BONUS SECTION 8: ROTORS, RUNOUT, AND RESURFACING

10 Targeted Practice Questions

1. A technician is measuring disc brake rotor thickness variation and takes eight measurements equally spaced around the rotor circumference. The measurements range from 0.993 inches to 1.004 inches. The manufacturer's maximum allowable thickness variation is 0.0005 inches. The correct conclusion is:

A. The rotor is within specification since all measurements are above the minimum discard thickness

B. The rotor has thickness variation of 0.011 inches, which far exceeds the 0.0005-inch maximum and will cause pedal pulsation — the rotor must be resurfaced or replaced

C. Only two measurements need to be above specification to condemn the rotor — the other six measurements are acceptable

D. Thickness variation is only significant if the rotor is below minimum discard thickness simultaneously

2. A disc brake rotor is being resurfaced on a brake lathe. After the finish cut, the rotor surface shows a smooth, mirror-like appearance. The technician should:

A. Return the rotor to service immediately since a mirror finish indicates perfect surface quality

B. Apply a non-directional scratch finish to the rotor surface using a sanding disc or brake rotor conditioning pad before installation

C. Polish the surface further with fine-grit paper to reduce any remaining micro-roughness

D. Accept the mirror finish only if the rotor surface measures within the specified surface roughness range of 30–60 microinches Ra

3. A technician measures rotor lateral runout at 0.006 inches on a vehicle that specifies a maximum of 0.002 inches. Before condemning the rotor, the technician removes the rotor, cleans the hub flange, and re-measures. The runout is now 0.004 inches. What should the technician do next?

A. Replace the rotor since 0.004 inches still exceeds the 0.002-inch specification

B. Index the rotor — rotate it 180 degrees on the hub, reinstall, and re-measure to determine if hub runout is contributing to total rotor runout

C. Machine the rotor with an on-car lathe since hub runout is confirmed to be contributing to the reading

D. Replace the hub bearing since the 0.002-inch reduction in runout after cleaning confirms the hub is causing the excess runout

4. The minimum discard thickness specification for a disc brake rotor represents:

A. The thickness at which the rotor should be scheduled for resurfacing at the next brake service

B. The absolute minimum safe thickness — a rotor at or below this measurement must be replaced and may not be returned to service

C. The thickness after which the rotor begins to lose its thermal mass capacity and brake fade may occur

D. The thickness that allows one final machining cut before the rotor must be discarded

5. A vehicle has a pulsating brake pedal. The technician measures rotor lateral runout at 0.003 inches — within the manufacturer's specification of 0.004 inches. However, the pedal pulsation continues. The NEXT measurement the technician should take is:

A. Rotor surface temperature at multiple points around the circumference

B. Rotor thickness variation — excessive thickness variation causes pedal pulsation independently of lateral runout and the two conditions must be measured separately

C. Hub flange runout to determine if it is contributing to the rotor's runout measurement

D. Caliper piston travel distance to verify the piston is not bottoming out during application

6. A brake lathe is set up to resurface a front disc brake rotor that has been removed from the vehicle. Before making the final finish cut, the technician should verify:

A. The rotor is mounted on the arbor with the hat facing outward to match its orientation on the vehicle

B. The rotor will remain above minimum discard thickness after the total material removed from both faces during machining

C. The lathe cutting speed is set to maximum RPM to produce the finest possible surface finish

D. The rotor is within 50 degrees of ambient temperature since hot rotors expand and produce inaccurate final measurements

7. Hard spots on a disc brake rotor appear as dark, discolored circular areas on the friction surface. These areas are significant because:

A. They indicate areas of reduced rotor thickness that will accelerate wear in those locations

B. They are areas where pad material has transferred onto the rotor at elevated temperatures, creating localized deposits with a different friction coefficient that cause pedal pulsation and uneven wear

C. They indicate the rotor has experienced cryogenic cooling and the metal has become brittle in those areas

D. They are areas of iron oxide buildup that can be removed with a mild acid wash, restoring the original surface

8. An on-car brake lathe (also called a hub-mounted lathe) has a significant advantage over a bench lathe for rotor resurfacing in that:

A. An on-car lathe cuts the rotor while it spins at normal driving speed, producing a more accurate surface finish

B. An on-car lathe compensates for hub and bearing runout by machining the rotor true to the actual axis of rotation — the same axis it spins on during driving — eliminating the need to separately measure and correct for hub runout

C. An on-car lathe removes significantly less material per pass than a bench lathe, extending rotor service life

D. An on-car lathe can resurface rotors that are below minimum discard thickness since it cuts both faces simultaneously

9. A technician is resurfacing a rotor and calculates that the material to be removed will result in a final rotor thickness of exactly the minimum discard specification. The correct decision is to:

