borit

HIGH PRECISION SHEET METAL PARTS AND ASSEMBLIES

Metal bipolar plate production

Metal bipolar plate competence center

2010
Established

€7m
Revenues (FY2020)

35
FTEs (FY2020)

Leased
Premises

Hydrogate™ presses
Laser cutters and welders
Machinery park

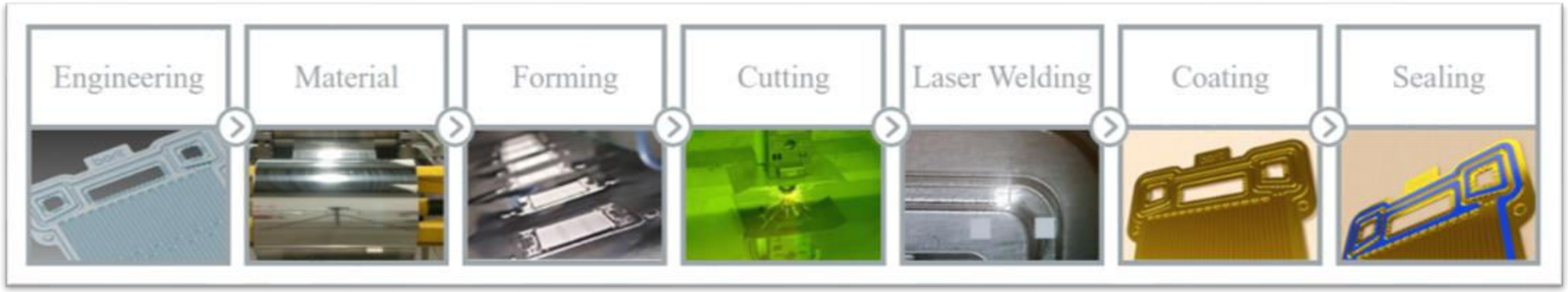
~25
Customers

3000 m² → 5.500 m²
Manufacturing/ warehouse area

500 m² → 1.000 m²
Office area

Company excellence

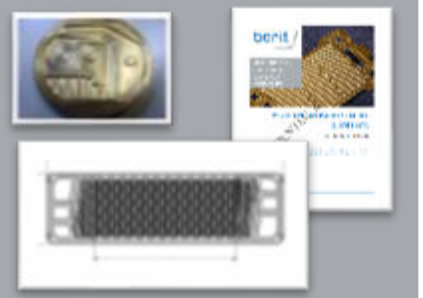
- Processes:



- Certificates & awards:

