



borit

HIGH PRECISION
SHEET METAL
PARTS AND
ASSEMBLIES

Production of Metal Bipolar Plates: Status and Prospects

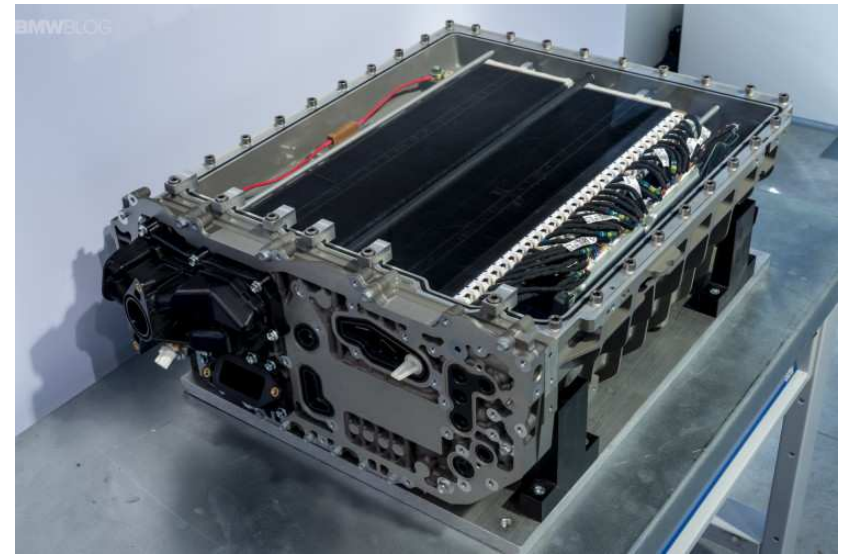
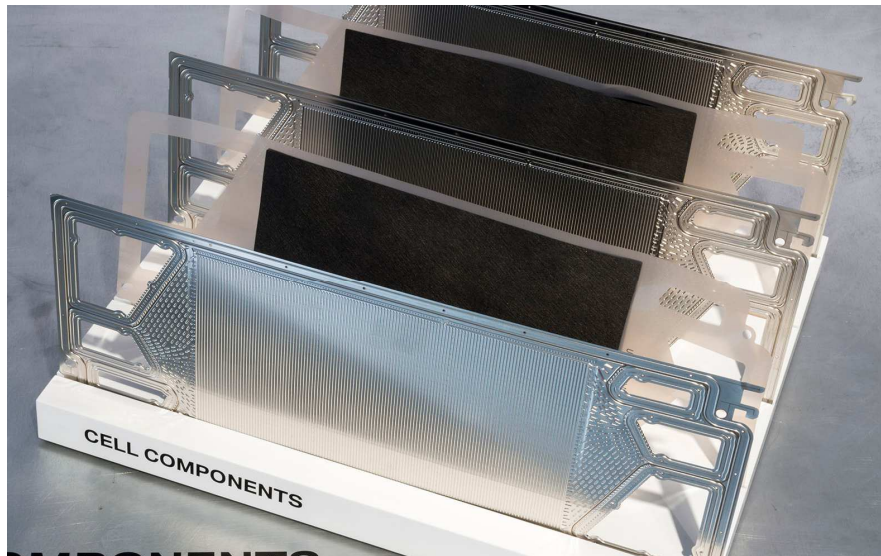
Joachim Kroemer | Borit NV

**Workshop on PEMFC Stack and MEA manufacturing:
Is the EU industry ready for the challenges?**

Brussels, 11 October 2018

Metal bipolar plates

A challenging key component for PEM stacks



Typical material:

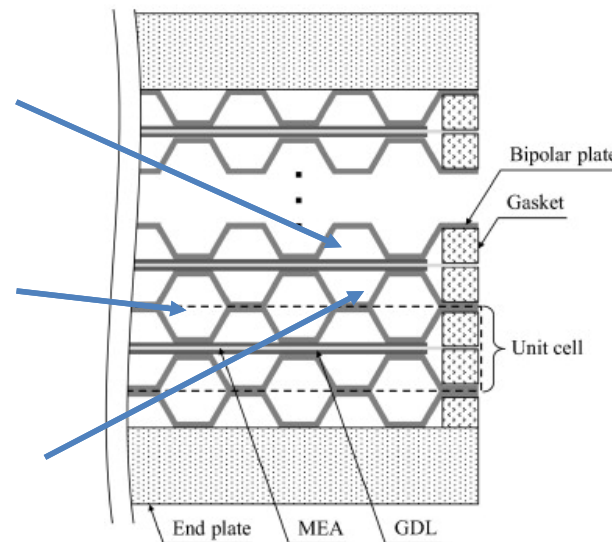
- Stainless steel 316L - 304
- 0.075 - 0.1 mm

