



Stefan Dahl – GF Machining Solutions

Advanced Technologies for sustainable production and products

GF Machining Solutions is part of publicly listed Georg Fischer AG...



> 200 Years of History

2018



GF Corporation



GF Piping Systems

1'821 Mio. CHF Sales
62 Companies
6'852 Employees



GF Casting Solutions

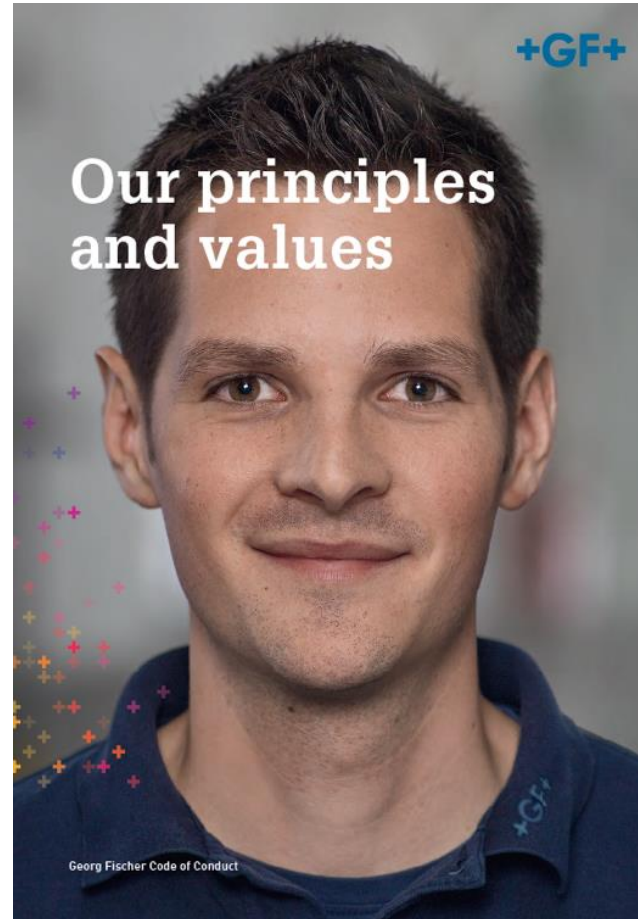
1'687 Mio. CHF Sales
19 Companies
4'693 Employees



GF Machining Solutions

1'066 Mio. CHF Sales
35 Companies
3'394 Employees

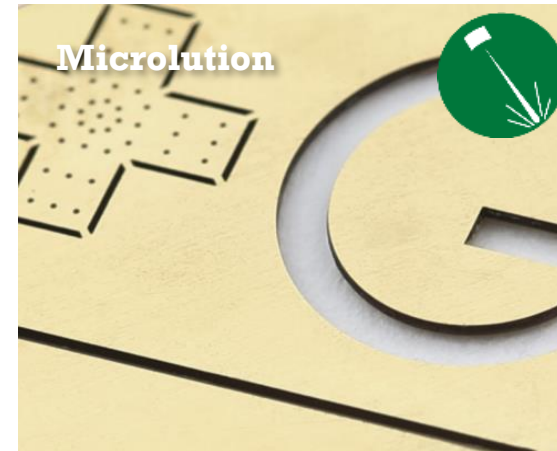
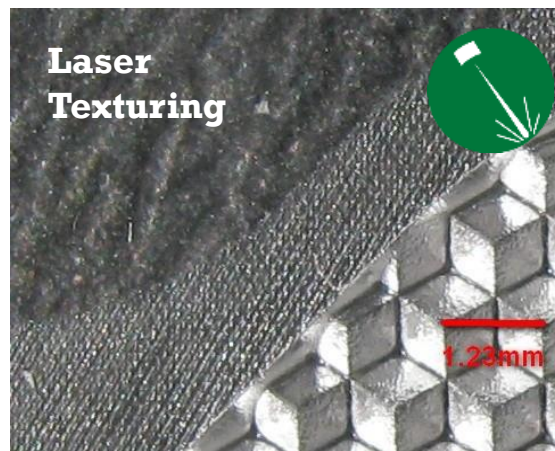
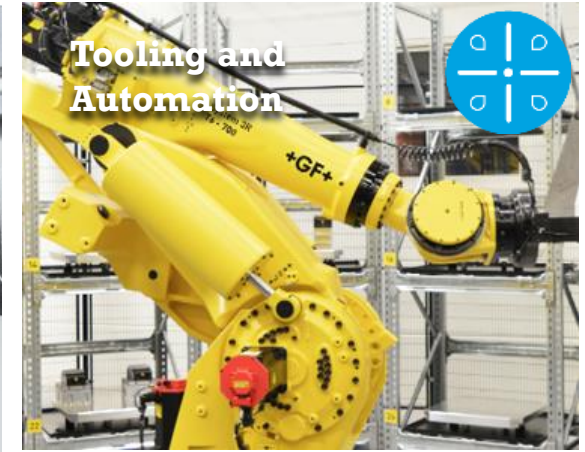
Social responsibility and sustainability are an integral element of the GF business model



