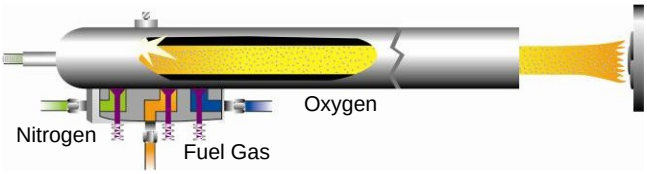
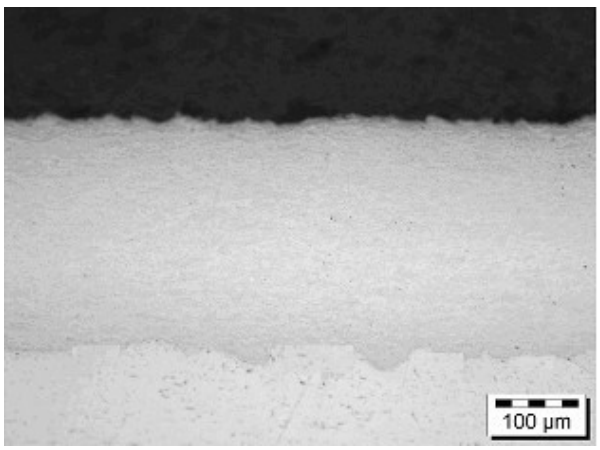
PST – Super D-Gun™

The Technology

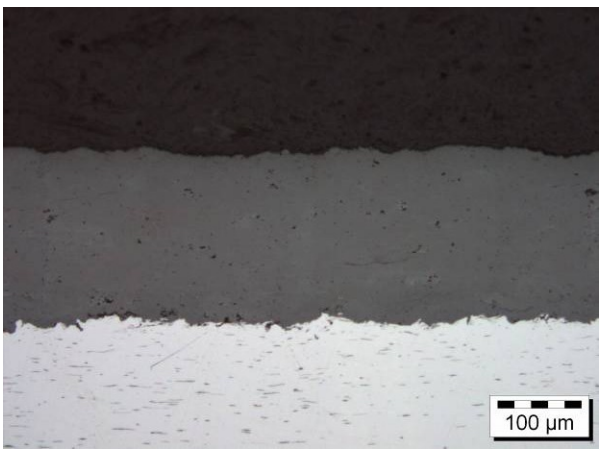
The Praxair Super D-Gun® coating technology is the logical further development of the original detonation gun (or D-Gun) technology. As in that process, a flammable gas and oxygen mixture is injected periodically together with the coating powder and carrier gas mixture into a reaction chamber and then ignited. The combustion gases undergo an explosive expansion and accelerate the powder particles to speeds that can exceed 1000 m/s at the acceleration tube outlet. The extreme particle impact speeds make possible the manufacturing of the densest coatings with outstanding adherence. The higher process temperatures, in particular, allow one to exert an influence on coating properties, especially in high-melting materials. Nevertheless, particle retention time on the flame is still so short that they are partly just melted on. Super D-Gun® technology is especially suitable both for manufacturing carbidic wear protection coatings and purely ceramic coatings. The coating distance is approximately 80 to 120 mm, and the coating process itself is carried out ideally at a 90° angle.



PST – Super D-Gun coating process



WC-CoCr spray coating on unalloyed steel



Zirconia spray coating on unalloyed steel

Characteristics of the Super D-Gun™ Coating Process:

- Exsplosive combustion
- Approx. 1-m-long acceleration tube
- Gas speeds and temperatures higher than with D-Gun technology
- $v_{Particles}$ partly > 1000 m/s
- Suitable for composite materials containing carbides and metallic matrix, as well as for purely ceramic materials
- Coating creation through superposition of so called “coating pops”

Advantages of the Super D-Gun™ Coating Process:

- Higher process flexibility due to a wide parameter field with regard to particle speed and temperature
- Highest particle impact speeds
  - Very good adherence even with workpiece hardness values of 58 HRC and higher
  - Better vibration resistance in component and coating

Features of Super D-Gun™ Coatings:

- Porosity < 0,5 %
- Adherence >> 70 MPa
- Coating thickness 0,05 – 0,2 (max. 2) mm
- Roughness processed < 0,01 µm Ra
- Residual compression stresses of up to 340 MPa
- Coating breaking elongation ≤ 0,8 %
- Highest resistance against wear