A. Complete the machining since the final thickness will still be at the minimum specification

B. Do not machine the rotor — replace it instead, since a rotor machined to exactly minimum discard thickness has no remaining material reserve and must not be returned to service

C. Machine only one face of the rotor to remove half the material and stay above minimum

D. Machine the rotor and advise the customer they will need replacement rotors at the next brake service interval

10. After resurfacing a disc brake rotor on a bench lathe and returning it to the vehicle, the technician measures lateral runout at 0.006 inches — more than the 0.002-inch maximum. The rotor surface is smooth and within thickness specification. The MOST likely cause of the runout is:

A. The bench lathe arbor was worn, producing an off-center cut on the rotor

B. Hub runout that was not present during bench machining is adding to the rotor's own runout when the rotor is mounted on the hub

C. The rotor was installed with a rust ridge or debris between the rotor hat and hub mounting surface

D. Lug nut distortion during installation has flexed the hub flange, creating runout that was not present during bench machining

BONUS SECTION 8 — ANSWERS AND EXPLANATIONS

1. B — Thickness variation far exceeds specification and must be corrected — The measured variation of 0.011 inches (1.004 − 0.993) exceeds the 0.0005-inch maximum by a factor of more than 20. Thickness variation causes the caliper piston to be pushed back into its bore as the thick spot passes, then pulled forward as the thin area passes, creating a pumping action felt through the pedal as pulsation. This rotor must be resurfaced or replaced regardless of its thickness above the discard limit.

2. B — Apply non-directional scratch finish — A mirror-smooth rotor surface from a fine lathe cut does not provide adequate mechanical keying for brake pad friction material transfer during bed-in. A non-directional scratch finish — typically applied with a 120–150 grit sanding disc moved in a swirling motion while the rotor is on the lathe — creates microscopic surface texture that promotes even, rapid pad material transfer and reduces the likelihood of brake squeal.

3. B — Index the rotor 180 degrees and re-measure — The cleaning step reduced runout from 0.006 to 0.004 inches, confirming debris was a partial contributor. Rotating the rotor 180 degrees on the hub redistributes the rotor's own runout relative to the hub's runout. If the two runouts partially cancel each other at 180 degrees, the total measured runout may fall within specification without any machining, saving both the rotor and the time required to cut it.

4. B — Absolute minimum — rotor must be replaced at or below this thickness — The discard thickness is determined by the manufacturer based on the rotor's structural integrity and thermal capacity at the minimum safe cross-section. A rotor below this thickness cannot safely absorb and dissipate the heat generated during repeated hard stops and may warp, crack, or fail structurally. It is an absolute condemnation criterion, not a maintenance threshold.

5. B — Measure rotor thickness variation — Lateral runout and thickness variation are two separate and independent conditions that both cause pedal pulsation. A rotor can be within the lateral runout specification while simultaneously having excessive thickness variation. If runout is confirmed within spec but pulsation persists, thickness variation is the next logical measurement in the diagnostic sequence.

6. B — Verify final thickness remains above minimum discard — Before making a finish cut, the technician must calculate the total material to be removed from both rotor faces and confirm the resulting thickness will be above the minimum discard specification. Machining a rotor below its discard limit — even by a small amount — requires replacement rather than return to service, wasting the machining time and cost.

7. B — Pad material deposited creating localized friction variation — Hard spots or heat spots are concentrated deposits of brake pad friction material that transferred onto the rotor surface during high-temperature braking events. These deposits are slightly raised above the rotor surface and have different friction and thermal properties than the base iron. As the rotor turns and these deposits repeatedly pass under the brake pad, they create alternating high and low friction zones that the driver feels as pedal pulsation.

8. B — Machines true to actual axis of rotation including hub runout — Hub bearing runout is invisible to a bench lathe since the rotor is mounted on an arbor rather than on the actual hub. A rotor that is perfectly true on the bench will show runout on the vehicle if the hub has any runout of its own. An on-car lathe mounts directly on the hub and machines the rotor using the vehicle's actual bearing and hub as the reference, producing a rotor surface that is true to the axis it will rotate on during normal operation.

9. B — Replace the rotor — do not machine to exactly minimum thickness — A rotor machined to exactly the discard limit has reached the end of its service life at the moment the machining is complete. There is zero material remaining for any future wear, heat cycling, or pad material transfer. The rotor must be replaced rather than machined to its final limit. This is a fundamental rule of brake rotor service that prevents the technician from returning an effectively end-of-life rotor to service.

10. C — Rust ridge or debris between rotor hat and hub — A rotor that measures correctly on a bench lathe but shows excessive runout after installation almost always has a contamination issue at the hub mounting interface. A rust ridge, debris particle, or corrosion buildup between the rotor hat and the hub face acts as a fulcrum that tilts the rotor off its true axis of rotation, producing runout that was not present during bench measurement. Always clean and inspect both mating surfaces before reinstalling any rotor.\