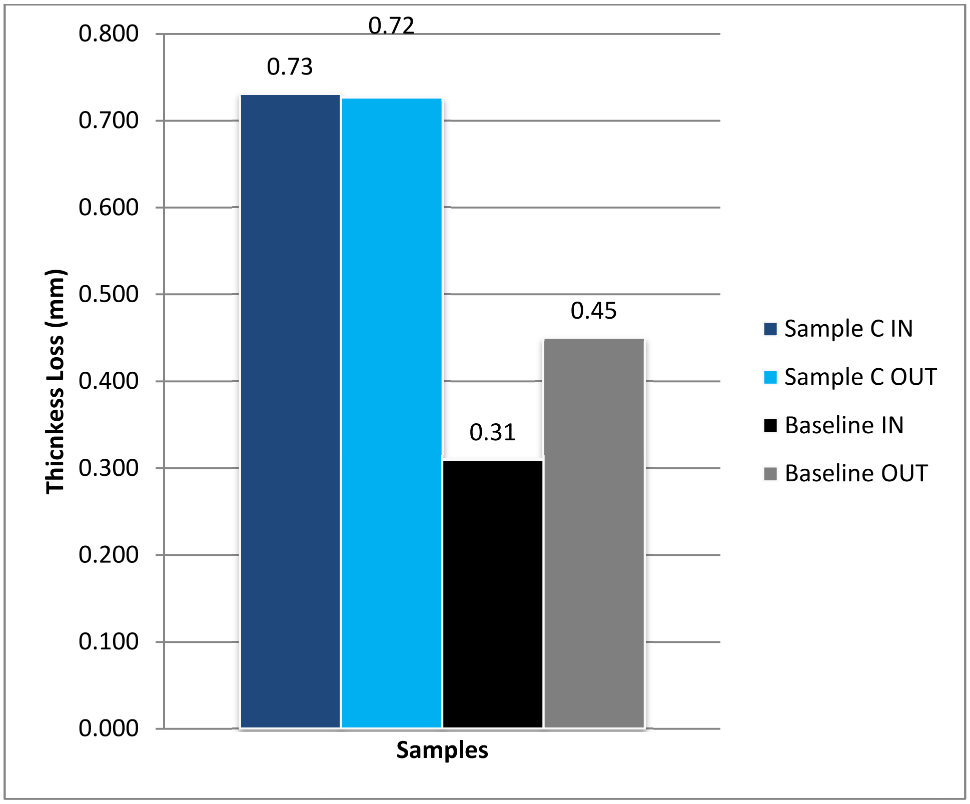


Figure 27 Comparison of baseline and sample C containing graphite RD18670C thickness loss after J2430 dynamometer test

An SEM image of pad C containing RD18670C graphite can be seen in Figure 28. This friction lining material also had a well-developed friction layer, with little diversity in elevation throughout the sample area. Again, even abrasion lines in the direction of the friction motion can be seen, evident of an even contact area throughout. The darker areas represent the “lower level” of the friction surface. This even friction layer may correlate to the materials low speed sensitivity apparent in the SAE J2430 testing.

Figure 28 Surface of Pad C after test in J2430 Dynamometer Procedure after Last Engagement Stop of “Second Effectiveness”.

It can be seen from Figure 29 that the indicated area shows many of the same elements in the friction layer as pad A, but with a much higher concentration of iron relative to the other elements present. This could again be transfer from the rotor, or a product of the iron oxide within the formulation.

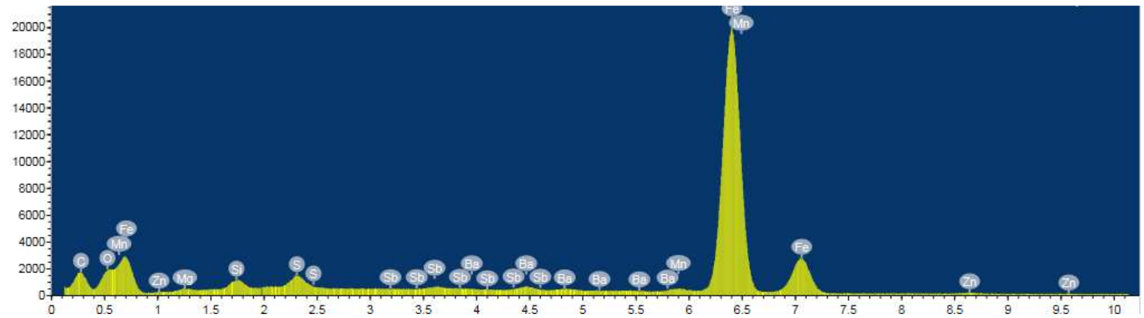


Figure 29 Energy-Dispersive X-ray Microanalysis of sample pad C showing the presence of carbon, oxygen, magnesium, silicon, sulfur, manganese, iron, zinc, antimony, and barium in the spot indicated by a cross in Figure 28

During the “first effectiveness” snubs, sample D displayed higher effectiveness values when compared to the baseline sample. The average calculated values of effectiveness initially increased from 0.28 to 0.38. After speed increased to 100 Km/h, the effectiveness dropped to 0.36 at stop 9 and then increased to almost 0.48 in stop 13. As represented in Figure 30, RD18670D displayed stable and linear effectiveness response to the engagements, with a steady rise at a leveling effectiveness value, with a smaller negative slope than the under the 100 KPH engagements. The sample went on to reach almost 0.5 effectiveness value which far surpasses the baseline peak of just under 0.35. The fade test proved promising, with a linear increase to a maximum value of 0.4125 and stabilizing at 0.375, exceeding the baseline value. The high speed effectiveness test ranging from 50 KPH to 160 KPH displayed higher effectiveness values, but instability with a larger deviation from average than the baseline sample.

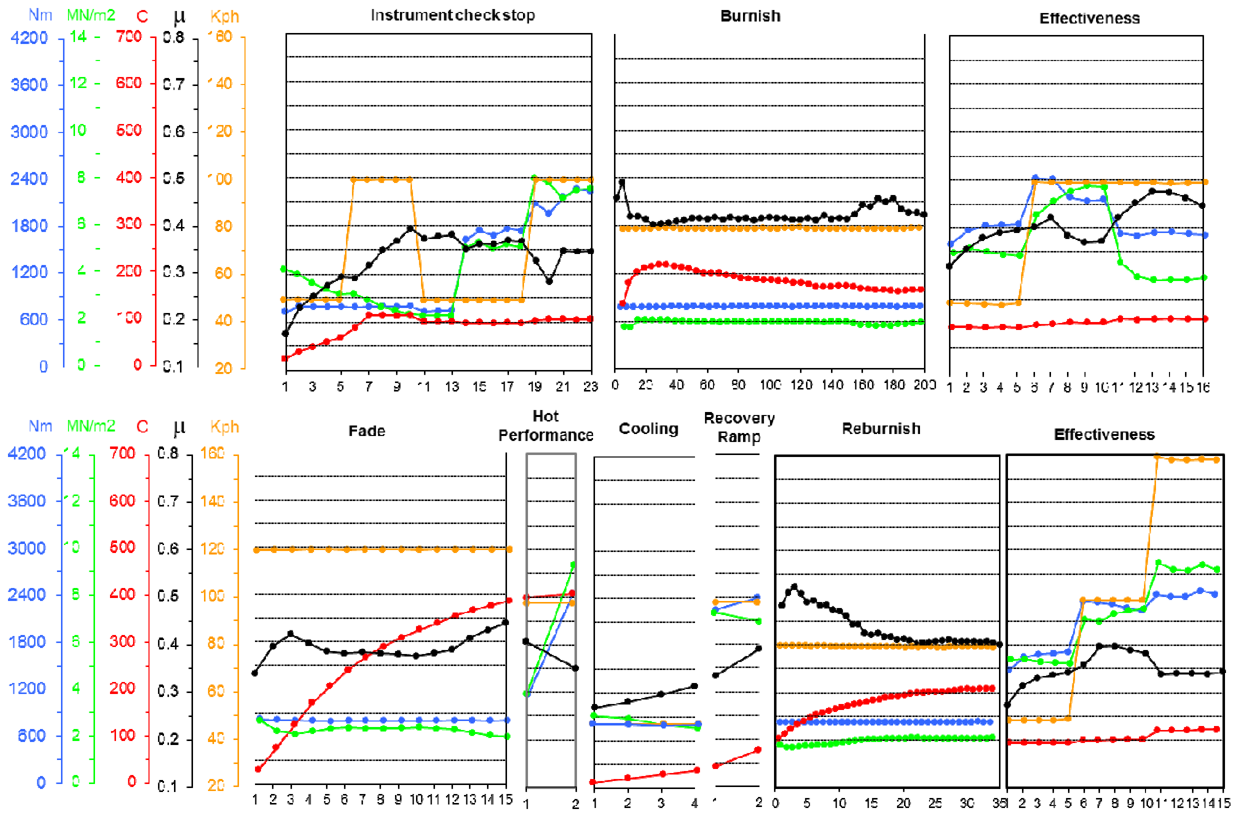
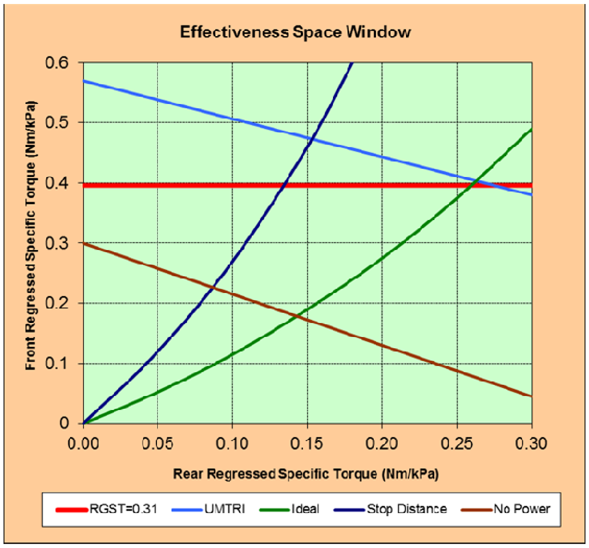
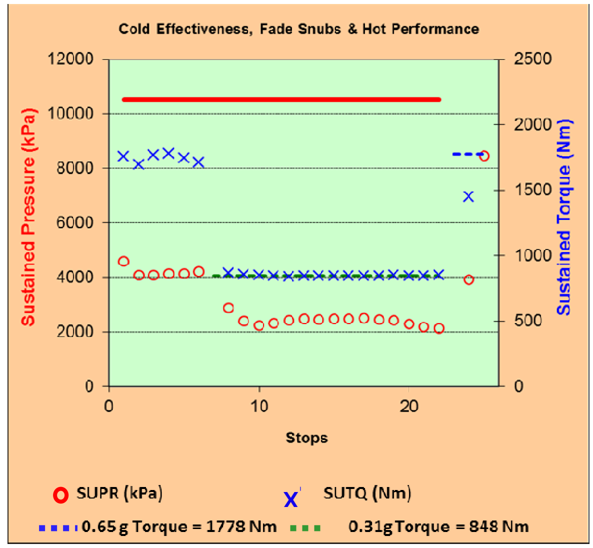


Figure 30 J2430 test of sample D with graphite RD18670D

Sample D containing graphite RD18670D passed the BEEP evaluation as shown in Figure 31. The regressed specific torque average was 0.40 which is higher than the baseline, but still within the allowed effectiveness space window. Cold effectiveness and fade snubs were both well below the limit of maximum allowable brake pedal force at 175N and 81N, respectively, requiring less driver input than the baseline for a higher deceleration. Hot performance was also well within limits of the BEEP evaluation, and the friction material completed the testing without signs of failure with 100 percent structural integrity.





BEEP Criteria	Parameter	Unit	Minimum level	Maximum level	Tested Material	Criteria assessment
Effectiveness Space	Between limits	Nm/kPa	0.179	0.473	0.40	meets criteria
Cold Effectiveness	Below maximum pedal force	N		500	175	meets criteria
Fade Snubs	Below maximum pedal force	N		500	81	meets criteria
Hot Performance Criteria #1	Torque above 60% of Cold Effect	Nm	1046		1452	meets criteria
Hot Performance Criteria #2	Torque above 0.5g Deceleration	Nm	1367		2623	meets criteria
Structural Integrity	Integrity above minimum	%	90		100	meets criteria

Figure 31 Sample D with graphite RD18670D BEEP

Average losses reported in Table 7 were much greater than the baseline, with 0.783mm and 0.930mm lost on the inboard and outboard pad respectively. These values are more than double the inboard loss of 0.31mm and outboard loss of 0.45mm displayed in the baseline testing, with a significant almost 2.5 times increase wear rate of 0.032mm on the rotor. Figure 32 gives a visual representation of the thickness loss when compared to the baseline.

Table 7 Sample D with graphite RD18670D wear report

Inboard Pad (mm)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Initial	15.676	15.504	15.440	15.388	15.336	15.268	15.348	15.476	15.430
Final	14.755	14.627	14.569	14.545	14.623	14.578	14.692	14.784	14.647
Loss	0.921	0.877	0.871	0.843	0.713	0.690	0.656	0.692	0.783
Outboard Pad (mm)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Initial	16.196	16.042	16.078	16.081	16.118	16.175	16.216	16.306	16.152
Final	15.056	15.109	15.115	15.087	15.375	15.375	15.345	15.311	15.222
Loss	1.140	0.933	0.963	0.994	0.743	0.800	0.871	0.995	0.930
Pad Weight (g)									
	Inboard Pad		**Outboard Pad**		**Rotor Weight**				
Initial	542.8		546.4		10658.50				
Final	536.5		541.0		10650.90				
Loss	6.3		5.4		7.60				
Rotor Thickness (mm)									
4 equally spaced positions									
	Position 1		**Position 2**		**Position 3**		**Position 4**		**Average**
Initial	27.894		27.899		27.910		27.911		27.904
Final	27.882		27.871		27.853		27.879		27.871
Loss	0.012		0.028		0.057		0.032		0.032

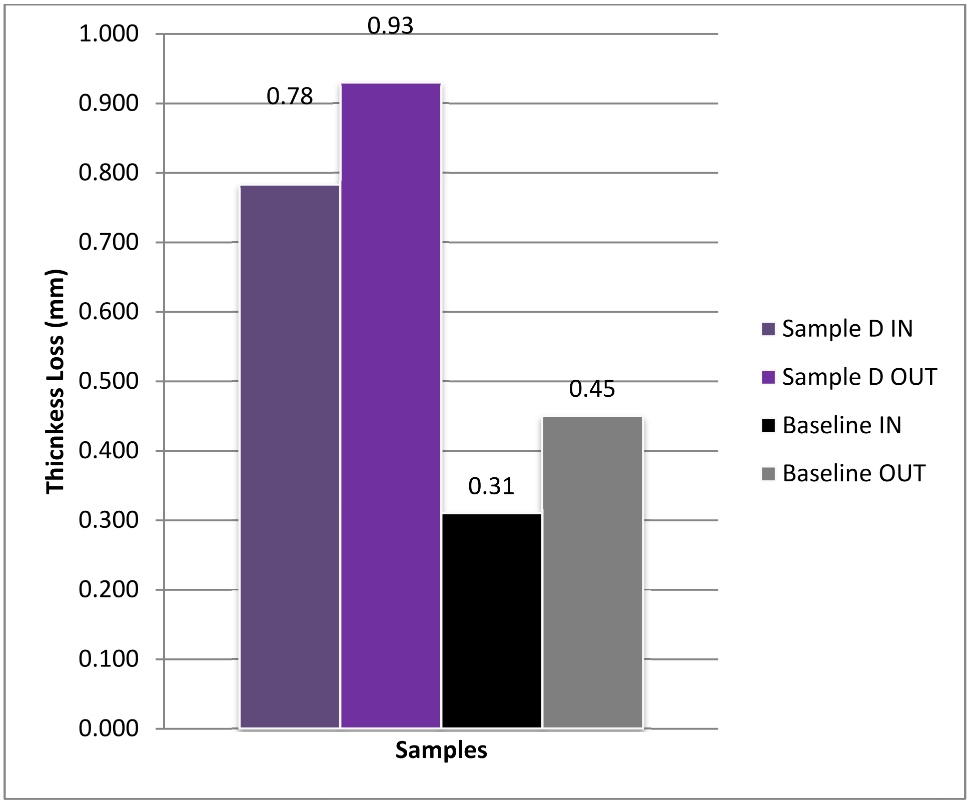


Figure 32 Comparison of baseline and sample D containing graphite RD18670D thickness loss after J2430 dynamometer test

As can be seen in Figure 33, there is some diversity in the elevation of the contact area creating the friction layer. It can be seen that the darker areas are lower than the gray areas, meaning the organic matrix composite is in the “lower level”. The friction material displayed acceptable performance but there isn’t an evenly developed friction layer obvious. No abrasion marks can be seen, which could be the result of the materials high wear rate allowing the friction lining to degrade before a well-developed friction layer could form.

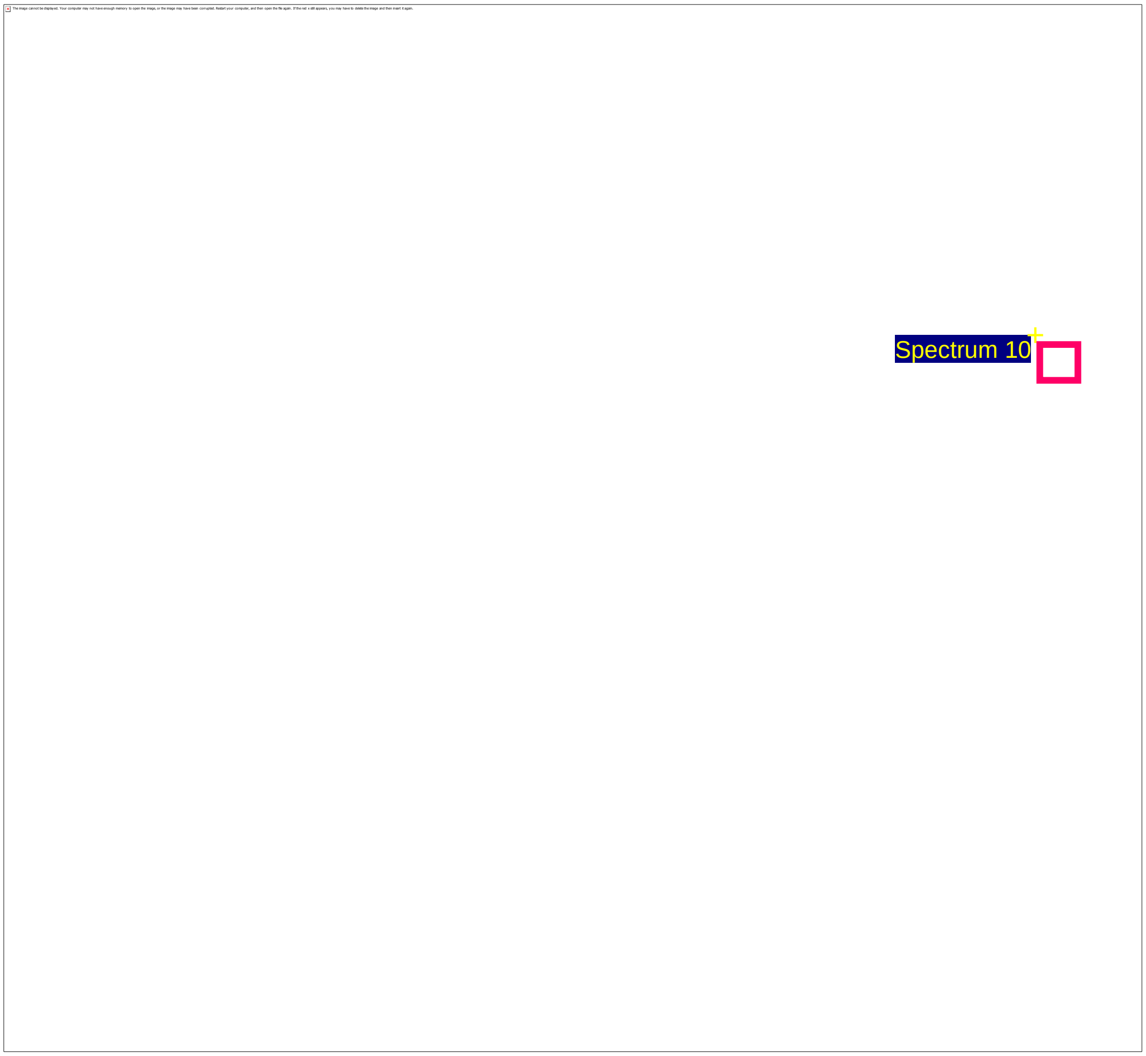


Figure 33 Surface of Pad D after test in J2430 Dynamometer Procedure after Last Engagement Stop of “Second Effectiveness”.

Figure 34 shows similar surface chemistry as detected for pad C. A high concentration of iron with traces of the elements used to formulate the friction material was detected on the surface of sample D. It can be reasoned that the elevated areas in the “upper level” will have relative high amounts of iron due to its presence in both the friction lining and the rotor.

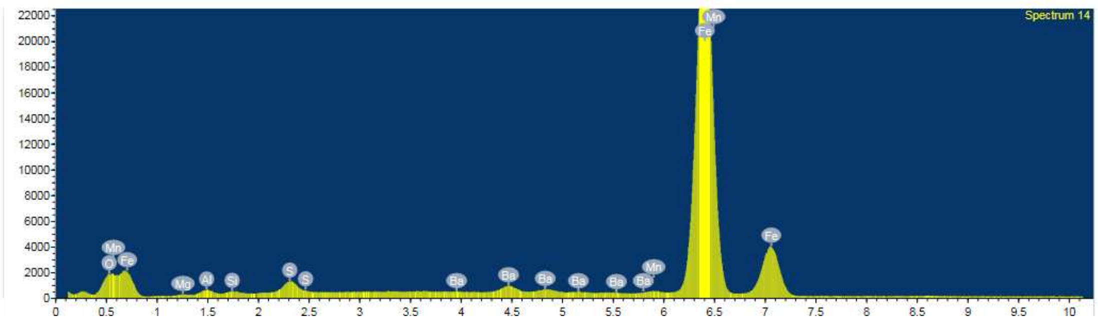


Figure 34 Energy-Dispersive X-ray Microanalysis of sample pad D showing the presence of oxygen, magnesium, aluminum, silicon, sulfur, manganese, iron, zinc, and barium in the spot indicated by a cross in Figure 33

Sample 3090 failed to complete the J2430 test so no usable data was obtained. The material appeared to be too soft and wore at a rate too fast to complete the burnish, failing after the instrument check stop, midway through the burnish. As can be seen from the post-mortem images of sample 3090 in Figure 35, the material began to delaminate during the dynamometer test.

Figure 35 Sample D containing graphite 3090 which failed in J2430 test

Sample F containing graphite RD18670F displayed promising effectiveness values as shown in Figure 36. The material began at an acceptable effectiveness value around 0.45, and held this value for more than half of the low speed testing. The effectiveness value then rose at an acceptable exponential rate to a peak effectiveness value of 0.55 while displaying very little instability. During the fade engagements, a linear rise to a maximum effectiveness value of 0.45 was achieved, with a stead decrease to a stable effectiveness of 0.38. The transition was very smooth and

displayed small deviation from the average value, resulting in a very predictable friction material.

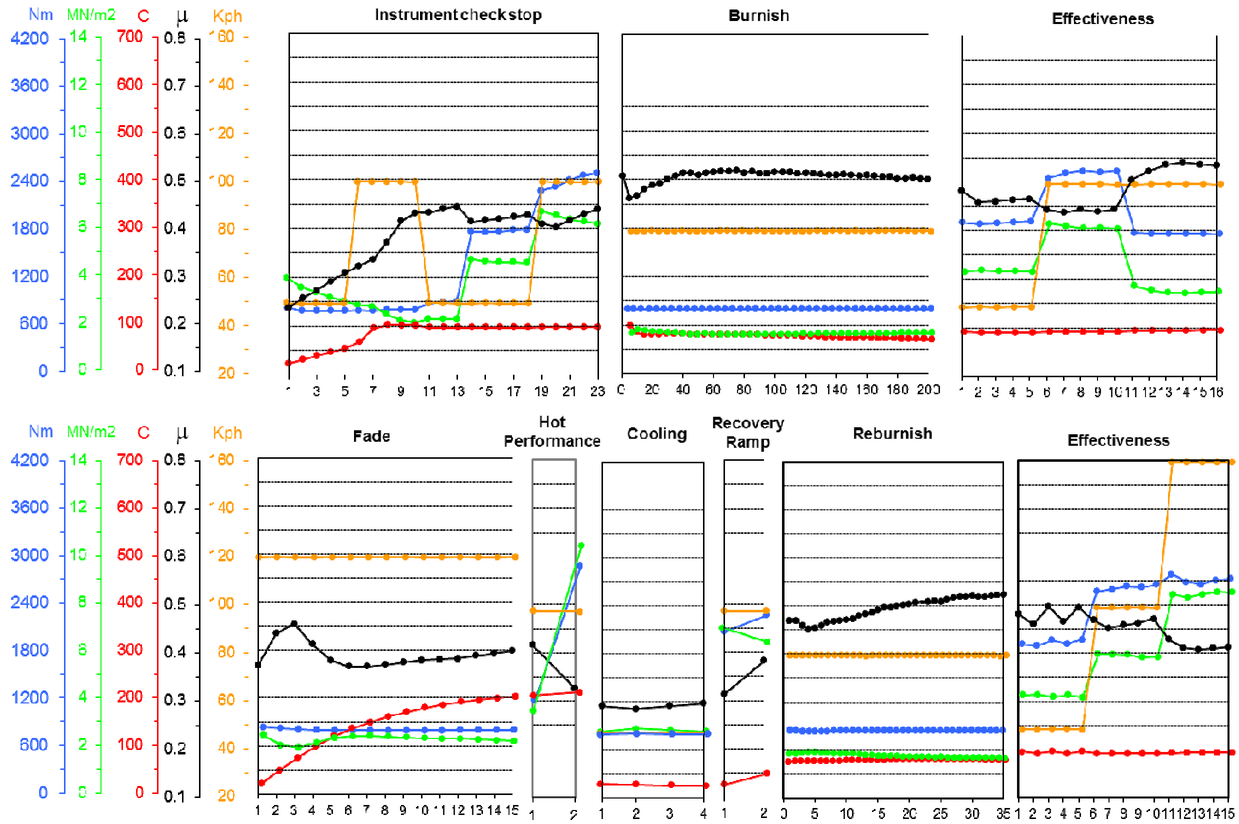


Figure 36 J2430 test of sample F with graphite RD18670F

As can be seen in Figure 38, sample RD18670F passed the BEEP evaluation. While RD18670F did pass the BEEP evaluation, passing the effectiveness space window criteria by .033. Maximum pedal force fell within an acceptable value in the cold effectiveness and fade snubs, well below the maximum limit of 500N with 155N and 80N respectively. Hot performance testing came close to the lower limit of the criteria,

but still allowed for a passing test. The friction material received a mark of 100 percent for retaining structural integrity throughout the testing as seen in Figure 37

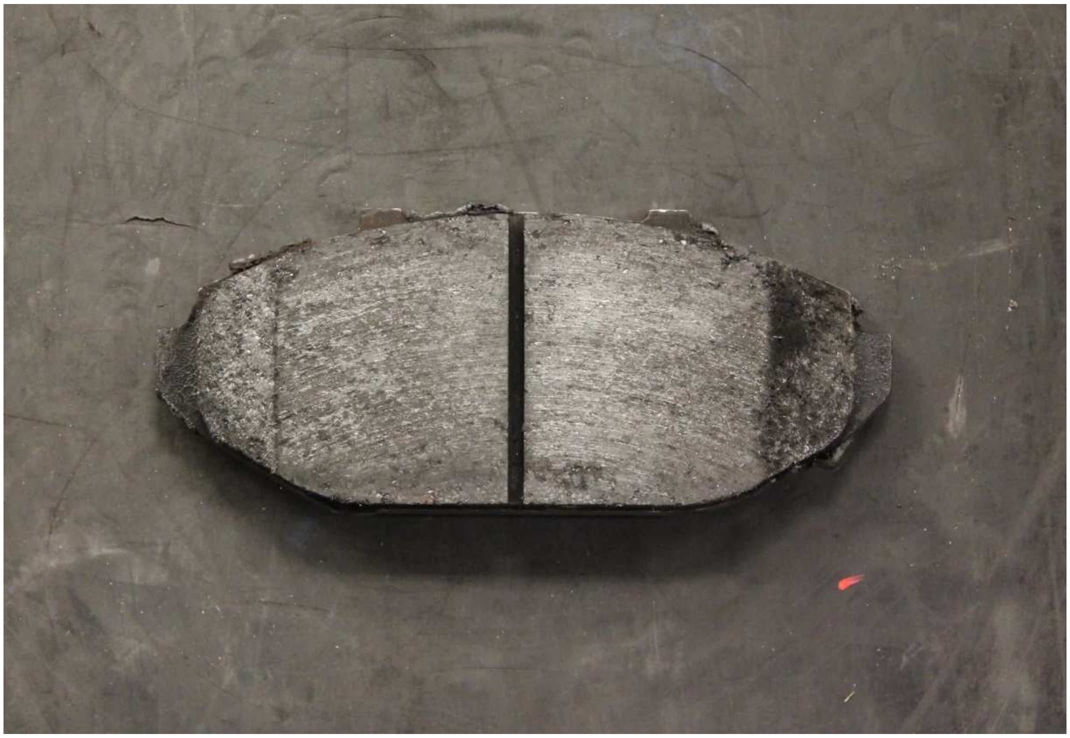


Figure 37 Sample F containing graphite RD18670F after J2430 test

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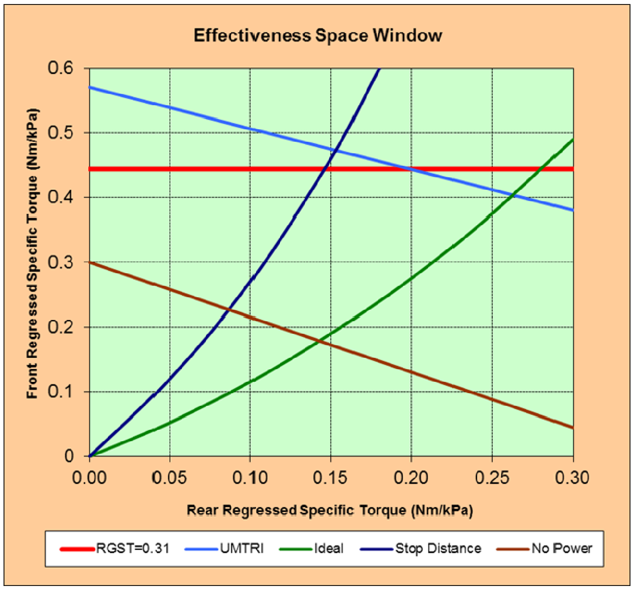
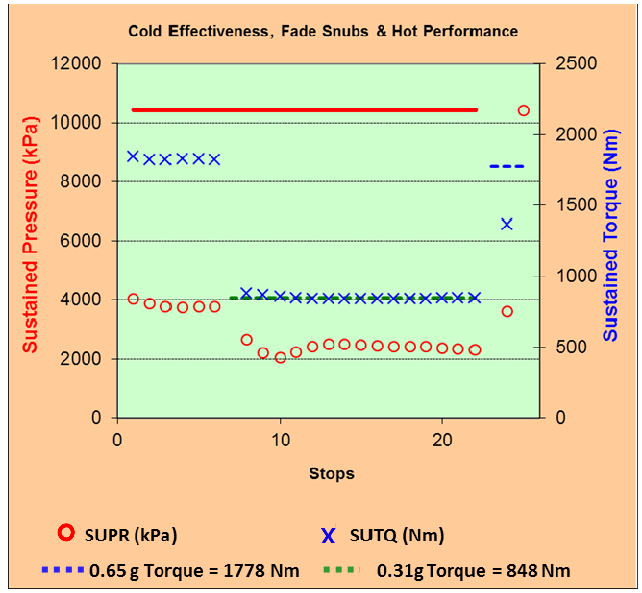




BEEP Criteria	Parameter	Unit	Minimum level	Maximum level	Tested Material	Criteria assessment
Effectiveness Space	Between limits	Nm/kPa	0.179	0.473	0.44	meets criteria
Cold Effectiveness	Below maximum pedal force	N		500	155	meets criteria
Fade Snubs	Below maximum pedal force	N		500	80	meets criteria
Hot Performance Criteria #1	Torque above 60% of Cold Effect	Nm	1097		1368	meets criteria
Hot Performance Criteria #2	Torque above 0.5g Deceleration	Nm	1367		3088	meets criteria
Structural Integrity	Integrity above minimum	%	90		100	meets criteria

Figure 38 Sample F with graphite RD18670F BEEP

RD18670F's wear report, displayed in Table 8, shows relatively low wear rates, losing 0.384mm on the inboard pad and 0.650mm on the outboard pad. Were the closest to the baseline wear of 0.31mm inboard and 0.45mm outboard. Rotor material loss was low and very close to the baseline at 0.011mm compared to the baseline of 0.0130. Figure 39 gives a visual representation of the thickness loss during testing when compared to the baseline test material.

Table 8 Sample F with graphite RD18670F wear report

Inboard Pad (mm)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Initial	15.771	15.715	15.738	15.847	15.685	15.569	15.531	15.633	15.686
Final	15.148	15.521	15.320	15.422	15.374	15.246	15.207	15.181	15.302
Loss	0.623	0.194	0.418	0.425	0.311	0.323	0.324	0.452	0.384
Outboard Pad (mm)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Initial	16.493	16.445	16.494	16.598	16.525	16.462	16.379	16.433	16.479
Final	15.621	15.588	15.598	15.620	16.122	16.088	16.001	15.995	15.829
Loss	0.872	0.857	0.896	0.978	0.403	0.374	0.378	0.438	0.650
Pad Weight (g)									
	Inboard Pad		**Outboard Pad**		**Rotor Weight**				
Initial	560.9		568.4		10384.70				
Final	557.2		564.1		10376.20				
Loss	3.7		4.3		8.50				
Rotor Thickness (mm)									
4 equally spaced positions									
	Position 1		**Position 2**		**Position 3**		**Position 4**		**Average**
Initial	27.924		27.919		27.907		27.929		27.920
Final	27.915		27.912		27.906		27.903		27.909
Loss	0.009		0.007		0.001		0.026		0.011

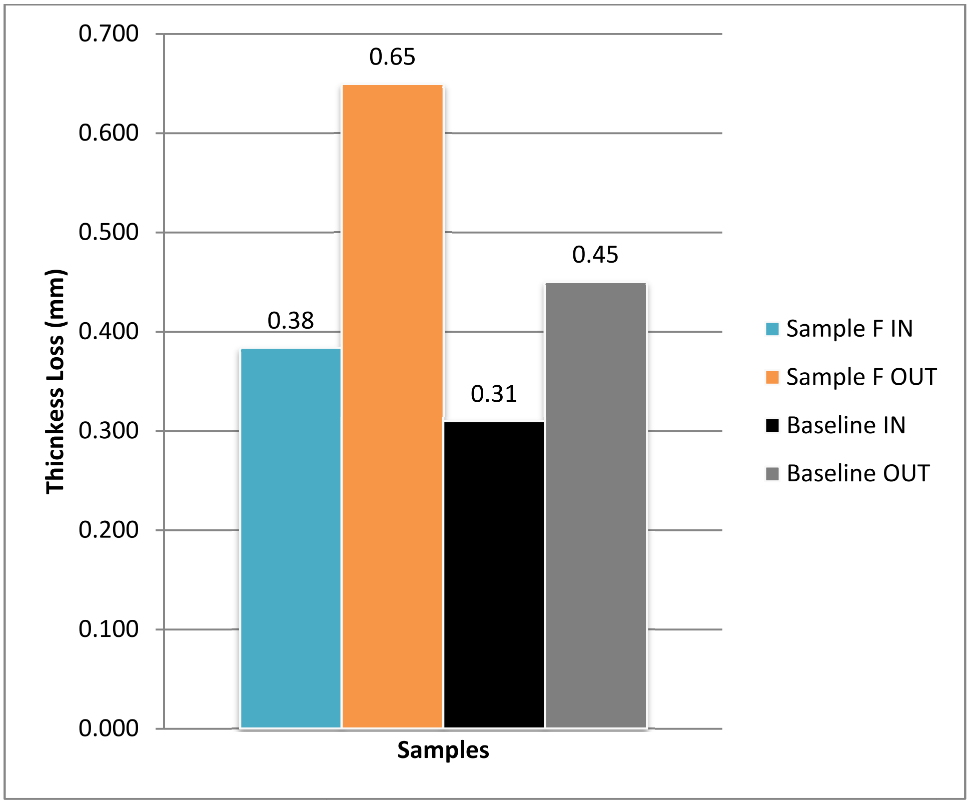


Figure 39 Comparison of baseline and sample F containing graphite RD18670F thickness loss after J2430 dynamometer test

Sample RD18670G was relatively unstable during SAE J2430 testing as shown in Figure 40. During the low speed engagements, there was a sudden decrease in effectiveness on engagement 11 which represents a sudden loss of braking torque. The material displayed acceptable values of effectiveness, but the average was not enough to surpass that of the baseline and warrant a replacement that is unstable. RD18670G also suffered from thermal fade during the fade engagements, resulting in an exponential decay of effectiveness, starting at 0.4125 and decreasing to 0.3. During the high speed effectiveness engagements, the material proved more stable but did not

display a high enough effectiveness value to serve as a replacement when compared to the baseline.