Ramp up approach & strategy

1. Design for manufacturing



Typical quantity:
Trial samples

Deliverables:
Mutual design & quality requirement fix

2. Prototype manufacturing

Manual operation

Typical quantity:
50-5000 BPP's
1-25 Stacks

Deliverables:
Product development & full size prototypes

3. Pre-series manufacturing

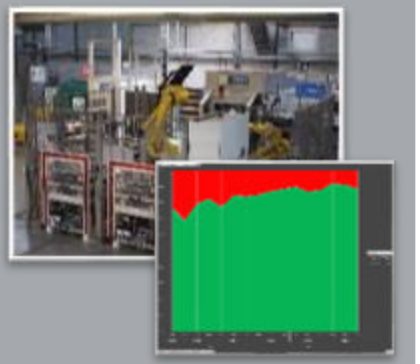
Automated operation

Typical quantity:
2500-250.000 BPP/YR
10 – 250 Stacks/YR

Deliverables:
Validation & PPAP

4. Series manufacturing

Dedicated line



Typical quantity:
>100.000 BPP/YR
>100 Stacks/YR

Deliverables:
Reliable & cost-effective supply chain

5. Series incorporation

Local-for-local

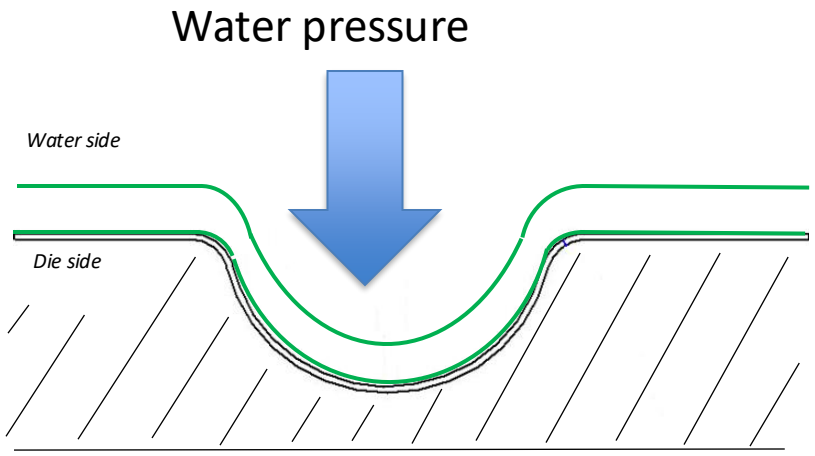
Typical quantity:
>1.000.000 BPP/YR
>1.000 Stacks/YR

Deliverables:
Local & reliable JIT supply of plates trough close customer partnership

Currently available technologies in Borit Belgium

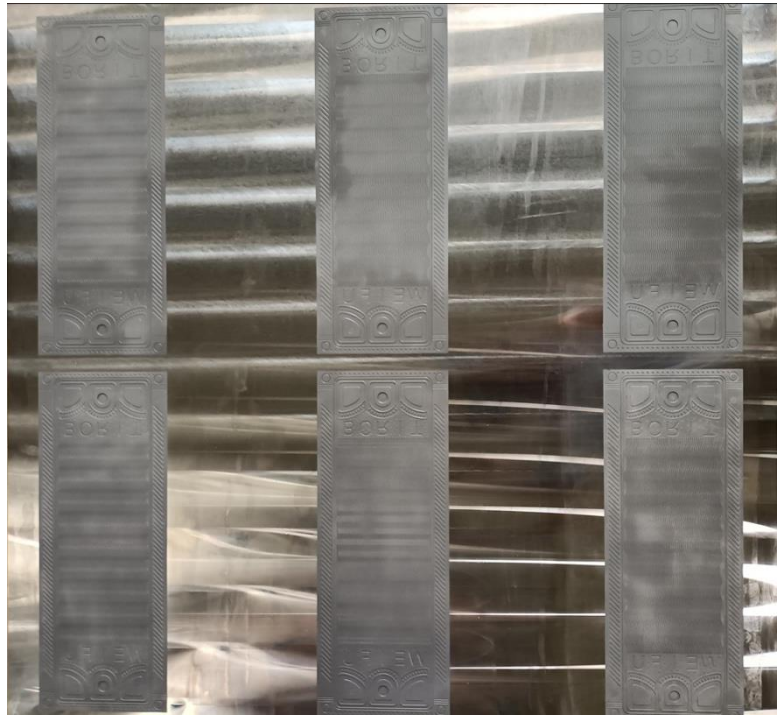
Forming technology: Borit Hydrogate™

- Hydrostatic pressure of >2000 bar
- Direct forming from coil,
  industrialized for volume production
- One step forming, resulting in time and
  cost effective tooling development (weeks)
- Suitable for pre-coated materials
- Substrate thickness from 50 µm to 1 mm



