One Thing Leads to Another...

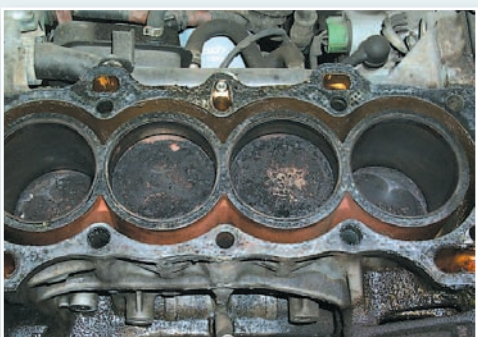
How far is it from that foam on the cap to rings and bearings?

A cheery thing to find first thing in the morning – a little blob of oily foam inside the radiator filler cap. But my immediate alarm seemed overdone because there was no corresponding soap foam in the crankcase oil. Whew! No coolant in the crankcase oil, at least. But there was no doubt oil had somehow made its way into the coolant.

The most likely cause, of course, was a headgasket leak, not an unlikely hypothesis on an Acura (Integra) with over 130K on the clock. There was also the possibility that the head was cracked around an oil galley, but there hadn't been any symptom of that before, though the temperature gauge had gone up once when a heater hose split.

OK, the car was no jewel, but everything worked, so it was certainly worth a new headgasket. The oil couldn't have been in the coolant for too long, or I'd have noticed it the last timeI checked, surely not over a couple of weeks ago. Nonetheless, the coolant hoses had piped hot oil, and that might call for replacing some or all of them. No problem with that; they're much easier to get with the cylinder head and both manifolds twenty feet away on the workbench; only the top radiator hose was new, and they needed replacing anyway. Besides, the top one would be easy to replace later if need be. Once the inner surface of a hose starts to dissolve from oil saturation, of course, it is only a matter of time before the hose decides to blimp up and let go somewhere.

Once the head was off, it was clear the oil had seeped around the gasket just at the area where the pressure galley comes up from the block. Of course, as long as I had it off, it would only be smart to replace a few other gaskets and odd knick-knacks. Obviously the engine would need new crankcase oil and a filter.

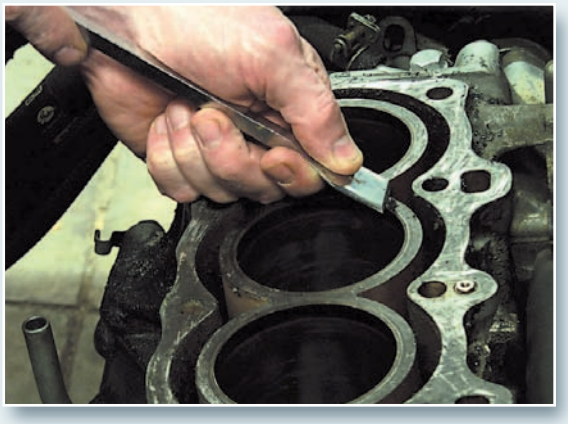


No doubt there would be this and that else, plugs and filters, accessory drive belts and such – the A/C idler bearing had disintegrated and locked the pulley, but most things were caught in plenty of time – no aluminum-fouled spark plugs or other exotic failures. The engine was still running normally on all four, after all, and the cylinders and waterjacket looked good. Besides, the car had even passed the New York State emissions inspection recently, buoying my confidence high, as only an Official Government Form can.

But every silver lining contains a dark cloud, doesn't it? Sometimes more than one. And not every repair job looks as simple as it did when you first set out to complete things. This story tells how that bit of oil foam on the radiator cap led to rings and bearings, to a timing belt and crank and camshaft seals, to a water pump and several idler pulley bearings. To gaskets unnumbered and many other parts.

Was it worthwhile? Oh, probably. The car will run for another 125 K after which nobody will want it, not even me. The use-value of the vehicle as transportation is already greater than its exchange value as a sale or trade-in, but somebody has to drive beaters. Besides, let's be serious environmentalists – any old car you keep running saves the energy, material waste and byproducts involved in building a new one, unless you're willing to ride a bicycle everywhere once you turn yours in for scrap. Estimates vary, and its not in the interest of anyone who actually knows the answer to make that information public, but a figure you often see is that building a car generates as much toxic waste as it will cause for the balance of its useful driving life. So keep those rusting old heaps running and rolling.