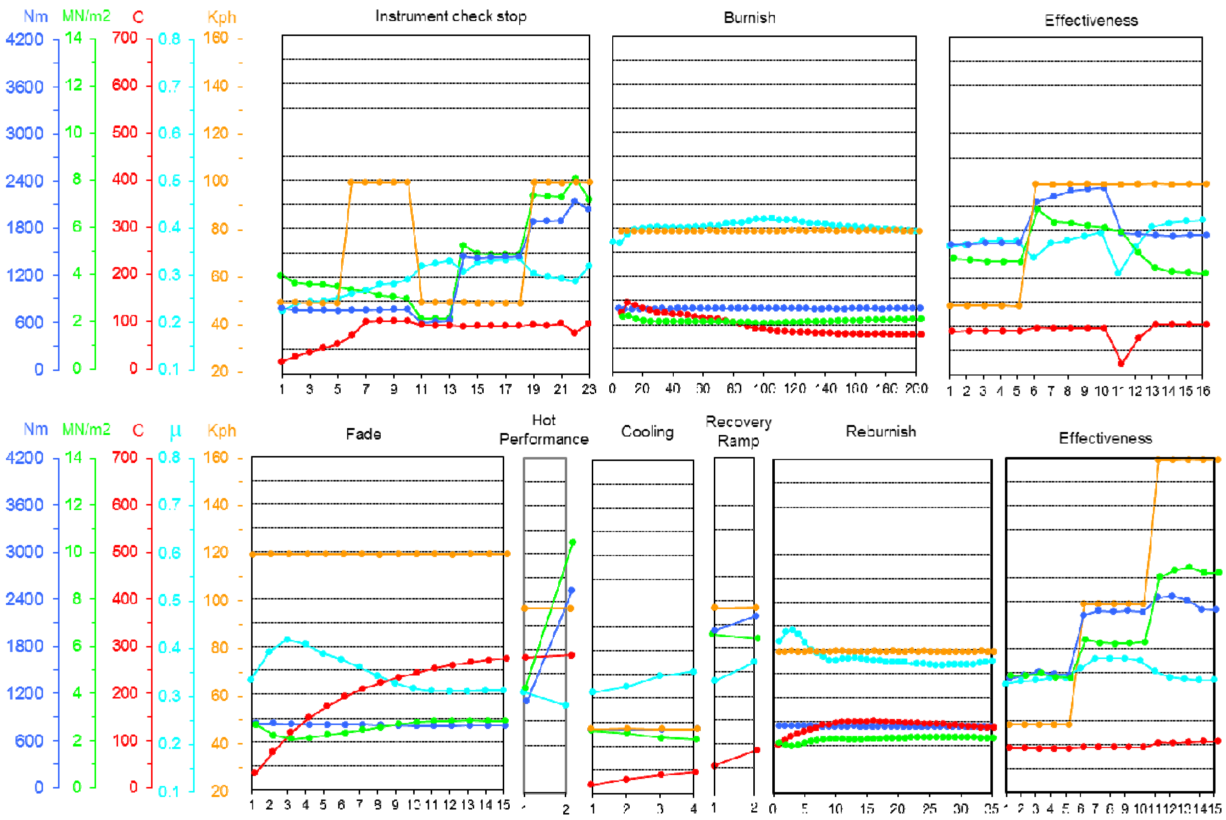


Figure 40 J2430 test of sample G with graphite RD18670G

During the BEEP evaluation, RD18670G failed two crucial criteria as shown in Figure 42. The sample provided enough torque to decelerate the vehicle in an acceptable manner, meeting the effectiveness space window with an average value of 0.37. RD18670G also passed the maximum brake pedal force limit with 220N and 102N, sufficiently below the maximum value of 500N. The sample failed the hot performance criteria, which was evident in the aforementioned J2430 testing where

thermal instability was present. Since the material did not physically fail as seen in Figure 41, a structural integrity mark of 100 percent was given.

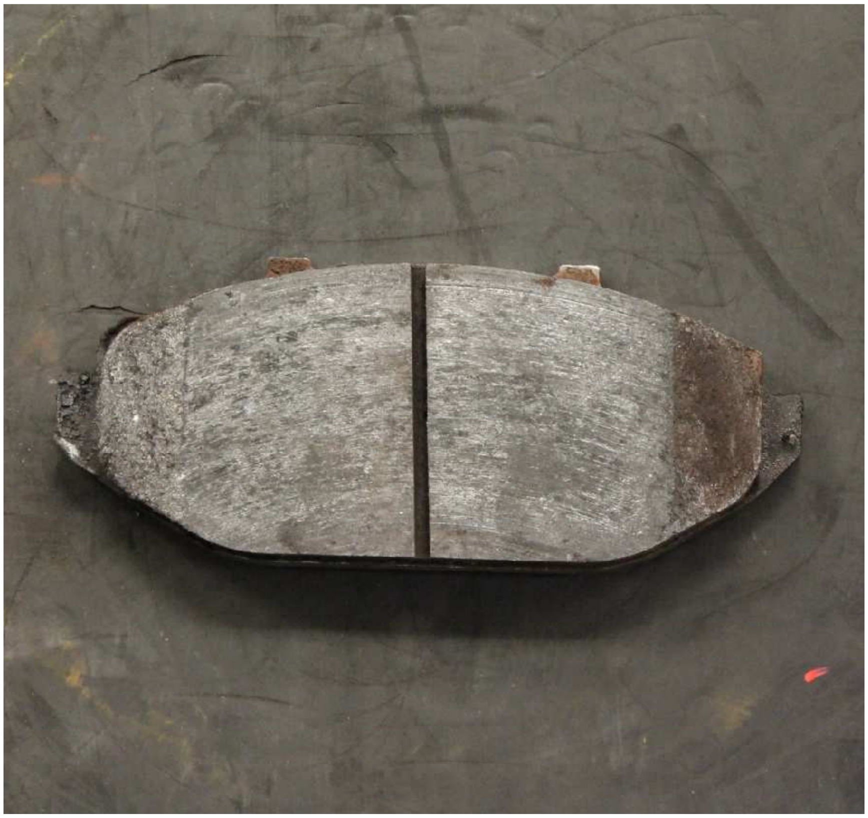
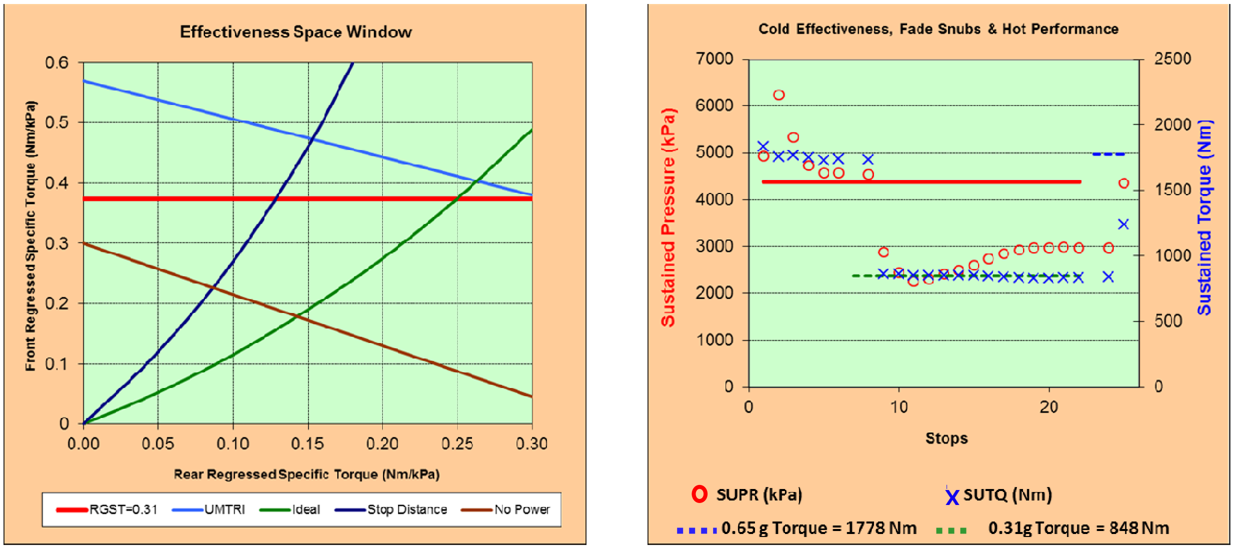


Figure 41 Sample G containing graphite RD18670G after J2430 test



BEEP Criteria	Parameter	Unit	Minimum level	Maximum level	Tested Material	Criteria assessment
Effectiveness Space	Between limits	Nm/kPa	0.179	0.473	0.37	meets criteria
Cold Effectiveness	Below maximum pedal force	N		500	220	meets criteria
Fade Snubs	Below maximum pedal force	N		500	102	meets criteria
Hot Performance Criteria #1	Torque above 60% of Cold Effect	Nm	1058		837	Failed
Hot Performance Criteria #2	Torque above 0.5g Deceleration	Nm	1367		1238	Failed
Structural Integrity	Integrity above minimum	%	90		100	meets criteria

Figure 42 Sample G with graphite RD18670G BEEP

RD18670G displayed relatively high wear rates in the wear report in Table 9. A loss of 1.202mm inboard and 1.632mm outboard represents a wear rate of four times that of the baseline. Rotor wear was minimal, but is to be expected with a softer material that wears pad friction material at the displayed rate. Figure 43 gives a direct comparison of the thickness loss from the sample material to the baseline.

Table 9 Sample G with graphite RD18670G wear report

Inboard Pad (mm)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Initial	17.473	17.343	17.305	17.296	17.123	17.166	17.252	17.332	17.286
Final	16.238	16.163	16.136	16.175	15.932	15.988	15.995	16.044	16.084
Loss	1.235	1.180	1.169	1.121	1.191	1.178	1.257	1.288	1.202
Outboard Pad (mm)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Initial	17.387	17.471	17.482	17.650	17.693	17.554	17.552	17.441	17.529
Final	15.587	15.567	15.621	15.774	16.249	16.209	16.127	16.026	15.895
Loss	1.800	1.904	1.861	1.876	1.444	1.345	1.425	1.415	1.634
Pad Weight (g)									
	Inboard Pad		**Outboard Pad**		**Rotor Weight**				
Initial	561.6		563.8		10376.20				
Final	555.4		557.2		10367.70				
Loss	6.2		6.6		8.50				
Rotor Thickness (mm)									
4 equally spaced positions									
	Position 1		**Position 2**		**Position 3**		**Position 4**		**Average**
Initial	27.915		27.912		27.906		27.903		27.909
Final	27.886		27.882		27.907		27.885		27.890
Loss	0.029		0.030		-0.001		0.018		0.019

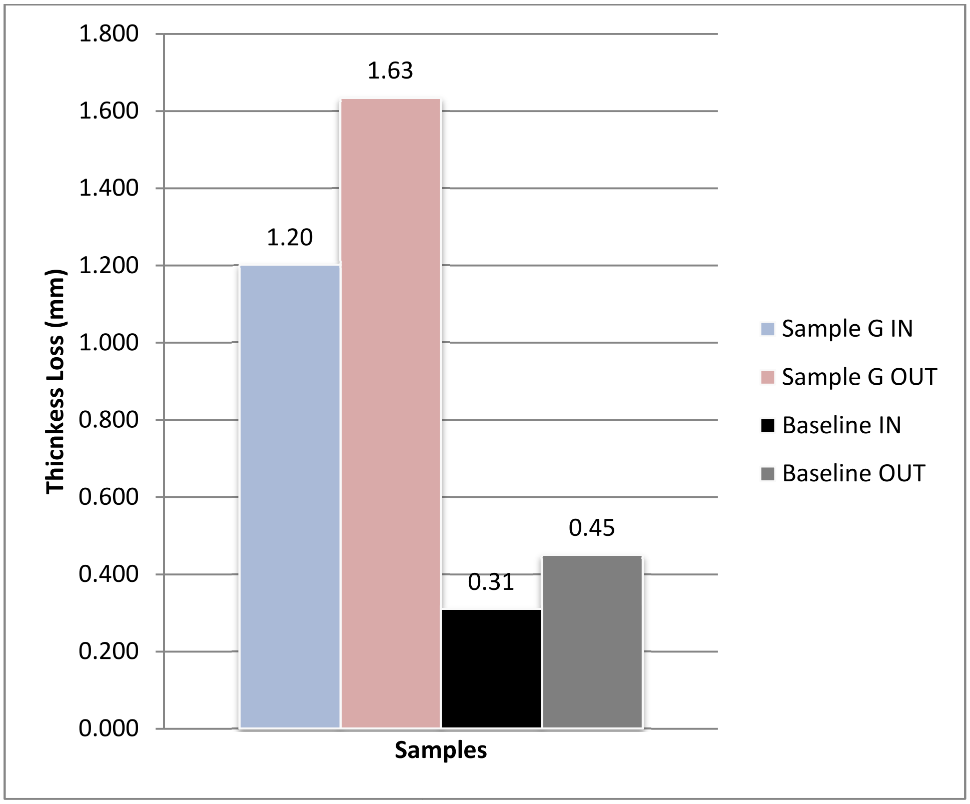


Figure 43 Comparison of baseline and sample G containing graphite RD18670G thickness loss after J2430 dynamometer test

CHAPTER 5

CONCLUSIONS

Figure 44 shows a direct comparison of the “first effectiveness” of the 6 different pad samples that completed the J2430 test. Sample RD18670B displays a stable effectiveness value just under 0.5 during the 50 kph engagement, and minimal loss of effectiveness at the 100 kph stops. Not only was there minimum thermal fade, the RD18670B graphite material displayed an increase of effectiveness at stop twelve that proved consistent over the next four stops. This increase could be the result of further burnishing required after the slower stops, which could have resulted in glazing of the material. RD18670G showed instability throughout the test, shown by the peaks causing a large deviation value from the average. Brakes containing graphites A-G will not fail at elevated speeds and will be even more effective than at lower speeds. The performance of sample G changes most drastically after braking speeds change from 50 to 100 kph. Nevertheless, the effectiveness of the remaining materials slightly increases towards the end of this testing procedure. This indicates that the sample materials would be stable and increase in effectiveness under more engagements.

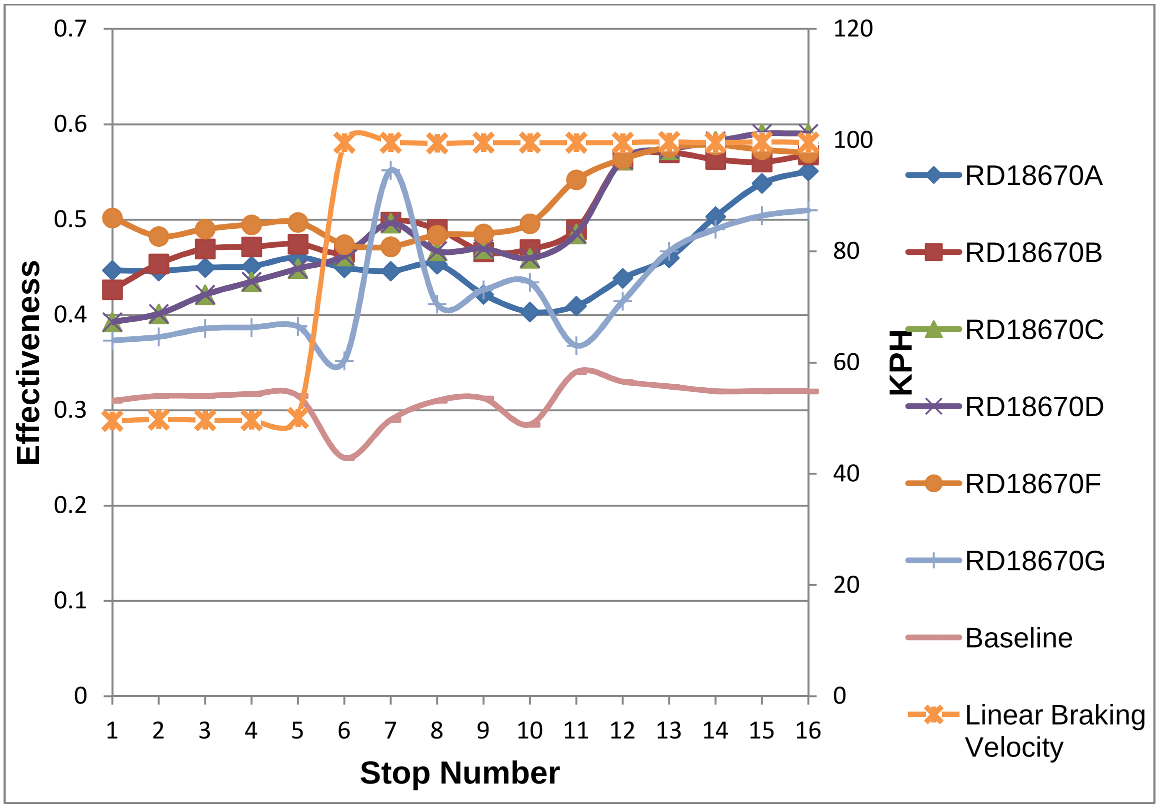


Figure 44 Direct comparison of graphite "first effectiveness"

Figure 45 is a direct comparison of the sample graphites' high speed effectiveness during the SAE J2430 testing. The samples display much of the same properties observed in the low speed testing in Figure 23, with RD18670A showing a high peak of effectiveness before settling down to a decently stable effectiveness curve. Sample FD18670F displayed the most favorable performance characteristics, with a good average effectiveness value of 0.5 with a low R value.

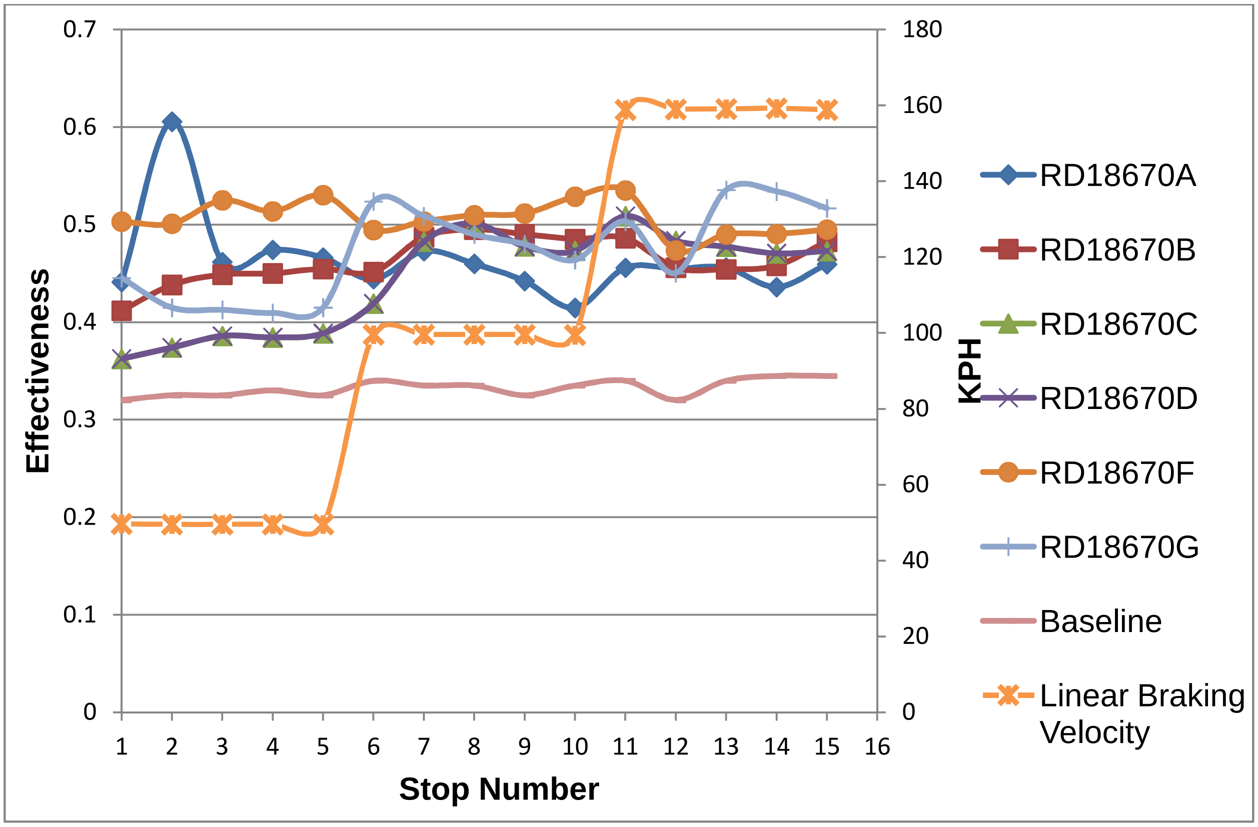


Figure 45 Direct comparison of graphite “second effectiveness”

Figure 46 is a direct comparisons of the sample graphites’ data collected during the fade portion of the SAE J2430 testing. It is obvious by the drop of effectiveness starting at 0.55 and decreasing to 0.40, sample graphite RD18670A suffered from thermal fade. Sample graphite RD18670B started at the same value of 0.55 and decreased also to 0.45 but had some instability apparent by the spikes and drops in effectiveness at braking engagement 9, followed by a rise in effectiveness to 0.52. Sample graphite RD18670C started at a lower value of 0.42 but increased to 0.48, and continued to increase after stop 8 with some fluctuations in effectiveness to a maximum value of 0.52. Sample graphite RD18670D displayed nearly identical effectiveness

values and trends as RD18670C. RD18670F started at a value of 0.45 and increased to 0.48 by braking engagement 3, to level out to 0.41 for the rest of the 12 engagements. Graphite RD18670G started at a lower effectiveness value of 0.38, increasing to 0.45 by braking engagement 2, only for effectiveness to linearly decline and hold for the remaining braking engagements to an effectiveness value of 0.34 at braking engagement 9.

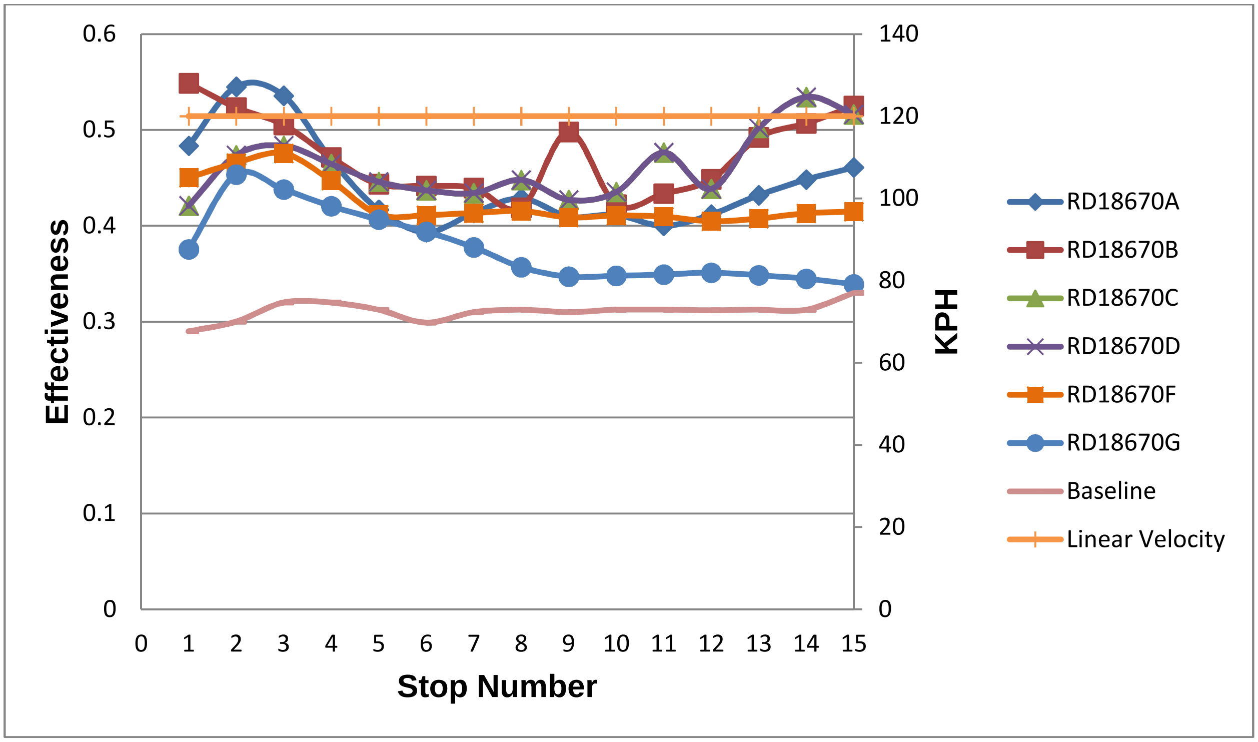


Figure 46 Direct comparison of graphite "fade"

Figure 47 allows for a direct visual comparison of the thickness losses between the sample material formulations. It can be seen that the baseline sample displayed the lowest amount of material loss. Sample RD18670G (labeled simply G), displayed the

highest amount of thickness loss throughout the testing with sample RD18670F (labeled F), was most comparable to the baseline wear.

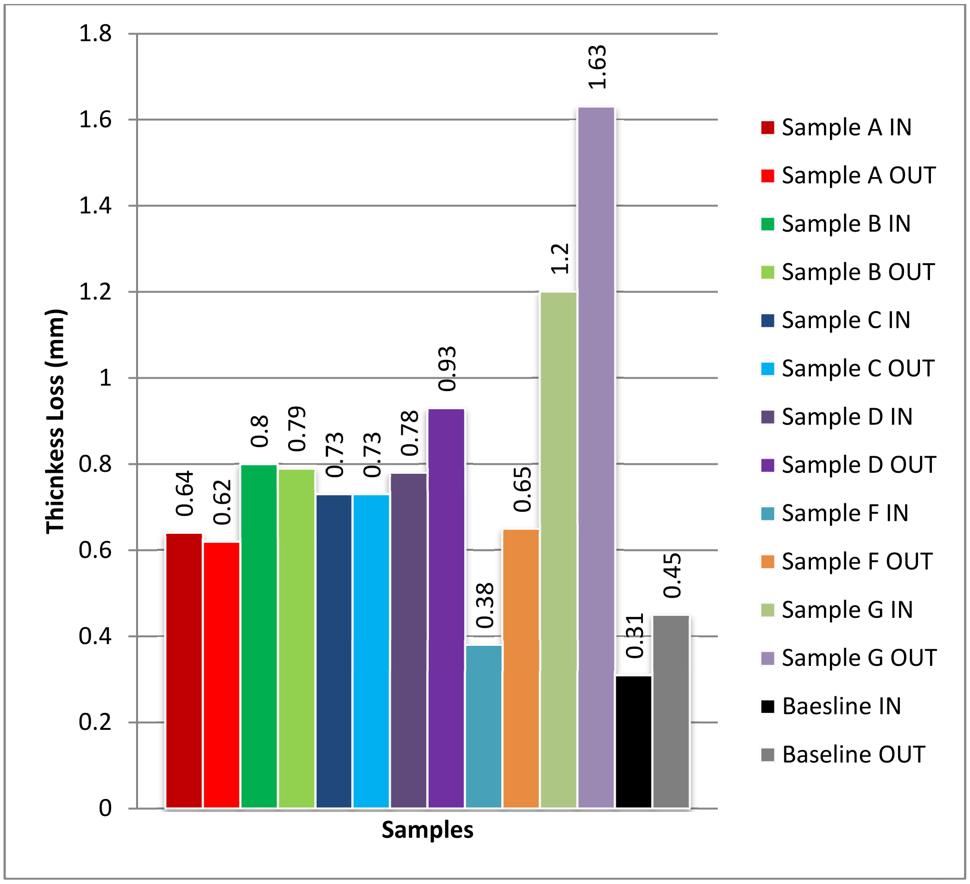


Figure 47 Pad thickness loss comparison after SAE J2430 testing

Figure 48 displays the mass loss of each friction material sample throughout the SAE J2430 testing. It can be seen that thickness loss cannot be directly correlated with the mass loss throughout the testing. While sample RD18670A (labeled A) displayed the second lowest thickness loss, when analyzing mass it suffered the largest mass loss. This is due to the variation in density of the graphite used through the different

sample material and formulations. It is worth noting that RD18670F (F) displayed lower mass loss than the baseline sample.

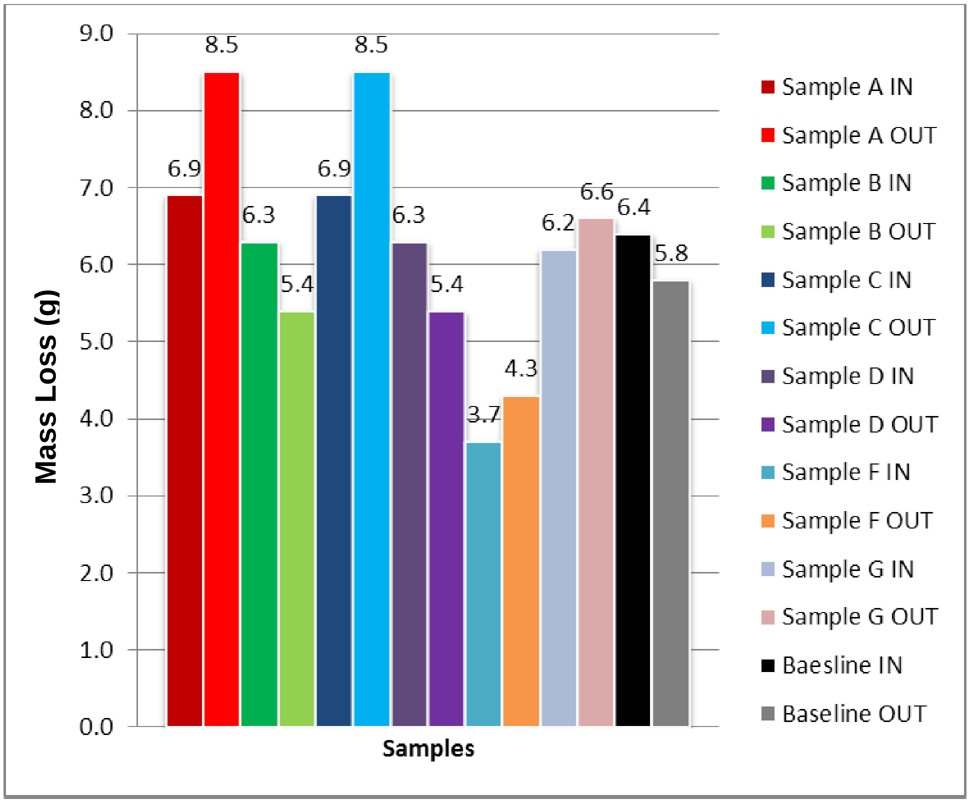


Figure 48 Pad mass loss comparison after SAE J2430 testing

Figure 49 Rotor Thickness Loss Comparison shows the data collected from the rotor thickness loss thought out the J2430 testing of the samples. It can be seen that sample RD18670B (labeled B) was the most aggressive material on the rotor due to the thickness loss of 0.055mm. Sample RD18670C (C) at a loss of 0.009mm and RD18670F (F) loss of 0.011 were lower than the baseline wear rate of 0.013mm.

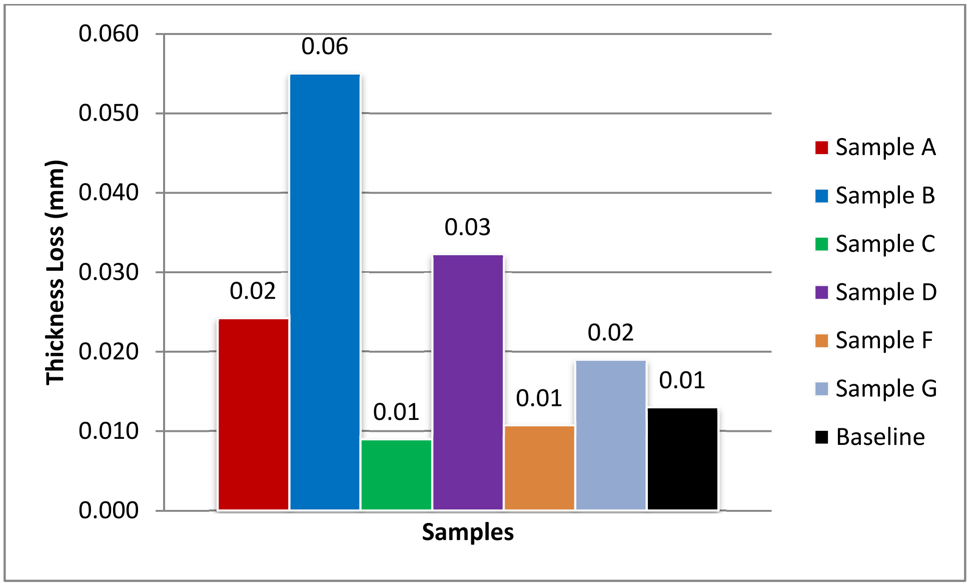


Figure 49 Rotor Thickness Loss Comparison

Figure 50 is a series images showing details of the friction surface of samples A and D, respectively. The cross with indication of “Spectrum 1” shows the location of performance x-ray microanalysis SEM allows a glimpse into how the surface is reacting to the engagements at the micro scale for a better understanding of the complex physical/chemical processes occurring during friction. It is apparent that the center of the material shown in Figure 50a is raised/elevated when compared to the surroundings, so the friction process obviously happens on selected contact areas only. The actual contact patch of the material with the rotor is much smaller than the apparent area of a pad which can cause some instability due to concentrated thermo-physical stresses. In the image of sample A, one can see wear mechanisms such as abrasion, more specifically plowing, which is represented by the streaks running in the direction of friction motion, these are best visible on the center raised portion of the friction surface. This is a wear mechanism that acts similar to machining a surface, and is accompanied

by a faster removal of the material when compared to the adhesive wear with considerable plastic deformation of steel chips. Sample RD18670D in Figure 50b also shows different wear mechanisms, part of the inspected friction surface showed signs of glazing, related to localized melting processes. Along with glazing, one can see that the contact surface of sample D shows different morphology. In addition, the steel chips, which were stripped of friction layer, and which are “lowered” with respect to the contacting surfaces show considerable plastic deformation visible as vertical lines. These differences explain the detected differences in friction levels of A and D, since the characteristics of the friction material are dependent on the “zone 1” layer that is formed. The zone 1 layer refers to the contact patch between the friction lining material and the rotor, creating a lubricating surface. These differences caused by thermo-physical processes and chemical composition are what alter this zone 1 layer, creating different performance characteristics.

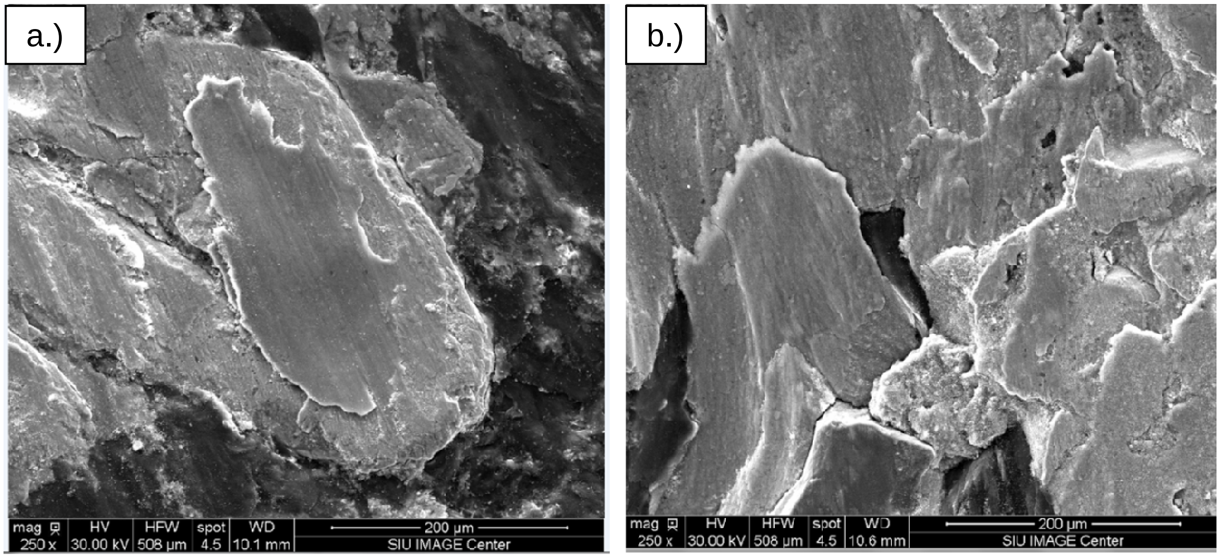


Figure 50 SEM Images of pad samples RD18670A (a.) and RD18670D (b.) subjected to J2430 brake dynamometer test.