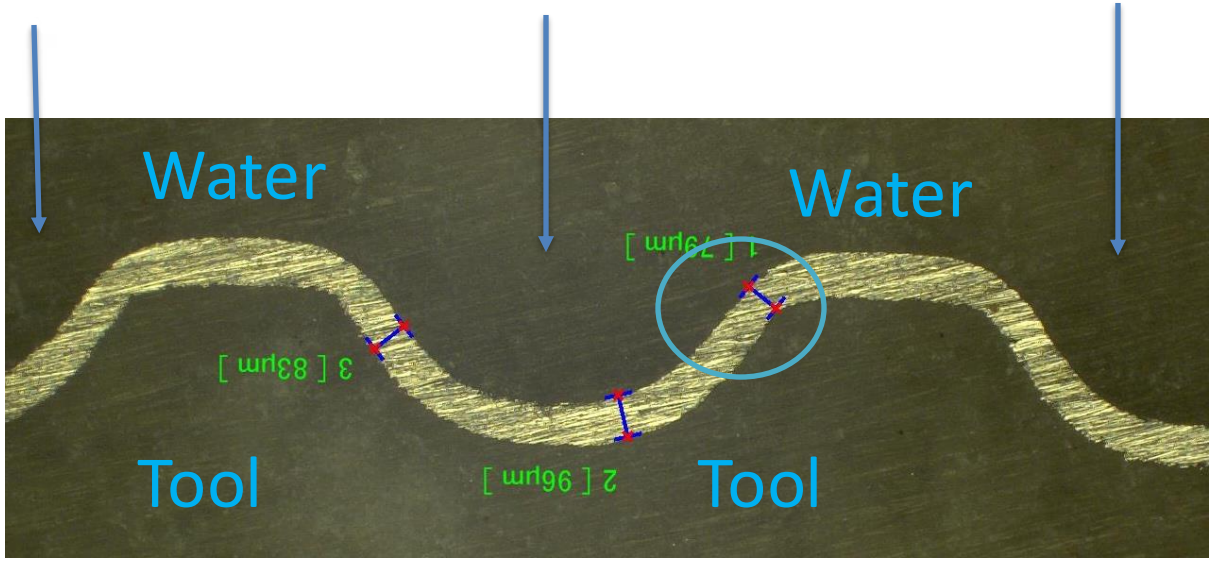
Borit Hydrogate™ : HG 5

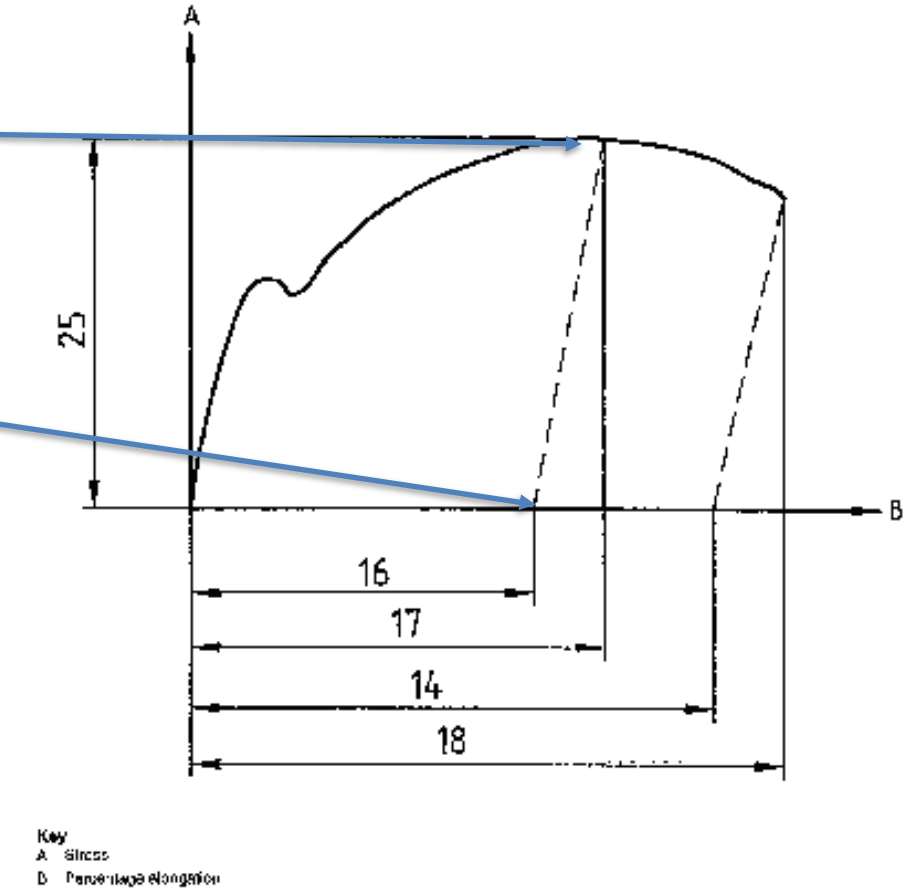
- Forming area up to 800x800mm
- Cycle time : 10-12 seconds
- Coil width up to 1m