<https://www.georgfischer.com/en/about-gf/sustainability-at-gf.html>

CLEAN WATER
A commitment of GF

Advanced Technologies compliment our solution portfolio for precision manufacturing



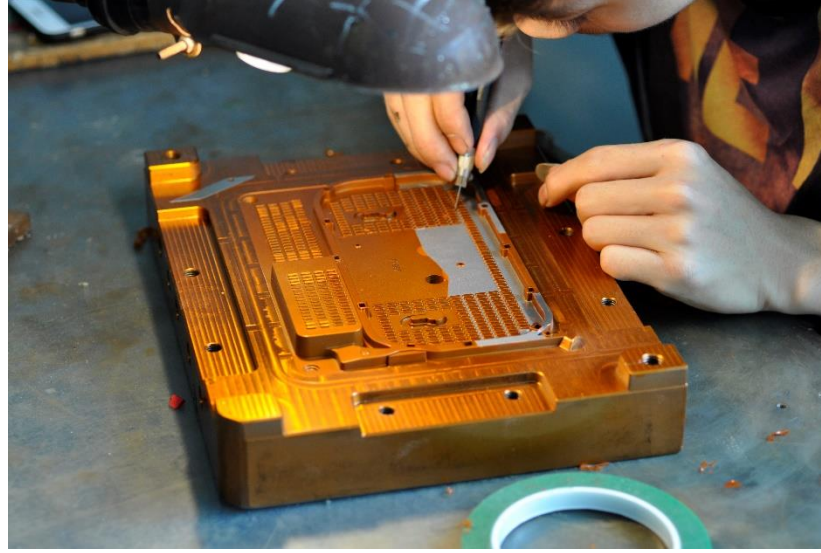
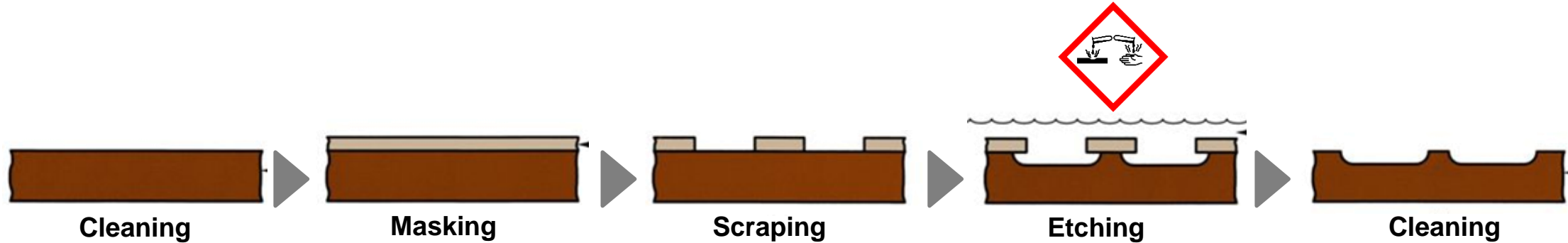
More Sustainable Production Processes