Sample RD18670F proved to be the most promising Cu-free replacement for the baseline 1999 Ford Crown Victoria friction lining. This is due to a higher average effectiveness value of 0.5, during both the high speed and low speed testing, than the baseline friction lining material of 0.33. Also, RD18670F displayed comparable wear rates to the baseline test, with 0.38mm lost inboard and 0.65 lost outboard, representing a difference of only 0.07mm and 0.2mm respectively from the baseline.

The differences in performance characteristics are most likely the result of chemical reactions taking place during the heating of the material. Different wear characteristics are the possible outcome of one graphite sample acting as a more efficient lubricant; or possible oxidizing, creating carbide resulting in higher wear resilience and a raise in effectiveness values.

Possible work for the future could be to explore the specifications on the three supplementary graphite samples RD18670E, RD18670F, and RD18670G to obtain a better understanding of how the performance characteristics are affected by morphology and particle size. An analysis using a technique such as x-ray diffraction that could detect the chemical compounds would give more insight into what chemical processes took place under the stop engagements. This would give a better understanding of why sample F had the best performance and could influence the exploration of more graphite samples.

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APPENDICES

Raw Data: Samples RD18670A, RD18670B, RD18670C, RD18670D, RD18670E, RD18670F respectively

Test: 136352-1								
Chrono	StpNum	50 AvgDst	52 Min	53 Max	AvgTime	AvgDist	AvgTime	BrkSpd (l)
		Effectiveness - A	Effectiveness - A	Effectiveness - A	Torque - A	Temperature #1A	Record Pressure - A	None
Sect:Recd	unitless	unitless			N·m	°C	MN/m²	kph
0999:0001	1	0	0	0	-19.8	-17.78	0.3265	0.12
0999:0002	2	0	0	0	-19.8	-17.78	3.3387	0.12
0999:0003	3	0	0	0	-20	-17.78	3.4028	0.12
0999:0004	4	0	0	0	-19.7	-17.78	3.4236	0
0999:0005	5	0	0	0	-23.8	-17.78	3.3906	0
0999:0006	6	0	0	0	-23.3	-17.78	3.4028	0
0999:0007	7	0	0	0	-22.6	-17.78	3.4083	0
0999:0008	8	0	0	0	-24.1	-17.78	3.4211	0
0999:0009	9	0	0	0	-23.8	-17.78	3.412	0.12
0999:0010	10	0	0	0	-22.2	-17.78	3.423	0
0999:0011	11	0	0	0	-20	-17.78	3.4486	0
0999:0012	12	0	0	0	-20	-17.78	3.4462	0
0999:0013	13	0	0	0	-20	-17.78	3.4437	0
0999:0014	14	0	0	0	-20	-17.78	3.4449	0.12
0999:0015	15	0	0	0	-20	-17.78	3.4449	0
0999:0016	16	0	0	0	-20	-17.78	3.4449	0
0999:00	17	0	0	0	-20	-17.78	6.7617	0

17								
0999:00 18	18	0	0	0	-20	-17.78	6.7629	0
0999:00 19	19	0	0	0	-20	-17.78	6.7617	0
0999:00 20	20	0	0	0	-20	-17.78	3.5987	0
0999:00 21	21	0	0	0	-20	-17.78	3.4449	0
0999:00 22	22	0	0	0	-20	-17.78	3.4449	0
0999:00 23	23	0	0	0	-20	-17.78	3.4449	0
0999:00 24	24	0	0	0	-23.1	-17.78	3.379	0
0999:00 25	25	0	0	0	-24.8	-17.78	3.368	0
0999:00 26	26	0	0	0	-19.8	-17.78	3.4486	0
0999:00 27	27	0	0	0	-19.8	-17.78	3.4449	0
0999:00 28	28	0	0	0	-19.8	-17.78	3.4443	0
0999:00 29	29	0	0	0	-19.8	-17.78	3.448	0
0999:00 30	30	0	0	0	-19.8	-17.78	3.4449	0
0999:00 31	31	0	0	0	-20	-17.78	3.4486	0
0999:00 32	32	0	0	0	-20	-17.78	3.4455	0
0999:00 33	33	0	0	0	-19.8	-17.78	3.4455	0
0999:00 34	34	0	0	0	-19.8	-17.78	3.4455	0
0999:00 35	35	0	0	0	-20	-17.78	3.4486	0
0999:00 36	36	0	0	0	-20	-17.78	3.4449	0
0999:00 37	37	0	0	0	-20	-17.78	3.4431	0
0999:00 38	38	0	0	0	-20	-17.78	3.4419	0
0999:00 39	39	0	0	0	-20	-17.78	3.4437	0.12

0999:00 40	40	0	0	0	-20	-17.78	3.4394	0
0999:00 41	41	0	0	0	-20	-17.78	3.4376	0
0999:00 42	42	0	0	0	-20	-17.78	3.4449	0
0999:00 43	43	0	0	0	-20	-17.78	3.4443	0
0999:00 44	44	0	0	0	-20	-17.78	3.4455	0
0999:00 45	45	0	0	0	-20	-17.78	3.4449	0
0999:00 46	46	0	0	0	-20	-17.78	3.4504	0
0002:00 01	1	0.20331	0	0.22027	852.7	19.5	4.5045	49.92
0002:00 02	2	0.22656	0	0.23658	848.4	32.76	4.0895	50.16
0002:00 03	3	0.23936	0	0.26096	846.2	48.55	3.8844	49.92
0002:00 04	4	0.24912	0	0.26812	844.6	59.82	3.7379	49.92
0002:00 05	5	0.25779	0	0.2761	842.4	70.85	3.614	49.92
0003:00 01	1	0.28417	0	0.30945	843.4	97.91	3.2917	99.71
0003:00 02	2	0.30451	0	0.34047	844.4	120.9	3.0805	99.71
0003:00 03	3	0.31102	0	0.36372	846.2	119.11	2.9243	99.58
0003:00 04	4	0.34559	0	0.4195	850.3	128.96	2.635	99.58
0003:00 05	5	0.37799	0	0.45538	850.1	119.23	2.4104	99.71
0004:00 01	1	0.38137	0	0.44145	802.6	104.26	2.2742	49.67
0004:00 02	2	0.38294	0	0.4284	806.2	103.48	2.2755	49.54
0004:00 03	3	0.38723	0	0.44982	814.3	103.03	2.2742	49.67
0005:00 01	1	0.36112	0	0.37721	1768.2	99.82	5.461	49.67
0005:00 02	2	0.35075	0	0.3838	1645.4	99.54	5.1161	49.67
0005:00	3	0.36411	0	0.38181	1790.4	99.66	5.3902	49.67

03								
0005:00 04	4	0.37122	0	0.40154	1739.8	99.86	5.0905	49.67
0005:00 05	5	0.37938	0	0.40927	1834.1	99.54	5.2895	49.67
0006:00 01	1	0.33895	0	0.39734	2159.4	105.72	8.016	99.71
0006:00 02	2	0.2915	0	0.32945	2067.2	107.02	8.2388	99.58
0006:00 03	3	0.29766	0	0.32151	2118.5	106.49	8.0624	99.71
0006:00 04	4	0.3111	0	0.33808	2145.9	106.37	7.7706	99.58
0006:00 05	5	0.32091	0	0.55974	2177.1	105.64	7.5173	99.58
0007:00 01	1	0.36758	0	0.4716	855	134.25	2.4653	79.91
0007:00 02	2	0.40692	0	0.53324	849.4	141.65	2.2059	80.41
0007:00 03	3	0.43677	0	0.55549	847.5	145.68	2.0612	80.54
0007:00 04	4	0.46444	0	0.55922	850	149.46	1.963	80.54
0007:00 05	5	0.47147	0	0.57445	846	152.39	1.9239	80.54
0007:00 06	6	0.48726	0	0.59089	848.8	156.79	1.8854	80.91
0007:00 07	7	0.4837	0	0.59071	846.2	158.13	1.8915	80.54
0007:00 08	8	0.48956	0	0.58408	847.7	159.8	1.8812	80.54
0007:00 09	9	0.48487	0	0.56291	849.3	160.86	1.9001	80.54
0007:00 10	10	0.48114	0	0.58343	847.2	162.04	1.9031	80.54
0007:00 11	11	0.48435	0	0.562	848.2	164.32	1.8976	80.54
0007:00 12	12	0.47654	0	0.57341	845.7	163.46	1.9117	80.54
0007:00 13	13	0.48253	0	0.59132	848.4	165.46	1.9019	80.54
0007:00 14	14	0.47958	0	0.58876	849.1	163.87	1.9123	80.54
0007:00 15	15	0.47932	0	0.58165	848.4	165.01	1.9117	80.41

0007:00 16	16	0.47624	0	0.58915	850	164.84	1.9239	80.54
0007:00 17	17	0.47186	0	0.57957	847.2	163.66	1.9306	80.54
0007:00 18	18	0.4752	0	0.55371	848.8	165.33	1.9251	80.29
0007:00 19	19	0.47238	0	0.55436	849.4	163.99	1.933	80.29
0007:00 20	20	0.47377	0	0.55896	848.8	165.05	1.9294	80.29
0007:00 21	21	0.46861	0	0.57375	847.9	163.18	1.9416	80.29
0007:00 22	22	0.47286	0	0.59228	848.2	164.48	1.9318	80.16
0007:00 23	23	0.46999	0	0.57328	849.8	163.83	1.9434	80.29
0007:00 24	24	0.47229	0	0.56816	849.1	164.93	1.9349	80.16
0007:00 25	25	0.4716	0	0.60754	848.8	164.23	1.9361	80.16
0007:00 26	26	0.46527	0	0.55913	847.4	162.53	1.9514	80.16
0007:00 27	27	0.46986	0	0.56881	849.4	164.11	1.9416	80.29
0007:00 28	28	0.46409	0	0.58447	846.9	162.77	1.952	80.16
0007:00 29	29	0.46917	0	0.58854	848.9	163.91	1.9428	80.16
0007:00 30	30	0.46501	0	0.5767	850	162.77	1.9575	80.29
0007:00 31	31	0.46978	0	0.58182	849.6	163.22	1.9404	79.79
0007:00 32	32	0.4644	0	0.59293	850	162.48	1.9605	80.29
0007:00 33	33	0.46735	0	0.56981	849.3	163.05	1.9489	80.16
0007:00 34	34	0.46449	0	0.55193	850	161.92	1.9587	80.29
0007:00 35	35	0.46817	0	0.56499	849.1	162.77	1.9428	80.29
0007:00 36	36	0.46657	0	0.58529	849.4	163.22	1.9501	80.29
0007:00 37	37	0.466	0	0.59206	849.4	162.57	1.9507	80.29
0007:00	38	0.466	0	0.58924	849.6	162.85	1.9514	80.29

38								
0007:00 39	39	0.45945	0	0.6134	845.3	161.71	1.9599	80.41
0007:00 40	40	0.46544	0	0.60073	849.4	163.01	1.9514	80.16
0007:00 41	41	0.45993	0	0.56382	847.7	161.02	1.9642	80.29
0007:00 42	42	0.46527	0	0.56048	850	162.73	1.9526	80.29
0007:00 43	43	0.46049	0	0.58134	848.2	161.35	1.9599	80.16
0007:00 44	44	0.46809	0	0.59891	849.4	161.39	1.9391	80.66
0007:00 45	45	0.46488	0	0.60295	849.6	161.06	1.9471	80.16
0007:00 46	46	0.46236	0	0.62199	848.8	159.92	1.9556	80.29
0007:00 47	47	0.46383	0	0.60689	849.8	160.9	1.9556	80.29
0007:00 48	48	0.46726	0	0.57466	849.3	161.71	1.9416	80.29
0007:00 49	49	0.46128	0	0.56673	847.2	160.98	1.9532	80.29
0007:00 50	50	0.4657	0	0.59011	850	161.92	1.9471	80.16
0007:00 51	51	0.46366	0	0.58312	850.5	161.3	1.9532	80.29
0007:00 52	52	0.46401	0	0.6193	849.4	161.14	1.9507	80.16
0007:00 53	53	0.4608	0	0.60603	849.1	160.08	1.9575	80.29
0007:00 54	54	0.46622	0	0.61505	850.1	160.78	1.941	80.29
0007:00 55	55	0.46548	0	0.59588	850.1	159.51	1.941	80.29
0007:00 56	56	0.47069	0	0.57406	849.8	160.04	1.9269	80.29
0007:00 57	57	0.46626	0	0.55874	848.1	159.43	1.933	80.29
0007:00 58	58	0.47329	0	0.57445	849.1	160.82	1.9178	80.29
0007:00 59	59	0.46908	0	0.60472	850.1	159.31	1.9312	80.29
0007:00 60	60	0.47364	0	0.61605	849.6	160.78	1.9153	80.29

0007:00 61	61	0.47177	0	0.60711	850.8	159.56	1.9214	80.29
0007:00 62	62	0.4752	0	0.61119	850.1	159.92	1.9068	80.29
0007:00 63	63	0.4726	0	0.59284	849.4	159.76	1.9129	80.41
0007:00 64	64	0.47724	0	0.59158	850	161.59	1.8995	80.29
0007:00 65	65	0.47021	0	0.57518	848.1	160.57	1.9147	80.29
0007:00 66	66	0.47355	0	0.58477	850.3	161.67	1.9129	80.29
0007:00 67	67	0.46596	0	0.599	847.2	159.68	1.9318	80.29
0007:00 68	68	0.46969	0	0.59622	850	162.2	1.9282	80.29
0007:00 69	69	0.46743	0	0.61149	849.8	161.43	1.9373	80.16
0007:00 70	70	0.46349	0	0.59653	849.8	160.98	1.9532	80.16
0007:00 71	71	0.46032	0	0.6203	847.5	159.84	1.9526	80.16
0007:00 72	72	0.4647	0	0.59835	849.8	161.14	1.9465	80.29
0007:00 73	73	0.46462	0	0.57991	850.1	161.39	1.9471	80.29
0007:00 74	74	0.46219	0	0.57171	849.8	160.98	1.955	80.29
0007:00 75	75	0.46088	0	0.59405	850	161.43	1.9605	80.29
0007:00 76	76	0.46102	0	0.58694	849.8	160.69	1.9593	80.29
0007:00 77	77	0.46102	0	0.61314	849.8	160.78	1.9587	80.29
0007:00 78	78	0.45867	0	0.63444	849.8	159.31	1.9636	80.29
0007:00 79	79	0.4618	0	0.60125	850.3	160.25	1.9544	80.41
0007:00 80	80	0.46214	0	0.60164	850.5	158.86	1.952	80.29
0007:00 81	81	0.46462	0	0.59102	849.6	158.58	1.941	80.29
0007:00 82	82	0.46036	0	0.58729	848.1	157.68	1.9495	80.29
0007:00	83	0.46492	0	0.57857	850	158.99	1.9385	80.16

83								
0007:00 84	84	0.46375	0	0.58573	851.2	159.43	1.9452	80.29
0007:00 85	85	0.46809	0	0.59388	849.4	160.21	1.9294	80.41
0007:00 86	86	0.46344	0	0.62815	848.1	159.15	1.941	80.54
0007:00 87	87	0.46995	0	0.60707	850	161.87	1.9221	80.41
0007:00 88	88	0.4667	0	0.60863	848.2	159.39	1.9245	80.54
0007:00 89	89	0.47459	0	0.60394	849.8	160.69	1.9068	80.54
0007:00 90	90	0.47776	0	0.61067	849.8	161.22	1.8958	80.54
0007:00 91	91	0.4749	0	0.58607	850.8	160.37	1.908	80.41
0007:00 92	92	0.47824	0	0.59392	850	161.1	1.8958	80.54
0007:00 93	93	0.47451	0	0.61075	850.3	159.15	1.9062	80.41
0007:00 94	94	0.47607	0	0.61817	850.1	160.78	1.9025	80.54
0007:00 95	95	0.47316	0	0.62863	851	160.04	1.9123	80.41
0007:00 96	96	0.47338	0	0.60724	850.5	159.47	1.9074	80.41
0007:00 97	97	0.47138	0	0.63114	850.8	159.35	1.916	80.54
0007:00 98	98	0.47398	0	0.60976	850	161.22	1.908	80.54
0007:00 99	99	0.4654	0	0.57887	847.5	158.58	1.9294	80.54
0007:01 00	100	0.47117	0	0.57744	849.8	161.1	1.9202	80.29
0007:01 01	101	0.47225	0	0.58343	850	162.32	1.9153	80.29
0007:01 02	102	0.46921	0	0.60017	850.3	161.67	1.9269	80.29
0007:01 03	103	0.46926	0	0.62129	850	161.55	1.9245	80.16
0007:01 04	104	0.46214	0	0.61041	848.6	159.88	1.944	80.16
0007:01 05	105	0.46774	0	0.60685	850	160.74	1.9294	80.29

0007:01 06	106	0.46631	0	0.60603	851.2	160.21	1.9355	80.29
0007:01 07	107	0.46982	0	0.60806	850.1	158.82	1.9239	80.29
0007:01 08	108	0.46639	0	0.58191	849.4	158.13	1.9306	80.29
0007:01 09	109	0.47143	0	0.58056	849.6	159.96	1.9153	80.29
0007:01 10	110	0.46878	0	0.59822	850.1	158.94	1.9245	80.29
0007:01 11	111	0.47377	0	0.61444	850	160.17	1.9086	80.29
0007:01 12	112	0.47242	0	0.63127	849.8	161.96	1.9129	80.29
0007:01 13	113	0.47255	0	0.64164	850.1	162.81	1.9117	80.16
0007:01 14	114	0.47602	0	0.62741	849.6	160.57	1.8976	80.29
0007:01 15	115	0.4755	0	0.62489	850.8	162.69	1.8995	80.29
0007:01 16	116	0.47936	0	0.6036	850.5	162.53	1.8836	80.29
0007:01 17	117	0.47412	0	0.5911	848.8	161.3	1.8928	80.29
0007:01 18	118	0.48132	0	0.59314	850.5	161.83	1.8769	80.16
0007:01 19	119	0.47984	0	0.62568	850.3	160.94	1.8793	80.16
0007:01 20	120	0.4788	0	0.64081	850.5	162.16	1.8909	80.29
0007:01 21	121	0.4703	0	0.61366	848.2	159.68	1.9123	80.29
0007:01 22	122	0.47537	0	0.61579	849.6	161.26	1.9001	80.29
0007:01 23	123	0.46965	0	0.6455	849.6	158.13	1.9147	80.29
0007:01 24	124	0.47711	0	0.62659	850.1	161.59	1.8946	80.16
0007:01 25	125	0.47815	0	0.58625	849.8	159.68	1.894	80.29
0007:01 26	126	0.47117	0	0.57653	850.5	158.09	1.9172	80.29
0007:01 27	127	0.47359	0	0.5823	850	159.15	1.9086	80.29
0007:01	128	0.47212	0	0.60342	849.3	158.54	1.9037	80.29

28								
0007:01 29	129	0.47997	0	0.61726	850.3	158.01	1.883	80.16
0007:01 30	130	0.4713	0	0.61414	849.3	159.07	1.9068	80.16
0007:01 31	131	0.47698	0	0.61479	850.3	159.6	1.8934	80.29
0007:01 32	132	0.47615	0	0.62333	850.3	160.29	1.8946	80.29
0007:01 33	133	0.47546	0	0.62273	850.1	159.47	1.8964	80.16
0007:01 34	134	0.47455	0	0.60438	850.1	160.65	1.9007	80.29
0007:01 35	135	0.4713	0	0.58087	851.2	160.17	1.9141	80.16
0007:01 36	136	0.47481	0	0.60442	850.3	162.08	1.9001	80.29
0007:01 37	137	0.47086	0	0.60121	851.2	162	1.9141	80.16
0007:01 38	138	0.47442	0	0.64767	850	163.79	1.9001	80.29
0007:01 39	139	0.47069	0	0.62299	849.6	162.65	1.9098	80.16
0007:01 40	140	0.47307	0	0.60845	849.8	166.84	1.9086	80.29
0007:01 41	141	0.47581	0	0.60707	850	166.35	1.8995	79.54
0007:01 42	142	0.4775	0	0.60477	850	167.04	1.8964	80.29
0007:01 43	143	0.4765	0	0.58494	850	165.05	1.9007	80.29
0007:01 44	144	0.46874	0	0.58191	847.5	162.61	1.9184	80.29
0007:01 45	145	0.47472	0	0.58004	849.8	162.81	1.9062	80.29
0007:01 46	146	0.47134	0	0.62394	850.1	162.57	1.9202	80.29
0007:01 47	147	0.47403	0	0.61891	849.6	164.11	1.9117	80.29
0007:01 48	148	0.47169	0	0.61726	849.6	165.21	1.9178	80.29
0007:01 49	149	0.46973	0	0.6065	849.8	164.4	1.9221	80.29
0007:01 50	150	0.46219	0	0.61314	849.3	163.26	1.944	80.29

0007:01 51	151	0.46418	0	0.61288	850	164.4	1.9398	80.41
0007:01 52	152	0.46219	0	0.58612	850.3	163.42	1.9489	80.04
0007:01 53	153	0.45624	0	0.57271	847.9	162.69	1.9599	80.29
0007:01 54	154	0.46049	0	0.59093	850.5	163.87	1.9526	80.16
0007:01 55	155	0.45538	0	0.60169	850	163.62	1.9684	80.16
0007:01 56	156	0.45954	0	0.58867	850.7	164.48	1.9587	80.66
0007:01 57	157	0.45607	0	0.60698	847.9	162.97	1.9593	80.29
0007:01 58	158	0.46561	0	0.58685	850.7	163.14	1.9355	80.16
0007:01 59	159	0.45954	0	0.61453	848.6	162.24	1.9483	80.29
0007:01 60	160	0.46626	0	0.61474	850	163.87	1.9306	80.29
0007:01 61	161	0.46587	0	0.59778	850.5	164.6	1.9355	80.29
0007:01 62	162	0.46748	0	0.58568	849.8	165.9	1.9251	80.29
0007:01 63	163	0.47537	0	0.59132	850.1	169.81	1.9013	79.54
0007:01 64	164	0.47195	0	0.60559	850.1	162.57	1.9117	80.16
0007:01 65	165	0.47446	0	0.60533	850.1	166.59	1.9062	80.16
0007:01 66	166	0.46687	0	0.61522	847.9	162.53	1.9239	80.29
0007:01 67	167	0.47238	0	0.63617	850.1	163.99	1.9111	80.29
0007:01 68	168	0.47012	0	0.60568	847.9	162.57	1.9117	79.79
0007:01 69	169	0.47832	0	0.63461	850.1	164.03	1.8867	80.54
0007:01 70	170	0.48327	0	0.60546	849.6	164.15	1.8702	80.41
0007:01 71	171	0.48088	0	0.60282	850.5	165.05	1.8763	80.54
0007:01 72	172	0.4824	0	0.59683	850.1	164.07	1.8714	80.54
0007:01	173	0.47459	0	0.61093	850	165.66	1.8983	80.41

73								
0007:01 74	174	0.47962	0	0.61422	850.3	167.08	1.8854	80.54
0007:01 75	175	0.48001	0	0.63314	849.8	168.55	1.8812	80.66
0007:01 76	176	0.47585	0	0.61522	850.3	165.01	1.8976	80.54
0007:01 77	177	0.47659	0	0.62394	850	165.94	1.894	80.54
0007:01 78	178	0.4732	0	0.62511	851	165.21	1.9074	80.54
0007:01 79	179	0.47316	0	0.5905	850	165.37	1.9056	80.54
0007:01 80	180	0.46583	0	0.58776	850	161.92	1.9282	80.54
0007:01 81	181	0.47338	0	0.59115	849.6	163.3	1.9068	80.54
0007:01 82	182	0.46947	0	0.59514	850.7	164.4	1.9184	80.54
0007:01 83	183	0.47472	0	0.62346	850.5	165.01	1.9037	80.54
0007:01 84	184	0.47602	0	0.61635	850	168.22	1.8995	80.29
0007:01 85	185	0.47468	0	0.62182	850.8	164.03	1.9025	80.16
0007:01 86	186	0.47828	0	0.63296	849.8	167.65	1.8848	80.29
0007:01 87	187	0.47325	0	0.65608	851.5	165.21	1.9056	80.16
0007:01 88	188	0.48123	0	0.59661	850	164.48	1.8775	79.54
0007:01 89	189	0.47811	0	0.60902	851.5	162.4	1.8879	80.29
0007:01 90	190	0.48374	0	0.60741	850.3	163.87	1.8683	80.29
0007:01 91	191	0.47715	0	0.61227	847.9	161.55	1.8812	80.29
0007:01 92	192	0.48778	0	0.63917	850	161.92	1.8519	80.16
0007:01 93	193	0.48374	0	0.63552	850	162.2	1.8659	80.29
0007:01 94	194	0.47767	0	0.64802	849.3	160.33	1.8738	80.16
0007:01 95	195	0.49003	0	0.64511	850.8	160.78	1.8427	80.04

0007:0196	196	0.48361	0	0.67422	851.9	159.88	1.8592	80.16
0007:0197	197	0.49463	0	0.64507	851.5	160.86	1.8244	80.29
0007:0198	198	0.48444	0	0.62082	847.7	160.94	1.8421	80.16
0007:0199	199	0.48101	0	0.62884	850	160.53	1.861	80.29
0007:0200	200	0.48661	0	0.64528	851.3	162.28	1.8488	80.29
0008:0001	1	0.39903	0	0.44679	1954.1	101.37	5.1265	49.54
0008:0002	2	0.40779	0	0.44622	1826.8	100.96	4.6883	49.79
0008:0003	3	0.41369	0	0.44965	1976.6	101.16	5.0594	49.67
0008:0004	4	0.4074	0	0.45117	1829.2	100.55	4.6925	49.67
0008:0005	5	0.4166	0	0.46036	1979.4	101	5.0343	50.04
0009:0001	1	0.41126	0	0.44939	2459.4	109.99	6.6024	99.58
0009:0002	2	0.41686	0	0.44596	2612	110.48	6.9631	99.58
0009:0003	3	0.40029	0	0.45316	2497.8	110.16	7.1621	99.46
0009:0004	4	0.37439	0	0.4215	2386.4	110.12	7.4337	99.58
0009:0005	5	0.35153	0	0.40311	2285.2	111.3	7.6229	99.58
0010:0001	1	0.35088	0	0.4094	1696.8	119.8	5.3163	99.58
0010:0002	2	0.37287	0	0.43855	1737.5	121.59	5.0185	99.58
0010:0003	3	0.40376	0	0.45993	1775.4	124.85	4.7255	99.71
0010:0004	4	0.43308	0	0.50318	1782.9	124.11	4.4105	99.58
0010:0005	5	0.45538	0	0.5381	1786.3	129.16	4.1719	99.71
0010:0006	6	0.4729	0	0.55098	1790.6	126.03	4.0181	99.58
0011:0001	1	0.37734	0	0.4834	862	63.28	2.4946	120.37
0011:00	2	0.44418	0	0.54491	857.7	88.71	2.107	120.49

02								
0011:00 03	3	0.46162	0	0.53558	852.2	117.32	2.0191	120.49
0011:00 04	4	0.41035	0	0.469	845.1	155.53	2.2773	120.62
0011:00 05	5	0.35986	0	0.41673	842	187.14	2.5941	120.37
0011:00 06	6	0.35049	0	0.39339	841.2	210.5	2.671	120.49
0011:00 07	7	0.34819	0	0.41334	840	232.64	2.685	120.49
0011:00 08	8	0.34515	0	0.42866	839.1	253.15	2.7003	120.49
0011:00 09	9	0.34554	0	0.40966	837.4	270.68	2.6923	120.49
0011:00 10	10	0.34316	0	0.41139	839.6	286.88	2.7119	120.49
0011:00 11	11	0.3468	0	0.3999	840.3	301.53	2.6893	120.37
0011:00 12	12	0.35574	0	0.41191	838.2	311.7	2.6228	120.49
0011:00 13	13	0.36762	0	0.43187	842.2	324.8	2.5465	120.37
0011:00 14	14	0.37912	0	0.44826	843.4	334.69	2.4616	120.62
0011:00 15	15	0.38697	0	0.4608	844.1	342.54	2.4073	120.62
0012:00 01	1	0.36958	0	0.40992	1249.1	356.38	3.9851	99.83
0012:00 02	2	0.28738	0	0.38068	1976.5	362.85	9.6182	99.83
0014:00 01	1	0.30698	0	0.34962	850.3	244.15	3.0213	50.04
0014:00 02	2	0.36003	0	0.39846	843.1	210.91	2.5648	49.79
0014:00 03	3	0.38393	0	0.41738	846.5	176.48	2.4305	49.79
0014:00 04	4	0.39916	0	0.44314	852.2	151.25	2.3243	49.92
0015:00 01	1	0.34411	0	0.50296	2185.1	145.92	7.8805	99.83
0015:00 02	2	0.32915	0	0.38576	2134.4	165.5	8.0233	99.83
0016:00 01	1	0.37925	0	0.44661	853.2	104.17	2.4329	80.54

0016:00 02	2	0.39742	0	0.48171	854.4	115.53	2.3103	80.54
0016:00 03	3	0.43009	0	0.55935	854.3	124.93	2.1314	80.54
0016:00 04	4	0.46462	0	0.58772	852.9	131.76	1.9489	80.41
0016:00 05	5	0.49077	0	0.66133	852.5	138.52	1.8415	80.54
0016:00 06	6	0.49671	0	0.63752	853.6	144.3	1.8213	80.29
0016:00 07	7	0.4932	0	0.60108	851.2	149.06	1.8384	80.16
0016:00 08	8	0.47941	0	0.59627	848.1	152.6	1.8793	80.29
0016:00 09	9	0.48617	0	0.62077	850.5	155.85	1.8683	80.16
0016:00 10	10	0.47988	0	0.65274	847	157.68	1.8775	80.16
0016:00 11	11	0.48214	0	0.59557	850.3	160.9	1.8848	80.16
0016:00 12	12	0.47199	0	0.61032	847.5	161.87	1.9098	80.16
0016:00 13	13	0.47485	0	0.59956	850.5	164.07	1.9092	80.16
0016:00 14	14	0.46752	0	0.59206	848.2	164.23	1.9214	80.29
0016:00 15	15	0.4739	0	0.59388	850.8	167.04	1.9092	80.04
0016:00 16	16	0.46713	0	0.59366	849.4	167.49	1.9239	80.16
0016:00 17	17	0.4673	0	0.61891	851.7	168.26	1.93	80.29
0016:00 18	18	0.45798	0	0.62503	850.3	167.65	1.9562	80.16
0016:00 19	19	0.46015	0	0.61383	852	168.39	1.955	80.29
0016:00 20	20	0.45312	0	0.61557	849.4	167.77	1.9672	80.16
0016:00 21	21	0.44874	0	0.62103	848.8	168.14	1.98	80.29
0016:00 22	22	0.44657	0	0.60078	849.4	168.67	1.9874	80.16
0016:00 23	23	0.44431	0	0.59418	850.5	169.12	1.9953	80.29
0016:00	24	0.44648	0	0.59522	853.1	170.54	1.9947	80.29

24								
0016:00 25	25	0.43733	0	0.61153	851.7	169.77	2.0264	80.29
0016:00 26	26	0.43373	0	0.6337	849.8	170.46	2.0344	80.16
0016:00 27	27	0.43108	0	0.65248	849.3	171.19	2.0423	80.29
0016:00 28	28	0.42922	0	0.63752	850.7	172.37	2.0569	80.29
0016:00 29	29	0.43017	0	0.64376	850.7	172.82	2.049	80.16
0016:00 30	30	0.43291	0	0.63344	852.9	173.59	2.049	80.16
0016:00 31	31	0.42601	0	0.60854	850.5	171.93	2.0655	80.16
0016:00 32	32	0.42766	0	0.59054	853.8	172.09	2.0698	80.16
0016:00 33	33	0.42466	0	0.6085	852.9	171.64	2.0759	80.16
0016:00 34	34	0.42466	0	0.65253	854.8	171.93	2.0795	80.16
0016:00 35	35	0.4215	0	0.62463	851.7	171.23	2.0844	80.29
0017:00 01	1	0.35652	0	0.44115	1829.6	100.96	5.204	49.67
0017:00 02	2	0.38857	0	0.60564	1799.7	100.92	4.7572	49.54
0017:00 03	3	0.41035	0	0.46171	1953.7	100.63	4.9831	49.54
0017:00 04	4	0.41317	0	0.47416	1849.2	100.67	4.6541	49.54
0017:00 05	5	0.42076	0	0.46613	1974.9	100.8	4.9312	49.54
0018:00 01	1	0.41885	0	0.4441	2561.1	103.65	6.9588	99.58
0018:00 02	2	0.40146	0	0.4729	2339.6	105.15	7.4679	99.58
0018:00 03	3	0.3724	0	0.45984	2218.2	105.6	7.7633	99.58
0018:00 04	4	0.3573	0	0.44228	2180.4	104.91	7.8689	99.58
0018:00 05	5	0.34988	0	0.41469	2165.1	105.19	7.9202	99.46
0019:00 01	1	0.31045	0	0.45581	2148.9	117.52	9.3783	158.83

0019:00 02	2	0.29419	0	0.45477	2121.3	115.81	9.4668	158.96
0019:00 03	3	0.30147	0	0.45598	2112.5	116.26	9.2404	159.08
0019:00 04	4	0.30494	0	0.43603	2129.2	115.89	9.2392	159.21
0019:00 05	5	0.30529	0	0.45937	2131.8	116.91	9.2459	158.83

Test: 136352-2								
Chrono	StpNum	50 AvgDst	52 Min	53 Max	AvgTime	AvgDist	AvgTime	BrkSpd (l)
		Effectiveness - A	Effectiveness - A	Effectiveness - A	Torque - A	Temperature #1A	Record Pressure - A	None
Sect:Recd	unitless	unitless			N·m	°C	MN/m²	kph
0999:00 01	1	0	0	0.00933	5.9	-17.78	3.3686	0
0999:00 02	2	0	0	0	6.2	-17.78	3.4236	0
0999:00 03	3	0	0	0	5	-17.78	3.3857	0
0999:00 04	4	0	0	0	6.2	-17.78	3.4205	0
0999:00 05	5	0	0	0	4.5	-17.78	0.4431	0
0999:00 06	6	0	0	0	4.8	-17.78	3.393	0
0999:00 07	7	0	0	0.01076	6	-17.78	3.4211	0
0999:00 08	8	0	0	0	6.2	-17.78	3.4205	0
0999:00 09	9	0	0	0	6.2	-17.78	6.7367	0
0999:00 10	10	0	0	0	4.8	-17.78	6.7025	0
0999:00 11	11	0	0	0	4.7	-17.78	6.5004	0
0999:00 12	12	0	0	0	6.2	-17.78	6.7391	0
0999:00	13	0	0	0	6.2	-17.78	6.7403	0

13								
0999:00 14	14	0	0	0	6.2	-17.78	6.7428	0
0999:00 15	15	0	0	0	6.2	-17.78	3.4205	0
0999:00 16	16	0	0	0	6.2	-17.78	3.4205	0
0999:00 17	17	0	0	0	6.2	-17.78	3.4211	0
0999:00 18	18	0	0	0	6.2	-17.78	3.4199	0
0999:00 19	19	0	0	0	6.2	-17.78	3.4205	0
0999:00 20	20	0	0	0.01015	6.2	-17.78	3.4199	0
0999:00 21	21	0	0	0	6.2	-17.78	3.4199	0
0999:00 22	22	0	0	0.0095	6.2	-17.78	3.4126	0
0999:00 23	23	0	0	0	6.2	-17.78	3.4156	0
0999:00 24	24	0	0	0	6.2	-17.78	3.4211	0
0999:00 25	25	0	0	0	6.2	-17.78	3.4156	0
0999:00 26	26	0	0	0	6.2	-17.78	3.4205	0
0999:00 27	27	0	0	0	6.2	-17.78	3.4077	0
0999:00 28	28	0	0	0.01028	6.4	-17.78	3.4205	0.12
0999:00 29	29	0	0	0	6.4	-17.78	3.4205	0
0999:00 30	30	0	0	0	4.1	-17.78	3.3638	0
0999:00 31	31	0	0	0	3.3	-17.78	3.3949	0
0999:00 32	32	0	0	0	5.9	-17.78	3.4199	0
0999:00 33	33	0	0	0	6.2	-17.78	3.4205	0
0999:00 34	34	0	0	0	6.2	-17.78	3.4217	0
0999:00 35	35	0	0	0	6.2	-17.78	3.4205	0