Borit Hydrogate™ : uniform thinning

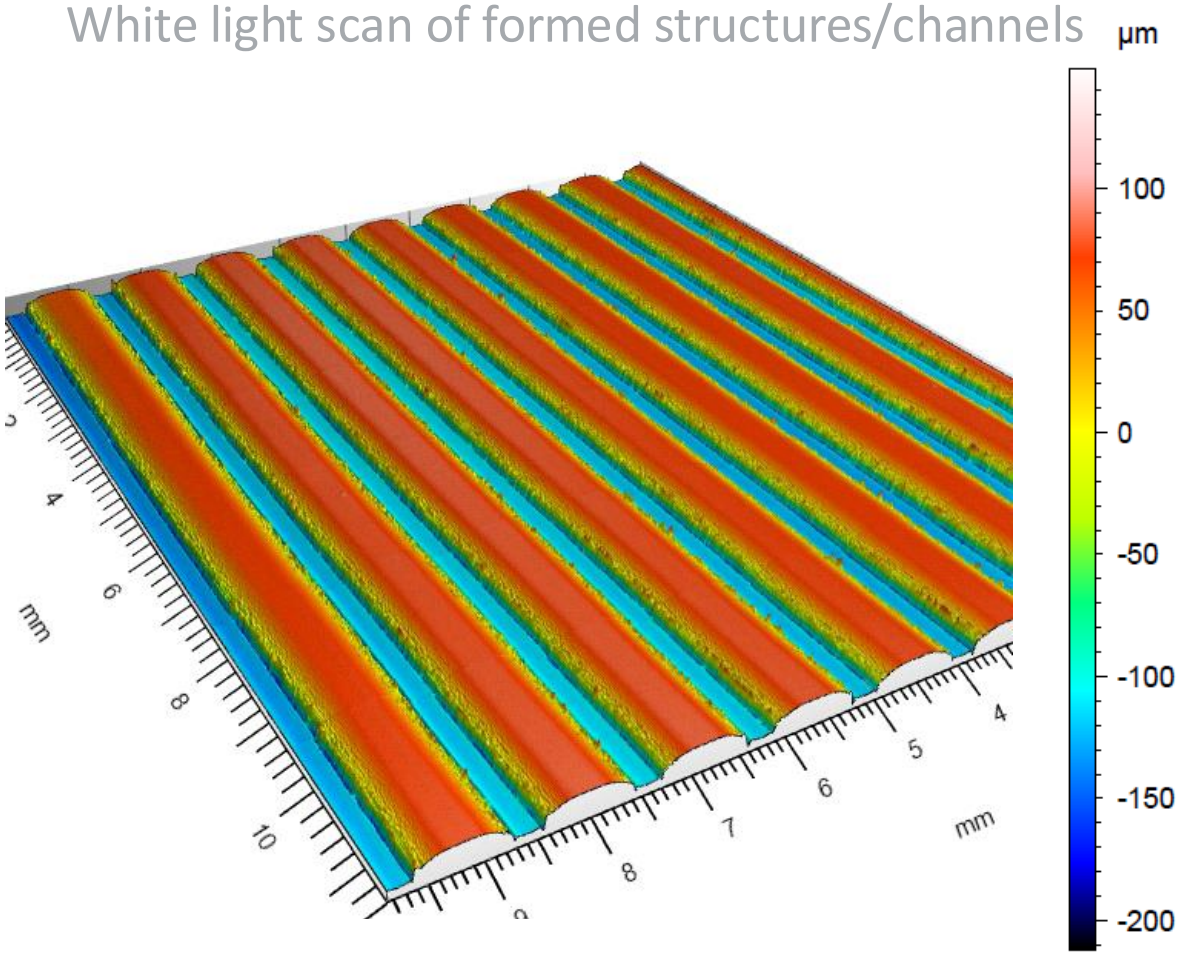
- EN 10005/ISO 6892 standard
- Maximum force
- Non proportional elongation
  - Going above leads to thinning/necking and eventually cracking





