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Top Ten Brake Myths

Timothy Janello  
*Southern Illinois University Carbondale*, tjanello@siu.edu

Ronald J. Henningsen

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BRAKE MYTHS

Presenter:
Tim Janello  SIUC Automotive Technology
Ronald J. Henningsen
Tech Editor Undercar Digest Magazine
Owner: Undercar Specialists Inc.
1267 W Royal Oaks Drive, Shoreview MN 55126

651-717-0966
Ronald.Henningsen@gmail.com

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My 4 Favorite Brake Books

Brake Handbook
   Fred Puhn  (HP Books)
High Performance Brake Systems (My present favorite)
   James Walker Jr.  (CarTech Books)
Physics for Gearheads
   Randy Beikmann Ph. D.  (Bentley Publishers)
Brake Design and Safety
   Rudolf Limpert Ph. D.  (SAE Publications)

If you read, understood and could apply the material in these books you would be smarter in the area of “Brakes” than 99% of the folks working in the discipline.
The Purpose Of Doing Brake Work Should Be To Restore A Vehicle To “Like New” Stopping So Why Do We………….. Believe Brake Myths? Perform Brake Work Following Myths? Not Be Really Concerned About the “Like New” Part?
Today We Will Explore Myths In Several Areas Including:

- Brake Fluid
- Brake Hoses
- Brake Hardware
- Brake Pad Bedding
- Friction Materials
- Pedal Pulsation
- Performance Brakes
- Rotors
Myth………

• Rotors Warp
• Rotors Warp if they are stored on edge
• Rotors Warp if they are dropped
• Rotors Warp if they are cheap
• Rotors Warp (may warp) if they are extremely overheated
• Stopping Rotor Run Out Is Easy
• Rotor Thickness Inside-To-Outside Is Critical
• Ceramic Pads Never Cause Problems
• It’s Easy To Clean Rust/Scale To Prevent Run Out
  • It’s OK To Use Sandpaper Or Abrasive Discs
  • A Hammer and Chisel Should Never Have To Be Used
• Rotors Don’t Have Transfer Layers
  • Transfer layers are good
Myth

• The Root Cause Of Pedal Pulsation Is Rotor Run Out
• Thickness Variation (TV) Is Caused By Rotor Run Out
PULSATING BRAKE PEDAL
Why Does This Rotor Have a Shinny Spot On It?
Myth – It Was Warped

The reality was that the rotor had excessive run out which cause it to “wobble” and wear at this one spot.

The result would be pedal pulsation. In this case severe pedal pulsation at moderate braking.
What Really Caused Rotor Run Out?

- One Prime Reason Is Rust and scale on ………………

the inside or outside of the rotor hat. Always clean the rotor hat before reinstalling a used rotor back on the vehicle.
Myth – Rotor Position Mounting Doesn’t Matter

Some OE’s match mount within a .0001 on new vehicles
Always mark a used rotor’s position and return it to the same position

So what do you do when installing a replacement rotor? You ………………. 
Myth – It Doesn’t Matter How You Clean a Hub

Best Method
This method removes rust and scale without removing any metal from hub face.

Not As Good
This method can easily remove metal which is just like rust build up. It will cause rotor run out issues.
Myth
A Hammer and Chisel Is Never Needed to Clean A Hub Face
Myth – It Doesn’t Matter How You Tighten Down a Rotor to Take Run-Out

The only thing right about this picture is how the dial indicator is mounted.

The rotor clamp method is completely wrong and will cause an error in run out.
Myth – It Doesn’t Matter How You Tighten Down a Rotor to Take Run-Out

If you don’t use the right pre-load adapters behind the lug nuts you will have an erroneous run-out reading.
Myth – It Doesn’t Matter How You Tighten Down a Rotor to Take Run-Out

Right, use these behind the lug nuts

Wrong
Proper Tightening Of a Rotor Onto a Hub to Take Run-Out
Hub Run Out Causes Rotor Run Out

- Use a dial indicator to take hub run out
- If a hub has only a slight amount of run out it can still lead to a pulsating pedal problem
- The best way to cure a pulsating brake issue, especially a reoccurring pedal pulsation problem is to …………………

Compensate for hub run out. Do this by using a on-the-car lathe or a behind the rotor run out adjustment shim.
A On-The-Car Brake Lathe and Lateral Run-Out Correction Plates Both Solve Run Out Issues

- That doesn’t mean you can short cut anything
You Must Still Go Through The Steps
Using a On-The-Car Lathe to Turn a Rotor On A Vehicle Takes The “Stacked” Tolerances Into Consideration
Installing a Lateral Run Out Compensation Plate Takes The “Stacked” Tolerances Into Consideration
Lubrication on Hub Faces and Inside Rotor Faces.........