0999:00 36	36	0	0	0	6.2	-17.78	3.4217	0
0999:00 37	37	0	0	0	6.2	-17.78	3.4205	0
0999:00 38	38	0	0	0	6.2	-17.78	3.4205	0
0002:00 01	1	0.21077	0	0.2296	828.8	23.12	4.294	49.79
0002:00 02	2	0.22149	0	0.23797	840.5	34.55	4.2286	49.92
0002:00 03	3	0.22613	0	0.24604	834.4	43.95	4.1035	49.92
0002:00 04	4	0.2338	0	0.25805	826	51.93	3.9198	49.92
0002:00 05	5	0.24799	0	0.27107	841.5	60.47	3.7721	49.67
0003:00 01	1	0.26465	0	0.28907	840.1	72.96	3.5951	99.83
0003:00 02	2	0.27176	0	0.30768	840.1	107.35	3.5316	99.46
0003:00 03	3	0.25953	0	0.28364	845.1	109.99	3.628	99.71
0003:00 04	4	0.23697	0	0.28061	851.2	110.36	3.8429	99.46
0003:00 05	5	0.23485	0	0.29492	847.7	108.81	3.7873	99.58
0004:00 01	1	0.26924	0	0.31249	570.3	101.45	2.2755	49.79
0004:00 02	2	0.28655	0	0.33622	603.9	101.04	2.2761	49.79
0004:00 03	3	0.29952	0	0.34641	630.7	100.8	2.2755	49.42
0005:00 01	1	0.28664	0	0.30477	1569.6	99.41	5.9938	49.67
0005:00 02	2	0.28256	0	0.30156	1536.3	99.62	5.8577	49.67
0005:00 03	3	0.29015	0	0.31197	1582.5	99.62	5.8687	49.67
0005:00 04	4	0.29822	0	0.32425	1601.3	99.82	5.7613	49.54
0005:00 05	5	0.3059	0	0.33084	1634.8	99.58	5.7399	49.67
0006:00 01	1	0.26777	0	0.3029	1967.3	101.57	8.6575	99.21
0006:00	2	0.22344	0	0.3979	1811.3	103.48	8.5427	99.58

02								
0006:00 03	3	0.26517	0	0.34702	1964.9	104.3	8.0886	99.71
0006:00 04	4	0.27128	0	0.31167	2094.7	104.62	8.1167	99.83
0006:00 05	5	0.28924	0	0.33136	2168.7	104.38	7.9147	99.71
0007:00 01	1	0.36112	0	0.45099	858.1	131.84	2.5422	80.54
0007:00 02	2	0.39504	0	0.49038	855.8	139.86	2.3231	80.54
0007:00 03	3	0.40831	0	0.5125	847	144.74	2.2217	80.54
0007:00 04	4	0.4264	0	0.51849	852.9	149.71	2.1766	80.54
0007:00 05	5	0.42618	0	0.48912	852	153.74	2.1845	80.16
0007:00 06	6	0.4172	0	0.49945	844.6	156.42	2.2065	80.29
0007:00 07	7	0.41759	0	0.49121	848.2	160.17	2.234	79.91
0007:00 08	8	0.41399	0	0.4988	845.5	162.12	2.2413	80.29
0007:00 09	9	0.41664	0	0.48956	847.2	163.83	2.2382	80.16
0007:00 10	10	0.42302	0	0.49485	847.9	165.54	2.212	80.16
0007:00 11	11	0.42427	0	0.4834	843.4	165.98	2.187	80.16
0007:00 12	12	0.42926	0	0.52582	844.3	166.72	2.1625	80.16
0007:00 13	13	0.43056	0	0.50834	844.8	167.37	2.1558	80.16
0007:00 14	14	0.43976	0	0.51142	846.9	168.3	2.121	80.66
0007:00 15	15	0.44137	0	0.52083	847	168.3	2.1064	80.16
0007:00 16	16	0.4375	0	0.52261	846.5	168.06	2.1107	80.16
0007:00 17	17	0.44132	0	0.50691	847.2	168.75	2.0948	80.29
0007:00 18	18	0.43737	0	0.542	845	168.59	2.0917	80.29
0007:00 19	19	0.43581	0	0.55948	845.5	169	2.096	80.29

0007:00 20	20	0.43889	0	0.51207	848.4	169.32	2.0942	80.16
0007:00 21	21	0.43113	0	0.50981	845.3	169.28	2.1131	80.16
0007:00 22	22	0.43356	0	0.51524	848.9	170.05	2.11	80.29
0007:00 23	23	0.43542	0	0.53237	848.6	170.05	2.1009	80.16
0007:00 24	24	0.42809	0	0.53315	846.7	169.73	2.1216	80.29
0007:00 25	25	0.42892	0	0.52417	847	169.69	2.1119	80.16
0007:00 26	26	0.42987	0	0.53146	849.6	169.57	2.1155	80.16
0007:00 27	27	0.42844	0	0.51164	848.8	170.09	2.1198	80.29
0007:00 28	28	0.42701	0	0.51268	849.1	170.66	2.1253	80.29
0007:00 29	29	0.42284	0	0.53771	848.1	169.97	2.1345	80.16
0007:00 30	30	0.42054	0	0.53862	849.4	170.58	2.1534	80.29
0007:00 31	31	0.41981	0	0.54643	850.5	170.34	2.1558	80.29
0007:00 32	32	0.4159	0	0.53085	847	169.08	2.1607	80.29
0007:00 33	33	0.41929	0	0.52539	850.1	169.89	2.1558	80.16
0007:00 34	34	0.41464	0	0.50517	847.9	169.24	2.168	80.16
0007:00 35	35	0.41599	0	0.52014	850.3	169.57	2.1711	80.29
0007:00 36	36	0.41586	0	0.52396	850.3	169.93	2.1723	80.16
0007:00 37	37	0.4113	0	0.52127	850.3	169.24	2.1955	80.29
0007:00 38	38	0.41143	0	0.52435	850.5	170.54	2.1961	80.16
0007:00 39	39	0.41243	0	0.53012	849.8	171.03	2.1894	80.16
0007:00 40	40	0.40835	0	0.50769	845.5	170.83	2.1943	80.41
0007:00 41	41	0.411	0	0.49502	849.6	171.93	2.1992	80.29
0007:00	42	0.40727	0	0.53562	847.4	171.6	2.2083	80.29

42								
0007:00 43	43	0.41282	0	0.54985	850.3	172.82	2.19	79.91
0007:00 44	44	0.41005	0	0.52756	850.1	172.66	2.2065	80.16
0007:00 45	45	0.40632	0	0.53588	846.7	172.37	2.2108	80.29
0007:00 46	46	0.41243	0	0.50192	850.1	173.59	2.1918	80.16
0007:00 47	47	0.40666	0	0.49407	846.2	172.01	2.2071	80.29
0007:00 48	48	0.41013	0	0.50196	850.1	172.94	2.2028	80.16
0007:00 49	49	0.41143	0	0.52738	850.5	172.7	2.1979	80.29
0007:00 50	50	0.40783	0	0.53432	847.5	171.27	2.2016	80.16
0007:00 51	51	0.41091	0	0.51931	850.3	171.31	2.1986	80.29
0007:00 52	52	0.40714	0	0.52023	849.8	170.54	2.215	80.29
0007:00 53	53	0.4077	0	0.51116	850	172.09	2.2126	80.29
0007:00 54	54	0.40961	0	0.51216	849.8	172.05	2.2034	80.16
0007:00 55	55	0.40601	0	0.4965	848.2	171.48	2.2175	80.16
0007:00 56	56	0.40849	0	0.52335	849.8	172.33	2.212	80.29
0007:00 57	57	0.40766	0	0.54703	850	171.52	2.212	80.41
0007:00 58	58	0.40623	0	0.52495	846.5	170.91	2.2102	80.16
0007:00 59	59	0.4097	0	0.51428	850	171.6	2.2077	80.16
0007:00 60	60	0.40679	0	0.50968	848.2	170.79	2.2114	80.29
0007:00 61	61	0.41013	0	0.51142	850	171.23	2.2022	80.16
0007:00 62	62	0.40822	0	0.53142	850.1	171.07	2.2138	80.29
0007:00 63	63	0.40918	0	0.5381	850.1	171.23	2.2083	80.16
0007:00 64	64	0.40731	0	0.52439	847	169.93	2.2059	80.29

0007:00 65	65	0.40736	0	0.52057	847	169.4	2.2047	80.16
0007:00 66	66	0.41183	0	0.51658	850.3	169.73	2.1979	80.29
0007:00 67	67	0.41187	0	0.50296	851.2	169.08	2.1967	80.16
0007:00 68	68	0.40788	0	0.50227	847.2	169.16	2.2022	80.16
0007:00 69	69	0.41165	0	0.52638	850.3	170.87	2.1955	80.16
0007:00 70	70	0.40875	0	0.54243	847.5	170.46	2.1961	80.29
0007:00 71	71	0.40792	0	0.51242	850.7	170.5	2.2132	80.29
0007:00 72	72	0.41152	0	0.53588	850.8	170.91	2.1955	80.16
0007:00 73	73	0.40727	0	0.51133	846.9	169.04	2.2016	80.29
0007:00 74	74	0.41209	0	0.5184	851.2	170.05	2.1918	80.41
0007:00 75	75	0.40914	0	0.52031	848.8	168.59	2.1973	80.41
0007:00 76	76	0.41274	0	0.54712	851.2	169.52	2.1876	80.41
0007:00 77	77	0.41113	0	0.54456	850.5	168.14	2.1955	80.41
0007:00 78	78	0.40957	0	0.54955	848.8	168.75	2.1949	80.41
0007:00 79	79	0.4159	0	0.54361	851.3	169.16	2.1705	80.41
0007:00 80	80	0.41226	0	0.51676	847	166.84	2.1723	80.41
0007:00 81	81	0.41477	0	0.51745	851.2	167.53	2.1747	80.41
0007:00 82	82	0.41391	0	0.54282	850.8	167.49	2.1778	80.41
0007:00 83	83	0.4107	0	0.54903	850.5	167.21	2.1857	80.41
0007:00 84	84	0.41196	0	0.55402	852.4	167.65	2.1845	80.66
0007:00 85	85	0.41191	0	0.53875	850.5	167.29	2.1735	80.41
0007:00 86	86	0.41851	0	0.53541	851.3	167.82	2.1467	80.41
0007:00	87	0.41976	0	0.55202	852.2	167.37	2.14	80.54

87								
0007:00 88	88	0.41994	0	0.56911	850.7	166.07	2.1302	80.41
0007:00 89	89	0.42714	0	0.60594	851.7	167.21	2.1058	80.04
0007:00 90	90	0.42922	0	0.56742	850	166.19	2.0887	80.16
0007:00 91	91	0.43165	0	0.57393	848.9	165.41	2.0728	80.16
0007:00 92	92	0.43898	0	0.55332	851.9	165.58	2.0533	80.29
0007:00 93	93	0.43152	0	0.5538	850.8	164.97	2.0759	80.16
0007:00 94	94	0.43412	0	0.55857	852.2	165.29	2.071	80.16
0007:00 95	95	0.43347	0	0.58195	852.9	165.33	2.0692	80.16
0007:00 96	96	0.42931	0	0.5941	848.9	163.71	2.0685	80.29
0007:00 97	97	0.43724	0	0.58781	853.8	163.83	2.0502	80.29
0007:00 98	98	0.44384	0	0.61292	853.1	163.87	2.0203	80.29
0007:00 99	99	0.44835	0	0.57206	853.2	165.05	2.0032	80.29
0007:01 00	100	0.44696	0	0.59314	852.9	165.01	2.0075	80.16
0007:01 01	101	0.43915	0	0.61509	853.1	165.41	2.0344	80.16
0007:01 02	102	0.43265	0	0.60863	849.6	164.03	2.0478	80.29
0007:01 03	103	0.42879	0	0.59969	849.8	164.84	2.0637	80.16
0007:01 04	104	0.4313	0	0.62663	854.1	165.94	2.0667	80.16
0007:01 05	105	0.42584	0	0.60932	853.9	167.08	2.0887	80.29
0007:01 06	106	0.42059	0	0.5774	851	167.33	2.0991	80.29
0007:01 07	107	0.42354	0	0.57206	854.6	168.59	2.0972	80.41
0007:01 08	108	0.42276	0	0.60108	856	167.61	2.1039	80.16
0007:01 09	109	0.42367	0	0.62446	855	167.86	2.0972	80.29

0007:01 10	110	0.42423	0	0.62043	855.5	168.43	2.0972	80.16
0007:01 11	111	0.4195	0	0.60945	851.3	167.9	2.1046	80.29
0007:01 12	112	0.42167	0	0.6036	854.3	168.87	2.1076	80.41
0007:01 13	113	0.42132	0	0.58815	855.1	168.39	2.11	80.16
0007:01 14	114	0.41742	0	0.58985	850.1	166.55	2.1113	80.16
0007:01 15	115	0.42054	0	0.61071	854.8	167.25	2.1155	80.16
0007:01 16	116	0.41395	0	0.59653	853.2	164.44	2.1375	80.16
0007:01 17	117	0.41985	0	0.63019	855.5	164.68	2.1149	80.29
0007:01 18	118	0.41881	0	0.65331	855	164.84	2.1174	80.16
0007:01 19	119	0.4159	0	0.6124	851.2	165.21	2.1162	80.16
0007:01 20	120	0.42523	0	0.58555	854.3	165.58	2.0881	80.29
0007:01 21	121	0.4231	0	0.59974	852.7	164.89	2.0905	80.16
0007:01 22	122	0.42913	0	0.62797	854.4	163.75	2.0716	80.29
0007:01 23	123	0.42727	0	0.65196	855.8	163.87	2.0832	80.16
0007:01 24	124	0.42701	0	0.65235	852.4	162	2.0692	80.29
0007:01 25	125	0.43729	0	0.62494	854.6	162.85	2.0356	80.29
0007:01 26	126	0.43946	0	0.61674	850	161.43	2.0081	80.29
0007:01 27	127	0.44857	0	0.59783	854.3	162.24	1.9935	80.16
0007:01 28	128	0.44618	0	0.62932	853.9	161.18	2.0032	80.16
0007:01 29	129	0.43924	0	0.66597	850.3	160.45	2.0154	80.29
0007:01 30	130	0.44228	0	0.65101	853.4	160.69	2.0142	80.29
0007:01 31	131	0.44635	0	0.65461	855	160.04	2.0045	80.16
0007:01	132	0.45182	0	0.61301	854.8	159.76	1.9831	80.16

32								
0007:01 33	133	0.45078	0	0.599	854.3	158.66	1.9849	80.29
0007:01 34	134	0.44553	0	0.61717	854.3	159.15	2.0051	80.29
0007:01 35	135	0.45082	0	0.65769	854.1	159.92	1.9849	80.16
0007:01 36	136	0.4454	0	0.64433	851	158.13	1.9935	80.29
0007:01 37	137	0.45269	0	0.62737	855	158.62	1.9794	80.29
0007:01 38	138	0.4539	0	0.64181	855.1	159.27	1.9758	80.29
0007:01 39	139	0.44696	0	0.61453	852	158.29	1.9892	80.16
0007:01 40	140	0.45256	0	0.63479	854.4	158.62	1.9727	80.16
0007:01 41	141	0.45069	0	0.64637	854.8	159.19	1.98	80.16
0007:01 42	142	0.45165	0	0.65587	854.8	159.68	1.9782	80.16
0007:01 43	143	0.45338	0	0.63335	855.1	159.8	1.9715	80.29
0007:01 44	144	0.44926	0	0.63131	854.3	159.68	1.9861	80.41
0007:01 45	145	0.45047	0	0.66146	854.1	160.41	1.9831	80.16
0007:01 46	146	0.44132	0	0.61782	853.9	158.62	2.0154	80.16
0007:01 47	147	0.44245	0	0.61032	855	159.11	2.0142	80.16
0007:01 48	148	0.43789	0	0.6229	855.3	159.96	2.0362	80.16
0007:01 49	149	0.42957	0	0.6563	850.7	158.74	2.0508	80.16
0007:01 50	150	0.42965	0	0.63609	854.4	160	2.0655	80.16
0007:01 51	151	0.43226	0	0.64424	855.1	161.18	2.0545	80.16
0007:01 52	152	0.42909	0	0.62503	855.5	161.06	2.0692	80.16
0007:01 53	153	0.42883	0	0.62338	856.2	161.02	2.071	80.16
0007:01 54	154	0.42406	0	0.65738	852.7	160.57	2.0789	80.16

0007:01 55	155	0.42918	0	0.61331	855.5	162.04	2.0704	79.66
0007:01 56	156	0.42753	0	0.64428	853.8	160.69	2.0673	80.66
0007:01 57	157	0.43599	0	0.64021	855	161.63	2.0405	80.41
0007:01 58	158	0.43798	0	0.63999	854.8	160.98	2.0319	80.41
0007:01 59	159	0.43286	0	0.64754	851	160.61	2.0386	80.41
0007:01 60	160	0.4405	0	0.59817	854.3	161.22	2.0209	80.41
0007:01 61	161	0.43508	0	0.6193	852	160.57	2.0331	80.29
0007:01 62	162	0.44362	0	0.63665	854.6	161.22	2.0081	80.41
0007:01 63	163	0.44306	0	0.66138	854.8	160.9	2.0106	80.41
0007:01 64	164	0.44037	0	0.66359	853.8	160.9	2.0167	80.41
0007:01 65	165	0.44471	0	0.6478	854.6	161.39	2.0032	80.41
0007:01 66	166	0.43603	0	0.62017	852.2	160.17	2.0264	80.41
0007:01 67	167	0.44332	0	0.61323	854.8	161.59	2.0081	80.41
0007:01 68	168	0.44206	0	0.65374	855.8	160.78	2.0154	80.54
0007:01 69	169	0.44071	0	0.66636	854.8	161.18	2.0179	80.41
0007:01 70	170	0.43768	0	0.64242	855	161.71	2.0325	80.41
0007:01 71	171	0.43004	0	0.64394	851.7	160.45	2.0508	80.29
0007:01 72	172	0.43581	0	0.66671	855.8	161.3	2.0423	80.29
0007:01 73	173	0.42978	0	0.60347	855.3	161.18	2.0649	80.16
0007:01 74	174	0.42388	0	0.59509	851.7	160.53	2.0789	80.16
0007:01 75	175	0.42545	0	0.62038	855.5	162.12	2.0869	80.16
0007:01 76	176	0.41538	0	0.66068	851.9	161.47	2.1137	80.16
0007:01	177	0.42154	0	0.61153	855.7	161.59	2.1009	80.29

77								
0007:01 78	178	0.42475	0	0.6383	856.2	162.04	2.0869	80.16
0007:01 79	179	0.42497	0	0.61904	856.7	162.28	2.0875	80.29
0007:01 80	180	0.4267	0	0.61344	856	161.96	2.0783	80.29
0007:01 81	181	0.4225	0	0.64615	855.5	161.71	2.0936	80.16
0007:01 82	182	0.43026	0	0.66272	856.5	162.08	2.0637	80.16
0007:01 83	183	0.43052	0	0.68063	855.8	161.18	2.0612	80.16
0007:01 84	184	0.4372	0	0.63756	856.2	160	2.0338	80.29
0007:01 85	185	0.4411	0	0.65253	856	159.07	2.0185	80.29
0007:01 86	186	0.43681	0	0.6134	855.7	158.78	2.0356	80.29
0007:01 87	187	0.44401	0	0.60668	855.7	158.86	2.0093	80.16
0007:01 88	188	0.44475	0	0.62268	855.5	158.74	2.0087	80.16
0007:01 89	189	0.44748	0	0.67382	855	158.66	1.9935	80.16
0007:01 90	190	0.45039	0	0.66289	854.6	159.07	1.9831	80.16
0007:01 91	191	0.44254	0	0.68935	852	158.54	2.002	80.29
0007:01 92	192	0.45008	0	0.66415	855.8	159.47	1.9813	80.29
0007:01 93	193	0.44332	0	0.61852	854.4	158.99	2.0014	80.29
0007:01 94	194	0.44774	0	0.6137	854.8	159.84	1.988	80.29
0007:01 95	195	0.44744	0	0.62915	855.3	160.08	1.9922	80.16
0007:01 96	196	0.43772	0	0.63635	851.9	159.11	2.0191	80.04
0007:01 97	197	0.4467	0	0.70241	855.8	159.8	1.9941	80.16
0007:01 98	198	0.44154	0	0.64684	855.7	159.15	2.0154	80.16
0007:01 99	199	0.44119	0	0.66142	855.8	158.66	2.0167	80.16

0007:02 00	200	0.4464	0	0.63218	855.5	158.82	1.9929	80.29
0008:00 01	1	0.3596	0	0.42657	1850.8	102.1	5.2327	49.67
0008:00 02	2	0.39612	0	0.45347	1959.4	101.77	5.1173	49.67
0008:00 03	3	0.41525	0	0.46926	2002	101.57	5.0246	49.42
0008:00 04	4	0.41308	0	0.47143	1895.1	101.73	4.7145	49.54
0008:00 05	5	0.41321	0	0.47438	1856.1	101.65	4.5894	49.54
0009:00 01	1	0.41664	0	0.46553	2487.6	108.12	6.932	99.46
0009:00 02	2	0.41946	0	0.49763	2414.2	109.59	7.3983	99.58
0009:00 03	3	0.39178	0	0.48999	2215.6	110.28	7.5954	99.46
0009:00 04	4	0.37482	0	0.46618	2172.7	111.17	7.9806	99.46
0009:00 05	5	0.3645	0	0.46878	2128.4	110.44	8.0923	99.46
0010:00 01	1	0.42154	0	0.48951	1786.6	113	4.6742	99.58
0010:00 02	2	0.45056	0	0.56234	1792.5	112.68	4.3416	99.58
0010:00 03	3	0.44909	0	0.57015	1741.5	112.31	4.1957	99.58
0010:00 04	4	0.46084	0	0.56326	1795.6	114.14	4.3092	99.58
0010:00 05	5	0.44909	0	0.56044	1783.4	114.35	4.3568	99.58
0010:00 06	6	0.4477	0	0.56798	1795.6	114.75	4.4282	99.46
0011:00 01	1	0.4208	0	0.54872	866.9	46.35	2.2657	120.37
0011:00 02	2	0.46115	0	0.52335	856.2	86.72	2.046	120.24
0011:00 03	3	0.43061	0	0.50535	851.9	125.01	2.1845	120.49
0011:00 04	4	0.40029	0	0.47143	845.1	161.06	2.3438	120.37
0011:00 05	5	0.36819	0	0.4434	841.5	192.6	2.5593	120.37
0011:00	6	0.36159	0	0.44167	839.8	216.85	2.5953	120.37

06								
0011:00 07	7	0.36801	0	0.43954	842.4	240.9	2.5318	120.24
0011:00 08	8	0.35982	0	0.41868	842	261.77	2.5825	120.49
0011:00 09	9	0.35261	0	0.49797	839.8	279.59	2.6417	120.49
0011:00 10	10	0.35969	0	0.42228	842	295.22	2.5947	120.62
0011:00 11	11	0.36641	0	0.4336	843.6	309.01	2.5575	120.62
0011:00 12	12	0.37461	0	0.44848	844.6	323.3	2.4976	120.62
0011:00 13	13	0.39582	0	0.49225	846.2	334	2.3542	120.62
0011:00 14	14	0.41543	0	0.50682	847	341.28	2.2376	120.74
0011:00 15	15	0.44887	0	0.525	848.1	348.57	2.0801	120.62
0012:00 01	1	0.40484	0	0.45381	1387.2	360.24	4.1615	99.83
0012:00 02	2	0.34676	0	0.43078	2397.5	374	8.9242	99.71
0014:00 01	1	0.27801	0	0.33323	860.5	24.3	3.2765	50.29
0014:00 02	2	0.28109	0	0.32802	860.3	32.35	3.2655	49.92
0014:00 03	3	0.29484	0	0.35162	857.9	38.86	3.1123	49.92
0014:00 04	4	0.30464	0	0.37075	846.3	43.99	2.9524	49.92
0015:00 01	1	0.32073	0	0.35448	2331.8	51.07	7.5777	99.83
0015:00 02	2	0.39239	0	0.41916	2530.9	79.47	7.156	99.83
0016:00 01	1	0.52062	0	0.67504	852.2	105.76	1.7469	80.54
0016:00 02	2	0.52933	0	0.6638	850.8	109.34	1.7286	80.54
0016:00 03	3	0.53194	0	0.64246	850.8	114.71	1.7292	80.41
0016:00 04	4	0.52834	0	0.67803	849.4	118.38	1.7298	80.41
0016:00 05	5	0.51997	0	0.64186	850.3	123.22	1.7554	80.54

0016:00 06	6	0.51394	0	0.65201	849.6	126.47	1.7719	80.54
0016:00 07	7	0.50916	0	0.60997	849.6	128.55	1.7872	80.54
0016:00 08	8	0.50647	0	0.62489	850.1	131.32	1.7963	80.29
0016:00 09	9	0.49945	0	0.60295	850	133.84	1.8201	80.16
0016:00 10	10	0.48778	0	0.61626	848.9	135.63	1.8531	80.16
0016:00 11	11	0.48921	0	0.61743	850.5	137.62	1.858	80.16
0016:00 12	12	0.47793	0	0.62949	846.7	138.68	1.8818	80.29
0016:00 13	13	0.48496	0	0.6026	850.8	141.73	1.8769	80.16
0016:00 14	14	0.48045	0	0.60186	849.1	142.42	1.886	80.16
0016:00 15	15	0.48769	0	0.5944	850.1	143.93	1.8677	80.29
0016:00 16	16	0.48019	0	0.58924	851.3	144.91	1.894	80.16
0016:00 17	17	0.47494	0	0.57783	849.8	146.66	1.9147	80.16
0016:00 18	18	0.4696	0	0.61557	851.9	148	1.9404	80.16
0016:00 19	19	0.46752	0	0.59648	850.5	148.41	1.9446	80.29
0016:00 20	20	0.46366	0	0.59267	850.8	149.06	1.9568	80.16
0016:00 21	21	0.45694	0	0.63886	847.5	149.02	1.9691	80.16
0016:00 22	22	0.46032	0	0.57475	850.8	151.05	1.9684	80.16
0016:00 23	23	0.45104	0	0.56451	848.9	151.82	1.9935	80.16
0016:00 24	24	0.45412	0	0.57566	851.3	153.37	1.9904	80.29
0016:00 25	25	0.44618	0	0.56673	851.7	153.37	2.0215	80.16
0016:00 26	26	0.44744	0	0.60872	851.7	154.14	2.0106	80.29
0016:00 27	27	0.44176	0	0.61162	852.9	153.98	2.0356	80.16
0016:00	28	0.44184	0	0.61101	850.3	153.57	2.0234	80.16

28								
0016:00 29	29	0.44831	0	0.60455	853.1	154.06	2.0093	80.16
0016:00 30	30	0.44744	0	0.59076	853.1	153	2.0099	80.16
0016:00 31	31	0.44735	0	0.56651	852.4	152.8	2.0112	80.16
0016:00 32	32	0.44362	0	0.59839	849.6	152.64	2.0087	80.16
0016:00 33	33	0.44922	0	0.59601	853.1	152.31	2.0087	80.16
0016:00 34	34	0.44327	0	0.60164	851	151.54	2.0258	80.16
0016:00 35	35	0.44813	0	0.59462	852.7	151.25	2.0118	80.16
0017:00 01	1	0.35305	0	0.41178	1820.1	100.63	5.3255	49.54
0017:00 02	2	0.36476	0	0.43829	1866.8	100.72	5.2535	49.54
0017:00 03	3	0.38931	0	0.4487	1920.8	100.92	5.1302	49.79
0017:00 04	4	0.40293	0	0.45004	1954.6	100.72	5.0642	49.54
0017:00 05	5	0.40922	0	0.45451	1962.2	100.59	5.0099	49.54
0018:00 01	1	0.38289	0	0.45147	2341.1	104.38	7.5338	99.46
0018:00 02	2	0.38541	0	0.48717	2268.5	105.76	7.7084	99.58
0018:00 03	3	0.38363	0	0.49507	2235.8	105.88	7.7511	99.58
0018:00 04	4	0.38046	0	0.49008	2225.8	106.21	7.7651	99.46
0018:00 05	5	0.3789	0	0.48522	2210.8	106.37	7.7511	99.46
0019:00 01	1	0.34346	0	0.48617	2400.2	118.46	9.1818	158.96
0019:00 02	2	0.34646	0	0.45594	2621.4	119.72	9.5248	158.83
0019:00 03	3	0.35739	0	0.4542	2693.7	120.41	9.5163	158.96
0019:00 04	4	0.3619	0	0.45789	2624	119.47	9.2154	159.08
0019:00 05	5	0.36233	0	0.48257	2660.6	118.95	9.277	159.08

Test: 136352-3								
Chrono	StpNum	50 AvgDst	52 Min	53 Max	AvgTime	AvgDist	AvgTime	BrkSpd (l)
		Effectiveness - A	Effectiveness - A	Effectiveness - A	Torque - A	Temperature #1A	Record Pressure - A	None
Sect:Recd	unitless	unitless			N·m	°C	MN/m²	kph
0002:0001	1	0.23207	0	0.26399	857.4	26.7	3.9698	50.29
0002:0002	2	0.263	0	0.2908	850.1	36.95	3.5163	50.41
0002:0003	3	0.2826	0	0.30442	836.9	46.88	3.2392	50.41
0002:0004	4	0.30603	0	0.33951	846	54.73	3.0519	50.54
0002:0005	5	0.3236	0	0.36094	843.9	62.42	2.8883	50.41
0003:0001	1	0.32624	0	0.35474	843.9	79.15	2.8504	100.08
0003:0002	2	0.33266	0	0.38155	841	108.61	2.8095	99.83
0003:0003	3	0.34377	0	0.41573	851.2	108.69	2.6423	99.83
0003:0004	4	0.38905	0	0.47633	851.2	109.22	2.3438	99.58
0003:0005	5	0.41521	0	0.4994	850.8	108.08	2.2016	99.46
0004:0001	1	0.40441	0	0.47889	867.2	100.96	2.281	49.54
0004:0002	2	0.41642	0	0.49476	889.4	100.51	2.2803	49.54
0004:0003	3	0.42254	0	0.49724	902.7	100.43	2.2791	49.54
0005:0001	1	0.38706	0	0.40467	1838.5	100.15	5.2187	49.17
0005:0002	2	0.38688	0	0.41556	1848.2	100.06	5.2046	49.67
0005:0003	3	0.38888	0	0.42527	1851.1	99.9	5.1723	49.54
0005:00	4	0.39074	0	0.41399	1863.2	100.31	5.1808	49.54

04								
0005:00 05	5	0.39226	0	0.41985	1867.5	100.15	5.1668	49.54
0006:00 01	1	0.34672	0	0.42614	2090.8	102.06	7.839	99.33
0006:00 02	2	0.30572	0	0.33956	2090.6	102.02	8.1387	99.46
0006:00 03	3	0.30776	0	0.33765	2103.5	102.26	8.0898	99.46
0006:00 04	4	0.31449	0	0.34567	2134.4	102.63	7.98	99.58
0006:00 05	5	0.32021	0	0.35387	2167.8	102.42	7.8738	99.46
0007:00 01	1	0.37161	0	0.43299	850.7	128.14	2.4848	80.16
0007:00 02	2	0.40918	0	0.48335	855	134.12	2.2462	80.16
0007:00 03	3	0.44583	0	0.55792	853.1	140.47	2.0557	80.16
0007:00 04	4	0.45564	0	0.56985	847.4	145.19	1.991	80.16
0007:00 05	5	0.46006	0	0.54981	849.8	149.99	2.0124	80.16
0007:00 06	6	0.44995	0	0.53033	850.1	154.47	2.0545	80.29
0007:00 07	7	0.44995	0	0.51619	848.6	157.52	2.0545	80.04
0007:00 08	8	0.44284	0	0.55016	845.1	160	2.0673	80.16
0007:00 09	9	0.44505	0	0.52925	847.5	161.92	2.0692	79.91
0007:00 10	10	0.44349	0	0.54131	848.2	163.3	2.0692	80.16
0007:00 11	11	0.44605	0	0.5312	847.2	165.01	2.0569	80.16
0007:00 12	12	0.44297	0	0.54417	845.5	165.01	2.0576	80.16
0007:00 13	13	0.44423	0	0.55345	847.2	165.46	2.0557	80.16
0007:00 14	14	0.44696	0	0.54851	847.7	165.46	2.0405	80.16
0007:00 15	15	0.44609	0	0.52964	847.9	164.97	2.0423	80.16
0007:00 16	16	0.44674	0	0.5371	847.4	165.13	2.0386	80.16

0007:00 17	17	0.44418	0	0.52695	847.7	164.44	2.0454	80.29
0007:00 18	18	0.44852	0	0.55402	848.2	164.03	2.0295	80.29
0007:00 19	19	0.44752	0	0.55571	846.2	163.01	2.0234	80.16
0007:00 20	20	0.45021	0	0.57067	848.1	163.66	2.0185	80.16
0007:00 21	21	0.44627	0	0.57996	847.4	163.01	2.0276	80.29
0007:00 22	22	0.44566	0	0.56803	847.9	162.89	2.0325	80.29
0007:00 23	23	0.44657	0	0.57245	848.1	162.85	2.0283	80.29
0007:00 24	24	0.44913	0	0.53792	848.6	163.01	2.0234	80.04
0007:00 25	25	0.44952	0	0.56204	848.9	163.1	2.0167	80.16
0007:00 26	26	0.44813	0	0.5456	849.4	162.89	2.0222	80.29
0007:00 27	27	0.44683	0	0.55068	849.4	162.77	2.024	80.16
0007:00 28	28	0.44609	0	0.55597	850	163.01	2.0228	80.16
0007:00 29	29	0.44375	0	0.57961	849.8	162.44	2.0307	80.16
0007:00 30	30	0.43724	0	0.59666	847.7	161.87	2.0441	80.16
0007:00 31	31	0.43937	0	0.56655	850.8	162.12	2.0441	80.41
0007:00 32	32	0.43403	0	0.59175	852	161.51	2.0667	80.16
0007:00 33	33	0.43282	0	0.5836	850.5	161.67	2.071	80.16
0007:00 34	34	0.4264	0	0.55658	847.7	161.47	2.0881	80.16
0007:00 35	35	0.42575	0	0.55159	851.2	161.87	2.1033	80.16
0007:00 36	36	0.42536	0	0.55645	850.8	162.2	2.1015	80.16
0007:00 37	37	0.42345	0	0.56117	851.9	162.12	2.1137	80.16
0007:00 38	38	0.42419	0	0.58603	851.3	162.16	2.1088	79.79
0007:00	39	0.42254	0	0.5849	850.7	161.26	2.1143	80.16

39								
0007:00 40	40	0.42575	0	0.56651	851.7	161.51	2.1082	80.16
0007:00 41	41	0.42215	0	0.56603	849.6	160.82	2.1174	80.16
0007:00 42	42	0.42189	0	0.59366	848.4	160.65	2.1186	80.16
0007:00 43	43	0.42575	0	0.60234	851.3	160.86	2.1119	80.41
0007:00 44	44	0.42519	0	0.59362	851.5	160.61	2.1155	80.16
0007:00 45	45	0.42479	0	0.56048	851.2	160.69	2.1162	80.16
0007:00 46	46	0.42488	0	0.54608	851.3	160.57	2.1143	80.54
0007:00 47	47	0.42336	0	0.55844	848.4	159.8	2.1076	80.41
0007:00 48	48	0.42931	0	0.57197	851.7	160.41	2.0936	80.41
0007:00 49	49	0.42371	0	0.57961	847	159.47	2.1003	80.41
0007:00 50	50	0.43	0	0.58794	852	159.56	2.0899	80.41
0007:00 51	51	0.42944	0	0.57527	851.7	159.6	2.0942	80.29
0007:00 52	52	0.42601	0	0.56135	851	159.23	2.1046	80.41
0007:00 53	53	0.42874	0	0.57965	852	159.27	2.0948	80.29
0007:00 54	54	0.4261	0	0.5633	850.3	157.68	2.1003	80.41
0007:00 55	55	0.42978	0	0.54716	851.5	158.21	2.0881	80.41
0007:00 56	56	0.43065	0	0.55029	851.9	157.56	2.0844	80.41
0007:00 57	57	0.43009	0	0.58616	852.7	156.95	2.0875	80.54
0007:00 58	58	0.43195	0	0.58082	851.3	156.71	2.0753	80.41
0007:00 59	59	0.42727	0	0.59397	849.4	156.1	2.0893	80.41
0007:00 60	60	0.42978	0	0.57787	852	156.63	2.0856	80.41
0007:00 61	61	0.43169	0	0.57015	852	156.3	2.0771	80.16