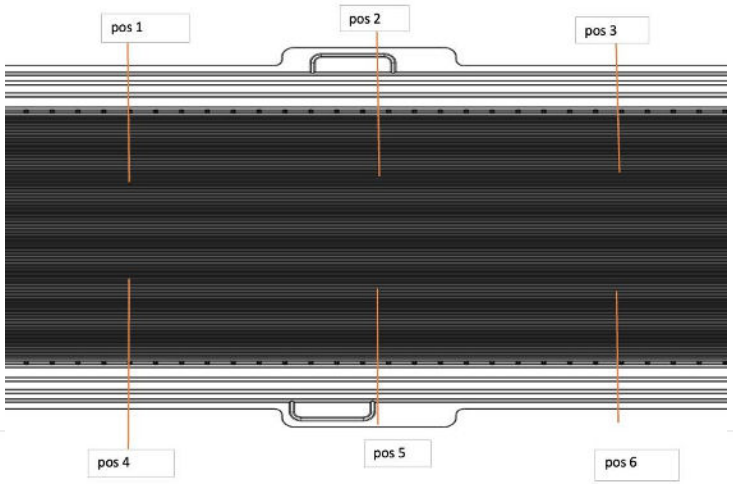
Borit Hydrogate™ : measurement of formed structures

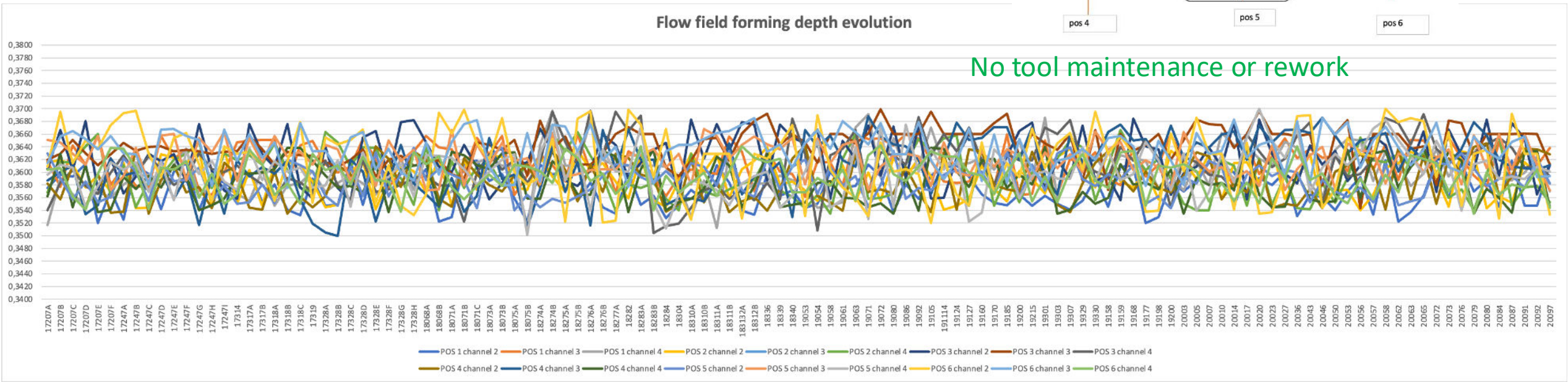
- White light scan of formed structures/channels



Borit Hydrogate™ : uniformity and repeatability

- Target depth 360 micron
- Measured 6 locations/plate, 3 channels/location
- 3 year production run, 250 000 strokes, multiple coils
- Std dev = 4 micron → tolerance +/- 20 micron, Cpk = 1,67



