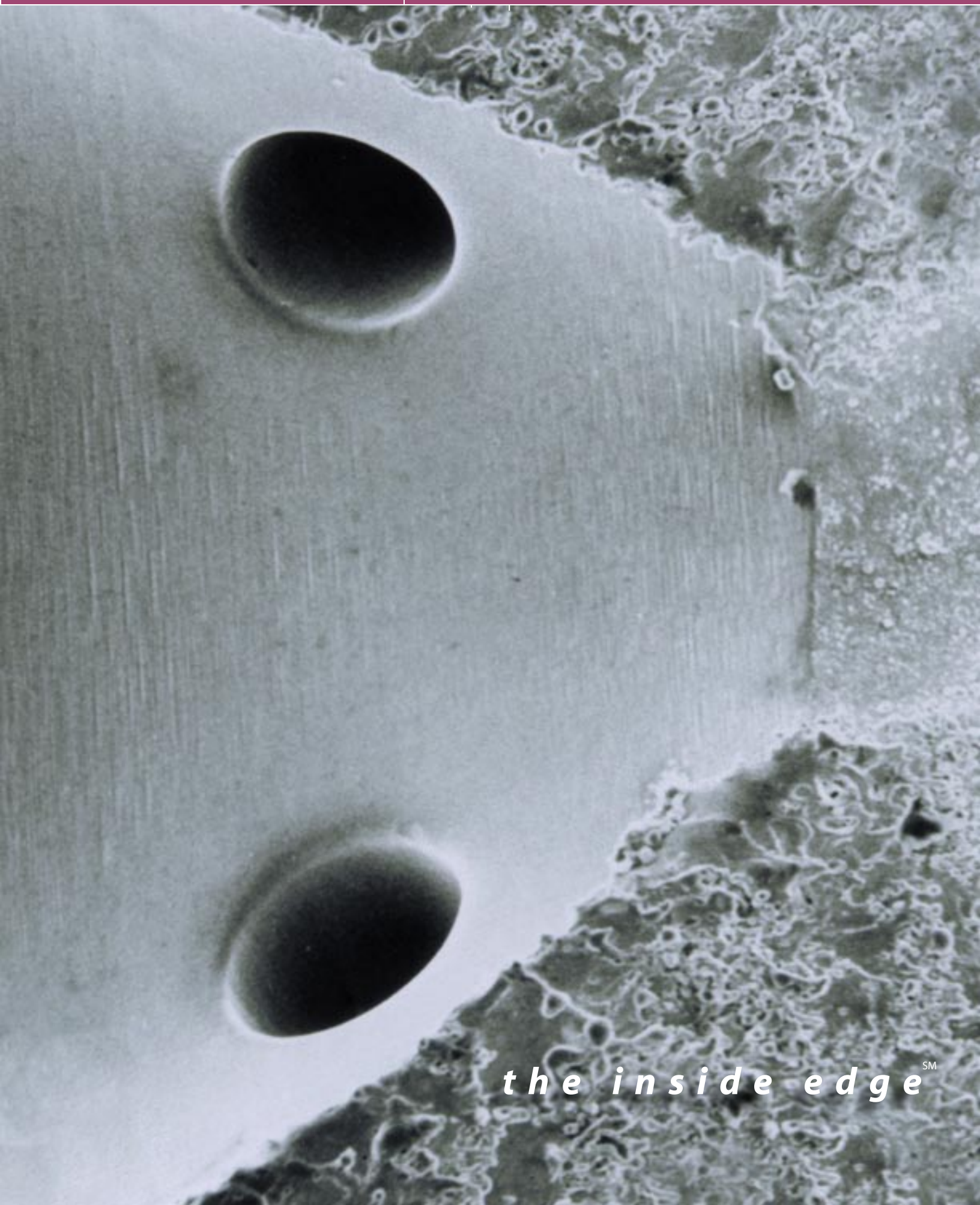
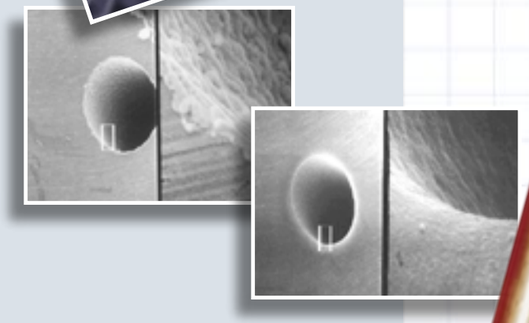
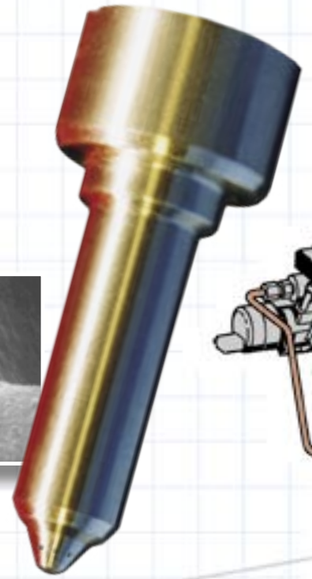
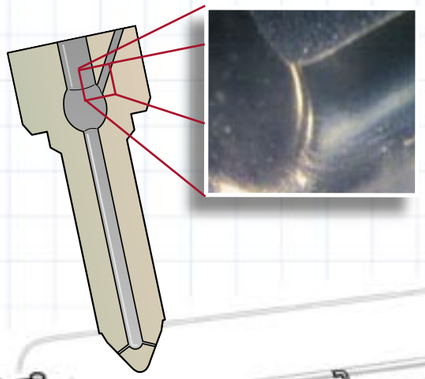