0007:00 62	62	0.43256	0	0.57844	852.9	155.77	2.0722	80.16
0007:00 63	63	0.43607	0	0.62602	851.9	155.36	2.0533	80.16
0007:00 64	64	0.43508	0	0.56929	853.2	154.51	2.06	80.16
0007:00 65	65	0.43976	0	0.55549	852.7	154.67	2.0405	80.16
0007:00 66	66	0.43868	0	0.58911	851.2	153	2.0374	80.16
0007:00 67	67	0.4444	0	0.60841	852.5	153.29	2.0161	80.04
0007:00 68	68	0.44458	0	0.60629	852	153.29	2.013	80.16
0007:00 69	69	0.44527	0	0.64945	852.2	152.96	2.0124	80.16
0007:00 70	70	0.44592	0	0.64381	851.9	152.07	2.0124	80.16
0007:00 71	71	0.44193	0	0.67942	853.2	151.54	2.0264	80.16
0007:00 72	72	0.44635	0	0.60347	852.7	151.17	2.0069	80.54
0007:00 73	73	0.44206	0	0.59657	850.7	150.32	2.0154	80.16
0007:00 74	74	0.44713	0	0.59952	853.1	150.32	2.0008	80.16
0007:00 75	75	0.44705	0	0.60733	853.2	149.91	1.9984	80.16
0007:00 76	76	0.4431	0	0.63144	853.6	149.55	2.013	80.04
0007:00 77	77	0.44388	0	0.61444	853.2	150.24	2.0081	80.29
0007:00 78	78	0.43347	0	0.6209	854.1	149.63	2.0521	80.16
0007:00 79	79	0.43963	0	0.63049	852.9	149.63	2.0258	80.16
0007:00 80	80	0.43508	0	0.65079	852.2	148.93	2.0405	80.04
0007:00 81	81	0.44306	0	0.62004	852.5	149.63	2.0142	80.16
0007:00 82	82	0.44132	0	0.59201	852.9	149.38	2.024	80.16
0007:00 83	83	0.43885	0	0.59349	852.7	149.63	2.0344	80.16
0007:00	84	0.43911	0	0.58186	852.2	150.28	2.0374	80.04

84								
0007:00 85	85	0.43707	0	0.57089	852.9	149.63	2.0478	80.16
0007:00 86	86	0.44024	0	0.60581	852.7	150.68	2.0362	80.29
0007:00 87	87	0.44115	0	0.61201	852.5	150.97	2.0319	80.16
0007:00 88	88	0.43729	0	0.63934	850.5	150.2	2.0417	80.16
0007:00 89	89	0.44184	0	0.61275	852.2	151.13	2.0338	80.16
0007:00 90	90	0.44054	0	0.59475	851.9	150.89	2.035	80.16
0007:00 91	91	0.44362	0	0.61583	851.3	151.21	2.0246	80.29
0007:00 92	92	0.44839	0	0.57978	851.3	151.21	2.002	80.16
0007:00 93	93	0.44861	0	0.59241	852.5	150.36	2.002	80.16
0007:00 94	94	0.4506	0	0.58902	851.9	149.99	1.9941	80.16
0007:00 95	95	0.44674	0	0.59995	850.5	149.1	1.9977	80.04
0007:00 96	96	0.45789	0	0.61787	852.2	149.22	1.9611	80.16
0007:00 97	97	0.45954	0	0.68866	851.5	148.85	1.9532	80.16
0007:00 98	98	0.46206	0	0.63591	853.6	148.2	1.9471	80.04
0007:00 99	99	0.46336	0	0.63162	852.2	147.88	1.9434	80.16
0007:01 00	100	0.46145	0	0.62737	851.9	147.63	1.9501	80.16
0007:01 01	101	0.46344	0	0.62212	851.3	147.63	1.9404	80.16
0007:01 02	102	0.46357	0	0.61284	850	146.62	1.9324	80.16
0007:01 03	103	0.46787	0	0.59744	852	147.31	1.9251	80.16
0007:01 04	104	0.46986	0	0.60099	851	147.02	1.916	80.16
0007:01 05	105	0.46631	0	0.59414	851.7	146.41	1.9337	80.29
0007:01 06	106	0.46917	0	0.63691	850.8	146.78	1.9208	80.29

0007:01 07	107	0.46405	0	0.62381	852	146.86	1.9428	80.16
0007:01 08	108	0.46743	0	0.63574	852.4	147.55	1.9355	80.04
0007:01 09	109	0.46149	0	0.63522	849.1	146.86	1.9477	80.29
0007:01 10	110	0.46674	0	0.64845	851.7	148.12	1.9379	80.29
0007:01 11	111	0.46956	0	0.57844	851.9	147.67	1.9263	79.66
0007:01 12	112	0.47099	0	0.59713	851.5	147.35	1.9227	80.16
0007:01 13	113	0.47216	0	0.59522	852	147.14	1.9196	80.04
0007:01 14	114	0.469	0	0.5983	852.2	146.86	1.9288	80.16
0007:01 15	115	0.47329	0	0.60598	851.7	147.71	1.9129	80.29
0007:01 16	116	0.47229	0	0.61561	852.2	147.51	1.9153	80.16
0007:01 17	117	0.47303	0	0.61023	851.7	147.47	1.9098	80.16
0007:01 18	118	0.47368	0	0.61683	851	147.35	1.9068	80.16
0007:01 19	119	0.47025	0	0.61978	851.5	148.08	1.9221	80.16
0007:01 20	120	0.47073	0	0.64784	851.3	148.45	1.9202	79.91
0007:01 21	121	0.46726	0	0.58755	852	148.04	1.9318	80.04
0007:01 22	122	0.46934	0	0.59713	851.7	148.69	1.9214	80.16
0007:01 23	123	0.46743	0	0.61149	851.7	148.24	1.9282	80.16
0007:01 24	124	0.46874	0	0.61101	852.5	147.8	1.9214	80.16
0007:01 25	125	0.46995	0	0.67422	852.2	147.71	1.9123	80.16
0007:01 26	126	0.47468	0	0.63891	852.2	147.43	1.8964	80.16
0007:01 27	127	0.48171	0	0.64741	852.4	147.96	1.8732	80.16
0007:01 28	128	0.47997	0	0.65083	851	147.43	1.8787	80.16
0007:01	129	0.47958	0	0.65196	851.3	146.98	1.8787	80.16

29								
0007:01 30	130	0.47451	0	0.6144	849.8	145.92	1.8873	80.29
0007:01 31	131	0.48062	0	0.61509	852.5	145.76	1.8714	80.41
0007:01 32	132	0.47854	0	0.6324	851.9	145.56	1.8775	80.41
0007:01 33	133	0.47472	0	0.65539	853.1	145.44	1.8928	80.41
0007:01 34	134	0.47546	0	0.64112	852.4	145.23	1.8897	80.54
0007:01 35	135	0.46735	0	0.65496	852	144.95	1.9202	80.29
0007:01 36	136	0.46687	0	0.65027	852.9	145.64	1.9269	80.41
0007:01 37	137	0.46158	0	0.62155	850.3	144.99	1.9391	80.54
0007:01 38	138	0.46518	0	0.65136	851.5	145.11	1.9343	80.54
0007:01 39	139	0.46331	0	0.60503	851.3	145.39	1.9416	80.54
0007:01 40	140	0.46271	0	0.59258	852.9	145.96	1.9477	80.41
0007:01 41	141	0.46696	0	0.59063	852.2	146.82	1.9294	80.41
0007:01 42	142	0.46136	0	0.61149	850.1	146.17	1.9434	80.41
0007:01 43	143	0.46796	0	0.64945	851.9	147.14	1.9263	80.41
0007:01 44	144	0.46457	0	0.67105	848.6	146.45	1.9233	80.54
0007:01 45	145	0.47772	0	0.62303	852	147.51	1.8879	80.41
0007:01 46	146	0.47559	0	0.61232	853.4	147.02	1.8964	80.16
0007:01 47	147	0.47984	0	0.61782	851.9	147.35	1.8806	80.16
0007:01 48	148	0.4811	0	0.61145	852	148.08	1.8769	80.29
0007:01 49	149	0.48166	0	0.59718	852.2	147.75	1.8757	80.16
0007:01 50	150	0.48114	0	0.60056	852.2	147.35	1.8775	80.16
0007:01 51	151	0.4788	0	0.65769	852.5	147.06	1.8867	80.16

0007:01 52	152	0.47936	0	0.62993	851.9	146.7	1.8842	80.04
0007:01 53	153	0.47832	0	0.66936	852.4	146.37	1.8891	80.16
0007:01 54	154	0.47325	0	0.69842	850.8	145.88	1.9007	80.16
0007:01 55	155	0.47555	0	0.62503	852.9	146.29	1.9013	80.16
0007:01 56	156	0.47537	0	0.6622	852.4	145.64	1.9025	80.29
0007:01 57	157	0.47346	0	0.6242	851.7	145.52	1.9062	80.16
0007:01 58	158	0.47351	0	0.59852	852.2	145.11	1.9019	80.16
0007:01 59	159	0.47711	0	0.6098	852.5	144.82	1.8897	80.16
0007:01 60	160	0.4791	0	0.62142	852.9	144.01	1.8799	80.16
0007:01 61	161	0.4847	0	0.68055	852.4	144.09	1.8567	80.04
0007:01 62	162	0.48366	0	0.67565	853.2	143.03	1.8574	80.29
0007:01 63	163	0.48891	0	0.69083	851.9	143.64	1.8433	79.91
0007:01 64	164	0.48205	0	0.72805	852.7	141.94	1.8671	80.16
0007:01 65	165	0.47897	0	0.61262	851.7	142.95	1.8793	80.29
0007:01 66	166	0.48027	0	0.62155	851.5	142.46	1.8769	80.29
0007:01 67	167	0.47546	0	0.61353	851.2	142.99	1.8946	80.29
0007:01 68	168	0.47012	0	0.62433	853.8	142.75	1.9153	80.16
0007:01 69	169	0.47212	0	0.62481	851.3	142.91	1.9037	80.16
0007:01 70	170	0.47576	0	0.66467	852.4	143.24	1.8903	80.16
0007:01 71	171	0.47876	0	0.65387	853.1	142.87	1.8812	80.16
0007:01 72	172	0.47229	0	0.69295	852	142.14	1.9001	80.16
0007:01 73	173	0.47772	0	0.62476	852.2	142.87	1.8812	80.16
0007:01	174	0.47438	0	0.6242	853.6	142.75	1.8934	80.16

74								
0007:01 75	175	0.47229	0	0.61904	851.7	143.03	1.9019	80.16
0007:01 76	176	0.47082	0	0.60685	852.4	143.6	1.9062	80.29
0007:01 77	177	0.46874	0	0.62407	852.7	142.75	1.9129	80.04
0007:01 78	178	0.47069	0	0.68597	852.4	142.83	1.9056	80.29
0007:01 79	179	0.46483	0	0.64424	851.9	143.24	1.93	80.16
0007:01 80	180	0.46999	0	0.65313	852.5	142.75	1.9105	80.29
0007:01 81	181	0.46809	0	0.63205	852.9	143.2	1.9202	80.16
0007:01 82	182	0.4673	0	0.62155	852.5	143.16	1.9257	80.16
0007:01 83	183	0.46856	0	0.5954	851.5	142.67	1.9208	80.29
0007:01 84	184	0.47021	0	0.6042	852.2	143.36	1.916	80.16
0007:01 85	185	0.46887	0	0.61297	852.7	142.59	1.9233	80.29
0007:01 86	186	0.46826	0	0.62251	852.5	142.91	1.9275	80.29
0007:01 87	187	0.46449	0	0.63296	850.3	142.1	1.9324	80.16
0007:01 88	188	0.47264	0	0.64567	852.4	143.32	1.9105	80.16
0007:01 89	189	0.47303	0	0.64255	850.7	142.99	1.905	80.16
0007:01 90	190	0.46913	0	0.59418	851.3	143.6	1.9208	80.16
0007:01 91	191	0.45707	0	0.58117	850.3	142.99	1.9642	80.16
0007:01 92	192	0.46071	0	0.57527	851.9	143.2	1.9562	80.54
0007:01 93	193	0.45715	0	0.61366	851.5	142.42	1.9642	80.29
0007:01 94	194	0.46622	0	0.63279	852	142.79	1.9349	80.29
0007:01 95	195	0.46336	0	0.64945	852.9	142.26	1.944	80.16
0007:01 96	196	0.46201	0	0.60859	851.2	142.59	1.9446	80.29

0007:0197	197	0.46128	0	0.61839	850.3	142.34	1.9428	80.29
0007:0198	198	0.46691	0	0.61184	852.2	142.99	1.9288	80.16
0007:0199	199	0.46145	0	0.62997	850.1	142.1	1.9398	80.16
0007:0200	200	0.46978	0	0.5888	852.7	142.95	1.9233	80.16
0008:0001	1	0.40033	0	0.49073	1914.9	101.04	4.8225	49.54
0008:0002	2	0.43312	0	0.49225	1913.4	100.76	4.5631	49.54
0008:0003	3	0.45585	0	0.50804	2090.6	101.12	4.8311	49.42
0008:0004	4	0.46184	0	0.506	2071.1	100.55	4.7389	49.54
0008:0005	5	0.46045	0	0.49823	2097.5	100.72	4.8244	49.67
0009:0001	1	0.42926	0	0.47884	2510.8	104.66	7.1328	100.33
0009:0002	2	0.39178	0	0.47108	2238	106.7	7.1993	99.46
0009:0003	3	0.37092	0	0.44831	2224.7	106.17	7.7694	99.46
0009:0004	4	0.3573	0	0.42523	2177.7	106.25	7.9086	99.46
0009:0005	5	0.35587	0	0.43069	2178.5	106.45	7.8988	99.58
0010:0001	1	0.36198	0	0.41477	1767.7	109.79	5.6014	99.71
0010:0002	2	0.3848	0	0.43178	1758.9	109.38	5.1271	99.71
0010:0003	3	0.40909	0	0.46405	1778	110.36	4.7938	99.83
0010:0004	4	0.43842	0	0.50799	1785.3	111.21	4.391	99.58
0010:0005	5	0.46097	0	0.5695	1789.9	111.34	4.1444	99.58
0010:0006	6	0.47967	0	0.58564	1792	111.13	3.9717	99.46
0011:0001	1	0.42614	0	0.52573	861.3	39.96	2.2187	120.62
0011:0002	2	0.45533	0	0.52673	855.1	71.25	2.0508	120.49
0011:00	3	0.46639	0	0.55879	848.6	104.26	1.9941	120.37

03								
0011:00 04	4	0.41451	0	0.47641	844.1	140.1	2.2498	120.49
0011:00 05	5	0.37617	0	0.45447	842.4	174.57	2.4866	120.62
0011:00 06	6	0.36719	0	0.42185	841.3	203.18	2.5538	120.62
0011:00 07	7	0.36198	0	0.41599	838.1	228.57	2.5843	120.49
0011:00 08	8	0.34962	0	0.46028	836.9	252.78	2.6673	120.49
0011:00 09	9	0.34286	0	0.43842	839.6	274.22	2.7198	120.49
0011:00 10	10	0.34424	0	0.43633	840.3	292.25	2.7058	120.49
0011:00 11	11	0.35903	0	0.40679	841	305.35	2.5959	120.62
0011:00 12	12	0.37868	0	0.42644	844.6	317.4	2.4671	120.49
0011:00 13	13	0.39912	0	0.4565	846	328.75	2.3304	120.49
0011:00 14	14	0.41742	0	0.48388	847.4	335.99	2.2272	120.49
0011:00 15	15	0.42102	0	0.48808	847.4	340.96	2.1992	120.49
0012:00 01	1	0.38962	0	0.44479	1288.2	353.08	3.8795	99.58
0012:00 02	2	0.30473	0	0.39933	2201.8	364.48	9.4131	99.58
0014:00 01	1	0.36099	0	0.42479	851.2	190.72	2.5471	49.92
0014:00 02	2	0.39734	0	0.43655	850.7	162.44	2.3292	49.67
0014:00 03	3	0.41373	0	0.51164	846.7	136.61	2.2059	49.67
0014:00 04	4	0.431	0	0.5338	852.5	118.82	2.1241	49.67
0015:00 01	1	0.37023	0	0.42848	2347	116.34	7.4612	99.58
0015:00 02	2	0.35457	0	0.40627	2297.7	138.64	7.6034	99.71
0016:00 01	1	0.3982	0	0.54439	852.4	106.41	2.2553	80.41
0016:00 02	2	0.4454	0	0.59397	853.1	112.43	2.0331	80.29

0016:00 03	3	0.48223	0	0.62932	852.2	118.38	1.8744	80.29
0016:00 04	4	0.51493	0	0.68398	851.7	124.28	1.7512	80.29
0016:00 05	5	0.52252	0	0.73356	851.9	129.52	1.7225	80.41
0016:00 06	6	0.53025	0	0.75082	850.5	133.31	1.6913	80.16
0016:00 07	7	0.53853	0	0.79459	851.9	137.38	1.6755	80.29
0016:00 08	8	0.5312	0	0.7709	851.5	140.15	1.6962	80.29
0016:00 09	9	0.5197	0	0.76782	853.6	142.95	1.7347	80.41
0016:00 10	10	0.51806	0	0.70328	852	145.44	1.7383	80.29
0016:00 11	11	0.50196	0	0.66519	850.7	148.2	1.7829	80.29
0016:00 12	12	0.49984	0	0.70701	850.3	149.99	1.7902	80.29
0016:00 13	13	0.49689	0	0.68575	848.2	151.17	1.7933	80.29
0016:00 14	14	0.49906	0	0.73208	853.1	153.53	1.7982	80.16
0016:00 15	15	0.49936	0	0.69482	852.2	154.92	1.7969	80.29
0016:00 16	16	0.49606	0	0.69178	852.5	155.93	1.8097	80.16
0016:00 17	17	0.48973	0	0.72067	851.7	156.87	1.8287	80.16
0016:00 18	18	0.48821	0	0.65031	851.5	157.93	1.8323	80.29
0016:00 19	19	0.47711	0	0.64129	850	157.76	1.8653	80.29
0016:00 20	20	0.47659	0	0.64099	850.1	157.93	1.8677	80.16
0016:00 21	21	0.47251	0	0.64949	850	159.27	1.8775	80.29
0016:00 22	22	0.47663	0	0.66125	852.4	160.78	1.869	80.16
0016:00 23	23	0.47234	0	0.64433	849.3	160	1.872	80.29
0016:00 24	24	0.47446	0	0.67517	852.7	163.1	1.8763	80.04
0016:00	25	0.47863	0	0.67634	853.2	162	1.8586	80.29

25								
0016:00 26	26	0.48106	0	0.68037	852.5	162.65	1.8531	80.16
0016:00 27	27	0.47451	0	0.68996	849.4	162.89	1.8659	80.16
0016:00 28	28	0.48036	0	0.68692	852.4	163.1	1.8555	80.41
0016:00 29	29	0.47715	0	0.66259	849.1	163.91	1.8567	80.29
0016:00 30	30	0.47759	0	0.65023	851.2	165.21	1.8702	80.16
0016:00 31	31	0.47307	0	0.6527	848.1	164.4	1.8726	80.29
0016:00 32	32	0.4703	0	0.71807	852.2	166.11	1.8976	80.16
0016:00 33	33	0.46691	0	0.69148	850.5	165.05	1.9007	80.29
0016:00 34	34	0.46466	0	0.69408	849.1	165.5	1.9074	80.29
0016:00 35	35	0.46665	0	0.66762	849.4	165.05	1.9025	80.29
0017:00 01	1	0.38315	0	0.48969	1784.4	100.92	4.7298	49.54
0017:00 02	2	0.40293	0	0.49394	1940.4	101.04	5.0453	49.54
0017:00 03	3	0.41213	0	0.50166	1952.8	100.63	5.0215	49.67
0017:00 04	4	0.4048	0	0.49658	1845.4	99.86	4.7682	49.67
0017:00 05	5	0.41647	0	0.4965	1960.8	101.04	5.0014	49.54
0018:00 01	1	0.3845	0	0.45529	2328.7	105.68	7.5057	99.58
0018:00 02	2	0.36485	0	0.46054	2239.9	106.45	7.7255	99.71
0018:00 03	3	0.35704	0	0.45117	2205.4	106.25	7.8225	99.71
0018:00 04	4	0.35752	0	0.44002	2197	106.01	7.8286	99.83
0018:00 05	5	0.35674	0	0.44423	2190.4	106.09	7.8475	100.33
0019:00 01	1	0.32268	0	0.46626	2192.8	119.68	9.2038	158.96
0019:00 02	2	0.32169	0	0.44969	2209.6	120.49	9.2123	157.96

0019:00 03	3	0.31661	0	0.45525	2212.7	121.35	9.2032	158.21
0019:00 04	4	0.32078	0	0.46266	2254	120.82	9.2209	157.71
0019:00 05	5	0.32225	0	0.44679	2264.6	121.96	9.1775	157.96

Test: 136352-4								
Chrono	StpNum	50 AvgDst	52 Min	53 Max	AvgTime	AvgDist	AvgTime	BrkSpd (l)
		Effectiveness - A	Effectiveness - A	Effectiveness - A	Torque - A	Temperature #1A	Record Pressure - A	None
Sect:Recd	unitless	unitless			N·m	°C	MN/m²	kph
0002:00 01	1	0.1759	0	0.22357	778.8	25.19	4.2048	49.79
0002:00 02	2	0.23068	0	0.25072	850.7	39.8	4.0077	50.04
0002:00 03	3	0.25324	0	0.2712	846	50.87	3.661	49.79
0002:00 04	4	0.27623	0	0.29761	847.2	60.47	3.3747	49.79
0002:00 05	5	0.29349	0	0.31709	845.8	69.59	3.1794	49.79
0003:00 01	1	0.29119	0	0.32412	840.8	89.69	3.1953	99.58
0003:00 02	2	0.31856	0	0.36953	845	116.46	2.9493	99.58
0003:00 03	3	0.34958	0	0.40445	848.9	116.1	2.6539	99.71
0003:00 04	4	0.3694	0	0.4434	847.4	115.49	2.4885	99.71
0003:00 05	5	0.3946	0	0.47398	850.1	116.02	2.3475	99.71
0004:00 01	1	0.37318	0	0.43273	786.9	102.91	2.2773	49.67
0004:00 02	2	0.37812	0	0.44405	795	102.63	2.2779	49.67
0004:00 03	3	0.38181	0	0.45195	801.7	103.69	2.2761	49.67
0005:00	1	0.35231	0	0.39001	1691.5	100.06	5.1155	49.67

01								
0005:00 02	2	0.36216	0	0.39781	1797.9	100.51	5.3322	49.67
0005:00 03	3	0.36181	0	0.42783	1734.2	100.31	5.0746	49.67
0005:00 04	4	0.37014	0	0.40241	1821.6	100.55	5.2467	49.67
0005:00 05	5	0.36866	0	0.40979	1791.5	99.82	5.1466	49.67
0006:00 01	1	0.32737	0	0.40541	2133.7	105.07	8.0117	99.58
0006:00 02	2	0.28351	0	0.318	2018.5	107.96	7.817	99.58
0006:00 03	3	0.34823	0	0.45134	2214.6	107.43	7.181	99.58
0006:00 04	4	0.34606	0	0.4002	2315.9	107.19	7.4947	99.46
0006:00 05	5	0.34702	0	0.41005	2293.3	107.76	7.5631	99.58
0007:00 01	1	0.45733	0	0.6743	850.3	145.27	1.9526	80.29
0007:00 02	2	0.52513	0	0.66324	854.3	162.36	1.7499	80.16
0007:00 03	3	0.53519	0	0.71538	852.2	173.15	1.7389	80.29
0007:00 04	4	0.5191	0	0.64402	850.1	182.67	1.8128	80.41
0007:00 05	5	0.49003	0	0.61531	849.6	189.42	1.919	80.16
0007:00 06	6	0.45798	0	0.56386	845.3	196.75	2.0283	80.29
0007:00 07	7	0.44601	0	0.52916	847.7	201.55	2.0991	80.29
0007:00 08	8	0.43056	0	0.51584	845.1	204.44	2.1601	80.16
0007:00 09	9	0.42861	0	0.49602	846.5	207.25	2.1796	80.29
0007:00 10	10	0.41903	0	0.48427	843.4	210.7	2.2089	80.29
0007:00 11	11	0.41968	0	0.49116	846.5	211.56	2.2163	80.29
0007:00 12	12	0.41456	0	0.49043	844.3	212.7	2.2224	80.41
0007:00 13	13	0.41603	0	0.49667	846.7	214.77	2.2169	80.29

0007:00 14	14	0.41716	0	0.5299	847.4	217.05	2.2095	80.16
0007:00 15	15	0.41907	0	0.50405	847.4	218.15	2.1943	80.29
0007:00 16	16	0.41551	0	0.48895	847.9	218.11	2.2028	80.29
0007:00 17	17	0.41261	0	0.52122	845.1	218.96	2.1992	80.16
0007:00 18	18	0.41647	0	0.49862	848.6	220.59	2.1906	80.29
0007:00 19	19	0.41512	0	0.49372	848.4	221.41	2.1918	80.29
0007:00 20	20	0.41352	0	0.50786	849.3	221.81	2.1937	80.29
0007:00 21	21	0.40779	0	0.54911	845.8	219.86	2.1998	80.29
0007:00 22	22	0.40961	0	0.54139	849.8	221.85	2.2028	80.54
0007:00 23	23	0.40389	0	0.56447	847.9	222.55	2.2156	80.54
0007:00 24	24	0.40428	0	0.5289	849.8	224.01	2.2181	80.04
0007:00 25	25	0.40172	0	0.53155	846.5	225.88	2.2169	80.54
0007:00 26	26	0.40445	0	0.51606	850.8	226.94	2.2175	80.41
0007:00 27	27	0.40254	0	0.52248	847.2	226.45	2.2108	80.41
0007:00 28	28	0.40215	0	0.55241	849.3	227.14	2.215	80.16
0007:00 29	29	0.4028	0	0.57792	850.7	225.35	2.2108	80.41
0007:00 30	30	0.40306	0	0.60446	849.3	225.43	2.204	80.41
0007:00 31	31	0.40311	0	0.58338	849.8	225.56	2.2053	80.41
0007:00 32	32	0.4064	0	0.56	852.5	224.62	2.1937	80.54
0007:00 33	33	0.40753	0	0.54265	852.9	224.5	2.187	80.54
0007:00 34	34	0.40558	0	0.5525	847	223.68	2.1778	80.41
0007:00 35	35	0.40606	0	0.55475	851.9	222.83	2.1863	80.54
0007:00	36	0.40384	0	0.60091	847.9	222.22	2.1815	80.29

36								
0007:00 37	37	0.41109	0	0.59336	853.8	221.89	2.165	80.29
0007:00 38	38	0.40562	0	0.58256	850	220.67	2.1766	80.29
0007:00 39	39	0.40866	0	0.60273	854.8	221.04	2.1766	80.29
0007:00 40	40	0.40849	0	0.58225	852.5	220.67	2.1717	80.29
0007:00 41	41	0.40584	0	0.57774	848.8	217.58	2.1662	80.29
0007:00 42	42	0.41039	0	0.57939	855.1	217.87	2.1662	80.29
0007:00 43	43	0.40875	0	0.60863	848.6	218.03	2.1497	80.29
0007:00 44	44	0.41508	0	0.59427	854.6	219.7	2.143	80.29
0007:00 45	45	0.41039	0	0.64572	848.4	216.89	2.1424	80.16
0007:00 46	46	0.41625	0	0.60811	853.1	216.89	2.132	80.29
0007:00 47	47	0.41018	0	0.58455	848.9	213.43	2.1424	80.29
0007:00 48	48	0.41582	0	0.62333	854.3	212.98	2.1339	80.16
0007:00 49	49	0.40935	0	0.57649	850.7	211.92	2.1479	80.29
0007:00 50	50	0.41577	0	0.58681	853.9	212.78	2.1339	80.29
0007:00 51	51	0.41334	0	0.61418	854.1	211.48	2.1455	80.29
0007:00 52	52	0.41417	0	0.63769	854.3	210.46	2.1406	80.16
0007:00 53	53	0.41508	0	0.63027	854.1	209.69	2.1363	80.29
0007:00 54	54	0.40957	0	0.64389	849.8	208.06	2.1455	80.29
0007:00 55	55	0.4153	0	0.59679	855.1	209	2.1363	80.29
0007:00 56	56	0.40987	0	0.58529	848.8	207.08	2.14	80.16
0007:00 57	57	0.41751	0	0.58815	854.3	208.55	2.1247	80.16
0007:00 58	58	0.41209	0	0.63387	853.1	207.37	2.1406	80.29

0007:00 59	59	0.4179	0	0.62203	853.9	209.56	2.1223	80.29
0007:00 60	60	0.41347	0	0.64229	851	208.3	2.1314	80.29
0007:00 61	61	0.41768	0	0.61253	854.8	208.1	2.1241	80.16
0007:00 62	62	0.41178	0	0.62199	851	206.02	2.1369	80.16
0007:00 63	63	0.41842	0	0.60533	855.3	206.8	2.1204	80.41
0007:00 64	64	0.41252	0	0.5738	851.5	206.43	2.1332	80.29
0007:00 65	65	0.4179	0	0.59978	855.1	208.67	2.1229	80.29
0007:00 66	66	0.41156	0	0.61201	850.1	208.3	2.1357	80.29
0007:00 67	67	0.41738	0	0.61049	854.3	207.49	2.1235	80.29
0007:00 68	68	0.41009	0	0.60906	850.1	204.68	2.14	80.16
0007:00 69	69	0.41369	0	0.60724	853.8	204.93	2.1369	80.29
0007:00 70	70	0.41165	0	0.62967	851.2	204.56	2.1375	80.29
0007:00 71	71	0.41716	0	0.62134	854.8	204.72	2.1241	80.29
0007:00 72	72	0.41248	0	0.59969	851	202.2	2.1308	80.29
0007:00 73	73	0.41634	0	0.58711	855.3	201.79	2.1284	80.29
0007:00 74	74	0.40953	0	0.63062	850.5	199.8	2.1393	80.29
0007:00 75	75	0.41647	0	0.6383	854.6	202.32	2.1265	80.04
0007:00 76	76	0.41334	0	0.64381	852.9	200.9	2.1339	80.29
0007:00 77	77	0.41226	0	0.60321	854.4	200.45	2.1418	80.29
0007:00 78	78	0.41174	0	0.63691	853.4	199.88	2.1406	80.16
0007:00 79	79	0.4182	0	0.59752	854.3	200.37	2.118	80.16
0007:00 80	80	0.41404	0	0.58451	855.3	198.78	2.1375	80.29
0007:00	81	0.41625	0	0.58035	854.8	198.82	2.1296	79.91

81								
0007:00 82	82	0.41091	0	0.60789	852.2	197.52	2.1393	80.41
0007:00 83	83	0.4172	0	0.66168	854.8	198.82	2.1235	80.16
0007:00 84	84	0.41113	0	0.64307	850.8	197.11	2.1332	80.29
0007:00 85	85	0.41629	0	0.59974	855.3	197.24	2.1259	80.16
0007:00 86	86	0.41057	0	0.63092	851.7	196.87	2.1387	80.29
0007:00 87	87	0.41838	0	0.59084	854.8	197.76	2.1174	80.29
0007:00 88	88	0.41152	0	0.59535	849.8	196.62	2.1308	80.16
0007:00 89	89	0.41629	0	0.57991	855.1	197.19	2.1265	80.29
0007:00 90	90	0.41035	0	0.58915	852.9	195.36	2.1436	80.29
0007:00 91	91	0.4153	0	0.60577	855.3	197.32	2.132	80.29
0007:00 92	92	0.41087	0	0.61965	850.8	195.57	2.1369	80.16
0007:00 93	93	0.41725	0	0.62784	854.3	195.73	2.1223	80.29
0007:00 94	94	0.41052	0	0.64407	850.5	194.35	2.1369	80.29
0007:00 95	95	0.41512	0	0.58659	855.1	194.63	2.1351	80.41
0007:00 96	96	0.41018	0	0.6209	850.3	193.21	2.1375	80.29
0007:00 97	97	0.41543	0	0.57991	856.2	193.61	2.1381	80.29
0007:00 98	98	0.40992	0	0.59774	851.3	193.41	2.1455	80.16
0007:00 99	99	0.41521	0	0.63396	856	194.51	2.1357	80.29
0007:01 00	100	0.41647	0	0.66294	854.8	194.47	2.1284	80.16
0007:01 01	101	0.41638	0	0.61878	856.2	194.26	2.1302	80.29
0007:01 02	102	0.41816	0	0.61383	854.3	194.18	2.1186	80.16
0007:01 03	103	0.41716	0	0.6026	855.5	193.25	2.1278	80.16

0007:01 04	104	0.41499	0	0.58685	855.3	192.64	2.1351	80.29
0007:01 05	105	0.41603	0	0.59349	855.8	191.5	2.1302	80.29
0007:01 06	106	0.41569	0	0.58733	854.6	190.93	2.129	80.54
0007:01 07	107	0.41209	0	0.62164	855.7	190.68	2.1467	80.54
0007:01 08	108	0.41378	0	0.61214	854.8	191.9	2.1406	80.54
0007:01 09	109	0.41018	0	0.63019	854.3	190.56	2.1509	80.54
0007:01 10	110	0.4153	0	0.62164	856.2	191.34	2.1345	80.54
0007:01 11	111	0.41616	0	0.63682	855.1	191.13	2.1284	80.54
0007:01 12	112	0.41599	0	0.61821	854.8	191.7	2.1302	80.41
0007:01 13	113	0.41143	0	0.57935	851.5	190.81	2.1381	80.41
0007:01 14	114	0.41751	0	0.58434	855.3	190.85	2.1229	79.91
0007:01 15	115	0.41196	0	0.60832	851.2	188.41	2.1332	80.41
0007:01 16	116	0.41655	0	0.61852	856.5	189.34	2.129	80.54
0007:01 17	117	0.41018	0	0.6075	854.1	188.61	2.1509	80.41
0007:01 18	118	0.41399	0	0.61926	854.6	188.45	2.1375	80.54
0007:01 19	119	0.40857	0	0.64238	852.2	187.71	2.1528	80.54
0007:01 20	120	0.41178	0	0.59679	855.7	189.06	2.1534	80.91
0007:01 21	121	0.40788	0	0.62598	851	186.94	2.1509	80.54
0007:01 22	122	0.41347	0	0.57028	855.3	187.51	2.1461	80.16
0007:01 23	123	0.41291	0	0.5777	856	187.23	2.1467	80.29
0007:01 24	124	0.41356	0	0.58724	855.3	187.06	2.1442	80.29
0007:01 25	125	0.41556	0	0.63192	855.1	186.17	2.1339	80.16
0007:01	126	0.41126	0	0.6573	851.5	184.87	2.1345	80.29

26								
0007:01 27	127	0.41677	0	0.62758	856.2	185.43	2.1253	80.16
0007:01 28	128	0.41161	0	0.60655	854.3	183.12	2.1418	80.29
0007:01 29	129	0.4153	0	0.6524	856.2	182.51	2.1326	80.16
0007:01 30	130	0.41	0	0.5977	851.5	180.88	2.1393	80.16
0007:01 31	131	0.41655	0	0.58681	856.5	181.45	2.1278	80.29
0007:01 32	132	0.41191	0	0.60611	851.2	179.78	2.1326	80.41
0007:01 33	133	0.41916	0	0.60763	856.7	180.27	2.1186	80.16
0007:01 34	134	0.4143	0	0.65838	851.9	179.09	2.1223	80.16
0007:01 35	135	0.42102	0	0.63648	856.2	180.27	2.1082	80.16
0007:01 36	136	0.4153	0	0.6393	851.2	178.8	2.1168	80.04
0007:01 37	137	0.41989	0	0.63032	856.9	180.14	2.1155	80.29
0007:01 38	138	0.41751	0	0.59219	857	180.1	2.1259	80.16
0007:01 39	139	0.41438	0	0.5869	856	180.06	2.1406	80.16
0007:01 40	140	0.41464	0	0.5839	856.9	180.71	2.1381	80.16
0007:01 41	141	0.4143	0	0.62051	856.9	181	2.1393	80.29
0007:01 42	142	0.41365	0	0.62017	856	181.73	2.1412	80.29
0007:01 43	143	0.41469	0	0.65144	856.9	182.1	2.1381	80.29
0007:01 44	144	0.40905	0	0.63053	851	181.24	2.1448	80.29
0007:01 45	145	0.41482	0	0.64841	857.2	182.06	2.1387	80.29
0007:01 46	146	0.4143	0	0.60841	857.2	182.02	2.1406	80.29
0007:01 47	147	0.41577	0	0.58065	855.7	181.37	2.132	80.16
0007:01 48	148	0.40896	0	0.5846	852.5	180.59	2.1503	80.29