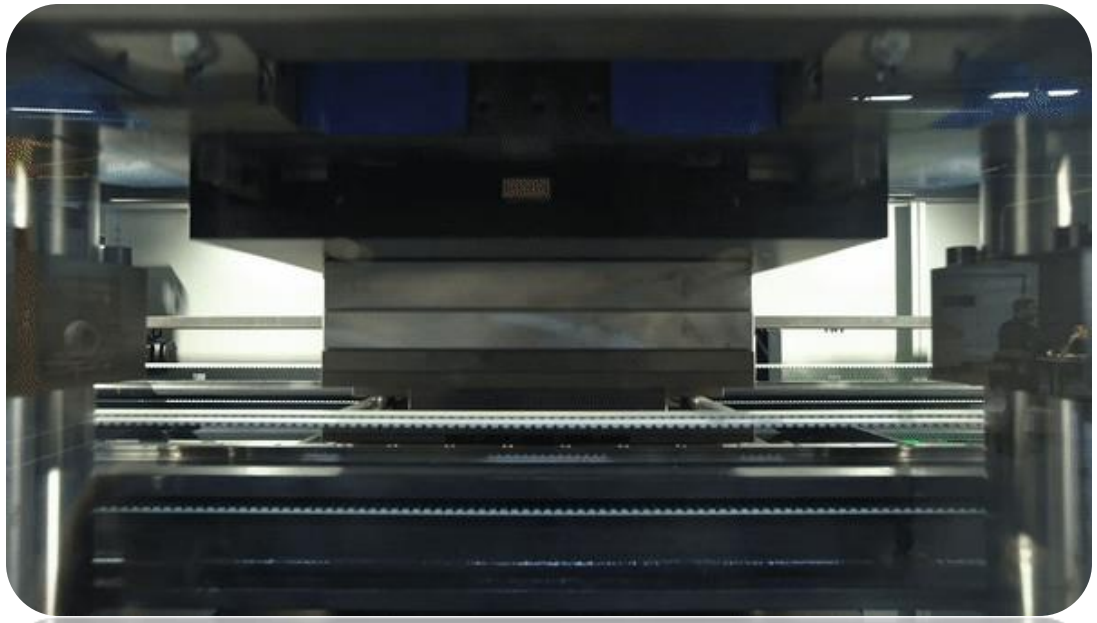


Cutting technology: laser-cutting

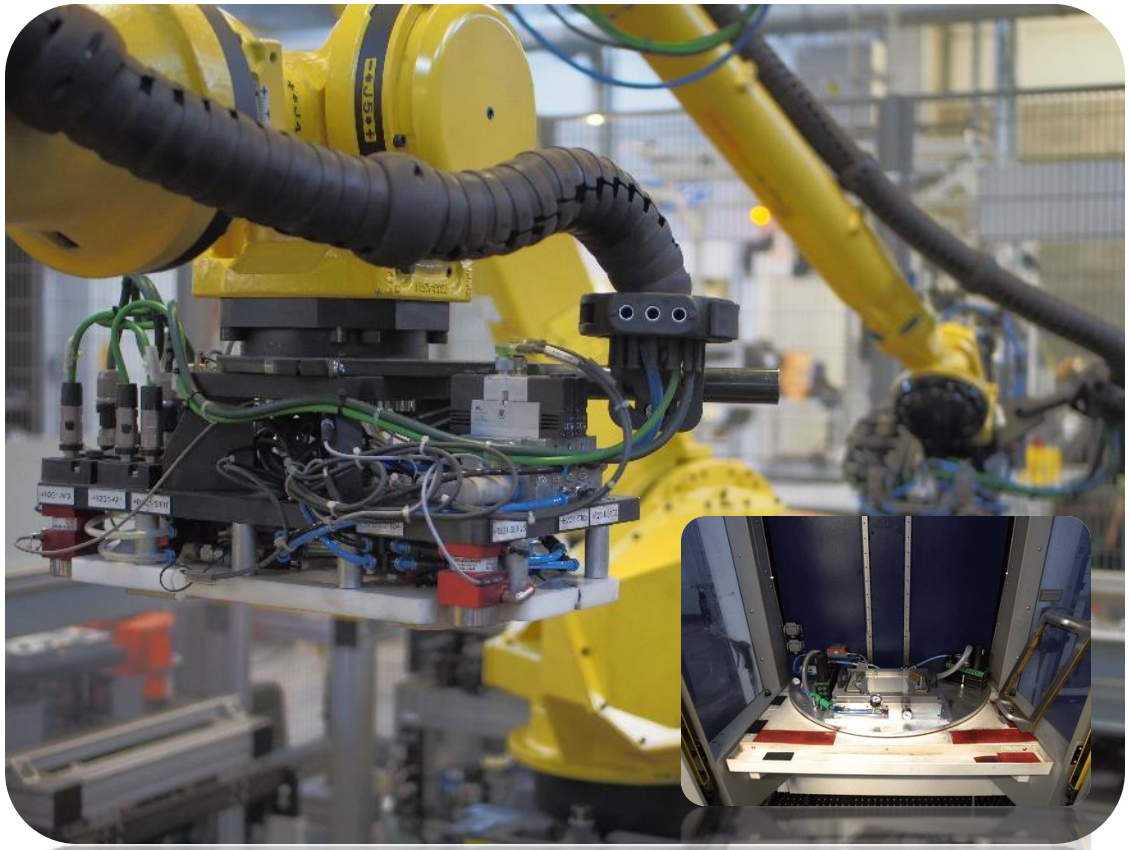
- Austenitic steel, chromium steel, titanium and more
- Compatible with complex cutting designs
- Low tooling investment combined with high flexibility
- Parallelized loading & laser-cutting
- Multicavity tools
- Suitable for pre-coated materials
- Substrate thickness from 50 µm to 750 µm