Anode and cathode half plate welded together

Hydrogen

Coolant

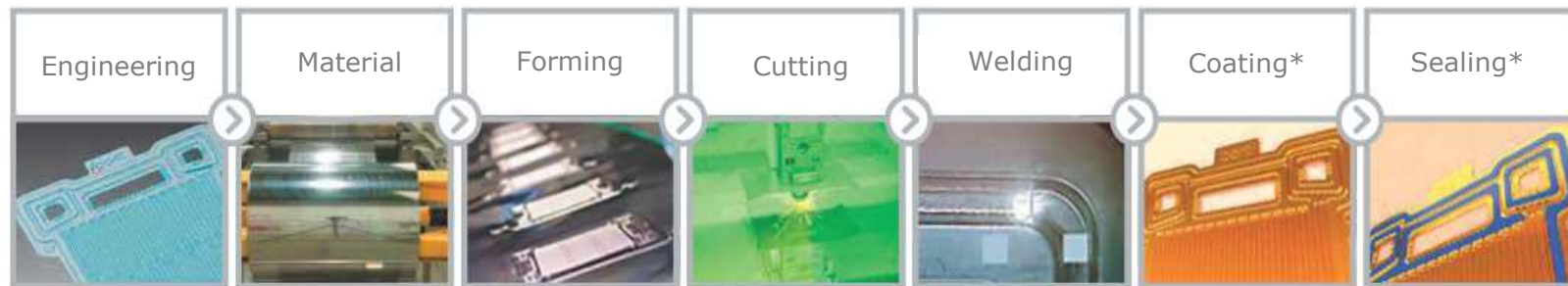
Air/Oxygen



Borit is specialized on fuel cell components

FOCUSED AND INTEGRATED SUPPLY CHAIN

Borit supplies welded bipolar plate assemblies with a coating and sealing that directly can be used in stack assembly by the customer.

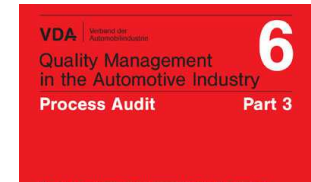


*at present with partners



The one-stop-shop offering combines integrated co-engineering in direct interaction with the customer, flexibility (capabilities menu) with a cost-efficient and high-quality manufacturing chain.

High quality standards:

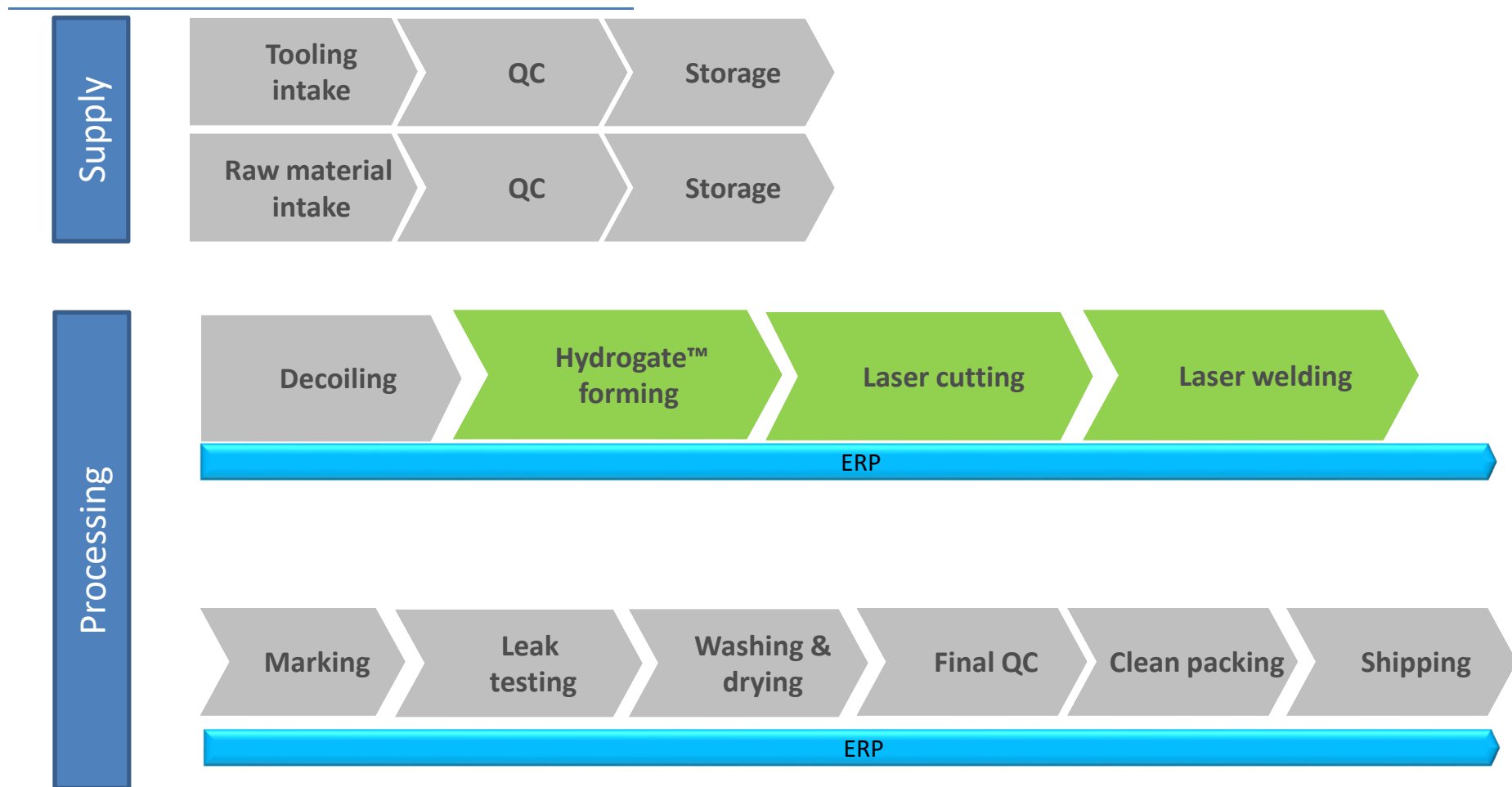


Borit' capability set provides a growth path from prototypes to volume production using scalable technologies and tools



Manufacturing of metal bipolar plates

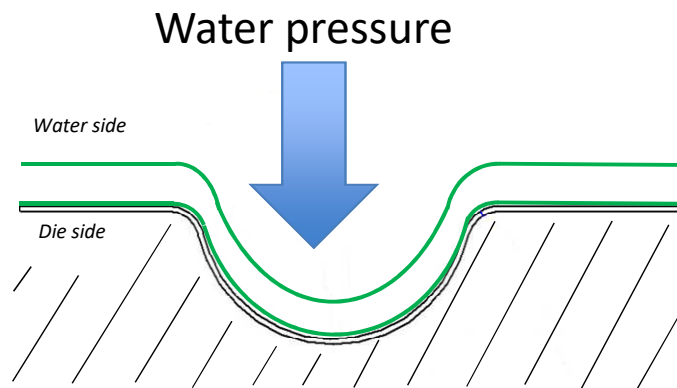
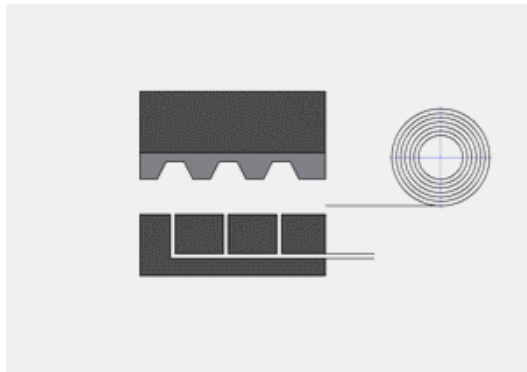
A simplified typical process flow (in-house)



Process steps: Hydrogate forming

Hydroforming directly from coil

Hydrogate™



Process steps: cutting

Laser cutting / die cutting

- Fiber laser for optimal cutting quality and speed
- Accurate positioning of formed structures vs cutting contour
 - Mechanical positioning to mate formed parts to cutting fixture
 - Vision system
 - Automated repositioning of cutting contour based on detected features
- Automation for improved productivity
- For volume > approx. 50 000 parts mechanical cutting becomes the most beneficial solution



Process steps: welding

BPP laser welding

- Remote welding system (scanner system)



- Welding speed up to 1 m/s
 - Minimum heat input into plates
- Welding tooling to fixture and clamp the 2 plates
- Shielding gas to avoid oxidation on welds
- Fully robotized lines with integrated leak testing



Digitized workflow

From material input to final product

- Paperless workflow
- Tracing and data acquisition at steps
- Full traceability
- Linked with quality system
- Base for continuous improvements



Vision for Series Production

Industrial Roadmap for the full process forming>cutting>welding

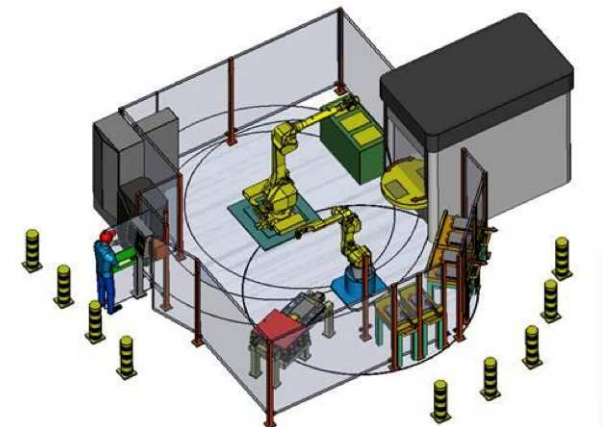
Present status

- Production capacity: > 500.000 plates per year
 - Coil fed automatic Hydrogate forming presses
 - Semi-automatized laser cutting/welding stations
 - Robotized welding lines + laser cutting stations
 - Marking, leak testing, cleaning, quality control, packaging