0007:01 49	149	0.41334	0	0.60134	857.2	181.32	2.1467	80.29
0007:01 50	150	0.41438	0	0.60351	856	181.28	2.1406	80.16
0007:01 51	151	0.41521	0	0.64068	856.7	180.71	2.1369	80.29
0007:01 52	152	0.40953	0	0.63006	851.7	179.53	2.1473	80.16
0007:01 53	153	0.41638	0	0.62307	856.3	180.8	2.1302	80.29
0007:01 54	154	0.41634	0	0.59375	853.9	179.9	2.121	80.16
0007:01 55	155	0.42488	0	0.59679	855.5	181.08	2.0911	80.04
0007:01 56	156	0.42189	0	0.62177	851.2	179.45	2.0911	80.29
0007:01 57	157	0.42792	0	0.62394	855.7	179.49	2.0814	80.29
0007:01 58	158	0.42748	0	0.62954	854.6	178.35	2.0771	80.16
0007:01 59	159	0.43477	0	0.64771	856.5	178.72	2.0496	80.29
0007:01 60	160	0.44223	0	0.6291	855.7	177.74	2.0185	80.29
0007:01 61	161	0.44679	0	0.61127	854.6	177.13	2.0002	80.29
0007:01 62	162	0.44679	0	0.59444	855.3	176.73	2.0045	80.29
0007:01 63	163	0.44124	0	0.60485	854.3	175.47	2.0234	80.16
0007:01 64	164	0.44497	0	0.62177	854.3	176.08	2.0112	80.29
0007:01 65	165	0.43876	0	0.62949	851.2	175.06	2.0222	80.16
0007:01 66	166	0.44787	0	0.6435	854.8	175.02	1.9984	80.16
0007:01 67	167	0.45113	0	0.6881	856	174.33	1.9861	80.29
0007:01 68	168	0.45542	0	0.64264	854.6	174.29	1.9672	79.91
0007:01 69	169	0.45984	0	0.62221	855.5	172.94	1.952	80.29
0007:01 70	170	0.45642	0	0.63158	853.9	173.27	1.9636	80.16
0007:01	171	0.45312	0	0.62698	853.9	173.51	1.98	80.29

71								
0007:01 72	172	0.4503	0	0.64316	855.1	173.43	1.9904	80.16
0007:01 73	173	0.44891	0	0.63496	854.8	173.27	1.9971	80.16
0007:01 74	174	0.44492	0	0.61075	853.2	172.54	2.0026	80.16
0007:01 75	175	0.45017	0	0.65231	855.3	173.59	1.991	80.29
0007:01 76	176	0.44345	0	0.60937	855	172.62	2.0154	80.16
0007:01 77	177	0.44657	0	0.58698	854.1	173.19	2.0008	80.29
0007:01 78	178	0.44327	0	0.62338	855	172.62	2.0142	80.16
0007:01 79	179	0.45052	0	0.63184	856	173.39	1.9831	79.91
0007:01 80	180	0.45668	0	0.64125	854.8	172.05	1.9581	80.29
0007:01 81	181	0.46058	0	0.66085	854.8	171.84	1.9446	80.29
0007:01 82	182	0.45837	0	0.64546	854.6	171.11	1.9526	80.29
0007:01 83	183	0.44761	0	0.62056	850.3	169.36	1.977	80.29
0007:01 84	184	0.44844	0	0.60941	856.3	170.18	1.9929	80.16
0007:01 85	185	0.43512	0	0.62303	851	169.85	2.0258	80.29
0007:01 86	186	0.43967	0	0.62142	855.3	171.11	2.027	80.29
0007:01 87	187	0.43299	0	0.65994	855	170.26	2.0515	80.29
0007:01 88	188	0.43785	0	0.61145	855.8	171.93	2.0356	80.29
0007:01 89	189	0.4356	0	0.64615	857	172.45	2.0466	80.29
0007:01 90	190	0.42787	0	0.60763	851.5	171.52	2.0576	80.29
0007:01 91	191	0.43642	0	0.59353	855	172.86	2.038	80.41
0007:01 92	192	0.43134	0	0.62542	855.1	172.37	2.0551	80.41
0007:01 93	193	0.43343	0	0.66285	855.3	172.98	2.0515	80.54

0007:01 94	194	0.42601	0	0.64498	855.7	172.41	2.0844	80.41
0007:01 95	195	0.42714	0	0.62867	855.5	173.43	2.0832	80.54
0007:01 96	196	0.42688	0	0.64316	856.9	173.76	2.0869	80.54
0007:01 97	197	0.4192	0	0.61965	850.3	173.27	2.0972	80.41
0007:01 98	198	0.42536	0	0.58737	855.3	174.45	2.093	80.41
0007:01 99	199	0.41855	0	0.59123	851	173.11	2.1058	80.41
0007:02 00	200	0.42206	0	0.65049	855.1	174.45	2.1052	80.54
0008:00 01	1	0.32073	0	0.39265	1644.4	102.22	5.0893	49.92
0008:00 02	2	0.35543	0	0.40124	1807.9	101.9	5.298	49.79
0008:00 03	3	0.37908	0	0.42137	1870.6	101.24	5.1698	49.42
0008:00 04	4	0.39005	0	0.43499	1879.6	101.98	5.0398	49.17
0008:00 05	5	0.39517	0	0.4487	1893.2	100.8	4.9904	49.92
0009:00 01	1	0.40163	0	0.46193	2462.1	106.13	6.6823	99.83
0009:00 02	2	0.42137	0	0.4965	2442	108.16	7.253	99.58
0009:00 03	3	0.38484	0	0.46717	2224.2	111.62	7.6589	99.58
0009:00 04	4	0.37027	0	0.46965	2178.9	111.58	7.875	99.58
0009:00 05	5	0.37261	0	0.45967	2194.2	111.54	7.8268	99.58
0010:00 01	1	0.42276	0	0.48513	1775.6	118.62	4.7243	99.58
0010:00 02	2	0.45256	0	0.56287	1745.6	116.83	4.1322	99.46
0010:00 03	3	0.47598	0	0.57367	1783.4	117.97	3.99	99.58
0010:00 04	4	0.47533	0	0.58225	1790.6	118.66	3.9961	99.21
0010:00 05	5	0.4631	0	0.59028	1772.3	118.29	3.9991	99.46
0010:00	6	0.44575	0	0.59024	1755.8	117.93	4.0931	99.58

06								
0011:00 01	1	0.33431	0	0.42098	862.4	37.89	2.8095	120.37
0011:00 02	2	0.39105	0	0.47368	853.2	83.14	2.3701	120.49
0011:00 03	3	0.41616	0	0.48357	847.9	130.99	2.2315	120.49
0011:00 04	4	0.39747	0	0.46457	843.6	176.81	2.3481	120.62
0011:00 05	5	0.37929	0	0.44596	840.8	212.94	2.4732	120.74
0011:00 06	6	0.37539	0	0.43711	842.9	245.94	2.5025	120.49
0011:00 07	7	0.37756	0	0.43416	844.8	273.69	2.4726	120.62
0011:00 08	8	0.37534	0	0.44792	845.7	295.34	2.4757	120.62
0011:00 09	9	0.37387	0	0.42709	845.7	314.18	2.4854	120.62
0011:00 10	10	0.36984	0	0.43529	845.1	330.58	2.5135	120.49
0011:00 11	11	0.37591	0	0.47654	844.1	344.09	2.4665	120.62
0011:00 12	12	0.38346	0	0.43859	848.1	358.58	2.4366	120.62
0011:00 13	13	0.40779	0	0.50209	846.7	371.56	2.2938	120.74
0011:00 14	14	0.42553	0	0.53432	843.9	381.04	2.1839	120.74
0011:00 15	15	0.4398	0	0.51623	848.2	390.11	2.1271	120.74
0012:00 01	1	0.40619	0	0.4647	1298.9	402.28	3.9381	99.83
0012:00 02	2	0.35014	0	0.4241	2566.6	409.97	9.3252	99.83
0014:00 01	1	0.26968	0	0.32065	858.1	23.97	3.39	50.04
0014:00 02	2	0.2813	0	0.32173	854.6	32.48	3.2661	49.92
0014:00 03	3	0.29683	0	0.33965	839.1	40.98	3.025	49.92
0014:00 04	4	0.31518	0	0.35734	848.1	49.32	2.8889	49.92
0015:00 01	1	0.33422	0	0.36285	2351.8	57.09	7.4758	99.83

0015:00 02	2	0.38975	0	0.41764	2501.8	90.66	7.1279	99.83
0016:00 01	1	0.48301	0	0.61075	853.6	107.67	1.8806	80.54
0016:00 02	2	0.5109	0	0.63652	852.9	118.38	1.7963	80.54
0016:00 03	3	0.52231	0	0.61544	850.8	128.71	1.7658	80.54
0016:00 04	4	0.50838	0	0.63717	850.7	137.54	1.8122	80.66
0016:00 05	5	0.4896	0	0.61553	847.5	144.34	1.8616	80.54
0016:00 06	6	0.4935	0	0.62745	850.1	151.21	1.8641	80.41
0016:00 07	7	0.48236	0	0.63674	847.2	156.34	1.8879	80.54
0016:00 08	8	0.48414	0	0.63366	852	161.3	1.8989	80.66
0016:00 09	9	0.47372	0	0.62368	852.4	165.21	1.9318	80.29
0016:00 10	10	0.47051	0	0.57284	852.7	169.36	1.944	80.29
0016:00 11	11	0.46019	0	0.56065	853.2	172.41	1.9831	80.29
0016:00 12	12	0.44414	0	0.6016	848.4	175.22	2.0252	80.29
0016:00 13	13	0.44414	0	0.60073	853.6	178.52	2.0423	80.29
0016:00 14	14	0.42401	0	0.57623	846.9	181.12	2.096	80.29
0016:00 15	15	0.4218	0	0.5705	848.6	184.09	2.1082	80.29
0016:00 16	16	0.42458	0	0.58564	853.6	187.55	2.1174	80.29
0016:00 17	17	0.41833	0	0.56395	851.2	189.71	2.1369	80.41
0016:00 18	18	0.41838	0	0.53823	853.9	192.47	2.1448	80.29
0016:00 19	19	0.41156	0	0.55788	849.8	194.55	2.1546	80.29
0016:00 20	20	0.41213	0	0.57579	851.2	197.07	2.1552	80.29
0016:00 21	21	0.4094	0	0.60741	847	198.7	2.1461	80.16
0016:00	22	0.40475	0	0.59193	853.8	201.59	2.1912	80.29

22								
0016:00 23	23	0.40384	0	0.59891	850.1	202.53	2.1766	80.16
0016:00 24	24	0.40532	0	0.58317	849.4	203.83	2.1644	80.29
0016:00 25	25	0.40762	0	0.57675	850.8	204.97	2.1564	80.29
0016:00 26	26	0.40853	0	0.59167	849.3	205.62	2.1436	80.16
0016:00 27	27	0.41031	0	0.61075	851.7	205.37	2.1442	79.79
0016:00 28	28	0.40822	0	0.62967	850.5	206.19	2.1418	80.29
0016:00 29	29	0.40688	0	0.60026	851.2	208.14	2.154	80.41
0016:00 30	30	0.40753	0	0.58473	851.2	209.77	2.1455	80.29
0016:00 31	31	0.40744	0	0.63036	851	211.07	2.1473	80.29
0016:00 32	32	0.40536	0	0.61127	850.5	210.62	2.1503	80.29
0016:00 33	33	0.40827	0	0.59245	858.4	211.72	2.1662	80.41
0016:00 34	34	0.40467	0	0.61756	853.2	211.92	2.165	80.29
0016:00 35	35	0.40102	0	0.6609	853.1	212.41	2.179	80.16
0017:00 01	1	0.27467	0	0.36251	1533.7	102.06	5.4952	49.67
0017:00 02	2	0.31574	0	0.37404	1691	101.49	5.5129	49.67
0017:00 03	3	0.33067	0	0.38589	1726.3	101.69	5.4207	49.67
0017:00 04	4	0.33713	0	0.3845	1738.2	101.77	5.37	49.67
0017:00 05	5	0.34272	0	0.38866	1755.1	101.41	5.3481	50.29
0018:00 01	1	0.35708	0	0.41911	2385.1	106.33	7.1767	99.58
0018:00 02	2	0.39677	0	0.48275	2369.9	106.86	7.0766	99.58
0018:00 03	3	0.39703	0	0.50136	2349.2	107.43	7.402	99.58
0018:00 04	4	0.38892	0	0.47772	2302.5	108.37	7.5307	99.58

0018:00 05	5	0.38181	0	0.47325	2269.9	108.69	7.6083	99.58
0019:00 01	1	0.33873	0	0.50886	2470.2	126.92	9.5114	158.96
0019:00 02	2	0.34047	0	0.48357	2445.1	126.64	9.219	157.84
0019:00 03	3	0.34043	0	0.47754	2446.1	126.68	9.1995	157.71
0019:00 04	4	0.33969	0	0.4706	2519.9	129.52	9.4302	157.96
0019:00 05	5	0.34359	0	0.47307	2477.1	129.65	9.2056	157.84

Test: 143955-1								
Chrono	StpNum	50 AvgDst	52 Min	53 Max	AvgTime	AvgDist	AvgTime	BrkSpd (l)
		Effectiveness - A	Effectiveness - A	Effectiveness - A	Torque - A	Temperature #1A	Record Pressure - A	None
Sect:Recd	unitless	unitless			N·m	°C	MN/m²	kph
0002:00 01	999	0	0	0	11.70869	22.98	-0.0029	49.67
0999:00 01	1	0	0	0	6.30468	0	3.419	0
0999:00 02	2	0	0	0	9.00668	0	3.3985	0
0999:00 03	3	0	0	0	9.90735	0	3.3922	0
0999:00 04	4	0	0	0	9.68218	0	3.3943	0
0999:00 05	5	0	0	0	9.68218	0	3.3893	0
0999:00 06	6	0	0	0	9.45702	0	3.39	0
0999:00 07	7	0	0	0	9.90735	0	3.3936	0
0999:00 08	8	0	0	0	8.10601	0	3.3823	0
0999:00 09	9	0	0	0	7.43051	0	3.4472	0
0999:00	10	0	0	0	7.4305	0	3.4472	0

10					1			
0999:00 11	11	0	0	0	7.6556 8	0	3.4472	0
0999:00 12	12	0	0	0	7.6556 8	0	3.4472	0
0999:00 13	13	0	0	0	7.6556 8	0	3.4472	0
0999:00 14	14	0	0	0	7.6556 8	0	3.4472	0
0999:00 15	15	0	0	0	7.6556 8	0	3.4472	0
0999:00 16	16	0	0	0	7.6556 8	0	3.4472	0
0999:00 17	17	0	0	0	7.8808 5	0	3.4465	0
0999:00 18	18	0	0	0	7.6556 8	0	3.4472	0
0999:00 19	19	0	0	0	7.8808 5	0	3.4472	0
0999:00 20	20	0	0	0	7.8808 5	0	3.4472	0
0999:00 21	21	0	0	0	7.6556 8	0	3.4472	0
0999:00 22	22	0	0	0	7.6556 8	0	3.4472	0
0999:00 23	23	0	0	0	8.1060 1	0	3.3907	0
0999:00 24	24	0	0	0	7.6556 8	0	3.4472	0
0999:00 25	25	0	0	0	7.6556 8	0	3.4479	0
0999:00 26	26	0	0	0	7.6556 8	0	3.4472	0
0999:00 27	27	0	0	0	7.6556 8	0	3.4472	0
0999:00 28	28	0	0	0	7.6556 8	0	3.4465	0
0999:00 29	29	0	0	0	7.6556 8	0	3.4472	0
0999:00 30	30	0	0	0	7.6556 8	0	3.4465	0
0999:00 31	31	0	0	0	7.4305 1	0	3.4472	0
0999:00 32	32	0	0	0	7.4305 1	0	3.4472	0

0999:00 33	33	0	0	0	7.4305 1	0	3.4472	0
0999:00 34	34	0	0	0	7.4305 1	0	3.4472	0
0999:00 35	35	0	0	0	7.4305 1	0	3.4472	0
0999:00 36	36	0	0	0	7.4305 1	0	3.4472	0
0999:00 37	37	0	0	0	7.2053 4	0	3.4472	0
0999:00 38	38	0	0	0	7.2053 4	0	3.4465	0
0999:00 39	39	0	0	0	7.2053 4	0	3.4472	0
0999:00 40	40	0	0	0	7.2053 4	0	3.4472	0
0999:00 41	41	0	0	0	7.2053 4	0	3.4465	0
0999:00 42	42	0	0	0	7.2053 4	0	3.4465	0
0999:00 43	43	0	0	0	7.2053 4	0	3.4472	0
0999:00 44	44	0	0	0	7.2053 4	0	3.4472	0
0999:00 45	45	0	0	0	7.2053 4	0	3.4472	0
0999:00 46	46	0	0	0	7.2053 4	0	3.4472	0
0999:00 47	47	0	0	0	7.2053 4	0	3.4472	0
0999:00 48	48	0	0	0	10.808 02	0	3.4472	0
0999:00 49	49	0	0	0	10.808 02	0	3.4472	0
0999:00 50	50	0	0	0	10.582 85	0	3.4465	0
0999:00 51	51	0	0	0	10.582 85	0	3.4465	0
0999:00 52	52	0	0	0	10.582 85	0	3.4465	0
0999:00 53	53	0	0	0	10.582 85	0	3.4472	0
0999:00 54	54	0	0	0	10.582 85	0	3.4465	0
0999:00	55	0	0	0	10.357	0	3.4472	0

55					68			
0999:00 56	56	0	0	0	10.357 68	0	3.4472	0
0999:00 57	57	0	0	0	10.357 68	0	3.4465	0
0999:00 58	58	0	0	0	10.357 68	0	3.4472	0
0999:00 59	59	0	0	0	10.357 68	0	3.4472	0
0999:00 60	60	0	0	0	10.357 68	0	3.4472	0
0999:00 61	61	0	0	0	10.357 68	0	3.4472	0
0999:00 62	62	0	0	0	10.357 68	0	3.4472	0
0999:00 63	63	0	0	0	10.357 68	0	3.4465	0
0999:00 64	64	0	0	0	10.357 68	0	3.4472	0
0999:00 65	65	0	0	0	10.357 68	0	3.4472	0
0999:00 66	66	0	0	0	10.357 68	0	3.4472	0
0999:00 67	67	0	0	0	10.357 68	0	3.4465	0
0999:00 68	68	0	0	0	10.357 68	0	3.4472	0
0999:00 69	69	0	0	0	10.357 68	0	3.4472	0
0999:00 70	70	0	0	0	10.357 68	0	3.4472	0
0999:00 71	71	0	0	0	10.357 68	0	3.4465	0
0999:00 72	72	0	0	0	10.357 68	0	3.4472	0
0999:00 73	73	0	0	0	10.357 68	0	3.4472	0
0999:00 74	74	0	0	0	10.582 85	0	3.4465	0
0999:00 75	75	0	0	0	10.582 85	0	3.4465	0
0999:00 76	76	0	0	0	10.582 85	0	3.4465	0
0999:00 77	77	0	0	0	10.582 85	0	3.4472	0

0999:00 78	78	0	0	0	10.582 85	0	3.4472	0
0999:00 79	79	0	0	0	10.582 85	0	3.4472	0
0999:00 80	80	0	0	0	10.582 85	0	3.4472	0
0999:00 81	81	0	0	0	10.582 85	0	3.4479	0
0999:00 82	82	0	0	0	10.582 85	0	3.4472	0
0999:00 83	83	0	0	0	10.582 85	0	3.4479	0
0999:00 84	84	0	0	0	10.582 85	0	3.4479	0
0999:00 85	85	0	0	0	10.582 85	0	3.4479	0
0999:00 86	86	0	0	0	10.582 85	0	3.4472	0
0999:00 87	87	0	0	0	10.582 85	0	3.4472	0
0999:00 88	88	0	0	0	10.582 85	0	3.4472	0
0999:00 89	89	0	0	0	10.582 85	0	3.4479	0
0999:00 90	90	0	0	0	10.582 85	0	3.4472	0
0999:00 91	91	0	0	0	10.582 85	0	3.4472	0
0999:00 92	92	0	0	0	10.582 85	0	3.4472	0
0999:00 93	93	0	0	0	10.582 85	0	3.4472	0
0999:00 94	94	0	0	0	10.582 85	0	3.4479	0
0999:00 95	95	0	0	0	10.582 85	0	3.4472	0
0999:00 96	96	0	0	0	10.582 85	0	3.4472	0
0999:00 97	97	0	0	0	10.582 85	0	3.4472	0
0999:00 98	98	0	0	0	10.582 85	0	3.4479	0
0999:00 99	99	0	0	0	10.582 85	0	3.4479	0
0999:01	100	0	0	0	10.582	0	3.4472	0

00					85			
0999:01 01	101	0	0	0	10.582 85	0	3.4472	0
0999:01 02	102	0	0	0	10.582 85	0	3.4472	0
0999:01 03	103	0	0	0	10.582 85	0	3.4465	0
0999:01 04	104	0	0	0	10.582 85	0	3.4472	0
0999:01 05	105	0	0	0	10.582 85	0	3.4472	0
0999:01 06	106	0	0	0	10.582 85	0	3.4472	0
0999:01 07	107	0	0	0	10.582 85	0	3.4472	0
0999:01 08	108	0	0	0	10.582 85	0	3.4472	0
0999:01 09	109	0	0	0	10.582 85	0	3.4472	0
0999:01 10	110	0	0	0	10.582 85	0	3.4472	0
0999:01 11	111	0	0	0	10.582 85	0	3.4472	0
0999:01 12	112	0	0	0	10.582 85	0	3.4472	0
0999:01 13	113	0	0	0	10.582 85	0	3.4472	0
0999:01 14	114	0	0	0	10.582 85	0	3.4472	0
0999:01 15	115	0	0	0	10.582 85	0	3.4472	0
0999:01 16	116	0	0	0	10.582 85	0	3.4472	0
0999:01 17	117	0	0	0	10.582 85	0	3.4472	0
0999:01 18	118	0	0	0	10.582 85	0	3.4472	0
0999:01 19	119	0	0	0	10.357 68	0	3.4472	0
0999:01 20	120	0	0	0	10.582 85	0	3.4472	0
0999:01 21	121	0	0	0	10.582 85	0	3.4472	0
0999:01 22	122	0	0	0	10.582 85	0	3.4472	0

0999:01 23	123	0	0	0	10.582 85	0	3.4472	0
0999:01 24	124	0	0	0	10.582 85	0	3.4472	0
0999:01 25	125	0	0	0	10.582 85	0	3.4472	0
0999:01 26	126	0	0	0	10.582 85	0	3.4465	0
0999:01 27	127	0	0	0	10.582 85	0	3.4465	0
0999:01 28	128	0	0	0	10.582 85	0	3.4472	0
0999:01 29	129	0	0	0	10.582 85	0	3.4465	0
0999:01 30	130	0	0	0	10.582 85	0	3.4472	0
0999:01 31	131	0	0	0	10.582 85	0	3.4472	0
0999:01 32	132	0	0	0	10.582 85	0	3.4472	0
0999:01 33	133	0	0	0	10.582 85	0	3.4472	0
0999:01 34	134	0	0	0	10.582 85	0	3.4472	0
0999:01 35	135	0	0	0	10.582 85	0	3.4472	0
0999:01 36	136	0	0	0	10.582 85	0	3.4465	0
0999:01 37	137	0	0	0	10.582 85	0	3.4472	0
0999:01 38	138	0	0	0	10.582 85	0	3.4472	0
0999:01 39	139	0	0	0	10.582 85	0	3.4472	0
0999:01 40	140	0	0	0	10.582 85	0	3.4472	0
0999:01 41	141	0	0	0	10.582 85	0	3.4472	0
0999:01 42	142	0	0	0	10.582 85	0	3.4472	0
0999:01 43	143	0	0	0	10.582 85	0	3.4472	0
0999:01 44	144	0	0	0	10.582 85	0	3.4479	0
0999:01	145	0	0	0	10.582	0	3.4472	0

45					85			
0999:01 46	146	0	0	0	10.582 85	0	3.4479	0
0999:01 47	147	0	0	0	10.582 85	0	3.4479	0
0999:01 48	148	0	0	0	10.582 85	0	3.4479	0
0999:01 49	149	0	0	0	10.582 85	0	3.4472	0
0999:01 50	150	0	0	0	10.582 85	0	3.4472	0
0999:01 51	151	0	0	0	10.582 85	0	3.4479	0
0999:01 52	152	0	0	0	10.582 85	0	3.4472	0
0999:01 53	153	0	0	0	10.582 85	0	3.4472	0
0999:01 54	154	0	0	0	10.582 85	0	3.4479	0
0999:01 55	155	0	0	0	10.582 85	0	3.4472	0
0999:01 56	156	0	0	0	10.582 85	0	3.4472	0
0999:01 57	157	0	0	0	10.582 85	0	3.4472	0
0999:01 58	158	0	0	0	10.582 85	0	3.4479	0
0999:01 59	159	0	0	0	10.582 85	0	3.4472	0
0999:01 60	160	0	0	0	10.582 85	0	3.4472	0
0999:01 61	161	0	0	0	10.582 85	0	3.4472	0
0999:01 62	162	0	0	0	10.582 85	0	3.4479	0
0999:01 63	163	0	0	0	10.582 85	0	3.4472	0
0999:01 64	164	0	0	0	10.582 85	0	3.4479	0
0999:01 65	165	0	0	0	10.582 85	0	3.4479	0
0999:01 66	166	0	0	0	10.582 85	0	3.4479	0
0999:01 67	167	0	0	0	10.582 85	0	3.4472	0

0999:01 68	168	0	0	0	10.582 85	0	3.4472	0
0999:01 69	169	0	0	0	10.582 85	0	3.4472	0
0999:01 70	170	0	0	0	10.582 85	0	3.4472	0
0999:01 71	171	0	0	0	10.582 85	0	3.4479	0
0999:01 72	172	0	0	0	10.582 85	0	3.4472	0
0999:01 73	173	0	0	0	10.582 85	0	3.4479	0
0999:01 74	174	0	0	0	10.582 85	0	3.4472	0
0999:01 75	175	0	0	0	10.582 85	0	3.4472	0
0999:01 76	176	0	0	0	10.582 85	0	3.4472	0
0999:01 77	177	0	0	0	10.582 85	0	3.4479	0
0999:01 78	178	0	0	0	10.357 68	0	3.4472	0
0999:01 79	179	0	0	0	10.357 68	0	3.4472	0
0999:01 80	180	0	0	0	10.357 68	0	3.4472	0
0999:01 81	181	0	0	0	10.357 68	0	3.4472	0
0999:01 82	182	0	0	0	10.582 85	0	3.4472	0
0999:01 83	183	0	0	0	9.6821 8	0	3.4366	0
0999:01 84	184	0	0	0	10.132 52	0	3.4472	0
0999:01 85	185	0	0	0	10.132 52	0	3.4472	0
0999:01 86	186	0	0	0	10.357 68	0	3.4472	0
0999:01 87	187	0	0	0	10.132 52	0	3.4465	0
0999:01 88	188	0	0	0	10.132 52	0	3.4472	0
0999:01 89	189	0	0	0	10.132 52	0	3.4472	0
0999:01	190	0	0	0	10.132	0	3.4465	0

90					52			
0999:0191	191	0	0	0	10.13252	0	3.39	0
0999:0192	192	0	0	0	10.13252	0	3.4472	0
0999:0193	193	0	0	0	10.35768	0	3.4465	0
0999:0194	194	0	0	0	10.13252	0	3.4472	0
0999:0195	195	0	0	0	10.13252	0	3.4472	0
0999:0196	196	0	0	0	7.65568	0	12.4339	0
0999:0197	197	0	0	0	8.10601	0	12.4353	0
0999:0198	198	0	0	0	10.58285	0	3.4472	0
0999:0199	199	0	0	0	9.90735	0	3.4528	0
0999:0200	200	0	0	0	10.80802	0	3.4472	0
0999:0201	201	0	0	0	10.13252	0	3.4472	0
0999:0202	202	0	0	0	8.10601	0	3.4465	0
0999:0203	203	0	0	0	11.25835	0	3.4472	0
0999:0204	204	0	0	0	10.80802	0	3.4472	0
0999:0205	205	0	0	0	10.80802	0	3.4472	0
0999:0206	206	0	0	0	10.80802	0	3.4472	0
0999:0207	207	0	0	0	10.80802	0	3.4472	0
0999:0208	208	0	0	0	11.03318	0	3.4472	0
0999:0209	209	0	0	0	10.35768	0	3.4472	0
0999:0210	210	0	0	0	10.58285	0	3.4472	0
0002:0002	999	0.1741	0	0.1842	836.0452	25.5	5.2318	49.54
0002:0003	999	0.1798	0	0.1885	802.4953	32.82	4.9095	49.67

0002:00 04	999	0.1825	0	0.1899	809.25 03	39.83	4.8368	49.67
0002:00 05	999	0.1837	0	0.192	806.77 35	46.6	4.7952	49.54
0002:00 06	999	0.1864	0	0.1952	816.23 05	53.7	4.7649	49.54
0003:00 01	999	0.1935	0	0.2084	821.40 93	72.19	4.731	99.46
0003:00 02	999	0.1782	0	0.1879	835.59 48	100.89	5.1437	99.46
0003:00 03	999	0.1361	0	0.1914	855.18 44	114.99	6.5432	99.58
0003:00 04	999	0.103	0	0.1539	831.78 1	114.22	8.5359	99.46
0003:00 05	999	0.0968	0	0.1464	807.91 33	112.84	8.9796	99.46
0004:00 01	999	0.1744	0	0.1877	369.51 31	43.63	2.2981	49.67
0004:00 02	999	0.1842	0	0.1876	385.27 48	47.24	2.2946	49.79
0002:00 07	1	0.1773	0	0.1931	807.91 13	46.24	5.1141	49.67
0002:00 08	2	0.1718	0	0.1907	805.88 48	56.31	5.287	49.67
0002:00 09	3	0.1648	0	0.1851	801.83 18	64.87	5.4541	49.67
0002:00 10	4	0.1581	0	0.1758	804.53 38	72.6	5.6763	49.67
0002:00 11	5	0.1502	0	0.1703	818.04 38	79.84	6.0297	49.67
0003:00 06	1	0.1277	0	0.1719	817.14 32	101.08	7.1541	99.46
0003:00 07	2	0.1317	0	0.1575	805.43 45	124.42	6.9221	99.71
0003:00 08	3	0.1588	0	0.1971	807.91 13	123.69	5.9529	99.46
0003:00 09	4	0.187	0	0.2223	824.34 85	123.65	5.0838	99.46
0003:00 10	5	0.2211	0	0.254	831.32 87	122.36	4.2536	99.58
0004:00 03	1	0.2122	0	0.2577	459.35 28	105.61	2.2982	49.67
0004:00 04	2	0.2332	0	0.2747	500.33 32	105.2	2.2982	49.67
0004:00	3	0.2456	0	0.2872	525.10	105.06	2.2982	49.67

05					15			
0005:00 01	1	0.2278	0	0.2366	1253.292	47.98	6.108	49.67
0005:00 02	2	0.2286	0	0.2377	1256.444	58.46	6.1087	49.67
0005:00 03	3	0.2295	0	0.2388	1252.841	67.71	6.0989	49.67
0005:00 04	4	0.2285	0	0.2406	1253.967	76.4	6.1447	49.67
0005:00 05	5	0.2236	0	0.2401	1236.629	84.41	6.2012	49.79
0006:00 01	1	0.1925	0	0.2302	1353.266	103.41	9.429	99.46
0006:00 02	2	0.1415	0	0.179	1099.277	112.57	9.3366	99.58
0006:00 03	3	0.1379	0	0.193	1042.535	115.31	9.2471	99.46
0006:00 04	4	0.1194	0	0.1852	952.4686	120.26	9.4319	99.46
0006:00 05	5	0.1218	0	0.1875	976.5614	123.1	9.4396	99.46
0007:00 01	1	0.1393	0	0.2253	770.5336	144.34	6.7683	80.16
0007:00 02	2	0.1476	0	0.221	775.9376	149.74	6.3754	80.16
0007:00 03	3	0.158	0	0.2252	782.0171	150.75	6.0058	80.04
0007:00 04	4	0.172	0	0.2273	789.6728	149.69	5.5614	80.29
0007:00 05	5	0.178	0	0.2285	792.1496	148.23	5.3681	80.16
0007:00 06	6	0.1838	0	0.2369	798.6795	147.4	5.2037	80.16
0007:00 07	7	0.1931	0	0.2449	804.0835	146.76	4.9448	80.29
0007:00 08	8	0.2019	0	0.2529	813.9908	146.03	4.748	80.16
0007:00 09	9	0.2069	0	0.2566	816.4677	144.84	4.595	80.29
0007:00 10	10	0.2147	0	0.2603	818.4942	144.66	4.4313	80.29
0007:00 11	11	0.2201	0	0.2655	825.024	144.57	4.3156	80.29
0007:00 12	12	0.228	0	0.2737	830.6532	144.43	4.1703	80.16

0007:0013	13	0.2322	0	0.2734	837.4082	143.6	4.0483	80.29
0007:0014	14	0.2368	0	0.2787	840.3354	143.51	3.9947	80.29
0007:0015	15	0.2438	0	0.2857	840.7857	142.83	3.8726	80.29
0007:0016	16	0.2516	0	0.291	841.236	142.64	3.7351	80.29
0007:0017	17	0.259	0	0.3167	845.0639	142.96	3.6166	80.29
0007:0018	18	0.2564	0	0.3059	843.2625	141.73	3.6568	80.41
0007:0019	19	0.2503	0	0.2875	841.6864	141.59	3.7365	80.29
0007:0020	20	0.2423	0	0.3019	853.8454	142.32	3.867	80.41
0007:0021	21	0.2484	0	0.311	855.1964	141.5	3.8021	80.29
0007:0022	22	0.2605	0	0.3189	857.6732	137.52	3.6272	80.29
0007:0023	23	0.2711	0	0.3275	859.9249	138.48	3.4967	80.29
0007:0024	24	0.2706	0	0.3292	859.6997	139.21	3.448	80.41
0007:0025	25	0.2938	0	0.3279	857.8984	140.03	3.2173	80.29
0007:0026	26	0.3014	0	0.3389	858.7991	140.95	3.1475	80.29
0007:0027	27	0.304	0	0.3463	860.6004	141.27	3.1517	80.29
0007:0028	28	0.2948	0	0.3391	862.6269	139.39	3.2138	80.41
0007:0029	29	0.2647	0	0.3412	869.8323	141.68	3.5524	80.29
0007:0030	30	0.2791	0	0.3278	868.2561	141.82	3.393	80.29
0007:0031	31	0.29	0	0.3364	863.9779	142.55	3.2787	80.29
0007:0032	32	0.2999	0	0.3449	866.6799	141.27	3.1947	80.29
0007:0033	33	0.3069	0	0.3462	867.8057	143.06	3.1052	80.29
0007:0034	34	0.3139	0	0.3549	866.0044	140.22	3.0353	80.41
0007:00	35	0.3096	0	0.3479	866.90	135.87	3.065	80.29

35					51			
0007:00 36	36	0.3063	0	0.3546	872.53 43	133.44	3.0974	80.29
0007:00 37	37	0.3109	0	0.3567	872.53 43	131.02	3.0501	80.29
0007:00 38	38	0.3129	0	0.3627	865.77 92	131.89	3.0579	80.29
0007:00 39	39	0.3162	0	0.3618	866.67 99	135.04	3.0198	80.29
0007:00 40	40	0.3218	0	0.3651	866.45 47	136.05	2.9662	80.16
0007:00 41	41	0.3273	0	0.3713	870.28 26	137.61	2.9098	80.29
0007:00 42	42	0.3258	0	0.3703	869.38 19	136.46	2.9394	80.29
0007:00 43	43	0.3223	0	0.3711	873.20 98	135.78	2.9422	80.29
0007:00 44	44	0.3328	0	0.381	875.01 11	135.82	2.8696	80.29
0007:00 45	45	0.3427	0	0.3901	874.78 59	135.59	2.7786	80.29
0007:00 46	46	0.3469	0	0.3939	871.85 88	136.37	2.7518	80.41
0007:00 47	47	0.3545	0	0.4076	875.91 18	137.2	2.6671	80.41
0007:00 48	48	0.3405	0	0.3931	872.98 46	135.36	2.7976	80.29
0007:00 49	49	0.3421	0	0.3943	875.01 11	132.34	2.7694	80.29
0007:00 50	50	0.3508	0	0.3944	873.88 53	134.82	2.7087	80.29
0007:00 51	51	0.3405	0	0.3982	872.08 39	134.54	2.768	80.29
0007:00 52	52	0.3527	0	0.3963	872.08 39	135.18	2.6756	80.29
0007:00 53	53	0.3463	0	0.3905	870.28 26	136.23	2.7447	80.29
0007:00 54	54	0.3351	0	0.385	870.05 74	136.23	2.8639	80.29
0007:00 55	55	0.3185	0	0.3781	874.56 08	139.94	2.9761	80.29
0007:00 56	56	0.3143	0	0.359	869.60 71	141.36	3.0382	80.29
0007:00 57	57	0.3141	0	0.3892	876.36 21	145.02	3.0099	80.29