Replacing Chemical Etching by Laser Technology

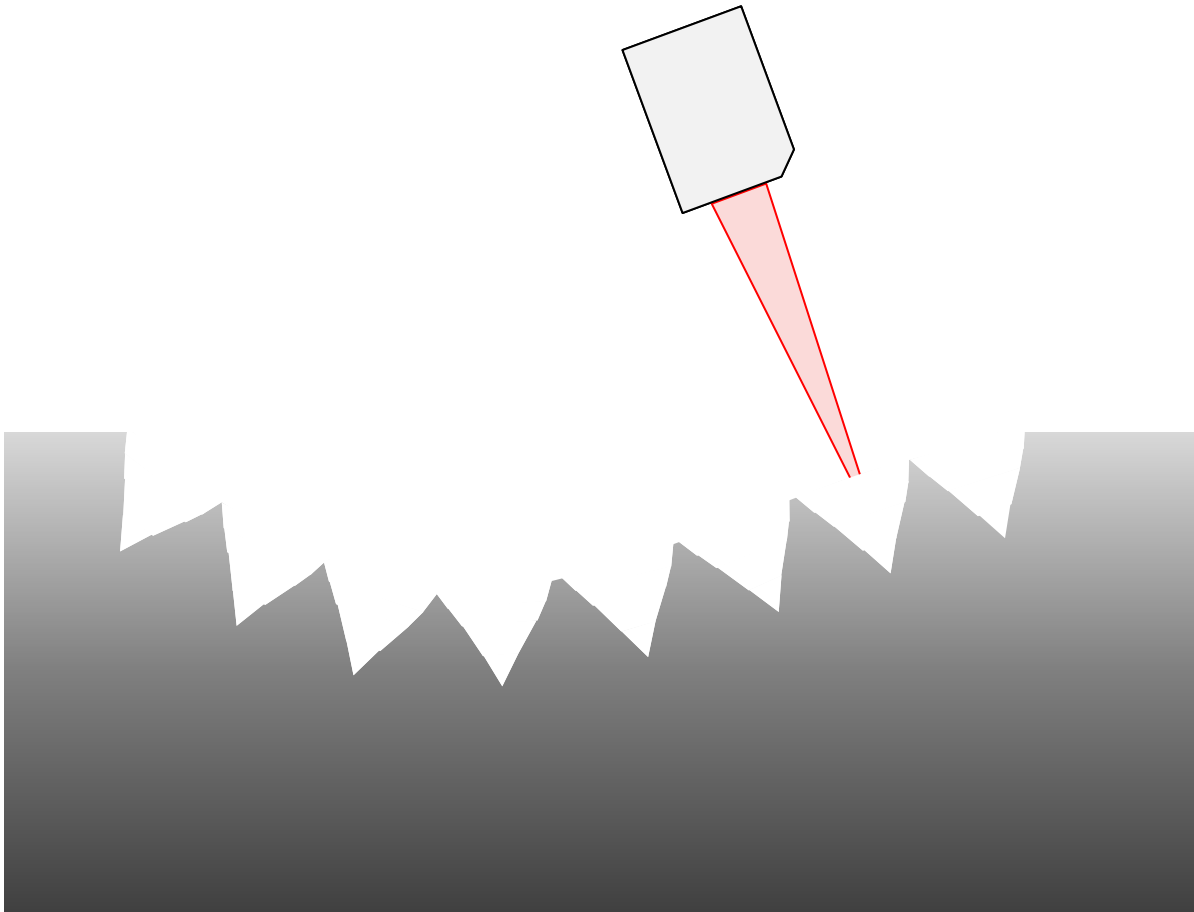
Textures are an important design element of day-to-day products...



