THE K FACTOR

With next generation engines and components putting further and further emphasis on decreasing fuel consumption and emissions, the aftermarket sector must adapt and grow with these changes to stay relevant in the current market. The MICROFLOW process was developed to help manufacturers at all levels achieve these goals through technological advancements in the processing cycles of these components. Today, we will be taking an in-depth look at next gen fuel nozzles, what a K Factor is, and what that means to you as an aftermarket supplier.

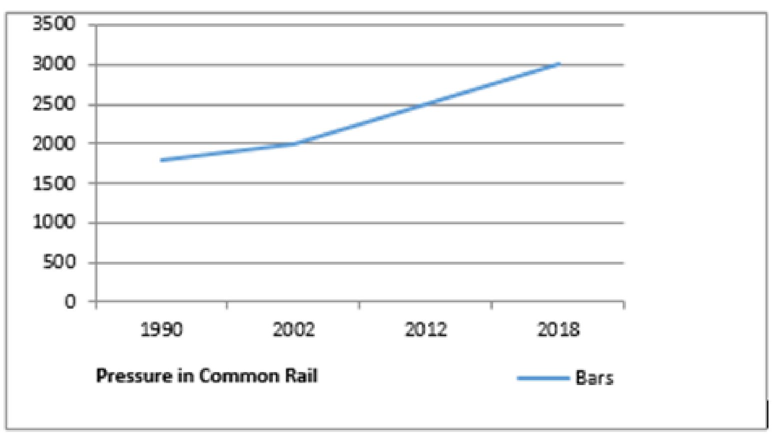
WHAT IS A K FACTOR?

Simply put, a K Factor (in regard to fuel nozzles), is the comparison between the inlet diameter to the outlet diameter of a given spray hole. This K Factor can be defined as:

$$K = \frac{D_{inlet} - D_{outlet}}{10}$$

A positive K Factor would mean a conical spray hole, with a larger inlet than outlet (for instance a 2µm inlet, and a 1µm outlet would result in a K Factor of .1). Conversely, a negative K Factor would result in a conical spray hole with a larger outlet than inlet.

WHY IS A K FACTOR IMPORTANT?



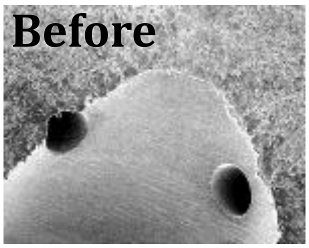
Trend for Diesel Pressure in Common Rail systems

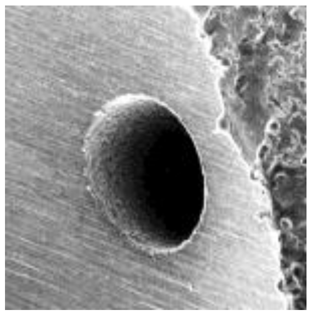
As fuel efficiency and emissions become more of a priority, one of the most common efforts to achieve these goals has been to increase injection system pressures for greater atomization of the fuel. To accommodate this increase in pressure, nozzles required a higher wall thickness around each of the spray holes to prevent failure. However, cavitation become a problem with this increase in thickness due to the pressure difference between the inlet and outlet of the spray hole. The result being, damage to the needle, nozzle, and ultimately injection failure. By creating a positive K Factor, it was found that cavitation can be greatly reduced, but not eliminated.

In addition, due to high system pressures, the edge of the inlet hole was found to break down and cause debris to enter the cylinder. This would potentially damage the engine and increase fuel consumption and emissions, completely negating the desired effect and failing regulation requirements. To alleviate this problem, the inlet of the spray hole must be rounded to further reduce cavitation and prevent an edge for any material breakdown to occur.

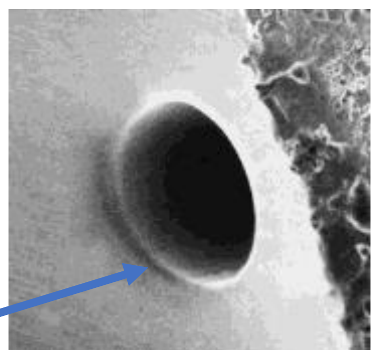
HOW CAN EXTRUDE HONE HELP?

By combining optimization of the spray hole (K Factor ratio) and it's geometry (rounding of the inlet diameter edge) smaller spray holes can be used, allowing for a greater wall thickness, while keeping the flow coefficient at a constant. By doing so, regulations can be met by a better atomization of the fuel which allows for a cleaner, more efficient, combustion and all around efficiency, as well as maintaining engine life and performance.





Through the MICROFLOW process, nozzles can be directly flow tuned to their desired flow conditions, while simultaneously rounding the inlet diameter edge and maintaining the K Factor of the spray hole. Achieving in one process two of the most critical aspects of next gen nozzles, which no other processes can, and offer the flexibility of capital equipment and contract services.



A uniform entrance radius and bore improves atomization by preserving hole geometry and

Aftermarket suppliers can rest assured knowing that MICROFLOW can provide them with an affordable, convenient, solution to processing and reconditioning their nozzles to current industry standards to maintain a competitive edge in today's market.