0007:00 58	58	0.3235	0	0.3754	871.40 84	137.24	2.9274	80.29
0007:00 59	59	0.3295	0	0.3869	877.71 31	139.16	2.8794	80.41
0007:00 60	60	0.3226	0	0.3816	875.23 63	137.61	2.945	80.29
0007:00 61	61	0.3278	0	0.3717	870.28 26	139.76	2.8914	80.41
0007:00 62	62	0.3114	0	0.3582	873.66 01	143.42	3.0508	80.29
0007:00 63	63	0.309	0	0.3609	874.56 08	138.43	3.084	80.41
0007:00 64	64	0.3181	0	0.3624	871.18 33	142.51	2.9817	80.29
0007:00 65	65	0.3253	0	0.3667	873.43 49	144.02	2.9069	80.41
0007:00 66	66	0.3344	0	0.3847	876.58 73	143.42	2.8413	80.41
0007:00 67	67	0.3369	0	0.3829	874.11 04	143.6	2.804	80.29
0007:00 68	68	0.3259	0	0.3734	871.63 36	143.47	2.8985	80.29
0007:00 69	69	0.2666	0	0.3123	860.60 04	153.86	3.515	80.41
0007:00 70	70	0.2085	0	0.2954	874.56 08	122.18	4.4221	80.29
0007:00 71	71	0.2227	0	0.2931	873.20 98	138.34	4.2077	80.29
0007:00 72	72	0.252	0	0.2903	869.60 71	173.31	3.7732	80.29
0007:00 73	73	0.2567	0	0.2898	865.55 41	180.41	3.6906	80.29
0007:00 74	74	0.2671	0	0.3004	865.10 37	191.76	3.5686	80.29
0007:00 75	75	0.2708	0	0.3077	866.67 99	193.23	3.5298	80.41
0007:00 76	76	0.2826	0	0.3145	866.90 51	192.08	3.3605	80.41
0007:00 77	77	0.2863	0	0.3259	869.83 23	195.24	3.3217	80.29
0007:00 78	78	0.2896	0	0.3317	871.63 36	195.15	3.2928	80.29
0007:00 79	79	0.2929	0	0.333	870.50 78	198.13	3.2434	80.16
0007:00	80	0.2931	0	0.3347	869.15	198.26	3.2385	80.29

80					68			
0007:00 81	81	0.2842	0	0.3357	872.75 94	200.69	3.3288	80.29
0007:00 82	82	0.2864	0	0.3311	875.68 66	197.85	3.3288	80.29
0007:00 83	83	0.2916	0	0.3421	872.53 43	193.55	3.2448	80.29
0007:00 84	84	0.2916	0	0.333	869.38 19	192.63	3.2723	80.41
0007:00 85	85	0.2937	0	0.3489	875.46 14	197.3	3.2216	80.41
0007:00 86	86	0.2844	0	0.3358	868.70 64	195.06	3.309	80.41
0007:00 87	87	0.2557	0	0.3241	875.68 66	205.5	3.6681	80.29
0007:00 88	88	0.2743	0	0.3361	872.53 43	187.46	3.4212	80.29
0007:00 89	89	0.2781	0	0.3294	870.50 78	189.98	3.4198	80.29
0007:00 90	90	0.266	0	0.3285	864.42 82	185.22	3.5573	80.29
0007:00 91	91	0.2577	0	0.34	874.78 59	202.34	3.6321	80.41
0007:00 92	92	0.2611	0	0.3377	874.11 04	193.09	3.5792	80.29
0007:00 93	93	0.2649	0	0.3386	872.08 39	187.14	3.5305	80.16
0007:00 94	94	0.2727	0	0.3504	877.71 31	195.79	3.3972	80.41
0007:00 95	95	0.2626	0	0.343	878.16 34	196.2	3.57	80.29
0007:00 96	96	0.2772	0	0.3364	870.50 78	186.45	3.4155	80.29
0007:00 97	97	0.2638	0	0.3345	874.78 59	182.01	3.5531	80.29
0007:00 98	98	0.2606	0	0.3334	877.03 76	196.75	3.5728	80.29
0007:00 99	99	0.2669	0	0.3335	877.48 79	187.41	3.5129	80.29
0007:01 00	100	0.2755	0	0.3461	876.58 73	188.51	3.3852	80.29
0007:01 01	101	0.2894	0	0.358	877.93 83	178.95	3.2526	80.29
0007:01 02	102	0.2988	0	0.3595	874.78 59	174.69	3.1637	80.29

0007:0103	103	0.3048	0	0.3645	874.3356	179.17	3.1115	80.41
0007:0104	104	0.3059	0	0.3696	876.1369	182.38	3.0946	80.29
0007:0105	105	0.3153	0	0.3787	876.5873	164.62	2.9881	80.29
0007:0106	106	0.3097	0	0.3588	872.3091	165.99	3.0593	80.16
0007:0107	107	0.2952	0	0.3679	875.9118	174.73	3.1771	80.29
0007:0108	108	0.3019	0	0.3567	873.6601	180.59	3.1376	80.29
0007:0109	109	0.2821	0	0.3425	873.2098	188.47	3.3104	80.41
0007:0110	110	0.2604	0	0.3038	868.9316	193.73	3.6018	80.16
0007:0111	111	0.256	0	0.3195	873.8853	197.07	3.6808	80.41
0007:0112	112	0.2809	0	0.3244	870.9581	183.8	3.3774	80.41
0007:0113	113	0.2953	0	0.3296	871.1833	185.81	3.2194	80.16
0007:0114	114	0.3036	0	0.3457	870.2826	176.34	3.1418	80.41
0007:0115	115	0.3137	0	0.356	872.3091	180.5	3.0353	80.29
0007:0116	116	0.3186	0	0.3637	876.1369	180.55	3.0029	80.29
0007:0117	117	0.323	0	0.3772	878.6138	177.98	2.9443	80.29
0007:0118	118	0.3141	0	0.3609	874.7859	181.88	3.0311	80.29
0007:0119	119	0.3128	0	0.3583	873.4349	179.13	3.0318	80.29
0007:0120	120	0.3171	0	0.3648	877.0376	186.96	2.9944	80.41
0007:0121	121	0.3059	0	0.3467	874.5608	190.21	3.1207	80.41
0007:0122	122	0.2944	0	0.3504	875.4614	193.91	3.2138	80.29
0007:0123	123	0.3075	0	0.3728	879.9648	183.94	3.0882	80.41
0007:0124	124	0.3087	0	0.3563	872.0839	171.71	3.1108	80.29
0007:01	125	0.2903	0	0.3644	879.96	207.83	3.235	80.29

25					48			
0007:01 26	126	0.3026	0	0.3491	874.56 08	197.76	3.1644	80.29
0007:01 27	127	0.3018	0	0.3389	871.63 36	203.21	3.1418	80.29
0007:01 28	128	0.312	0	0.3558	870.95 81	197.39	3.0769	80.16
0007:01 29	129	0.2806	0	0.328	872.98 46	209.2	3.381	80.29
0007:01 30	130	0.2855	0	0.3209	872.08 39	214.93	3.321	80.29
0007:01 31	131	0.2931	0	0.3319	868.03 09	213.51	3.2547	80.29
0007:01 32	132	0.2936	0	0.3402	872.08 39	211.22	3.2138	80.29
0007:01 33	133	0.2908	0	0.3324	870.28 26	205.82	3.2879	80.29
0007:01 34	134	0.2947	0	0.3336	871.63 36	217.86	3.2321	80.29
0007:01 35	135	0.2964	0	0.3384	866.45 47	217.4	3.2272	80.29
0007:01 36	136	0.277	0	0.337	877.26 28	221.02	3.4226	80.16
0007:01 37	137	0.2843	0	0.3294	875.01 11	212.78	3.3288	80.29
0007:01 38	138	0.2899	0	0.3296	870.95 81	225.78	3.2836	80.29
0007:01 39	139	0.2828	0	0.3464	875.23 63	226.33	3.3598	80.29
0007:01 40	140	0.2828	0	0.3495	878.38 86	233.74	3.3295	80.16
0007:01 41	141	0.2865	0	0.3527	877.93 83	233.15	3.2991	80.29
0007:01 42	142	0.2846	0	0.359	883.34 23	232.18	3.2808	80.29
0007:01 43	143	0.2776	0	0.3665	885.59 39	239.01	3.357	80.29
0007:01 44	144	0.2802	0	0.3616	882.89 19	236.85	3.345	80.29
0007:01 45	145	0.2903	0	0.3713	883.34 23	232.23	3.2053	80.29
0007:01 46	146	0.2988	0	0.3754	880.18 99	237.04	3.1306	80.29
0007:01 47	147	0.3053	0	0.3861	885.36 88	232.73	3.065	80.29

0007:01 48	148	0.3026	0	0.3474	873.66 01	231.04	3.1221	80.41
0007:01 49	149	0.3054	0	0.3721	878.61 38	232.92	3.0882	80.16
0007:01 50	150	0.3125	0	0.361	877.71 31	232.37	3.0191	80.29
0007:01 51	151	0.3112	0	0.3684	878.83 89	236.76	3.0262	80.29
0007:01 52	152	0.317	0	0.3699	877.71 31	248.07	2.9958	80.29
0007:01 53	153	0.3176	0	0.3648	877.26 28	247.06	2.9986	80.29
0007:01 54	154	0.3202	0	0.3671	875.01 11	260.11	2.9662	80.29
0007:01 55	155	0.3192	0	0.3856	883.79 26	252.74	2.9394	80.29
0007:01 56	156	0.3233	0	0.3926	882.89 19	258.51	2.9182	80.41
0007:01 57	157	0.3298	0	0.3825	883.11 71	255.53	2.8759	80.29
0007:01 58	158	0.3289	0	0.3866	879.06 41	266.29	2.8787	80.29
0007:01 59	159	0.3157	0	0.3765	874.78 59	258.37	3.029	80.29
0007:01 60	160	0.3129	0	0.3921	888.74 63	273.29	2.9895	80.41
0007:01 61	161	0.3178	0	0.3987	884.69 33	274.12	2.9535	80.29
0007:01 62	162	0.3239	0	0.3977	884.91 84	256.26	2.8985	80.41
0007:01 63	163	0.3287	0	0.4064	883.79 26	261.02	2.8583	80.29
0007:01 64	164	0.3245	0	0.3993	882.66 68	257.91	2.8801	80.29
0007:01 65	165	0.3226	0	0.398	883.56 74	254.75	2.9006	80.41
0007:01 66	166	0.3241	0	0.3991	886.71 98	250.27	2.8935	80.29
0007:01 67	167	0.3193	0	0.3989	886.04 43	253.24	2.9486	80.41
0007:01 68	168	0.3211	0	0.3947	886.49 46	256.36	2.9274	80.29
0007:01 69	169	0.3298	0	0.408	887.39 53	264.05	2.8632	80.29
0007:01	170	0.3241	0	0.3961	883.34	260.98	2.9077	80.41

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0007:01 71	171	0.3229	0	0.3947	882.66 68	257.09	2.9161	80.29
0007:01 72	172	0.3313	0	0.405	885.81 91	254.71	2.8442	80.29
0007:01 73	173	0.3292	0	0.3836	882.89 19	264.14	2.883	80.41
0007:01 74	174	0.3217	0	0.3837	879.51 44	266.01	2.9373	80.41
0007:01 75	175	0.3175	0	0.3674	876.58 73	266.06	2.9655	80.29
0007:01 76	176	0.3192	0	0.3859	879.28 93	265.05	2.9514	80.41
0007:01 77	177	0.2981	0	0.3809	883.34 23	275.58	3.1291	80.29
0007:01 78	178	0.2937	0	0.364	884.01 78	275.17	3.1778	80.29
0007:01 79	179	0.3004	0	0.3663	878.83 89	270.87	3.1186	80.16
0007:01 80	180	0.2981	0	0.3587	879.28 93	278.1	3.1595	80.41
0007:01 81	181	0.2962	0	0.3602	879.96 48	275.22	3.1926	80.29
0007:01 82	182	0.2943	0	0.3739	884.91 84	282.63	3.1778	80.29
0007:01 83	183	0.3036	0	0.37	879.73 96	275.17	3.0967	80.29
0007:01 84	184	0.3009	0	0.3384	877.26 28	284.92	3.1228	80.29
0007:01 85	185	0.2813	0	0.3518	880.18 99	287.76	3.2949	80.29
0007:01 86	186	0.2794	0	0.351	880.41 51	292.84	3.3147	80.29
0007:01 87	187	0.2998	0	0.3562	876.58 73	282.68	3.1306	80.29
0007:01 88	188	0.3053	0	0.3483	872.08 39	289.96	3.0826	80.29
0007:01 89	189	0.3151	0	0.3743	879.96 48	277.5	2.9676	80.29
0007:01 90	190	0.3174	0	0.3745	877.48 79	279.29	2.9443	80.29
0007:01 91	191	0.3228	0	0.3873	877.93 83	275.81	2.9055	80.29
0007:01 92	192	0.3287	0	0.3971	879.96 48	267.53	2.8301	80.41

0007:0193	193	0.3344	0	0.3877	876.8124	284.05	2.7927	80.29
0007:0194	194	0.3322	0	0.3792	874.1104	290.73	2.8025	80.29
0007:0195	195	0.3328	0	0.3799	876.1369	294.9	2.8082	80.29
0007:0196	196	0.3106	0	0.3737	879.0641	292.47	2.9902	80.29
0007:0197	197	0.3176	0	0.3762	876.1369	280.11	2.9366	80.29
0007:0198	198	0.3202	0	0.3555	870.2826	298.88	2.9288	80.29
0007:0199	199	0.3279	0	0.3837	877.2628	302	2.8498	80.29
0007:0200	200	0.3253	0	0.3759	874.7859	299.89	2.8674	80.29

Test: 143955-2								
Chrono	StpNum	50 AvgDst	52 Min	53 Max	AvgTime	AvgDist	AvgTime	BrkSpd (l)
		Effectiveness - A	Effectiveness - A	Effectiveness - A	Torque - A	Temperature #1A	Record Pressure - A	None
Sect:Recd	unitless	unitless			N·m	°C	MN/m²	kph
0002:0001	1	0.2376	0	0.2515	877.4506	24.58	3.9922	49.79
0002:0002	2	0.2571	0	0.2621	839.6236	32.32	3.5979	49.67
0002:0003	3	0.273	0	0.2805	840.7494	40.28	3.4018	49.79
0002:0004	4	0.2914	0	0.2999	840.5242	48.2	3.1866	49.67
0002:0005	5	0.3087	0	0.318	843.001	55.71	3.023	49.79
0003:0001	1	0.3233	0	0.3306	843.6765	68.48	2.8868	99.71
0003:0002	2	0.3367	0	0.3683	842.5507	97.55	2.8107	99.71
0003:0003	3	0.3721	0	0.3945	856.961	104.01	2.501	99.71
0003:00	4	0.4154	0	0.4457	857.63	103.41	2.2357	99.71

04					64			
0003:0005	5	0.432	0	0.465	858.0868	103.18	2.1454	99.58
0004:0001	1	0.4328	0	0.4898	932.8401	99.38	2.2964	49.92
0004:0002	2	0.4409	0	0.4878	947.2503	99.29	2.2964	49.92
0004:0003	3	0.4456	0	0.4929	956.7071	99.2	2.2971	49.79
0005:0001	1	0.414	0	0.4321	1815.694	98.88	4.7604	49.79
0005:0002	2	0.4175	0	0.4374	1811.191	98.93	4.6659	49.92
0005:0003	3	0.4202	0	0.4463	1819.297	98.88	4.6384	49.79
0005:0004	4	0.4238	0	0.4507	1838.211	98.88	4.637	49.79
0005:0005	5	0.4284	0	0.4534	1845.641	98.88	4.6017	49.79
0006:0001	1	0.4093	0	0.447	2323.882	99.66	6.7258	99.71
0006:0002	2	0.4026	0	0.4275	2370.04	100.02	6.5656	99.58
0006:0003	3	0.4165	0	0.4457	2456.051	99.98	6.4013	99.46
0006:0004	4	0.4304	0	0.4633	2511.666	100.02	6.2955	99.58
0006:0005	5	0.4391	0	0.4793	2546.115	99.89	6.2122	99.71
0007:0001	1	0.5081	0	0.5615	865.2919	108.68	1.8252	80.29
0007:0002	2	0.4901	0	0.5554	865.2919	104.1	1.8788	80.29
0007:0003	3	0.4765	0	0.5581	864.3913	100.62	1.9232	80.29
0007:0004	4	0.4661	0	0.5637	864.1661	97.09	1.955	80.29
0007:0005	5	0.4621	0	0.5692	864.1661	93.98	1.9684	80.29
0007:0006	6	0.4592	0	0.5631	862.59	91.83	1.979	80.29
0007:0007	7	0.4625	0	0.5722	863.4906	90.5	1.9677	80.29
0007:0008	8	0.4597	0	0.5629	863.2655	89.86	1.9811	80.29

0007:00 09	9	0.4621	0	0.5654	863.71 58	89.82	1.9719	80.29
0007:00 10	10	0.4671	0	0.5635	863.26 55	89.5	1.9521	80.29
0007:00 11	11	0.4689	0	0.5648	862.81 51	89.5	1.9423	80.29
0007:00 12	12	0.4723	0	0.5648	864.16 61	89.59	1.9338	80.41
0007:00 13	13	0.474	0	0.5652	863.04 03	89.77	1.9253	80.29
0007:00 14	14	0.4773	0	0.5696	863.26 55	90.14	1.9112	80.29
0007:00 15	15	0.4808	0	0.5718	863.94 09	90.41	1.8978	80.41
0007:00 16	16	0.4789	0	0.5725	863.94 09	90.69	1.9056	80.41
0007:00 17	17	0.4841	0	0.5774	864.16 61	90.59	1.8865	80.41
0007:00 18	18	0.4848	0	0.5777	864.39 13	90.64	1.8844	80.29
0007:00 19	19	0.486	0	0.5761	864.61 64	90.55	1.8823	80.41
0007:00 20	20	0.4882	0	0.5785	864.84 16	90.59	1.8731	80.29
0007:00 21	21	0.4874	0	0.5803	865.29 19	91.1	1.8753	80.29
0007:00 22	22	0.4909	0	0.5822	863.71 58	91.19	1.8597	80.29
0007:00 23	23	0.4898	0	0.5841	864.16 61	91.37	1.8633	80.29
0007:00 24	24	0.4923	0	0.5853	864.16 61	91.42	1.8541	80.29
0007:00 25	25	0.4926	0	0.5874	864.61 64	91.33	1.8541	80.29
0007:00 26	26	0.4975	0	0.596	865.06 67	91.24	1.8343	80.29
0007:00 27	27	0.4977	0	0.5967	866.41 77	91.42	1.8365	80.41
0007:00 28	28	0.4956	0	0.5978	865.06 67	91.42	1.8386	80.29
0007:00 29	29	0.4992	0	0.6004	866.64 29	91.37	1.8308	80.41
0007:00 30	30	0.5001	0	0.598	865.51 71	91.51	1.8266	80.29
0007:00	31	0.4994	0	0.5967	864.84	91.78	1.8266	80.41

31					16			
0007:00 32	32	0.5039	0	0.6039	865.29 19	91.83	1.8125	80.29
0007:00 33	33	0.5015	0	0.599	865.96 74	91.46	1.8238	80.41
0007:00 34	34	0.5042	0	0.6066	865.74 22	91.51	1.8097	80.29
0007:00 35	35	0.507	0	0.6067	865.51 71	91.05	1.8019	80.41
0007:00 36	36	0.5069	0	0.6056	866.41 77	91.24	1.804	80.41
0007:00 37	37	0.5083	0	0.6091	865.51 71	91.37	1.7955	80.29
0007:00 38	38	0.5053	0	0.6026	867.09 32	91.33	1.8132	80.41
0007:00 39	39	0.5108	0	0.6082	864.84 16	90.87	1.7878	80.41
0007:00 40	40	0.5141	0	0.6153	865.51 71	90.55	1.7786	80.29
0007:00 41	41	0.5116	0	0.6121	864.61 64	90.27	1.7857	80.29
0007:00 42	42	0.5122	0	0.6155	865.51 71	90.09	1.7843	80.29
0007:00 43	43	0.516	0	0.6173	865.29 19	90.04	1.7737	80.41
0007:00 44	44	0.5139	0	0.6139	865.29 19	90.09	1.7793	80.41
0007:00 45	45	0.5137	0	0.6083	865.74 22	90.14	1.7814	80.29
0007:00 46	46	0.5117	0	0.607	864.61 64	90	1.7843	80.41
0007:00 47	47	0.5155	0	0.6123	864.39 13	89.95	1.7716	80.41
0007:00 48	48	0.5139	0	0.61	865.74 22	89.91	1.7793	80.41
0007:00 49	49	0.5154	0	0.6203	866.41 77	89.95	1.7737	80.29
0007:00 50	50	0.5095	0	0.615	865.51 71	90.14	1.7906	80.29
0007:00 51	51	0.5122	0	0.6133	865.51 71	90.37	1.7835	80.29
0007:00 52	52	0.5133	0	0.6159	864.61 64	90.55	1.7779	80.29
0007:00 53	53	0.5132	0	0.6118	865.74 22	90.41	1.7807	80.41

0007:00 54	54	0.5141	0	0.6138	864.84 16	90.5	1.7772	80.29
0007:00 55	55	0.5141	0	0.6185	865.74 22	90.5	1.7779	80.29
0007:00 56	56	0.5169	0	0.6123	865.96 74	90.32	1.7701	80.41
0007:00 57	57	0.5173	0	0.62	866.19 25	90.18	1.7701	80.41
0007:00 58	58	0.5177	0	0.6232	865.96 74	90.18	1.7666	80.29
0007:00 59	59	0.518	0	0.6137	865.51 71	90.09	1.7659	80.41
0007:00 60	60	0.5169	0	0.6255	865.96 74	89.95	1.7687	80.41
0007:00 61	61	0.5187	0	0.6199	864.84 16	89.72	1.7638	80.41
0007:00 62	62	0.5176	0	0.6162	864.84 16	89.54	1.7666	80.29
0007:00 63	63	0.5159	0	0.6221	865.29 19	89.31	1.7716	80.41
0007:00 64	64	0.5182	0	0.6165	865.74 22	89.13	1.7666	80.41
0007:00 65	65	0.5186	0	0.6212	865.96 74	89.13	1.7652	80.41
0007:00 66	66	0.517	0	0.6193	865.29 19	89.13	1.7694	80.29
0007:00 67	67	0.5152	0	0.6175	866.19 25	89.18	1.7786	80.41
0007:00 68	68	0.5166	0	0.6194	865.74 22	89.22	1.7709	80.41
0007:00 69	69	0.5166	0	0.6148	865.96 74	89.22	1.7716	80.41
0007:00 70	70	0.517	0	0.6194	865.74 22	89.13	1.7701	80.29
0007:00 71	71	0.5161	0	0.619	865.51 71	89.22	1.7723	80.41
0007:00 72	72	0.5176	0	0.6166	864.61 64	89.31	1.7666	80.29
0007:00 73	73	0.5181	0	0.622	865.06 67	89.36	1.7659	80.41
0007:00 74	74	0.5171	0	0.6215	865.96 74	89.31	1.7709	80.29
0007:00 75	75	0.5191	0	0.6217	865.74 22	89.45	1.7645	80.41
0007:00	76	0.5178	0	0.6201	865.74	89.4	1.768	80.41

76					22			
0007:00 77	77	0.5155	0	0.6248	866.19 25	89.27	1.7744	80.29
0007:00 78	78	0.5142	0	0.6214	865.29 19	88.99	1.7779	80.41
0007:00 79	79	0.5139	0	0.6198	864.39 13	88.9	1.7765	80.41
0007:00 80	80	0.5152	0	0.6192	865.06 67	89.04	1.7737	80.29
0007:00 81	81	0.5152	0	0.614	865.06 67	89.18	1.7737	80.41
0007:00 82	82	0.516	0	0.6161	865.74 22	89.36	1.773	80.41
0007:00 83	83	0.5139	0	0.6237	866.64 29	89.27	1.7814	80.29
0007:00 84	84	0.5161	0	0.6133	865.96 74	89.18	1.7737	80.41
0007:00 85	85	0.5175	0	0.6278	865.74 22	88.95	1.7666	80.41
0007:00 86	86	0.5164	0	0.6253	865.06 67	88.72	1.7673	80.29
0007:00 87	87	0.5138	0	0.6196	865.96 74	88.85	1.7786	80.41
0007:00 88	88	0.5137	0	0.622	865.96 74	88.9	1.7793	80.29
0007:00 89	89	0.5122	0	0.6247	865.06 67	88.85	1.7821	80.29
0007:00 90	90	0.5134	0	0.6217	864.84 16	88.81	1.7772	80.29
0007:00 91	91	0.5156	0	0.629	867.09 32	88.76	1.7751	80.29
0007:00 92	92	0.5148	0	0.6236	865.74 22	88.63	1.7737	80.29
0007:00 93	93	0.5137	0	0.6076	864.61 64	88.53	1.7786	80.41
0007:00 94	94	0.5133	0	0.6205	865.96 74	88.53	1.7807	80.41
0007:00 95	95	0.5121	0	0.6078	865.51 71	88.67	1.7864	80.29
0007:00 96	96	0.513	0	0.6237	865.96 74	88.81	1.7807	80.29
0007:00 97	97	0.5156	0	0.6205	864.84 16	88.67	1.7716	80.41
0007:00 98	98	0.5155	0	0.6093	864.84 16	88.49	1.773	80.41

0007:00 99	99	0.5144	0	0.6134	865.29 19	88.4	1.7772	80.41
0007:01 00	100	0.5161	0	0.6088	864.61 64	88.35	1.7723	80.29
0007:01 01	101	0.515	0	0.6256	865.29 19	88.35	1.7751	80.41
0007:01 02	102	0.5159	0	0.6181	865.96 74	88.49	1.7751	80.29
0007:01 03	103	0.5167	0	0.606	864.39 13	88.35	1.7737	80.41
0007:01 04	104	0.5161	0	0.6024	865.96 74	88.31	1.7793	80.29
0007:01 05	105	0.5158	0	0.6002	865.74 22	88.12	1.7814	80.29
0007:01 06	106	0.5138	0	0.6156	866.64 29	88.17	1.7864	80.41
0007:01 07	107	0.5158	0	0.6072	865.29 19	88.03	1.7772	80.29
0007:01 08	108	0.517	0	0.6033	864.61 64	87.71	1.7744	80.29
0007:01 09	109	0.5182	0	0.6173	866.86 8	87.53	1.7723	80.29
0007:01 10	110	0.5158	0	0.6051	864.39 13	87.39	1.7772	80.29
0007:01 11	111	0.5128	0	0.6233	866.41 77	87.21	1.7871	80.41
0007:01 12	112	0.5125	0	0.6028	865.06 67	87.39	1.7878	80.29
0007:01 13	113	0.511	0	0.6126	867.09 32	87.34	1.7955	80.41
0007:01 14	114	0.51	0	0.619	866.19 25	87.39	1.797	80.29
0007:01 15	115	0.512	0	0.6154	866.86 8	87.02	1.7934	80.29
0007:01 16	116	0.5117	0	0.6065	865.96 74	86.93	1.7934	80.41
0007:01 17	117	0.5131	0	0.6077	865.06 67	86.98	1.7885	80.41
0007:01 18	118	0.5119	0	0.6016	865.29 19	87.02	1.7934	80.41
0007:01 19	119	0.513	0	0.6234	866.64 29	87.02	1.7899	80.29
0007:01 20	120	0.5142	0	0.6045	865.06 67	86.89	1.7857	80.29
0007:01	121	0.5154	0	0.6159	866.19	86.57	1.7828	80.29

21					25			
0007:0122	122	0.5116	0	0.6176	865.7422	86.34	1.7941	80.41
0007:0123	123	0.5127	0	0.5976	865.0667	86.2	1.7927	80.29
0007:0124	124	0.512	0	0.6205	867.5435	85.79	1.7948	80.29
0007:0125	125	0.5121	0	0.6173	866.6429	85.6	1.7934	80.41
0007:0126	126	0.5139	0	0.5982	864.8416	85.42	1.7878	80.29
0007:0127	127	0.5132	0	0.6189	867.5435	85.24	1.792	80.41
0007:0128	128	0.5109	0	0.6105	866.4177	85.15	1.797	80.41
0007:0129	129	0.5111	0	0.6195	867.0932	85.06	1.7948	80.41
0007:0130	130	0.5109	0	0.6052	865.9674	84.83	1.797	80.29
0007:0131	131	0.5098	0	0.6115	867.0932	84.69	1.8005	80.41
0007:0132	132	0.508	0	0.6138	866.4177	84.51	1.8047	80.29
0007:0133	133	0.51	0	0.5963	865.0667	84.23	1.7991	80.41
0007:0134	134	0.5081	0	0.605	865.5171	84.09	1.804	80.29
0007:0135	135	0.5094	0	0.5941	866.868	83.91	1.8068	80.41
0007:0136	136	0.5114	0	0.6144	867.3183	83.86	1.7984	80.29
0007:0137	137	0.511	0	0.591	865.0667	83.68	1.7984	80.41
0007:0138	138	0.5109	0	0.5973	864.8416	83.59	1.7962	80.41
0007:0139	139	0.5104	0	0.6175	867.9938	83.45	1.8012	80.29
0007:0140	140	0.5086	0	0.6101	866.6429	83.54	1.8047	80.41
0007:0141	141	0.5092	0	0.5906	865.0667	83.59	1.8033	80.29
0007:0142	142	0.5109	0	0.5962	867.9938	83.73	1.8033	80.41
0007:0143	143	0.5111	0	0.5972	864.8416	83.68	1.7962	80.29

0007:0144	144	0.5105	0	0.6054	865.9674	83.64	1.7998	80.29
0007:0145	145	0.511	0	0.6131	866.868	83.54	1.7991	80.29
0007:0146	146	0.5093	0	0.5965	866.4177	83.68	1.8061	80.29
0007:0147	147	0.5087	0	0.6038	866.1925	83.77	1.8061	80.29
0007:0148	148	0.5104	0	0.5974	865.2919	83.86	1.8005	80.29
0007:0149	149	0.5114	0	0.5951	865.7422	83.96	1.7984	80.29
0007:0150	150	0.5094	0	0.5936	865.5171	83.82	1.8019	80.41
0007:0151	151	0.5083	0	0.6145	867.3183	83.96	1.8061	80.41
0007:0152	152	0.508	0	0.6081	866.6429	83.96	1.8082	80.41
0007:0153	153	0.508	0	0.6027	866.6429	84	1.8082	80.41
0007:0154	154	0.5055	0	0.6055	866.4177	83.96	1.8153	80.41
0007:0155	155	0.5072	0	0.6049	866.1925	84.05	1.8104	80.29
0007:0156	156	0.51	0	0.603	866.6429	83.96	1.8033	80.41
0007:0157	157	0.5095	0	0.6041	867.5435	83.73	1.8068	80.41
0007:0158	158	0.507	0	0.6063	865.2919	83.59	1.8082	80.41
0007:0159	159	0.5087	0	0.5917	865.0667	83.36	1.8047	80.29
0007:0160	160	0.509	0	0.5897	865.0667	83.18	1.8047	80.29
0007:0161	161	0.5078	0	0.6049	865.9674	83.09	1.8089	80.41
0007:0162	162	0.5081	0	0.6001	865.9674	82.86	1.8089	80.29
0007:0163	163	0.5086	0	0.5883	864.3913	82.77	1.8061	80.29
0007:0164	164	0.5075	0	0.5997	864.8416	82.58	1.8097	80.41
0007:0165	165	0.5069	0	0.5996	865.2919	82.58	1.8125	80.41
0007:01	166	0.5071	0	0.5789	864.39	82.54	1.8139	80.41

66					13			
0007:0167	167	0.5045	0	0.5963	865.7422	82.45	1.8209	80.41
0007:0168	168	0.5053	0	0.594	865.5171	82.4	1.8209	80.41
0007:0169	169	0.5032	0	0.5987	864.8416	82.4	1.8216	80.29
0007:0170	170	0.5061	0	0.596	865.7422	82.4	1.8167	80.41
0007:0171	171	0.5045	0	0.5888	865.2919	82.35	1.8238	80.41
0007:0172	172	0.5069	0	0.5872	866.1925	82.35	1.8181	80.29
0007:0173	173	0.5053	0	0.5786	864.3913	82.35	1.8195	80.41
0007:0174	174	0.5075	0	0.5977	866.6429	82.22	1.8146	80.29
0007:0175	175	0.5055	0	0.5979	865.0667	82.22	1.816	80.41
0007:0176	176	0.506	0	0.5806	864.8416	82.13	1.8181	80.29
0007:0177	177	0.505	0	0.5958	865.7422	82.03	1.8202	80.41
0007:0178	178	0.5065	0	0.5917	865.9674	81.94	1.816	80.41
0007:0179	179	0.5034	0	0.5808	865.5171	81.9	1.8266	80.41
0007:0180	180	0.5017	0	0.5769	864.1661	81.58	1.8287	80.41
0007:0181	181	0.5016	0	0.5968	865.9674	81.48	1.8294	80.29
0007:0182	182	0.5016	0	0.5768	864.6164	81.35	1.8315	80.29
0007:0183	183	0.5021	0	0.5857	865.2919	81.3	1.8301	80.41
0007:0184	184	0.5011	0	0.5947	864.8416	81.3	1.8287	80.41
0007:0185	185	0.5029	0	0.5885	865.2919	81.3	1.8259	80.41
0007:0186	186	0.5036	0	0.5891	864.8416	81.35	1.8223	80.29
0007:0187	187	0.505	0	0.5819	864.1661	81.26	1.8188	80.29
0007:0188	188	0.5028	0	0.5916	865.2919	81.35	1.8259	80.54

0007:01 89	189	0.5038	0	0.5916	865.06 67	81.3	1.8216	80.41
0007:01 90	190	0.5034	0	0.5875	865.29 19	81.16	1.8252	80.29
0007:01 91	191	0.5053	0	0.5753	863.71 58	81.07	1.8181	80.41
0007:01 92	192	0.5045	0	0.5884	865.06 67	80.98	1.8202	80.41
0007:01 93	193	0.5045	0	0.5775	864.39 13	80.89	1.8216	80.29
0007:01 94	194	0.5039	0	0.5945	865.51 71	80.89	1.8231	80.41
0007:01 95	195	0.5031	0	0.5923	865.06 67	80.84	1.8266	80.41
0007:01 96	196	0.5036	0	0.5932	865.74 22	80.75	1.8259	80.41
0007:01 97	197	0.5023	0	0.5745	864.16 61	80.71	1.828	80.41
0007:01 98	198	0.5037	0	0.5839	865.96 74	80.48	1.8245	80.41
0007:01 99	199	0.5003	0	0.586	864.84 16	80.43	1.835	80.29
0007:02 00	200	0.5007	0	0.5726	863.94 09	80.34	1.8322	80.29
0008:00 01	1	0.4823	0	0.5018	1940.8 84	100.3	4.4769	49.67
0008:00 02	2	0.4581	0	0.4824	1922.6 46	98.74	4.5192	49.79
0008:00 03	3	0.4602	0	0.4901	1931.8 77	98.79	4.4938	49.67
0008:00 04	4	0.4635	0	0.4946	1946.9 63	98.83	4.4889	49.79
0008:00 05	5	0.4653	0	0.4971	1954.3 93	98.83	4.4818	49.79
0009:00 01	1	0.4425	0	0.4738	2481.7 19	99.98	6.4203	99.71
0009:00 02	2	0.437	0	0.4716	2545.8 9	99.93	6.3265	99.71
0009:00 03	3	0.4434	0	0.4838	2568.4 06	99.89	6.2348	99.71
0009:00 04	4	0.4385	0	0.4851	2556.0 22	100.02	6.2538	99.71
0009:00 05	5	0.4441	0	0.4957	2570.4 33	100.16	6.2122	99.46
0010:00	1	0.5043	0	0.5418	1815.4	102.54	3.8935	99.58

