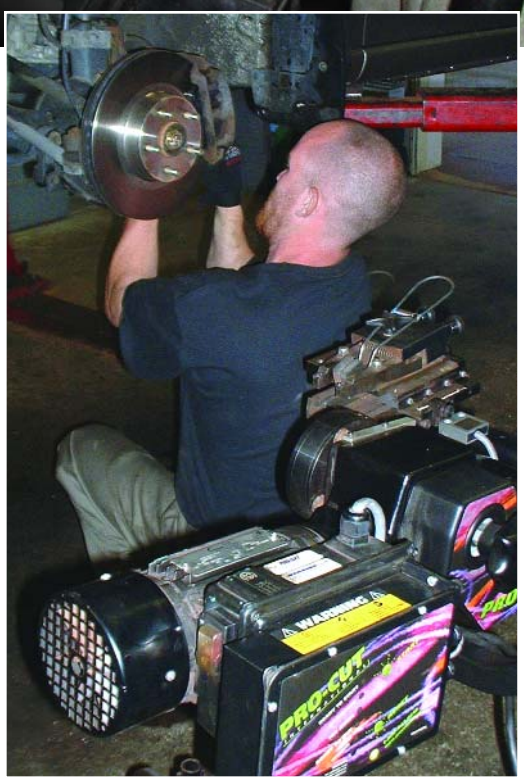
Subaru & the On-Car Brake Lathe



We vividly remember what a tech for a Japanese import dealership told us almost 25 years ago when we were visiting his shop to check out a new model. "Joe down the road at the service station can't do a brake job on these cars, you know — you can't get the rotors off without major surgery," he said. We hadn't known that, and were horrified. We investigated and found that this was true of just about every Asian FWD, including Subaru. How could it be that something as common and critical as brake work would be altogether taken out of independent service facilities, at least as far as the traditional approach to relines was concerned?

Well, of course, the traditional approach had to fall by the wayside. No sooner had the term "captive rotor" become widely known than people who would ordinarily never have thought of such a thing simply started hanging pads against unmachined, often lousy surfaces and hoping for the best.

Rationalizations began to spring up. As a successful Subaru specialist in California once told us, "I'm not a big fan of turning Subaru rotors because you tend to go through the hardening.

We know that from the racing program. After they're cut, they'll fissure on you. With customers' cars, we let the rotors go as long as possible — the scoring doesn't seem to contribute much to squealing."

Meanwhile, those who simply would not back down from their standards forced those rotors off with an assortment of barbaric pullers and presses, then either turned or replaced them. The result, of course, was that they had to price themselves way out of the market.

Back in the mid-'80s, this situation sparked a flurry of interest in on-car brake lathes and even grinders. Most used the car's engine to provide the necessary rotation, and set-up was complicated and time-consuming. Everybody kept thinking there must be a better way.

Like other Japanese cars of the era, older Subarus had the dreaded captive rotors. So, without on-car lathes, lots of pads got hung on poor surfaces.

Legacy legacy

This whole situation was a major reason we were so pleased with the first Legacy, which appeared as a 1990 model. Low and behold, you could take those rotors right off with no problem whatsoever. To us, this was proof that Fuji Heavy Industries took serviceability seriously and listened to feedback from the field. "Before they designed the Legacy," the former head of S.O.A. tech training told us back then, "Fuji's engineers asked me for a serviceability wish list. And they fulfilled almost every point." That's not exactly the prevailing attitude among carmakers, is it?

So, where Subaru vehicles were concerned it was back to business as usual for machining rotors. Or, was it? Pedal pulsation and squeal comebacks were reaching plague proportions with all automakers, under warranty and thereafter.

This is the universal adapter, but there are also those dedicated to particular bolt patterns.

And it seemed to be getting worse every year. People arrive at your door complaining of rough braking, and you turn rotors and reline only to have the same patrons show up again with the identical complaint maybe 4,000 miles later.

Fuji and S.O.A. managers decided to go pro-active here. They stepped back and did a careful assessment of all the possible causes of these customer complaints, then investigated potential cures. Friction formulations were scrupulously examined, and the issues of runout (techs would have to start making sure the hub/disc interface was perfectly clean) and lug tightening practices (no more cranking them on there with your gun set at max, and use the pattern!) were also given due consideration.

The Word

While this attention to detail helped, it wasn't the profoundly certain answer that Subaru was looking for. Hence the decision that led to this famous S.O.A. bulletin, dated January 3rd, 1994:

Brake Servicing Requirements for Subaru Dealers Warranty Policy Modification

When performing warranty repairs for brake judder, Subaru brake rotors must be resurfaced using an on-car lathe. If the rotors have been scored due to worn brake pads within the warranty coverage, the rotors must be resurfaced if they fall within the minimum thickness specifications listed in the respective Subaru service manuals and training materials.

The brake rotors are not to be resurfaced as a matter of course during routine brake pad replacements unless the above factors are experienced.

The machining of Subaru brake rotors requires accuracy on the part of the machine and the operator to ensure that the rotor is cut parallel to the mounting surface. A rotor that is machined not parallel to the mounting surface will result in a rotor excessive run out. Excessive rotor run out eventually leads to excessive rotor parallelism difference which is exhibited as a brake judder complaint.

Warranty claims for rotor resurfacing will be accepted using an on-car lathe. Rotors that are resurfaced properly will not require further surfacing for judder related complaints within the warranty period under normal use. If it is determined that a judder complaint exists on a Subaru vehicle after the rotors are resurfaced, the parallelism and the runout of the rotors must be measured and noted on the repair order. If the rotors are within the minimum thickness allowances, the rotors must be resurfaced again using on-car lathe. If the rotors are beyond the thickness specifications, the rotors should then be replaced and the original rotors must be retained for DTM inspection or for return to Subaru of America, Inc. if a request is issued after claim credit.