the inside edge℠

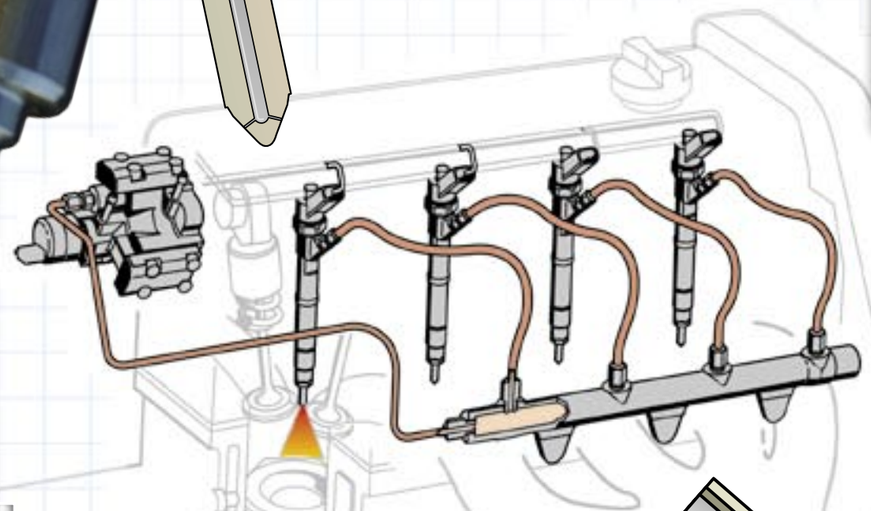
## *flow tuning fuel injector nozzles*



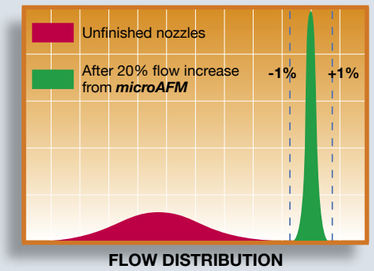


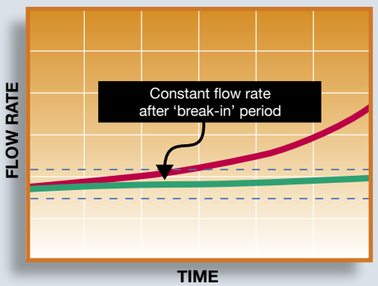


The fuel passages that break into the fuel gallery of an injection nozzle are smoothly radiused using the Abrasive Flow Machining process (AFM) to improve fatigue strength.



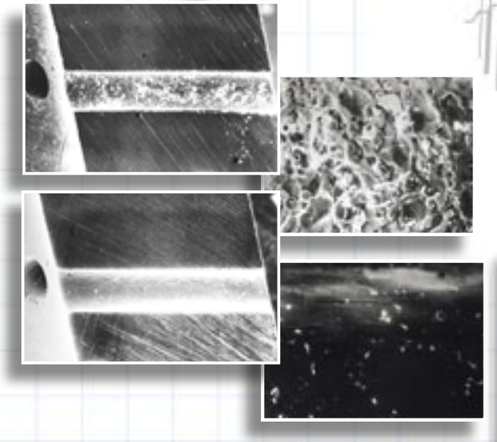
These photomicrographs show a fuel injector nozzle. The photo on the left shows an unprocessed EDM finish. The photo on the right shows the same hole after Extrude Hone ***microAFM*** processing. Note the smooth radius and even surface finish.



