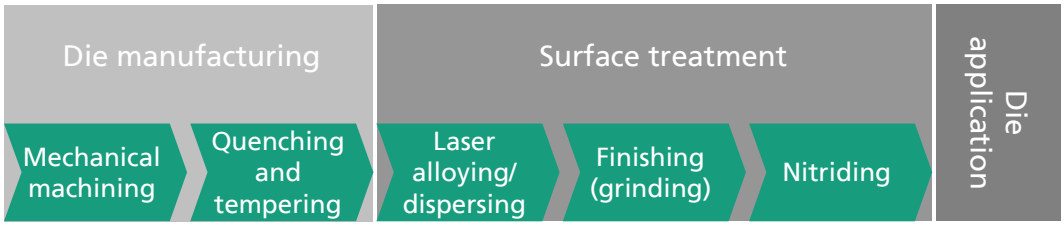


Figure 1-1: Process chain for laser surface treatment and combined nitriding - CURARE

Machining system Alzmetall

- Machine tool
  - Gantry-Concept (5-Axes simultaneous)
  - Working space:
    - Traverse path X-,Y-Axis: 800 mm
    - Traverse path Z-Axis: 600 mm
  - Fast traverse at TCP 60 m/min
  - Position accuracy 0.007 mm
- Rotary/ Tilting unit
  - Direct drives in turning and rotating axis
  - A-Axis tilting range ± 140°
  - C-Axis turning range 360° (continuously)
  - Turning table diameter 320 mm
- NC-Control Siemens SINUMERIK 840 D Solution Line

Figure 1-2: Machining system for the automated laser surface treatment

- Base material
  - 1.2714
  - 1.2365
- Gas nitrided and plasma nitrided samples
- Grinding time 0 - 20 min
- Graining P240
- Applied normal force $F_N = 7.6$ N

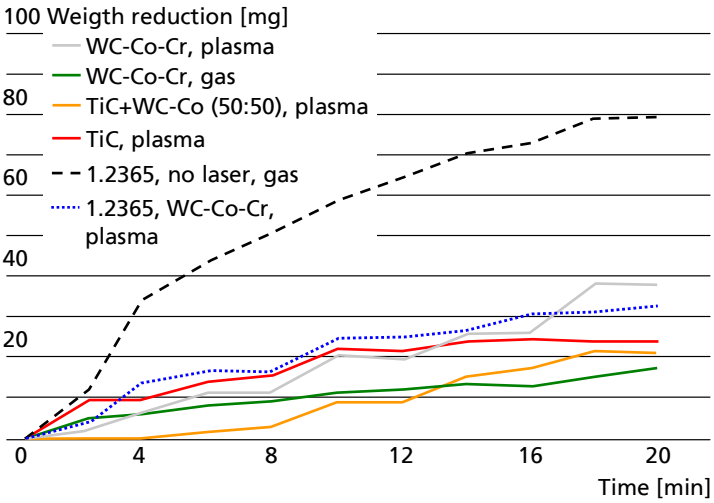


Figure 1-3: Wear resistance of laser alloyed/ dispersed and subsequent nitrided samples (Pin-on-disc-test)

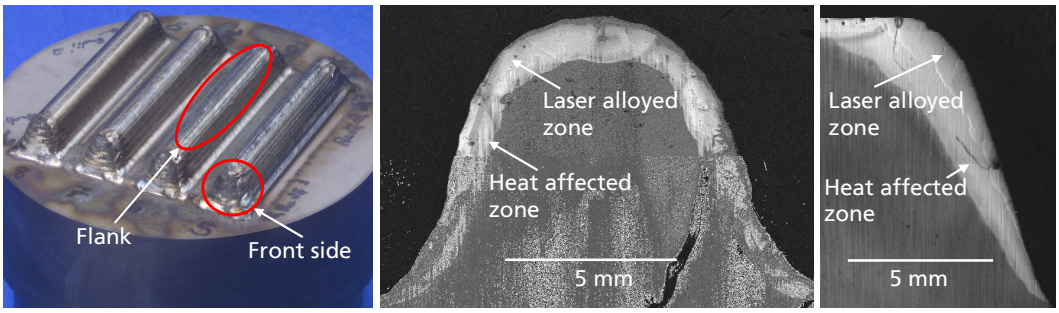


Figure 1-4: Laser alloyed demonstration part (left); metallographic cross-section at the flanks (centre); metallographic logitudal-section at the front side (right)