...however still today more than 80% of textures are done by chemical etching process



Laser Ablation Technology can create 3D textures directly out of digital data



Source: Reichle Technologiezentrum

This significantly improves the sustainability while opening new possibilities



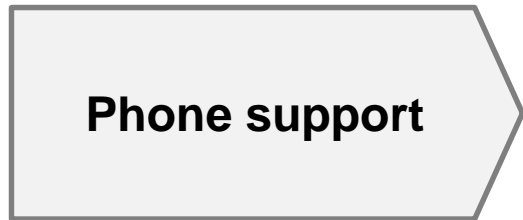
- **No use of chemicals**
- **Simplified process**
- **No manual work**
- **Reduced scrap level**
- **Full digital process**

Source: Custom Etch

More Sustainable Production

Ensuring efficient production by Digital Services

If something goes wrong on a machine-tool it can be quite difficult to solve on the phone...



← Target is to reduce time and efforts to solve the problems

Internal Studies show that 70% of service cases can be solved remotely



Internal Studies show that 70% of service cases can be solved remotely

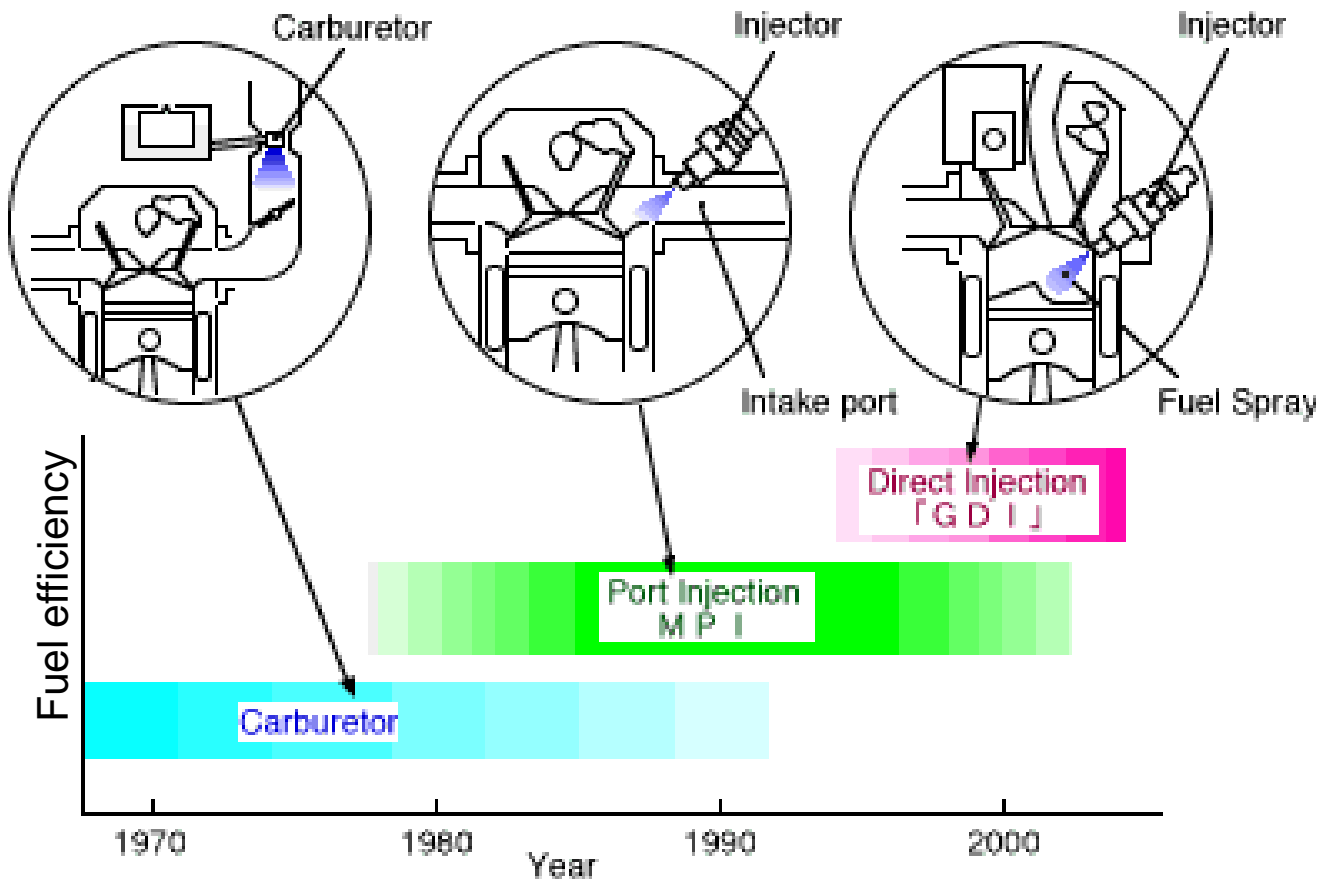


- **Reduction of downtime**
- **Less resources needed**
 - Travel time
 - Production capacity
- **Less stress for customer and service technician**