When a rotor is resurfaced using an on-car lathe, multiple repairs will virtually be eliminated.

Subaru of America, Inc. requires the use of an on-car brake lathe.

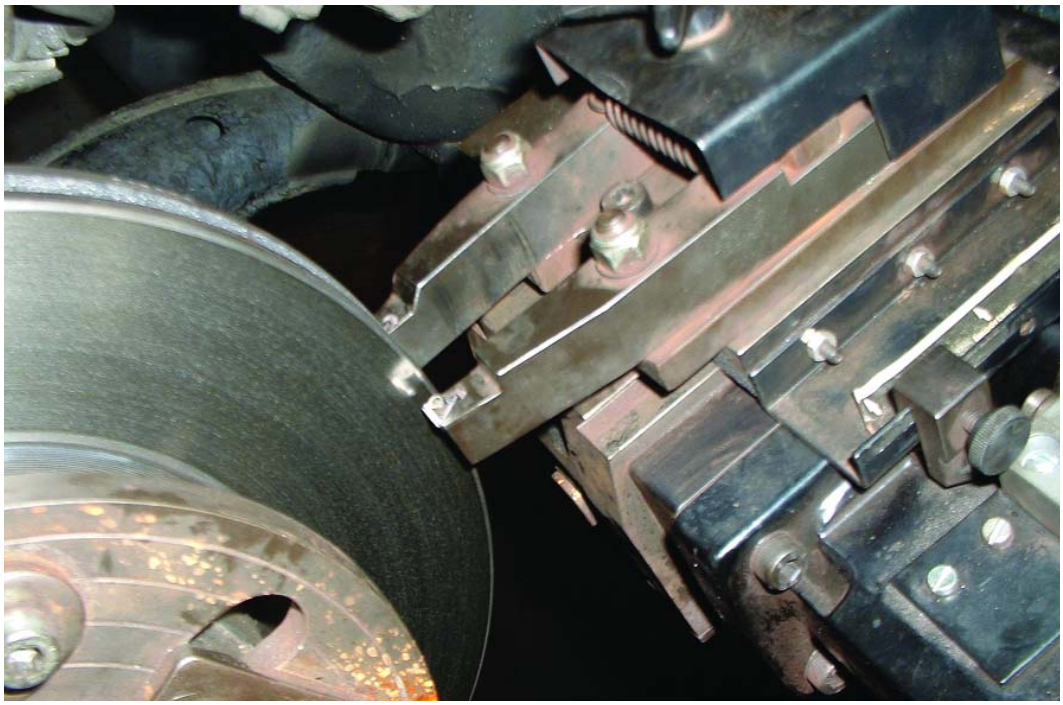
How's that for no uncertain terms? S.O.A. is determined to insure customer satisfaction with its vehicles, and pulsation simply isn't going to be tolerated. Perhaps you, as an independent, should be thinking along the same lines.

By the way, the only on-car brake lathe approved by Subaru is the Pro-Cut.

Why on-car is better

Can't you get rotors to run true on your regular off-car lathe? Yes and no. Mounting errors are common, and you have to be sure to really clamp modern, light-weight discs down solidly, or they'll flex. When it comes to putting them back on the car, are the hub flange and the back of the rotor "hat" completely free of rust and debris? If not, you'll be introducing runout.

Once you tighten the cutting head down in the right position…



…and turn the lathe on, it will automatically compensate for runout.

We wouldn't be surprised if right now you're thinking to yourself, "Hey, it's not runout that causes pulsation. It's thickness variation." Certainly, you're right. When it comes down to basics, DTV (Disc Thickness Variation, also seen as a lack of parallelism between the two sides of a rotor) is the direct source of pulsation — the fat places knock the pads and piston back, and that little column of fluid transmits this movement to the pedal. But it just so happens that ***runout causes thickness variation***.

Runout results in uneven wear as the rotor hits those abrasive pads in one spot on each side every revolution of the wheel. Ergo, the contact areas will end up thinner than the rest of the disc. We've heard claims that, typically, .002 in. of runout with zero-clearance bearings will cause about .0004 in. of DTV in 3,000 to 5,000 miles (some authorities want thickness variation held to .0002 in., while others say it'll take .0004 to generate a complaint).

Speaking of zero-clearance bearings, they're another factor that aggravates the development of DTV on late models. They were adopted to reduce rolling drag, which they did by requiring a less scuff-producing toe-in setting. But with no end-play to absorb hub and rotor imperfections, any runout at all causes contact between the pads and rotor, increasing the wear that results in thickness variation.

The specialists we've talked to like to use the O.E. pads to avoid comebacks. They have exactly the right friction recipe for the application.

Wobble reducer

The only sure-fire way to eliminate runout in the assembly is to use an on-car brake lathe, which will resurface discs with excruciating accuracy "in situ."

Although nobody could fault you for using a torque wrench to tighten the lugs, Subaru has approved Torque Stix, and they're a lot faster.

Avoiding the dreaded squeal is often considered another justification for the purchase of this equipment. As one authority tells us, "Noise comes from vibration. If you can get all the thickness variation, runout, and taper out of a rotor, you can be pretty sure it won't be the cause of noise."

So, if you're getting tired of brake pulsation and squeal comebacks, and maybe have a considerable number of customers with older captive-rotor cars, you might want to investigate the Pro-Cut machine.

Finally, just because you can't take the finished rotor to the shop sink to wash it with detergent and water (everybody out there knows by now that aerosol brake cleaner is exactly the wrong thing to use on the fresh contact surface, right?) doesn't relieve you of the responsibility of doing it on the car. Just put your biggest drain pan under the disc, then scrub and rinse (spray bottles help) until you get rid of all those noise- and groove-producing chips and filings.