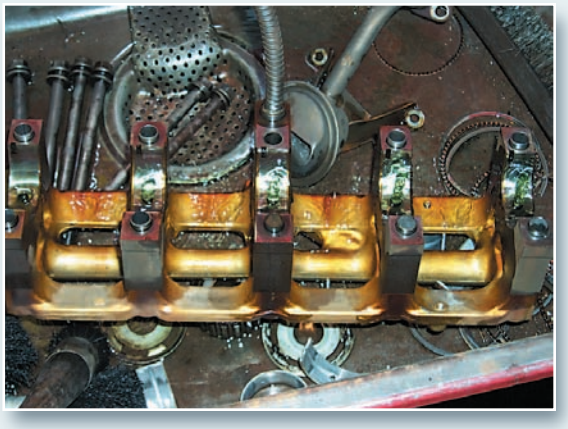
Most of the work, like most engine work of any kind, consists in carefully cleaning surfaces. It's amazing how much of major engine repair resembles washing encrusted dishes with drycleaning fluid. The only parts requiring care, as opposed to mere thoroughness, are the points where you're removing a gasket from an aluminum casting surface and using a steel-bladed gasket scraper to do it.



Yes, in high-volume engine-overhaul shops, they use various high-tech scrubber devices, but you probably don't have one, and neither do I. The head, of course, I shipped off to a local machine shop for a valve-cleanup and seal refit.

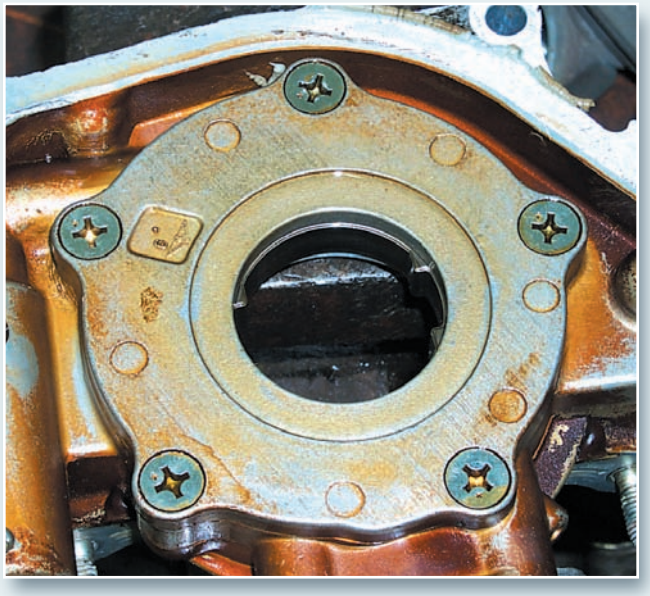
That tedious cleaning and care for the surface is one of the major determinants of whether the engine will function properly after the work is done, in particular whether there will be coolant or oil leaks requiring another disassembly. But 'ye get too tsoon oldt und too late schmardt,' no? Having learned my lessons the hard way (and more than once), I now believe there is *always* enough time to do a job the right way the first time. Had I known this many years ago, I'd have much less experience than I do now.

I did one thing that (I blush to admit) I've never done with an in-car overhaul before. Because one of my colleagues is Mike Mavrigian, the editor of *Import Service*'s sister publication *Precision Machine Shop*, I could hardly ignore his sternly repeated advice to wash out the engine with hot soapy water before I reassembled it. 'Otherwise,' Mike shook his minatory finger, 'nameless grief will follow.' Nameless grief never followed before, but I knew if a turn signal bulb burned out on the car in the next 100K it would be because I didn't wash out the engine with hot soapy water. And now that I've done it, if anything does go wrong, it's because of Mike's suds. Just so everybody's happy!



The bearings, main and rod, were worn, though not disastrously so. The engine uses a gang-saddle for all the main bearings, allowing you to flush out most of the oil galley in the parts cleaner. Nonetheless, there was enough wear to put in a new set of standard shells, checking them with plastigage.