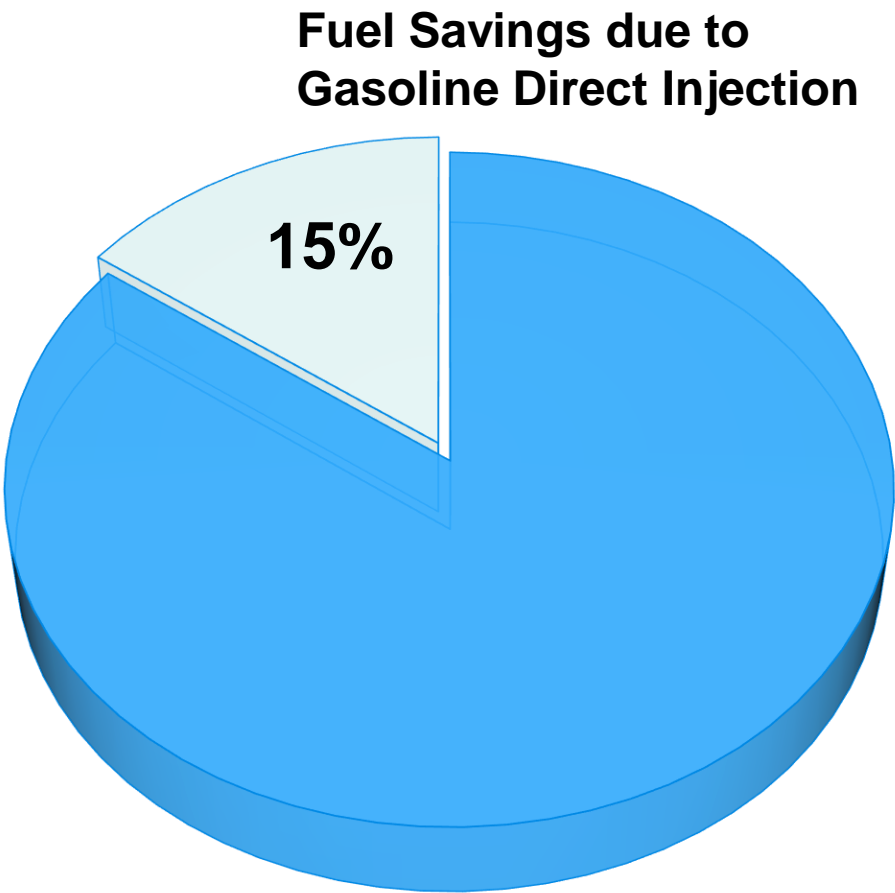
More Sustainable Products

Improving fuel efficiency and lowering emissions by Gasoline Direct Injection

