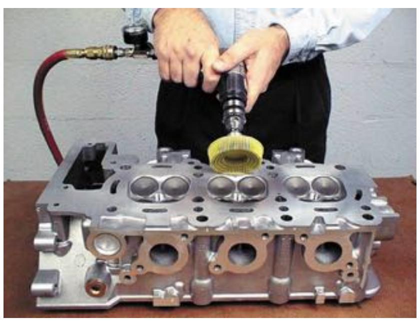
29

ENGINE CLEANING AND CRACK DETECTION

Figure 29-1 An air-powered grinder attached to a bristle pad being used to clean the gasket surface of a cylinder head. This type of cleaning pad should not be used on the engine block where the grit could get into the engine oil and cause harm when the engine is started and run after the repair.



TECH TIP

The Ice Scraper Trick

Using a steel scraper can damage aluminum heads or block deck surfaces. To prevent damage, try using a file to sharpen a plastic ice scraper and then use this to scrape gaskets from aluminum engine parts. This method works very well.

Figure 29-2 An abrasive disc commonly called by its trade can be engine damaging. name, Scotch Brite™ pad.

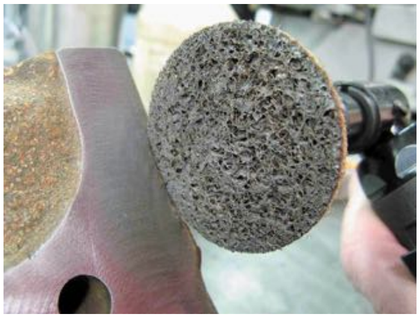


Figure 29-3 Using baking soda is the recommended way to clean engine parts because any soda that is left on or in the part is dissolved in oil or water, unlike either sand or glass beads, which can be engine damaging.

Figure 29-4 Small engine parts can be blasted clean in a sealed cabinet.

Figure 29-5 A pressure jet washer is similar to a large industrialsized dishwasher. Each part is then rinsed with water to remove chemicals or debris that may remain there while it is still in the tank.

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Figure 29-6 A microbial cleaning tank uses microbes to clean grease and oil from parts.

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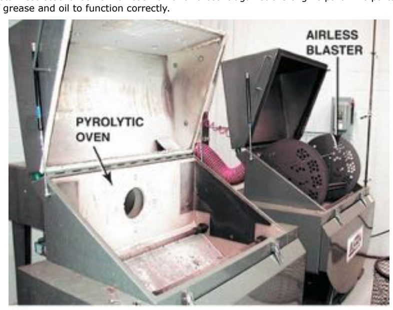
Figure 29-7 (a) A pyrolytic (high-temperature) oven cleans by baking the engine parts. After the parts have been cleaned, they are then placed into an airless blaster. This unit uses a paddle to scoop stainless steel shot from a reservoir and forces it against the engine part. The parts must be free of grease and oil to function correctly.



(a)

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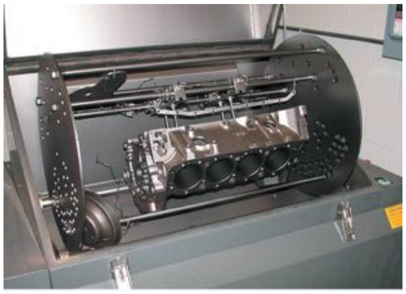
Figure 29-7 (b) This cleaned engine block has been baked and shot blasted.



(b)

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Figure 29-8 An ultrasonic cleaner being used to clean fuel injectors.

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Figure 29-9 The top deck surface of a block is being tested using magnetic crack inspection equipment.

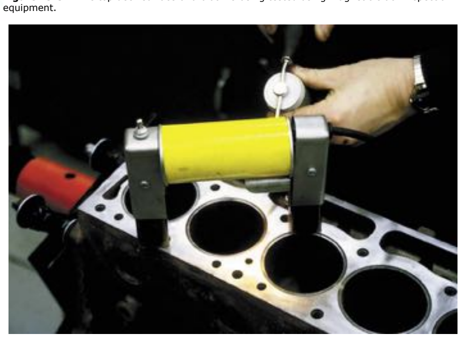

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Figure 29-10 If the lines of force are interrupted by a break (crack) in the casting, then two magnetic fields are created and the powder will lodge in the crack.

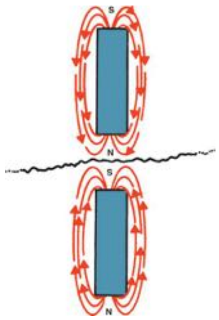

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Figure 29-11 This crack in a vintage Ford 289, V-8 block was likely caused by the technician using excessive force trying to remove the plug from the block. The technician should have used heat and wax, not only to make the job easier, but also to prevent damaging the block.