I chickened out when it came to the oil pump. There was no reason to suppose the engine had low oil pressure before, and that formidable cluster of staked Phillips screws holding the faceplate over the pump didn't look very inviting, particularly with nothing flat to hold the oil pump housing casting in – it's too fragile to hold in a vise, and I didn't want to make a clay or sand receptacle to hold it against the shock of the torque-hammer screwdriver.

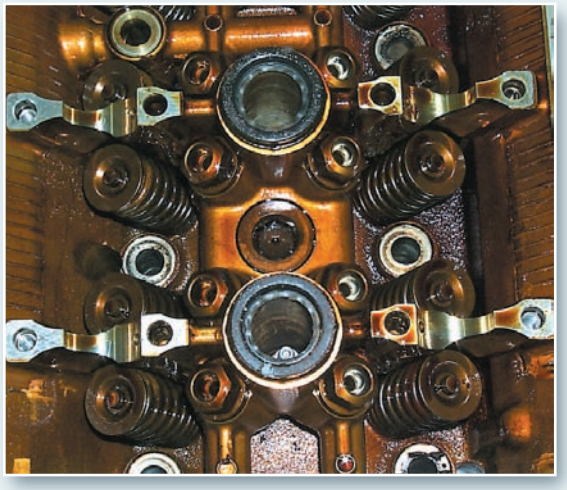


So, I held my breath and just re-used it uninspected, carefully replacing the crankshaft seal and packing the pump with lubriplate grease to prime the lubrication system at first crank.

A good question to ask is this: Why not use one of those snazzy new multilayer steel headgaskets, given that this one is already a one-time-loser? It's apparently true that those gaskets are the best, but before you can use them you have to achieve a very smooth, nearly mirror-smooth finish on both the head and the block, checking your work with a profilometer to confirm the smoothness. While I could probably borrow someone's profilometer for a day, there's no way I'm going to get a mirror-smooth finish on the block surface using a gasket scraper, or anything else from the toolbox. The only way to do that is with a milling machine run at slow speed by a skilled machinist. And nobody's going to lend me a milling machine for a day.

The camshaft lobes and bearings showed only minimal wear, but the seals had worn grooves in the front of each cam, just inboard of the timing sprockets. You could put new cams in, I guess, and maybe they make oversize seals and repair sleeves for these cams, but there is a bit of variability to just where you put the seals. So with a bit of care, you can put them so the lip rides in a new spot on each cam.

There was a good deal of varnish in the engine after all those miles, but these things wash up with parts cleaner and elbow grease. The head bolt threads were not only coated with carbon or rust but some of them were electrolysis-pitted.



The pistons, coated with the usual surface of carbon and varnished in the ring area enough to lock some of the oil scrapers in place, cleaned up fairly well, and the new rings moved freely but not too freely in their just-excavated grooves.

It's not too controversial to replace a thermostat when digging deep into an engine, but there was a particularly good reason here: the oil that had circulated with the coolant in the first place.

Obviously, the oil had distorted the rubber of the thermostat gasket, but there was the possibility that it seeped into the wax pellet as well, rendering the 'stat unreliable. Close by, an important problem-preventive on any Honda system comes with cleaning up the thermostat housing, in particular the small boss where so many different circuits find their ground return. If that ground grows resistance, you can find many hard problems resulting.

So what's the point here? You can never be sure what an internal engine job will involve, and specifically how much it will entail in parts andother costs, until it's underway. The mechanical symptoms that lead you to begin a job may not fully reveal all of what will be necessary to complete it. What's more, it's usual, not unusual, to find more things that need repair with a car that has some miles on it. The question becomes merely how much wear and expended useful life means replacement and how much means the part stays in service.

Could more have been done? Arguably the cylinders could have been re-honed, but that presented cleanup problems for any in-the-car job of this sort. How do you get all of the abrasive debris out, even using Mike's hot soap and water, with the engine and crankshaft still in the car? So you live with a less than perfect job. And keep the heap rolling for a few more years. ■

—By Joe Woods