A Point of Controversy

Myth:
It’s wrong to lubricate these points
Then why do Ford and other OE’s do it?
Myth – It’s Not Necessary To Coat The Hub Face Before Installing A Rotor

The reality is that many OE’s (especially Ford) coat the hub face area to prevent rust and scale build up. Other OE’s have a protective plating on the hub face but that has a tendency to wear off and rust then forms causing “rust jacking” problem.

Coat the hub face when installing or reinstalling a rotor. It’s a good preventive measure.
Myths About Drilled & Slotted Rotors

Drilled and slotted rotors supply more stopping power to a vehicle (myth)
Drilled rotors wear brake pads more rapidly (myth)
Slotted rotors cause more rapid pad wear (true)
There are no advantages to drilled and slotted rotors on street driven vehicles (myth and true depending on vehicle usage)
Drilled and Slotted Myths

It doesn’t make any difference if the slots go to the rotor edge (myth). It makes a major difference.

This rotor will provide increased stopping power, shorter stopping distances and always run cooler compared to a similar non-drilled/slotted rotor (myth).
PERFORMANCE BRAKES
Myth: Bigger is Always Better

• Will increasing rotor size increase your braking performance?
• It can, but the right pad is needed too!
• What are you trying to control?

HEAT!
Myth: Bigger is Always Better

• Larger Brakes can reduce brake temperatures
  • Used for street applications this can actually prevent the brakes from working properly because the pads don’t reach operating temperature
    • Stock brake temperatures are typically lower than 500°F
  • In race applications adding heat is typically not a problem
    • Race Pads may be designed to operate in excess of 1000°F
  • Using a “race” or “performance” pad may actually produce worse braking due to cooler operating temps
Myth: Bigger is Always Better

• In most cases the larger rotating mass is not worth the minimal braking performance gain vs. a quality performance pad and rotor combination in the stock size.

• Did you consider the brake balance in the vehicle?
Myth: Race cars have them, they must be better

- Cross drilled Rotors: Myths
  - Cross drilled rotors will keep my brakes cooler
  - Cross drilled rotors will improve braking performance in a street application
Myth: Race cars have them, they must be better

• Cross drilled Rotors: Myths

  • Cross drilled rotors will keep my brakes cooler: FALSE: the cross drilled holes were designed to release gasses from the brake pads

In most cases brake temperatures will stay the same due to some increase in airflow along with the reduced mass and “heat sink” abilities of the rotor

  • Cross drilled rotors will improve braking performance in a street application
FALSE: due to the reduced surface area of the rotor the coefficient of friction can DECREASE
Myth: Race cars have them, they must be better

- Slotted Rotors: Myths

- The slots will cause excessive pad wear

YES, In most cases the slots can reduce glazing and keep the pads clean. This can actually improve stopping ability but may accelerate pad and rotor wear.

Be careful of slots that go completely to the edge of the rotor.
Myth: Race cars have them, they must be better

• So what would you recommend?
  • Some things to consider:

  • Most “experts” recommend slotted rotors if you must go to a performance part for the street

  • Most racing applications today (NASCAR) will use slotted, not drilled rotors. If the improvement was so great wouldn’t those engineers use them?

  • For high speed racing drilled rotors might improve braking, but you will be replacing rotors more often

  • In most cases when new vehicles have drilled rotors it is for no other reason than looks
Myth --- Using A Torque Wrench Will Always Prevent Rotor Problems

Only if the torque wrench is in calibration
Only if the torque wrench is properly used
Only if the correct torque spec is used
Myth – Just Replace Rotors Don’t Ever Turn Them
Myth – All Rotors Are The Same, Some Just Cost More

• The Following Are All Incorrect Brake Myths
• If O.E. is a damped iron rotor you can use any type of replacement rotor
• There is no quality difference or make up difference is new rotors
• All new rotors have the same RA finish on them
• You can take all new rotors out of the box and just install them without doing anything else
Myth – Brake Cleaner Products Are Ok To Wash Rotors With

• True or False
• Both answers are true but the final wash should be with soap and water. Why????
Myth – A Non-Directional Finish Isn’t Necessary On a Turned Rotor

No matter how smooth a cut you put on a rotor you should always apply a non-directional finish to a turned rotor.
Rotor Service Tip

Before you cut a rotor on your lathe take a file and knock off the outer rust ridge. This will GREATLY extend the life of your lathe bits.