01					69			
0010:0002	2	0.5227	0	0.5636	1805.787	102.45	3.7136	99.71
0010:0003	3	0.5352	0	0.5758	1806.013	102.86	3.6261	99.71
0010:0004	4	0.5392	0	0.5783	1806.913	103.14	3.6078	99.71
0010:0005	5	0.5363	0	0.5733	1804.887	103.27	3.6346	99.71
0010:0006	6	0.5333	0	0.57	1799.483	103.27	3.6529	99.58
0011:0001	1	0.3674	0	0.4502	877.2254	30.12	2.5955	120.49
0011:0002	2	0.4349	0	0.4655	864.8416	56.72	2.1694	120.62
0011:0003	3	0.4547	0	0.4755	853.1332	82.45	2.0643	120.49
0011:0004	4	0.4124	0	0.447	841.8752	106.71	2.2682	120.49
0011:0005	5	0.3786	0	0.4116	839.1733	127.31	2.4643	120.62
0011:0006	6	0.3662	0	0.411	837.1468	142.69	2.5447	120.62
0011:0007	7	0.3662	0	0.4132	836.6965	156.24	2.5475	120.62
0011:0008	8	0.3693	0	0.4154	836.6965	167.73	2.52	120.62
0011:0009	9	0.3742	0	0.4086	837.5972	177.3	2.4862	120.62
0011:0010	10	0.3784	0	0.4107	838.9481	185.35	2.4572	120.49
0011:0011	11	0.3807	0	0.4094	840.9746	191.85	2.4438	120.49
0011:0012	12	0.3825	0	0.4047	841.8752	197.3	2.4311	120.62
0011:0013	13	0.3882	0	0.4075	843.4513	201.88	2.3966	120.49
0011:0014	14	0.3937	0	0.4129	845.2526	205.63	2.3683	120.49
0011:0015	15	0.3984	0	0.4147	844.352	208.61	2.3338	120.62
0012:0001	1	0.4163	0	0.4308	1340.606	218.96	3.6043	99.71
0012:0002	2	0.3254	0	0.4287	2996.661	225.59	10.4102	99.58

0014:0001	1	0.2922	0	0.345	854.7094	42.02	3.1083	49.79
0014:0002	2	0.2858	0	0.3219	861.6893	41.11	3.2353	49.79
0014:0003	3	0.2918	0	0.3236	858.5371	39.41	3.169	49.79
0014:0004	4	0.2966	0	0.3258	856.0603	38.36	3.1112	49.79
0015:0001	1	0.313	0	0.3547	2171.898	41.34	7.1709	99.71
0015:0002	2	0.3833	0	0.4065	2374.768	63.72	6.5804	99.71
0016:0001	1	0.4686	0	0.5521	867.0932	80.16	1.9571	80.41
0016:0002	2	0.4701	0	0.5504	866.6429	81.44	1.9507	80.41
0016:0003	3	0.4597	0	0.5486	864.6164	81.99	1.9846	80.29
0016:0004	4	0.4529	0	0.5519	864.6164	82.08	2.0121	80.41
0016:0005	5	0.4546	0	0.5597	865.0667	82.4	2.0072	80.29
0016:0006	6	0.4596	0	0.5619	865.2919	82.26	1.9895	80.29
0016:0007	7	0.4655	0	0.5634	865.9674	82.17	1.9712	80.29
0016:0008	8	0.4675	0	0.5664	866.4177	82.45	1.9599	80.29
0016:0009	9	0.4697	0	0.5713	866.6429	82.72	1.9514	80.41
0016:0010	10	0.4711	0	0.5759	868.219	83.09	1.9486	80.29
0016:0011	11	0.4733	0	0.5766	867.7687	83.18	1.938	80.29
0016:0012	12	0.4796	0	0.5878	867.9938	83.32	1.9091	80.29
0016:0013	13	0.483	0	0.5958	869.3448	83.64	1.8971	80.16
0016:0014	14	0.4866	0	0.598	871.3712	84.05	1.8887	80.29
0016:0015	15	0.4918	0	0.6029	869.7951	84.23	1.8633	80.29
0016:0016	16	0.4962	0	0.6033	870.2454	84.64	1.8499	80.41
0016:00	17	0.497	0	0.6071	869.34	85.01	1.8435	80.29

17					48			
0016:00 18	18	0.501	0	0.6093	869.11 96	85.33	1.8322	80.29
0016:00 19	19	0.502	0	0.6115	869.79 51	85.65	1.8287	80.29
0016:00 20	20	0.5036	0	0.5971	868.89 45	85.92	1.8231	80.29
0016:00 21	21	0.5073	0	0.6083	868.89 45	86.02	1.8089	80.29
0016:00 22	22	0.5094	0	0.6078	869.34 48	85.97	1.8012	80.29
0016:00 23	23	0.5084	0	0.6211	868.21 9	86.11	1.7984	80.41
0016:00 24	24	0.5098	0	0.6194	868.21 9	86.2	1.7955	80.29
0016:00 25	25	0.5092	0	0.6115	868.89 45	86.25	1.8005	80.41
0016:00 26	26	0.5132	0	0.604	868.66 93	86.34	1.7885	80.29
0016:00 27	27	0.5169	0	0.6046	867.31 83	85.97	1.7765	80.29
0016:00 28	28	0.5183	0	0.6161	868.21 9	85.7	1.773	80.29
0016:00 29	29	0.5195	0	0.6244	867.54 35	85.51	1.7701	80.29
0016:00 30	30	0.5213	0	0.6144	868.89 45	85.24	1.768	80.29
0016:00 31	31	0.5192	0	0.6214	868.89 45	84.92	1.7737	80.29
0016:00 32	32	0.5184	0	0.6151	869.11 96	84.64	1.7744	80.29
0016:00 33	33	0.5215	0	0.6215	869.79 51	84.51	1.7673	80.29
0016:00 34	34	0.5227	0	0.6187	868.89 45	84.37	1.7645	80.16
0016:00 35	35	0.5236	0	0.6294	868.89 45	84.28	1.761	80.41
0017:00 01	1	0.4815	0	0.5031	1954.3 93	102.13	4.3788	49.67
0017:00 02	2	0.4602	0	0.501	1934.3 54	98.83	4.4077	49.67
0017:00 03	3	0.4971	0	0.525	2005.9 55	103.73	4.316	49.79
0017:00 04	4	0.4651	0	0.5136	1958.2 21	98.83	4.3838	49.79

0017:0005	5	0.4948	0	0.5303	2008.207	103.37	4.297	49.67
0018:0001	1	0.4684	0	0.4945	2605.558	98.88	6.0725	99.58
0018:0002	2	0.4525	0	0.5033	2626.723	99.2	6.0605	99.58
0018:0003	3	0.4579	0	0.5097	2667.026	99.15	6.0387	99.71
0018:0004	4	0.4625	0	0.5115	2652.616	99.06	5.9392	99.71
0018:0005	5	0.4707	0	0.5287	2685.715	99.11	5.959	99.58
0019:0001	1	0.4293	0	0.5351	2813.381	100.3	8.5246	159.21
0019:0002	2	0.411	0	0.4736	2720.615	100.71	8.3772	159.08
0019:0003	3	0.4078	0	0.4899	2688.417	101.12	8.5161	159.08
0019:0004	4	0.41	0	0.4904	2740.204	100.71	8.6255	159.08
0019:0005	5	0.413	0	0.495	2754.614	100.71	8.6029	159.21

Test: 143955-3								
Chrono	StpNum	50 AvgDst	52 Min	53 Max	AvgTime	AvgDist	AvgTime	BrkSpd (l)
		Effectiveness - A	Effectiveness - A	Effectiveness - A	Torque - A	Temperature #1A	Record Pressure - A	None
Sect:Recd	unitless	unitless			N·m	°C	MN/m²	kph
0002:0001	1	0.2304	0	0.2441	867.771	24.9	4.0801	49.79
0002:0002	2	0.2448	0	0.2496	838.5	34.84	3.7732	49.79
0002:0003	3	0.2484	0	0.2533	838.5	43.95	3.7245	49.67
0002:0004	4	0.2506	0	0.2561	840.5265	52.87	3.6984	49.67
0002:0005	5	0.2555	0	0.2605	836.2484	61.8	3.6096	49.67
0003:00	1	0.2664	0	0.2769	840.75	78.78	3.4946	99.58

01					17			
0003:00 02	2	0.2715	0	0.2831	839.62 59	107.76	3.4283	99.58
0003:00 03	3	0.2857	0	0.293	844.12 91	109.09	3.2399	99.58
0003:00 04	4	0.2866	0	0.3075	848.85 75	109.18	3.2004	99.58
0003:00 05	5	0.2947	0	0.3223	852.23 49	109.32	3.1123	99.71
0004:00 01	1	0.3224	0	0.3391	682.46 34	100.67	2.2968	49.79
0004:00 02	2	0.3287	0	0.3449	695.97 31	100.25	2.2975	49.79
0004:00 03	3	0.3335	0	0.3493	706.10 53	100.16	2.2975	49.79
0005:00 01	1	0.3107	0	0.3289	1512.1 82	98.74	5.33	49.79
0005:00 02	2	0.3291	0	0.3668	1484.7 12	99.43	4.9935	49.67
0005:00 03	3	0.3336	0	0.3712	1495.5 2	99.52	4.9569	49.67
0005:00 04	4	0.3357	0	0.3762	1504.5 27	99.57	4.9554	49.67
0005:00 05	5	0.3375	0	0.369	1509.0 3	99.57	4.9378	49.67
0006:00 01	1	0.3073	0	0.3649	1945.3 92	101.76	7.3968	99.46
0006:00 02	2	0.3003	0	0.3598	1950.7 96	100.39	7.3721	99.58
0006:00 03	3	0.2973	0	0.3457	1954.8 49	104.69	7.3404	99.33
0006:00 04	4	0.2907	0	0.3069	2200.9 5	84.69	8.1106	99.71
0006:00 05	5	0.323	0	0.367	2093.7 73	103.5	7.2275	99.58
0006:00 06	5	0.3339	0	0.3832	2071.9 33	102.91	6.9707	99.46
0007:00 01	1	0.3713	0	0.4259	863.49 29	133.4	2.464	80.29
0007:00 02	2	0.3715	0	0.4205	858.31 42	141.68	2.4548	80.16
0007:00 03	3	0.369	0	0.4125	856.51 29	147.04	2.4732	80.16
0007:00 04	4	0.3687	0	0.4077	854.26 13	150.01	2.4781	80.16

0007:0005	5	0.3695	0	0.4076	852.9104	152.71	2.4704	80.16
0007:0006	6	0.3721	0	0.413	856.2878	152.99	2.4605	80.16
0007:0007	7	0.3759	0	0.4201	855.8375	153.22	2.4302	80.16
0007:0008	8	0.3806	0	0.4286	857.4136	152.81	2.3977	80.16
0007:0009	9	0.3838	0	0.4358	858.0891	151.39	2.3737	80.16
0007:0010	10	0.3869	0	0.4428	857.6387	149.05	2.3504	80.16
0007:0011	11	0.3898	0	0.4501	860.791	147.13	2.3385	80.16
0007:0012	12	0.392	0	0.4555	859.44	145.25	2.318	80.29
0007:0013	13	0.3948	0	0.4619	859.8904	143.42	2.3018	80.16
0007:0014	14	0.3975	0	0.4662	861.4665	141.77	2.2877	80.16
0007:0015	15	0.3974	0	0.4669	859.6652	142.19	2.282	80.16
0007:0016	16	0.3987	0	0.4683	860.791	140.4	2.2778	80.16
0007:0017	17	0.3998	0	0.4714	862.8174	139.44	2.2729	80.29
0007:0018	18	0.4006	0	0.4723	861.6916	139.48	2.2665	80.29
0007:0019	19	0.4002	0	0.4712	861.0162	138.16	2.2665	80.29
0007:0020	20	0.4009	0	0.4744	860.791	137.7	2.258	80.16
0007:0021	21	0.4015	0	0.4765	860.5658	137.56	2.2538	80.29
0007:0022	22	0.402	0	0.481	860.791	137.06	2.2531	80.16
0007:0023	23	0.4019	0	0.4788	860.791	135.73	2.2531	80.16
0007:0024	24	0.4016	0	0.4821	861.4665	135.09	2.2559	80.16
0007:0025	25	0.4017	0	0.4813	859.2149	134.17	2.2468	80.29
0007:0026	26	0.4028	0	0.4826	863.7181	134.08	2.2517	80.29
0007:00	27	0.402	0	0.4812	860.56	133.95	2.2489	80.29

27					58			
0007:00 28	28	0.4027	0	0.4827	861.24 13	133.08	2.2453	80.16
0007:00 29	29	0.4025	0	0.4834	860.56 58	132.02	2.2432	80.29
0007:00 30	30	0.4037	0	0.4852	863.26 78	132.71	2.2446	80.16
0007:00 31	31	0.4028	0	0.4852	863.71 81	131.52	2.2496	80.16
0007:00 32	32	0.403	0	0.49	861.24 13	131.38	2.2418	80.29
0007:00 33	33	0.4037	0	0.4938	863.94 33	130.47	2.2425	80.29
0007:00 34	34	0.4031	0	0.4906	865.74 45	131.29	2.251	80.29
0007:00 35	35	0.4017	0	0.4879	861.24 13	130.74	2.2482	80.29
0007:00 36	36	0.401	0	0.487	860.34 07	129.83	2.2489	80.16
0007:00 37	37	0.4024	0	0.4944	862.14 2	129.92	2.246	80.16
0007:00 38	38	0.4033	0	0.4954	862.14 2	128.82	2.2404	80.16
0007:00 39	39	0.4043	0	0.4937	863.49 29	128.82	2.2369	80.29
0007:00 40	40	0.4021	0	0.4949	863.04 26	129.23	2.2489	80.29
0007:00 41	41	0.4009	0	0.4907	860.34 07	128.96	2.246	80.16
0007:00 42	42	0.4019	0	0.4894	864.16 84	128.82	2.2538	80.16
0007:00 43	43	0.401	0	0.494	862.14 2	127.99	2.2524	80.16
0007:00 44	44	0.4024	0	0.4946	863.94 33	128.27	2.2468	80.29
0007:00 45	45	0.4027	0	0.4954	863.71 81	127.81	2.2439	80.29
0007:00 46	46	0.401	0	0.4932	861.91 68	127.31	2.2482	80.29
0007:00 47	47	0.4025	0	0.4922	863.71 81	126.8	2.246	80.16
0007:00 48	48	0.4006	0	0.4911	864.84 39	126.71	2.2609	80.16
0007:00 49	49	0.4009	0	0.4911	863.71 81	126.12	2.2545	80.29

0007:00 50	50	0.4014	0	0.4968	863.49 29	125.48	2.2496	80.29
0007:00 51	51	0.4026	0	0.4939	863.94 33	125.29	2.246	80.16
0007:00 52	52	0.4011	0	0.4998	865.29 42	124.24	2.2538	80.29
0007:00 53	53	0.4017	0	0.5003	863.26 78	124.38	2.246	80.16
0007:00 54	54	0.4021	0	0.502	863.49 29	123.33	2.2439	80.16
0007:00 55	55	0.4044	0	0.5003	864.61 87	123	2.2369	80.29
0007:00 56	56	0.4044	0	0.5051	864.61 87	122.59	2.2326	80.16
0007:00 57	57	0.4027	0	0.5034	864.16 84	122.46	2.2432	80.29
0007:00 58	58	0.4028	0	0.5012	864.39 36	122.36	2.2411	80.29
0007:00 59	59	0.4015	0	0.501	861.69 16	121.81	2.2411	80.29
0007:00 60	60	0.4041	0	0.502	864.39 36	122.09	2.2383	80.41
0007:00 61	61	0.4022	0	0.4999	863.49 29	122	2.2411	80.29
0007:00 62	62	0.4047	0	0.5043	866.87 04	121.45	2.2397	80.29
0007:00 63	63	0.4049	0	0.5007	865.51 94	120.58	2.2348	80.16
0007:00 64	64	0.4057	0	0.5044	865.29 42	120.21	2.2319	80.29
0007:00 65	65	0.4053	0	0.5036	864.16 84	120.08	2.2319	80.29
0007:00 66	66	0.4058	0	0.5032	864.84 39	119.07	2.2319	80.16
0007:00 67	67	0.4052	0	0.5025	864.84 39	118.34	2.2312	80.29
0007:00 68	68	0.4059	0	0.5017	865.96 97	117.37	2.2298	80.29
0007:00 69	69	0.4059	0	0.501	864.84 39	117.19	2.2305	80.29
0007:00 70	70	0.4046	0	0.499	865.06 91	116.69	2.2376	80.29
0007:00 71	71	0.4048	0	0.5023	865.29 42	116.14	2.2362	80.29
0007:00	72	0.4053	0	0.4995	864.39	116.14	2.2341	80.29

72					36			
0007:00 73	73	0.4052	0	0.5022	863.71 81	115.41	2.2298	80.29
0007:00 74	74	0.4083	0	0.5038	863.71 81	114.86	2.2157	80.54
0007:00 75	75	0.4098	0	0.5023	863.94 33	113.99	2.2094	80.29
0007:00 76	76	0.4104	0	0.5072	864.39 36	112.75	2.2051	80.29
0007:00 77	77	0.4113	0	0.5061	865.29 42	111.97	2.2051	80.29
0007:00 78	78	0.4115	0	0.5065	865.96 97	111.06	2.2023	80.29
0007:00 79	79	0.4125	0	0.5078	865.51 94	110.14	2.1988	80.29
0007:00 80	80	0.4121	0	0.507	866.64 52	109.27	2.203	80.29
0007:00 81	81	0.4115	0	0.5031	864.16 84	108.45	2.1995	80.29
0007:00 82	82	0.4119	0	0.5034	864.84 39	107.07	2.1995	80.29
0007:00 83	83	0.4125	0	0.5039	864.16 84	106.62	2.1967	80.29
0007:00 84	84	0.4125	0	0.5012	864.84 39	105.7	2.1967	80.16
0007:00 85	85	0.412	0	0.4994	864.16 84	104.83	2.2002	80.29
0007:00 86	86	0.4129	0	0.4981	864.61 87	103.96	2.1953	80.29
0007:00 87	87	0.4132	0	0.4979	864.16 84	103.09	2.1967	80.16
0007:00 88	88	0.4132	0	0.4946	863.94 33	101.99	2.1939	80.29
0007:00 89	89	0.414	0	0.4931	863.04 26	101.12	2.191	80.41
0007:00 90	90	0.4153	0	0.4926	864.39 36	100.67	2.1917	80.16
0007:00 91	91	0.4163	0	0.4931	863.94 33	100.21	2.1875	80.29
0007:00 92	92	0.4176	0	0.4934	863.26 78	99.52	2.1804	80.29
0007:00 93	93	0.4182	0	0.4926	864.84 39	99.15	2.1797	80.29
0007:00 94	94	0.4187	0	0.4931	863.71 81	99.25	2.1776	80.41

0007:00 95	95	0.4198	0	0.4927	865.06 91	99.15	2.1755	80.29
0007:00 96	96	0.4199	0	0.4932	863.04 26	98.88	2.1741	80.29
0007:00 97	97	0.4197	0	0.4892	863.71 81	98.24	2.1762	80.29
0007:00 98	98	0.4203	0	0.4894	863.49 29	97.74	2.1776	80.29
0007:00 99	99	0.4197	0	0.4877	863.04 26	97.28	2.1804	80.41
0007:01 00	100	0.4197	0	0.4846	862.81 74	96.77	2.179	80.29
0007:01 01	101	0.4204	0	0.4844	862.36 71	96.41	2.1797	80.41
0007:01 02	102	0.421	0	0.4857	862.36 71	95.86	2.1776	80.41
0007:01 03	103	0.4209	0	0.4845	861.24 13	95.68	2.1769	80.29
0007:01 04	104	0.4201	0	0.4827	861.69 16	95.31	2.179	80.29
0007:01 05	105	0.4204	0	0.4823	863.04 26	95.31	2.1847	80.29
0007:01 06	106	0.4201	0	0.4802	861.69 16	95.49	2.1833	80.29
0007:01 07	107	0.419	0	0.4785	861.46 65	94.99	2.1889	80.41
0007:01 08	108	0.4187	0	0.4782	861.46 65	94.9	2.1924	80.29
0007:01 09	109	0.418	0	0.4767	862.81 74	94.71	2.2009	80.29
0007:01 10	110	0.4171	0	0.4757	862.81 74	94.53	2.2037	80.29
0007:01 11	111	0.4176	0	0.4761	862.14 2	94.12	2.2002	80.41
0007:01 12	112	0.4181	0	0.4743	863.04 26	94.12	2.2009	80.29
0007:01 13	113	0.4171	0	0.4725	861.01 62	93.75	2.2016	80.29
0007:01 14	114	0.4166	0	0.4724	862.14 2	93.66	2.2101	80.41
0007:01 15	115	0.4177	0	0.4725	863.26 78	93.57	2.2087	80.41
0007:01 16	116	0.4174	0	0.4702	862.14 2	93.71	2.2051	80.29
0007:01	117	0.4174	0	0.4706	862.81	93.71	2.2094	80.41

17					74			
0007:01 18	118	0.4162	0	0.4688	861.24 13	93.8	2.2122	80.41
0007:01 19	119	0.4155	0	0.4682	860.79 1	93.71	2.2122	80.41
0007:01 20	120	0.4168	0	0.47	863.26 78	93.8	2.2115	80.41
0007:01 21	121	0.4162	0	0.4685	861.69 16	94.03	2.2129	80.29
0007:01 22	122	0.4155	0	0.4671	863.94 33	93.57	2.2199	80.29
0007:01 23	123	0.4146	0	0.4661	861.91 68	93.16	2.2242	80.41
0007:01 24	124	0.4141	0	0.4647	862.14 2	93.02	2.227	80.41
0007:01 25	125	0.4133	0	0.4633	862.14 2	92.93	2.2284	80.29
0007:01 26	126	0.4136	0	0.4629	863.94 33	92.79	2.2334	80.41
0007:01 27	127	0.4127	0	0.4611	861.24 13	92.52	2.2305	80.29
0007:01 28	128	0.4114	0	0.4607	861.01 62	92.47	2.2397	80.41
0007:01 29	129	0.4111	0	0.4594	861.69 16	92.01	2.2418	80.29
0007:01 30	130	0.4113	0	0.4601	861.01 62	92.2	2.2425	80.41
0007:01 31	131	0.4114	0	0.4594	862.14 2	92.01	2.2439	80.41
0007:01 32	132	0.4118	0	0.459	863.49 29	92.06	2.2432	80.41
0007:01 33	133	0.411	0	0.4586	861.69 16	91.97	2.2468	80.16
0007:01 34	134	0.4102	0	0.457	861.01 62	92.01	2.2496	80.41
0007:01 35	135	0.4102	0	0.4574	861.01 62	91.92	2.2482	80.54
0007:01 36	136	0.4098	0	0.458	861.01 62	91.83	2.251	80.29
0007:01 37	137	0.4091	0	0.4563	861.01 62	91.69	2.2552	80.41
0007:01 38	138	0.4082	0	0.4558	861.24 13	91.51	2.2587	80.41
0007:01 39	139	0.4082	0	0.4551	862.14 2	91.28	2.2616	80.41

0007:01 40	140	0.4091	0	0.455	862.81 74	91.14	2.2595	80.41
0007:01 41	141	0.4086	0	0.4544	862.59 23	91.14	2.2602	80.41
0007:01 42	142	0.4077	0	0.4529	860.79 1	91.01	2.2623	80.29
0007:01 43	143	0.4082	0	0.454	863.94 33	90.96	2.2658	80.29
0007:01 44	144	0.4072	0	0.4529	860.79 1	90.82	2.2658	80.41
0007:01 45	145	0.4061	0	0.4511	860.56 58	90.55	2.2707	80.29
0007:01 46	146	0.4061	0	0.4511	860.79 1	90.37	2.2714	80.29
0007:01 47	147	0.4064	0	0.4505	862.14 2	90.37	2.2707	80.29
0007:01 48	148	0.4065	0	0.4502	861.46 65	90.55	2.27	80.41
0007:01 49	149	0.4053	0	0.4497	861.91 68	90.69	2.2785	80.29
0007:01 50	150	0.4048	0	0.4489	861.01 62	90.5	2.2799	80.41
0007:01 51	151	0.4047	0	0.4484	861.01 62	90.32	2.2792	80.29
0007:01 52	152	0.4047	0	0.4486	861.24 13	90.37	2.282	80.29
0007:01 53	153	0.4042	0	0.4475	861.91 68	89.86	2.2841	80.29
0007:01 54	154	0.4038	0	0.4473	861.24 13	90	2.2877	80.41
0007:01 55	155	0.4037	0	0.4461	862.36 71	89.72	2.2898	80.41
0007:01 56	156	0.4036	0	0.4451	861.91 68	89.59	2.287	80.29
0007:01 57	157	0.4028	0	0.4442	860.79 1	89.45	2.2926	80.29
0007:01 58	158	0.4021	0	0.4443	861.01 62	89.13	2.2968	80.29
0007:01 59	159	0.402	0	0.4435	861.01 62	89.04	2.2968	80.41
0007:01 60	160	0.4032	0	0.4445	862.59 23	89.08	2.2919	80.29
0007:01 61	161	0.4021	0	0.4434	861.24 13	89.45	2.2954	80.41
0007:01	162	0.4016	0	0.443	862.14	89.54	2.3011	80.41

62					2			
0007:01 63	163	0.4022	0	0.4435	861.69 16	89.5	2.2975	80.41
0007:01 64	164	0.402	0	0.4424	862.14 2	89.22	2.2975	80.29
0007:01 65	165	0.4014	0	0.4415	862.59 23	88.9	2.3025	80.41
0007:01 66	166	0.401	0	0.4425	863.49 29	89.18	2.306	80.29
0007:01 67	167	0.4013	0	0.4424	862.14 2	89.27	2.3046	80.41
0007:01 68	168	0.4017	0	0.4422	863.49 29	89.22	2.3018	80.29
0007:01 69	169	0.4008	0	0.442	861.24 13	89.31	2.3032	80.29
0007:01 70	170	0.4013	0	0.4418	861.46 65	89.45	2.3004	80.41
0007:01 71	171	0.3998	0	0.4418	861.01 62	89.45	2.3081	80.41
0007:01 72	172	0.4002	0	0.4407	862.59 23	89.13	2.3074	80.29
0007:01 73	173	0.3993	0	0.4403	861.69 16	89.22	2.3117	80.41
0007:01 74	174	0.3992	0	0.4403	862.14 2	89.22	2.3124	80.29
0007:01 75	175	0.3987	0	0.4403	861.24 13	89.27	2.3145	80.29
0007:01 76	176	0.3991	0	0.4407	862.36 71	88.95	2.3152	80.29
0007:01 77	177	0.3983	0	0.4402	861.69 16	89.08	2.3173	80.41
0007:01 78	178	0.3984	0	0.4412	863.49 29	89.22	2.3194	80.41
0007:01 79	179	0.3982	0	0.4406	861.69 16	89.04	2.3187	80.41
0007:01 80	180	0.3981	0	0.439	862.14 2	88.76	2.3173	80.41
0007:01 81	181	0.3978	0	0.4406	861.69 16	88.81	2.3201	80.41
0007:01 82	182	0.3976	0	0.4391	861.91 68	88.81	2.3208	80.41
0007:01 83	183	0.397	0	0.4402	861.46 65	88.9	2.3251	80.29
0007:01 84	184	0.3965	0	0.4384	861.91 68	88.72	2.3286	80.41

0007:01 85	185	0.3963	0	0.4391	861.91 68	88.9	2.3307	80.54
0007:01 86	186	0.3959	0	0.4387	860.79 1	88.67	2.3293	80.29
0007:01 87	187	0.3955	0	0.4378	861.69 16	88.63	2.3314	80.41
0007:01 88	188	0.397	0	0.4382	863.49 29	88.76	2.3279	80.29
0007:01 89	189	0.3966	0	0.4386	862.36 71	88.81	2.3265	80.29
0007:01 90	190	0.3969	0	0.4385	863.71 81	88.81	2.3286	80.29
0007:01 91	191	0.3959	0	0.4381	862.59 23	88.95	2.3314	80.41
0007:01 92	192	0.3956	0	0.4381	862.81 74	88.85	2.3363	80.29
0007:01 93	193	0.3955	0	0.4367	863.04 26	88.58	2.3356	80.29
0007:01 94	194	0.3958	0	0.4373	863.49 29	88.44	2.3356	80.41
0007:01 95	195	0.3947	0	0.4371	861.69 16	88.31	2.3385	80.29
0007:01 96	196	0.3943	0	0.4362	861.01 62	88.21	2.3392	80.41
0007:01 97	197	0.3945	0	0.4365	861.24 13	88.31	2.337	80.41
0007:01 98	198	0.395	0	0.4362	863.26 78	88.31	2.3392	80.41
0007:01 99	199	0.3941	0	0.4356	862.14 2	88.17	2.3434	80.41
0007:02 00	200	0.3938	0	0.4353	861.91 68	88.03	2.3448	80.29
0008:00 01	1	0.3654	0	0.3732	1659.8 88	99.7	4.9632	49.79
0008:00 02	2	0.3699	0	0.377	1664.8 41	100.16	4.9061	49.79
0008:00 03	3	0.3764	0	0.3859	1678.3 51	100.39	4.8475	49.79
0008:00 04	4	0.3775	0	0.387	1681.7 28	100.44	4.8433	49.79
0008:00 05	5	0.3768	0	0.3881	1680.6 03	100.44	4.8489	49.67
0009:00 01	1	0.3419	0	0.3519	2190.1 42	107.12	6.9658	99.58
0009:00	2	0.3724	0	0.5518	2253.8	106.34	6.4572	99.46

02					63			
0009:00 03	3	0.3788	0	0.4115	2323.2 13	106.07	6.4128	99.58
0009:00 04	4	0.3873	0	0.4264	2345.9 54	106.02	6.3034	99.58
0009:00 05	5	0.3933	0	0.4343	2360.3 64	106.16	6.24	99.46
0010:00 01	1	0.3095	0	0.3679	1797.9 12	33.14	6.046	99.46
0010:00 02	2	0.3638	0	0.4144	1789.1 3	86.06	5.1946	99.58
0010:00 03	3	0.4066	0	0.4669	1776.9 72	113.76	4.595	99.71
0010:00 04	4	0.414	0	0.49	1767.0 65	113.3	4.4299	99.46
0010:00 05	5	0.4179	0	0.5042	1773.8 19	113.35	4.3911	99.58
0010:00 06	6	0.4197	0	0.5099	1773.1 44	113.67	4.3608	99.58
0011:00 01	1	0.3302	0	0.3754	861.91 68	41.15	2.8365	120.37
0011:00 02	2	0.389	0	0.4534	861.91 68	85.42	2.4041	120.49
0011:00 03	3	0.4154	0	0.4378	852.00 97	126.35	2.2418	120.49
0011:00 04	4	0.4052	0	0.4204	850.43 36	156.74	2.3067	120.49
0011:00 05	5	0.3861	0	0.4064	847.50 65	180.87	2.4189	120.49
0011:00 06	6	0.3739	0	0.3937	846.83 1	200.64	2.5	120.49
0011:00 07	7	0.3574	0	0.3775	846.83 1	217.08	2.615	120.49
0011:00 08	8	0.3388	0	0.3568	843.90 39	230.35	2.7476	120.37
0011:00 09	9	0.3233	0	0.3469	839.62 59	240.65	2.8611	120.49
0011:00 10	10	0.3124	0	0.3478	835.79 81	250.77	2.9486	120.49
0011:00 11	11	0.3073	0	0.3491	834.89 75	259.56	2.9952	120.49
0011:00 12	12	0.3062	0	0.351	833.99 68	266.52	3.0043	120.37
0011:00 13	13	0.3063	0	0.3484	838.04 97	272.29	3.0121	120.49

0011:00 14	14	0.3079	0	0.3447	837.8246	276.68	2.9938	120.49
0011:00 15	15	0.3085	0	0.3389	840.9768	280.07	2.9966	120.49
0012:00 01	1	0.3112	0	0.3412	1265.18	288.63	4.3636	99.58
0012:00 02	2	0.2827	0	0.3195	2645.193	293.71	10.4116	99.58
0014:00 01	1	0.3123	0	0.3406	850.8839	30.35	2.9507	49.67
0014:00 02	2	0.3245	0	0.3474	851.7846	41.8	2.8414	49.79
0014:00 03	3	0.3467	0	0.376	854.9368	50.95	2.6622	49.67
0014:00 04	4	0.3567	0	0.3884	856.0626	57.27	2.586	49.67
0015:00 01	1	0.3318	0	0.3922	2134.302	69.72	6.7641	99.46
0015:00 02	2	0.3713	0	0.4033	2321.186	101.86	6.5976	99.58
0016:00 01	1	0.4183	0	0.5086	873.1749	104.33	2.1903	80.16
0016:00 02	2	0.4379	0	0.5243	867.0955	114.99	2.0845	80.16
0016:00 03	3	0.4417	0	0.5263	867.9962	122.55	2.0669	80.29
0016:00 04	4	0.4325	0	0.5253	866.6452	128.04	2.1007	80.16
0016:00 05	5	0.4162	0	0.5122	867.0955	132.94	2.1783	80.16
0016:00 06	6	0.4014	0	0.5022	866.1949	137.24	2.251	80.29
0016:00 07	7	0.3936	0	0.5014	863.7181	140.68	2.2799	80.16
0016:00 08	8	0.3856	0	0.4938	864.6187	146.53	2.3279	80.16
0016:00 09	9	0.3783	0	0.4888	863.7181	147.18	2.3674	80.16
0016:00 10	10	0.3783	0	0.4907	864.8439	150.29	2.3674	80.29
0016:00 11	11	0.3814	0	0.4967	865.7445	154.04	2.3455	80.29
0016:00 12	12	0.3822	0	0.4995	865.9697	152.94	2.3413	80.16
0016:00	13	0.3827	0	0.501	866.64	154.45	2.3406	80.16

13					52			
0016:00 14	14	0.3823	0	0.5005	865.74 45	153.58	2.3406	80.04
0016:00 15	15	0.3795	0	0.4953	864.16 84	153.22	2.3547	80.16
0016:00 16	16	0.3788	0	0.4945	864.84 39	155.14	2.3617	80.29
0016:00 17	17	0.3776	0	0.491	864.16 84	152.94	2.3688	80.16
0016:00 18	18	0.3755	0	0.4894	865.06 91	154.36	2.3843	80.16
0016:00 19	19	0.3756	0	0.4852	863.94 33	152.58	2.3815	80.29
0016:00 20	20	0.3748	0	0.4819	862.81 74	151.71	2.385	80.16
0016:00 21	21	0.3744	0	0.478	862.36 71	150.75	2.3892	80.16
0016:00 22	22	0.3716	0	0.4766	861.91 68	149.78	2.4104	80.29
0016:00 23	23	0.3712	0	0.4733	861.01 62	150.24	2.4104	80.16
0016:00 24	24	0.371	0	0.4708	862.81 74	149.01	2.4175	80.29
0016:00 25	25	0.3693	0	0.4699	860.79 1	148.69	2.4252	80.04
0016:00 26	26	0.3684	0	0.4667	858.98 97	148.78	2.428	80.16
0016:00 27	27	0.3687	0	0.4655	859.89 04	148.14	2.4294	80.16
0016:00 28	28	0.3696	0	0.468	861.69 16	145.99	2.4287	80.16
0016:00 29	29	0.3699	0	0.466	860.11 55	146.17	2.4252	80.16
0016:00 30	30	0.369	0	0.4667	858.53 94	146.03	2.4266	80.16
0016:00 31	31	0.3696	0	0.4642	860.34 07	144.29	2.4252	80.16
0016:00 32	32	0.37	0	0.4638	858.98 97	143.33	2.4224	80.16
0016:00 33	33	0.3729	0	0.4677	860.34 07	142.14	2.4062	80.29
0016:00 34	34	0.3755	0	0.4693	859.66 52	141.77	2.3914	80.16
0016:00 35	35	0.3765	0	0.4722	859.89 04	142.55	2.3836	80.16

0017:0001	1	0.3275	0	0.4452	1479.984	99.57	4.9851	49.67
0017:0002	2	0.3333	0	0.4148	1518.261	99.57	5.014	49.67
0017:0003	3	0.3352	0	0.4126	1561.492	99.48	5.0951	49.67
0017:0004	4	0.34	0	0.4094	1529.52	99.52	4.9329	49.67
0017:0005	5	0.3411	0	0.4149	1525.241	99.52	4.899	49.67
0018:0001	1	0.3587	0	0.5237	2262.194	101.86	6.4875	99.46
0018:0002	2	0.3805	0	0.5087	2319.61	101.76	6.35	99.58
0018:0003	3	0.3806	0	0.4898	2308.577	101.81	6.3295	99.46
0018:0004	4	0.3805	0	0.4799	2318.934	101.9	6.3444	99.58
0018:0005	5	0.3761	0	0.4636	2306.325	101.81	6.3867	99.58
0019:0001	1	0.3536	0	0.5032	2481.05	110.6	9.0756	159.08
0019:0002	2	0.3411	0	0.4503	2496.587	110.32	9.3451	159.08
0019:0003	3	0.3375	0	0.5354	2444.574	111.56	9.4742	159.21
0019:0004	4	0.3353	0	0.534	2335.596	113.39	9.2491	158.96
0019:0005	5	0.3347	0	0.5167	2327.491	113.62	9.2372	159.21

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Major Professor: Dr. Peter Filip