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Figure 29-12 To make sure that the mark observed in the cylinder wall was a crack, compressed air was forced into the water jacket while soapy water was sprayed on the cylinder wall. Bubbles confirmed that the mark was indeed a crack.

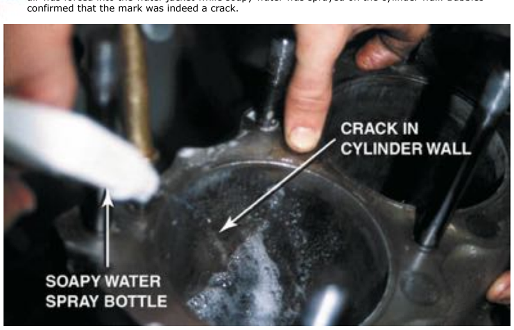

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Figure 29-13 A cylinder head is under water and being pressure tested using compressed air. Note that the air bubbles indicate a crack.

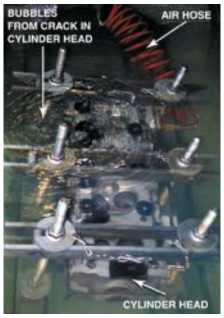
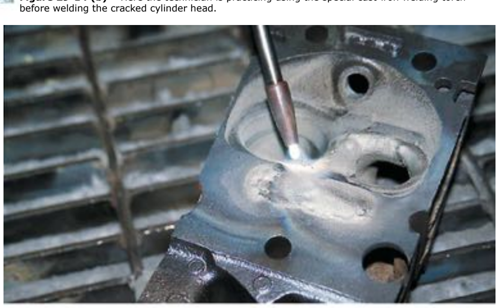


Figure 29-14 (a) Before welding, the crack is ground out using a carbide grinder.

(a)

Figure 29-14 (b) Here the technician is practicing using the special cast-iron welding torch before welding the cracked cylinder head.



(b)

Figure 29-14 (c) This is the finished welded crack before final machining.

(c)

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Figure 29-14 (d) Note the finished cylinder head after the crack has been repaired using welding.

(d)

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Figure 29-15 Reaming a hole for a tapered plug.

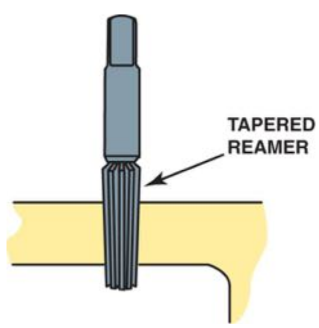

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Figure 29-16 Tapping a tapered hole for a plug.

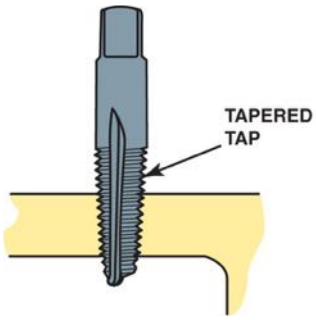

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Figure 29-17 Screwing a tapered plug in the hole.

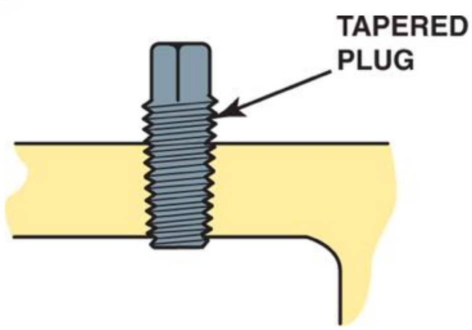

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Figure 29-18 Cutting the plug with a hacksaw.

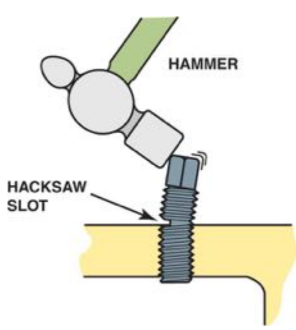

Figure 29-19 Interlocking plugs.

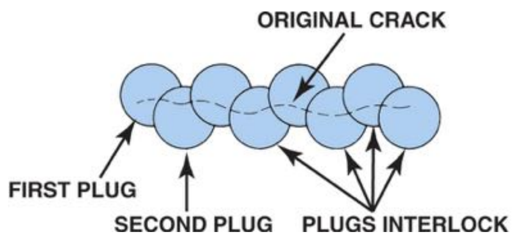

Figure 29-20 (a) A hole is drilled and tapped for the plugs.

(a)

Figure 29-20 (b) The plugs are installed.

(b)

Figure 29-20 (c) After final machining, the cylinder head can be returned to useful service.