Also you MUST always use a vibration damper of some type when turning a rotor.
Myth – A Rotor Must Have Equal Amount Of Metal On Both Sides

• True or False
• When you turn a rotor use common sense but provided the rotor is above minimum specs the amount of metal on each side is not that critical
• Some O.E. configurations have more metal on one side of the rotor than the other
Myth – You Don’t Have To Match O.E. Fin Design On Replacement Rotors

If you don’t you may easily have a cooling issue which could lead to a pulling brake

Cheap replacement rotors may not have the same number of fins or the same amount of metal in the center section of the rotor
Myth – It’s Easy To Tell The Smoothness of a Rotor (RA Value)

You can’t run a ball point pen across a turned rotor and tell how smooth it is

Your can’t drag your finger nail across a rotor and tell how smooth it is

You can only tell how smooth a rotor is by using a profilometer to tell RA
Myth – Spray On Rotor Treatments Are

- Good and should always be used
- No good and should never be used
- Can be used if you wish without any problems
- Who really knows
FRICTION MATERIALS
BRAKE PAD BEDDING
Myth: Test Drives After Installing New Brakes is Only to Verify the Car Stops

• Brake bedding is as important as using assembly lube in a new engine.

• What is brake bedding and what does it do….

• Ever hear of the term “Transfer Layer”
Myth: Test Drives After Installing New Brakes Are Only to Verify the Car Stops and Perhaps Doesn’t Pull

- The transfer layer is micro-thin layer of material
- This material is generated by the rotor and pad interacting while in motion
- The transferred material has a direct influence on the coefficient of friction and stopping ability
- All pads and rotors need to mate
Myth: Test Drives After Installing New Brakes is Only to Verify the Car Stops

• Bedding procedures may vary between pad manufacturers, consult your supplier for directions

• A sample procedure from a NAPA bulletin:
  • 15 stops from 35 to 40 MPH down to 5 MPH
  • Allow brakes to cool for 30 seconds between stops
  • Try to avoid panic stops or hard braking for approx. 200 miles

• Some procedures, Raybestos, for example also recommend braking events from higher speeds

• Note: These procedures DO NOT want you to stop the vehicle between brake applications, the area between the pad and rotor will stay hotter causing “hot spots”
Myth: Test Drives After Installing New Brakes is Only to Verify the Car Stops

New Rotor

Same Rotor After Bedding
Myth – The Deposit of a Transfer Layer Is Always Good
Transfer Layers Can Be Problematic

• When you have a irregular transfer layer ........
  • Don’t just replace the pads or rotor
  • Determine the root cause
  • In the picture shown it was a over heating problem
Myth: Ceramic Brake Pads Never Cause Problems
Myth – A Vehicle Will Never Have A Brake Problem If The Vehicle Isn’t Being Driven

This Vehicle Is Normally Parked For 3-Weeks At A Time. Semi-Met Pads Used On This Truck
Hydraulic Brake System Myths
Multi-Piston Calipers ....

Apply equal hydraulic pressure to all pistons (This is true)

Pad apply pressure will be therefor be equal across the entire pad (Myth)

Some late model vehicles use two different size caliper pistons.

Multi piston calipers have more stopping power (myth)
BRAKE FLUID MYTHS
Myth: You ....................

• Never have to change brake fluid
• Can tell how good brake fluid is by it’s color
• Moisture is the main problem with brake fluid
• Don’t know how good brake fluid is because there is no way to test it except for moisture
• Should be really concerned about dissolved mineral content of brake fluid (True, not a myth)
Myth – You Can Tell How Good Brake Fluid Is By How It Looks

False, the brake fluid shown here passes every SAE test in existence. It looks bad but appearances can be very deceiving.
Says Who???