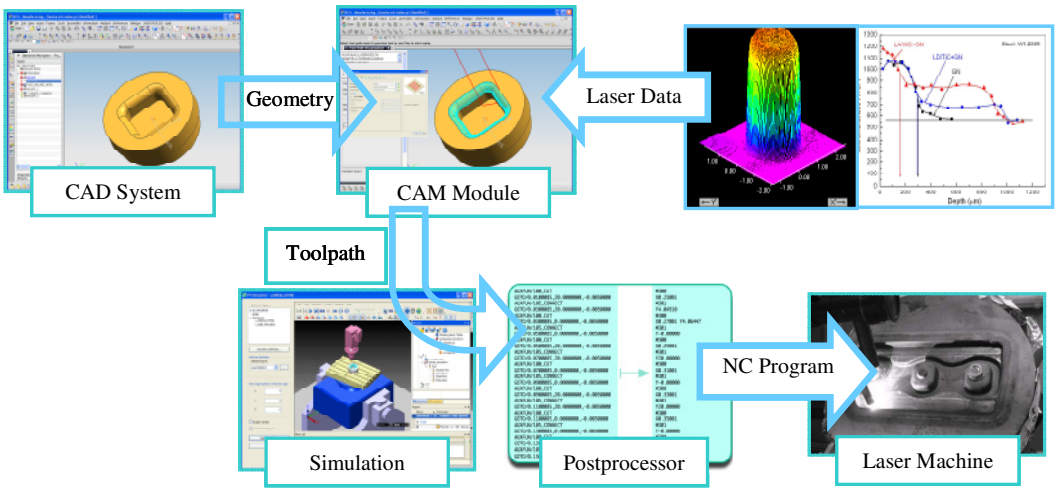


Figure 1-5: Process chain for the CAx-module

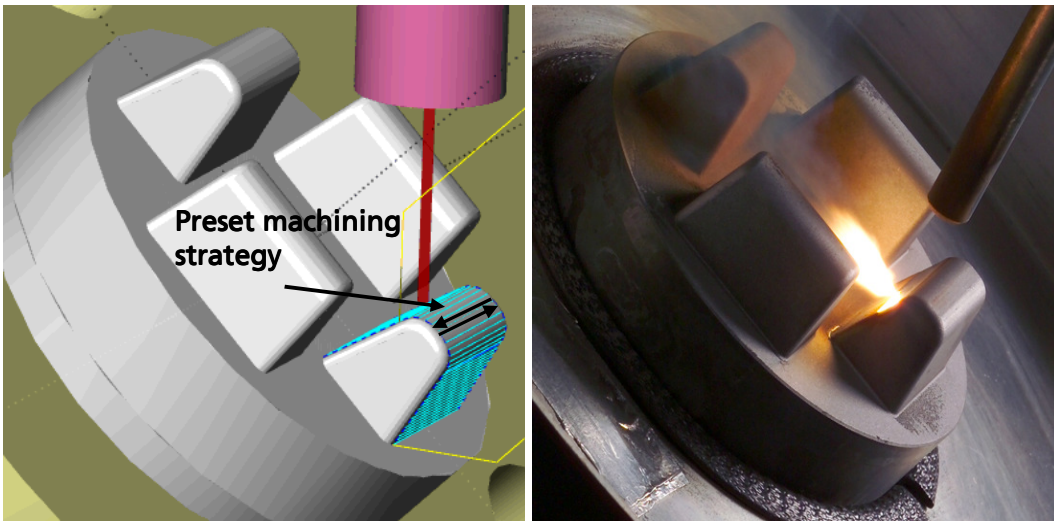
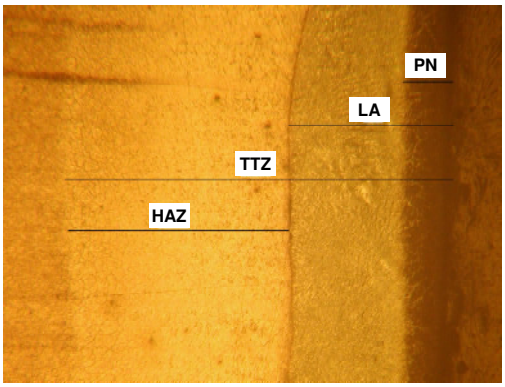


Figure 1-6: Calculated tool path and 5- axes treatment of a selected demonstration part



- Base material
  - Steel 1.2343
- Additive material
  - WC-Co-Cr
- Nitriding process
  - Plasma nitriding
- Depth of the characteristic layers
  - PN 0.2 mm
  - LA 1.0 mm
  - HAZ 1.5 mm

Figure 1-7: Micrograph of a combined treated surface

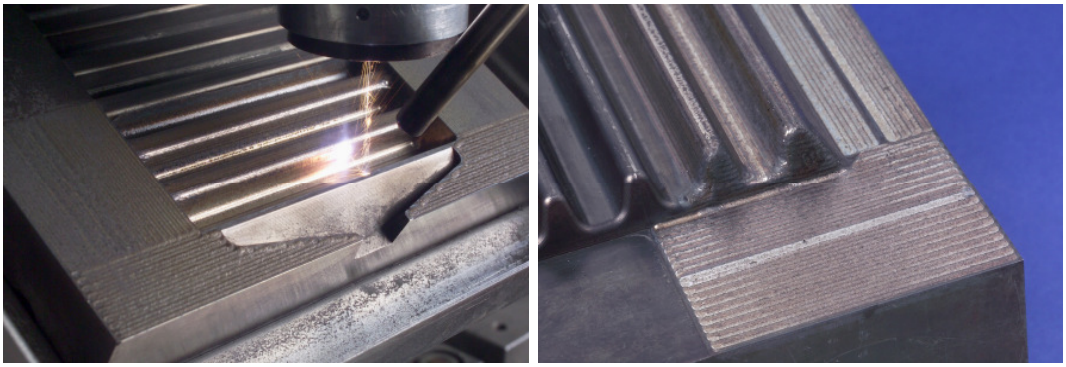


Figure 1-8: 5-axes laser surface treatment (left); Laser treated surface (right)

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