Cutting technology: die-punching

- Austenitic steel, chromium steel, titanium and more
- High-capacity at low process cost
- Low tool wear yielding high OEE
- Optimal cut accuracy & quality
- Compatible with complex cutting designs including small features
- Multicavity tools
- Suitable for pre-coated materials
- Substrate thickness from 50 µm to 750 µm



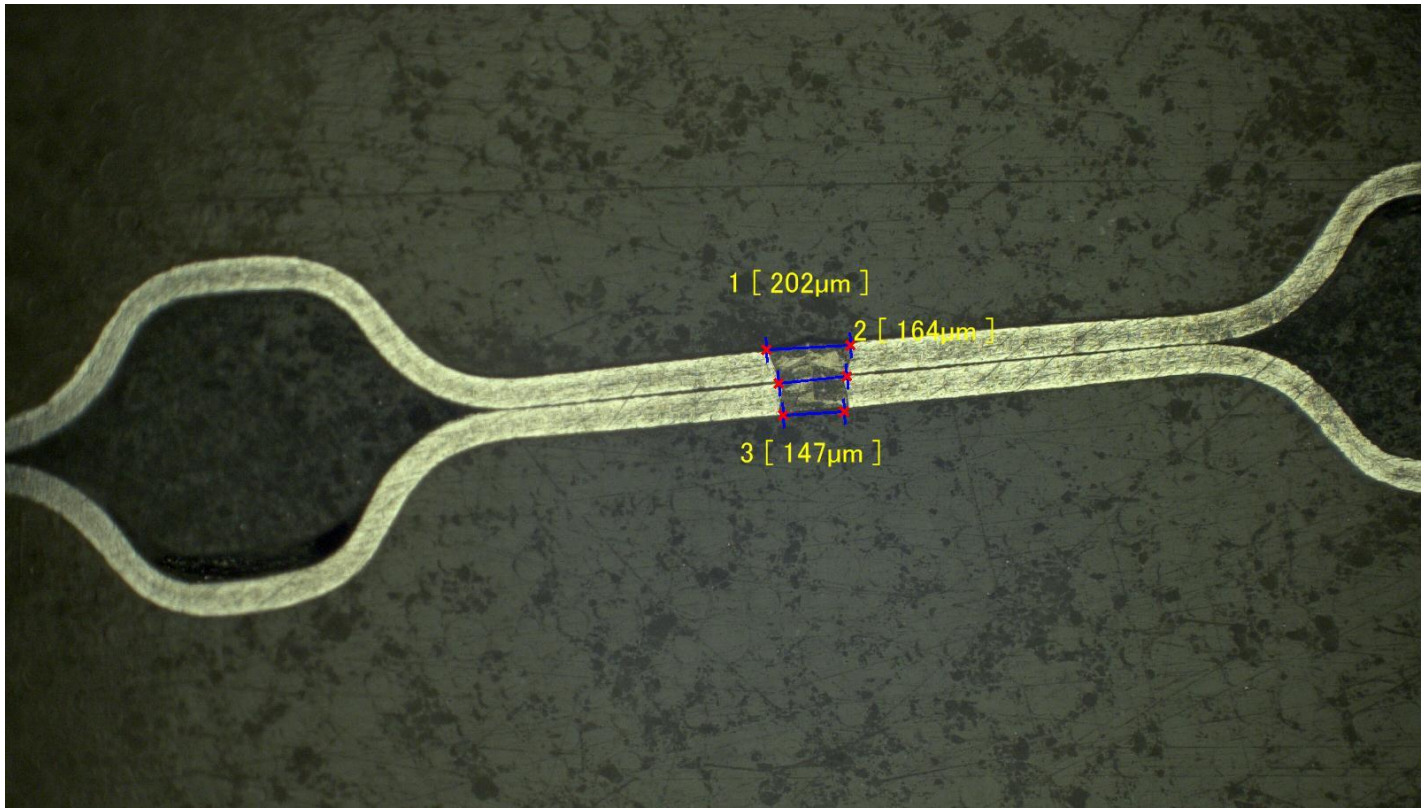
Joining technology: laser-welding



- Austenitic Steel, chromium steel, titanium and more
- Including 100% in line pressure testing
- Both leak tight and structure enhancing welds
- Welded assemblies containing two or more components
- Parallelized loading & laser-welding
- Multicavity tools
- Suitable for pre-coated materials