Gasoline direct injection (GDi) reduces fuel consumption by up to 15%

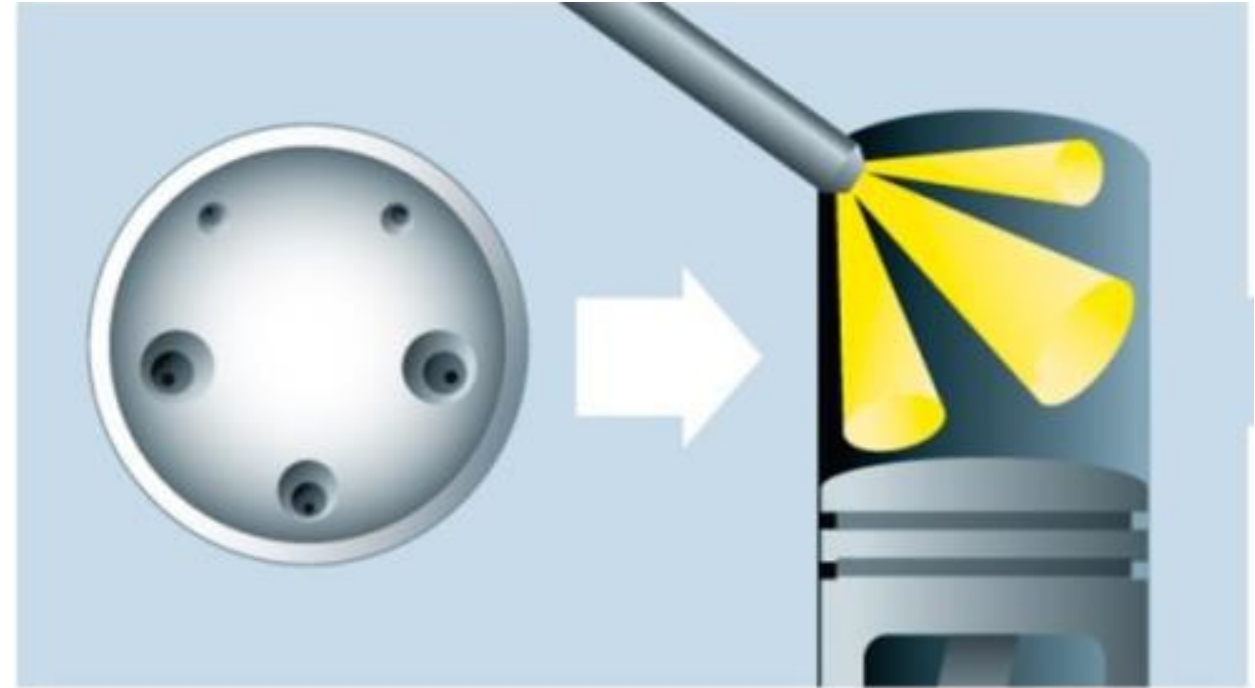
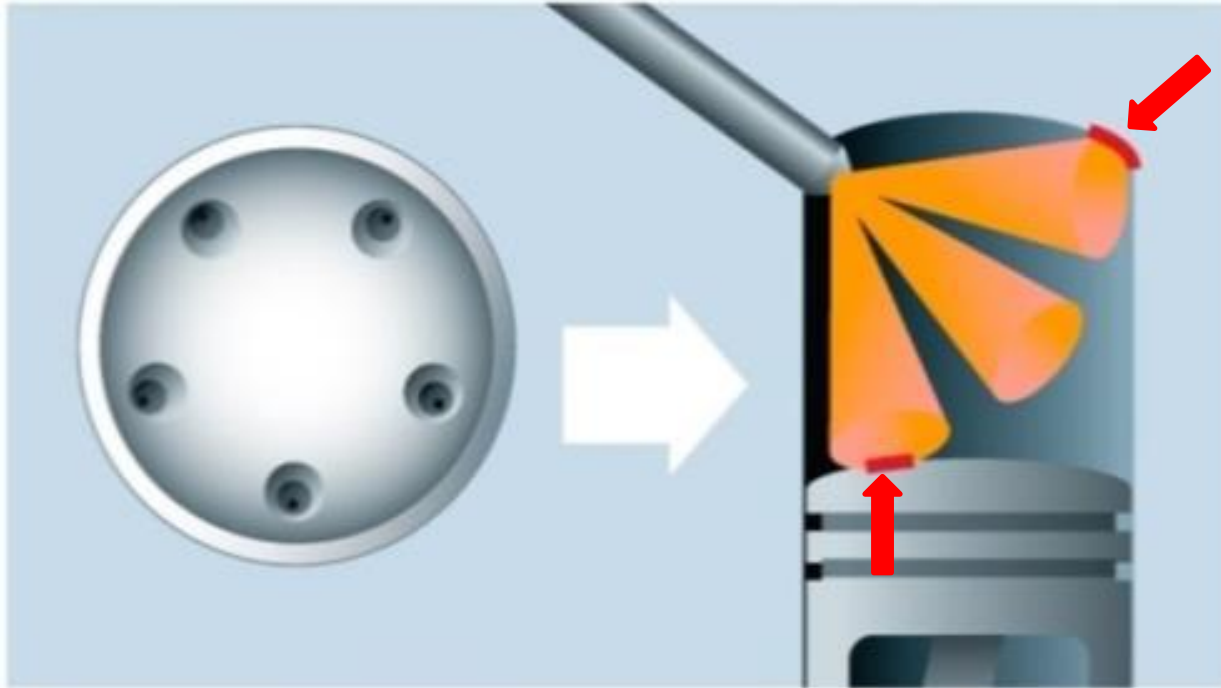