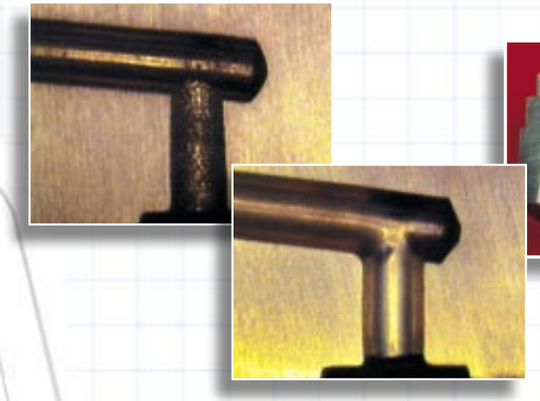

Over time, the flow rate of unfinished nozzles increases and eventually exceeds specified limits

***microAFM*** provides a more consistent flow rate, allowing rates to remain within the specified limits

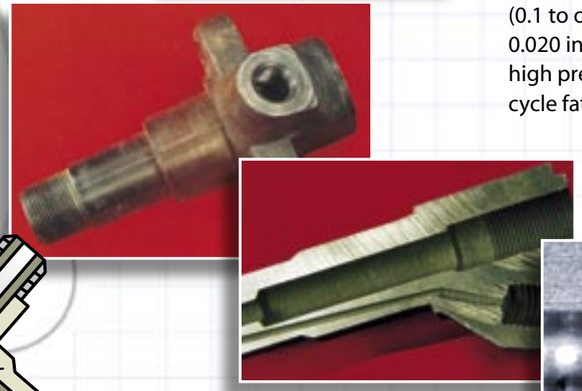


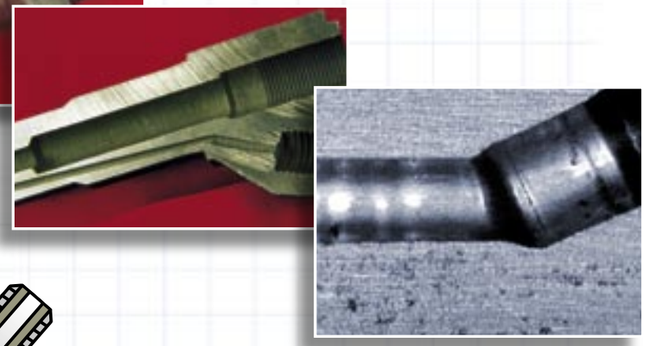
The spray orifices of a diesel injector nozzle are abrasive flowed to reduce variability produced from the manufacturing process and target more precise flow. Note the exit edge of the orifice remains sharp while the process produces a uniform radius on the inside diameter. The process also preserves the dimensional integrity of the 'seat' surface. The entry radius and finish improvement contribute to enhancing the flow capacity and durability of the orifice. Flow rates of these orifices can be 'tuned' to less than ±1% of total flow.

## *polishing surfaces and radiusing intersecting passages*



Diesel injector bodies, high pressure pump housings, intensifiers, valves and nozzle holders are abrasive flowed to produce a generous radius (0.1 to over 0.5 mm, 0.004 to over 0.020 inch) on the intersections of high pressure holes to improve high cycle fatigue strength.











Extrude Hone's Electrolytic Machining process (ECM) produces a fuel accumulation chamber in the main bore of this injector nozzle, leaving a smooth wall chamber with radiused fuel hole intersections. Diesel injector components such as this nozzle can be machined to create specific volume reservoirs.

Advanced high-pressure injection system components, such as the common rail, face high cycle fatigue challenges. Repeated pulses of very high pressures—over 1000 bar—can generate fatigue failures at high stress areas. Smoothing and removal of surface cracks and uniform radiusing of sharp edges by Extrude Hone's AFM process can dramatically improve reliability and extend service life.

## *improved fatigue strength*

Abrasive Flow Machining and microAFM services and equipment are now available with technical centers located all over the globe. Contact one of our technical centers for more information about how we can provide this exciting new technology for your fuel delivery system applications.

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