- Substrate thickness from 50 µm to 2 mm

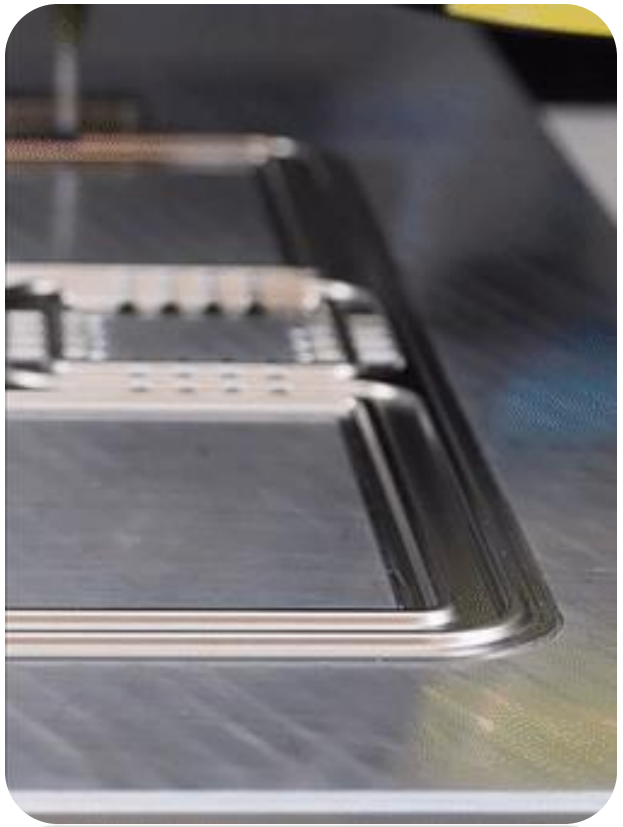
Joining technology: laser-welding

- Full penetration for good electrical contact and mechanical strength



Gasketing technology: dispensing

- Seal technology based on two component silicone
- Application of gasket on both sides of a welded BPP finalizing it ready-to-stack
- Highly flexible production technology
- Multiple ramp-up stage solutions:
  - Manual operation for prototype development with off-line curing
  - Automated operation for series production with in-line curing and leak-testing
- Compatible with both pre- and post-coated BPP's
- Competitive cost for both prototyping & series production



THANK YOU FOR
YOUR ATTENTION!