• This picture caption from a Dec. 07 national magazine article is 100% wrong.
Petroleum Based Contamination is a Different Story
This is Petroleum Based Contamination
Myth – Only Test Brake Fluid For Moisture
Busting The Brake Fluid Testing Myth
Dissolved Minerals Test Shows…
BRAKE HOSES
Myth – Brake Hoses Need Immediate Replacement When They Are Cracked

• Any cracking that you can feel mandates replacement (myth)
• The outer layer (the one that cracks) is there to protect the inner “pressure” layer
• MAP (Motorists Assurance Program) says minor cracking is allowed
• Cracking means the hose will fail the “whip” test which mandates replacement (myth it may fail not will fail)
Myth – This hose is bad

Yes but not because of the cracking. There is rust and scale inside the bracket which holds pressure on after releasing the pedal.

Common sense and good preventive maintenance would suggest that the hose be replaced as the cracking will only continue to get worse but ………. you can’t say this is unsafe.
Myth – Heating A Steel Brake Line To Remove It Is OK

Never use a torch to heat a steel brake line to flexible hose connection joint. You will at the least loosen the crimp of the hose end.
Myth – It’s Bad to Use a Line Lock/Clamp on a Flexible Brake Hose

Using a round line lock and finger tightening it does not cause any problems but
Myth – It’s Sometimes OK to Use a Locking Pliers To Pinch Off a Brake Hose

No, No and if you didn’t understand, NO. The reason why is

........................................
Myth – If You Use Very Light Pressure a Locking Pliers Is OK

Do this and ........

YOU MAY EASILY GET THIS

Vise Grip Was Clamped In This Area.
Class Bonus Photo

This is a actual photo of a hose with a “flapper” in it that allowed brake fluid to flow in one direction but not back in the other direction.

Most often this fact is illustrated by a line drawing not a photo.
Myth – It’s OK To Let a Caliper Hang By The Hose For A Few Seconds

Again, No, No and if you weren’t listening NO
Myth – Braided Flexible Brake Hoses Are Not DOT Approved

• Some are
• Some are not
• It’s depends on the machine/system doing the crimping
• It’s depends on the hose and ends used
Myth – If A Brake Hose Was Twisted It Must Be Replaced

If the hose is old or has been like this for some time yes, otherwise simply reposition it correctly.
BRAKE HARDWARE

&

Brake Component Lubrication
Myth – Wheel Brake Hardware & Return Springs Will Last The Life of the Vehicle

First let’s define hardware as anything on a brake system that isn’t friction or hydraulic and is located at a individual wheel, RF, LF etc.

• It may if it’s not rusty
• It will on light weight vehicles
• If it passes the “twang” test
• If it hasn’t been overheated

• Wait!!! You don’t know what the “TWANG” test is?

• Well what you do is take a brake shoe return spring in your hand and then you……………. 
Myth – You Can Tell The Condition Of Brake Hardware By Looking At It

• Sometimes “yes” and sometimes “no”
• What if it’s missing or is a accessory item?
• Because it doesn’t look shiny it’s bad
• Because it is shiny it’s good
Brake Hardware Can Easily Cause Brake Performance Problems
Cleaning Brake Hardware With a Wire Wheel Is Just Simply Wrong
New Clips Didn’t Come With The Pads So..............

But why is it bad? Let’s just clean it up on a wire wheel and reuse it.

After all if I should be replacing the hardware it should be included with the pads. “Says Who”? 
Replacement of Brake Hardware
Sometimes Includes Caliper Brackets
Brake System Parts Lubrication

Many people believe that there is only one type of brake lubricant that needs to be used on all necessary lubrication points.

Lubrication point categories------

Metal-to-Metal
Metal-to- non metal contact points

Most believe this a myth..........usually two types of lubricants are required!
The type of brake grease you use should be governed by:

The operating temperature requirement

The contact load of the parts

Common sense
Myth You Can Clean Up Slides With A Wire Brush

Lack of lubrication causes metal fretting wear on the caliper slides
Truth...you must be able to rock a dual-servo brake system side-to-side or there is a problem.
Your Thoughts
Your Thoughts
Thanks For Attending

Ronald.Henningsen@gmail.com
651-717-0966
Tech Editor Undercar Digest Magazine