Source: Mitsubishi Motors



Source: Bosch

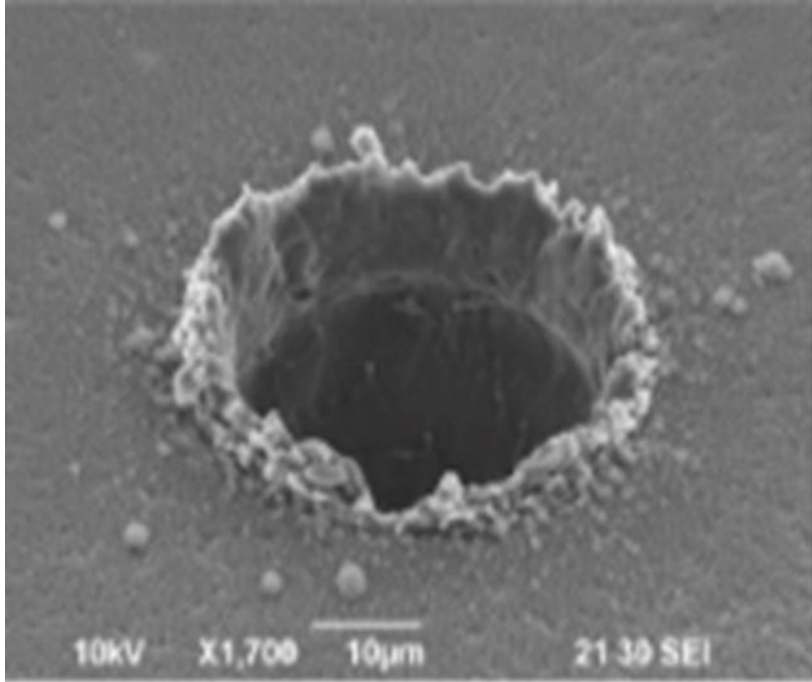
For Gasoline Direct injection, a perfect spray pattern is crucial



Needs:

- Different sizes and shapes
- Very accurate position and shape
- Sharp etches

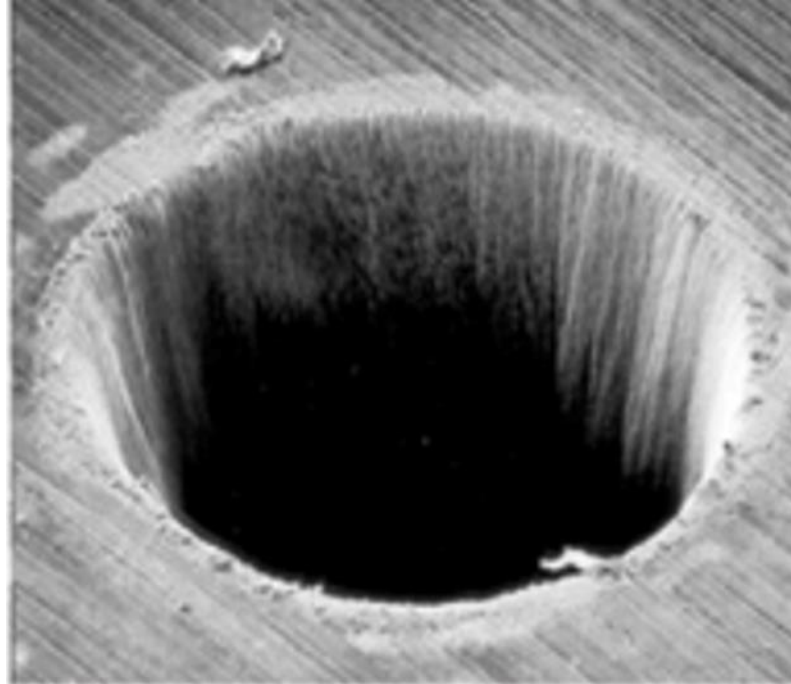
Femto-second laser drilling is the only technology feasible for this application



Nanosecond

HAZ (Heat Affected Zone)

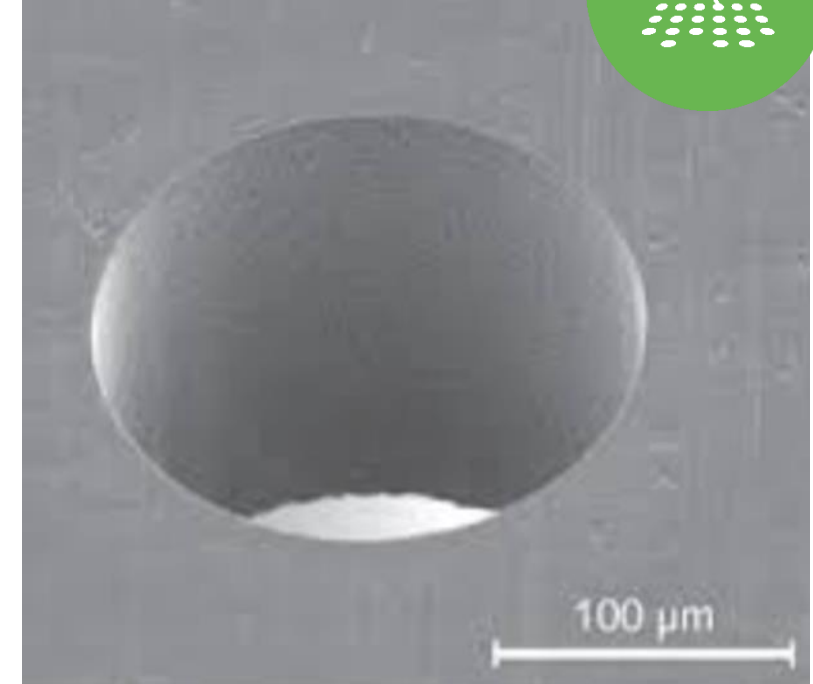
Melt zone adds variability



Picosecond

Less HAZ

Rough surface adds variability



Femtosecond

No HAZ

Low variability

Conclusion

- **The sustainability of a product is affected by its entire life-cycle**
 - Type of production process
 - Efficiency of production process
 - Efficiency of product
 - Lifetime and recycling of product
- **New Advanced Manufacturing Technologies can support the sustainability in each step**



+GF+

Thank you



GF Machining Solutions

**Passion for
Precision**