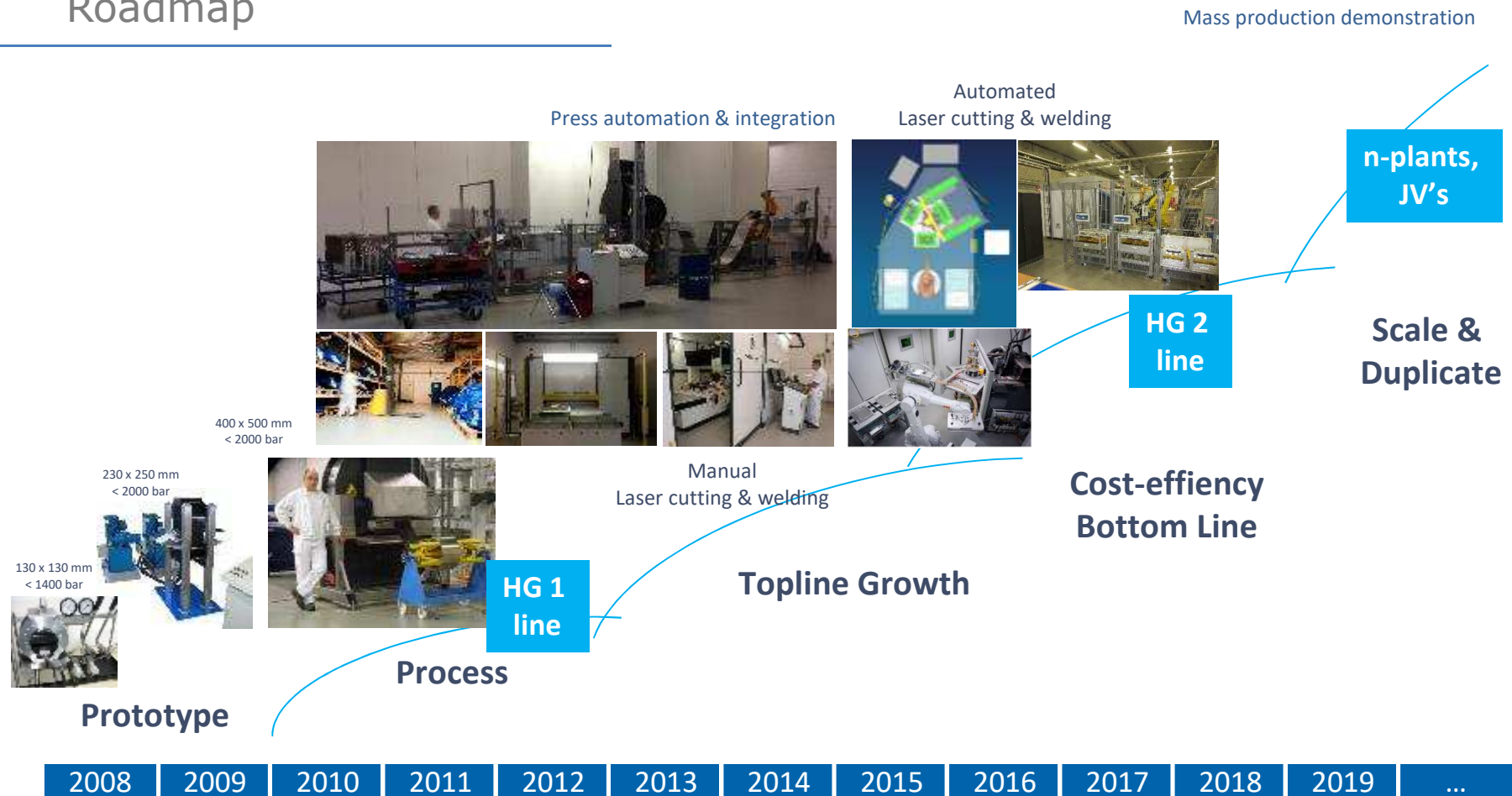
Upgrade

- Introduction of fully automatized parallel lines
- Integration of downstream steps
- Planning is in close contact with OEM customers
- Dedicated product-specific lines
- Roadmap in place to scale-up to capacity of millions of plates after 2020



Company vision

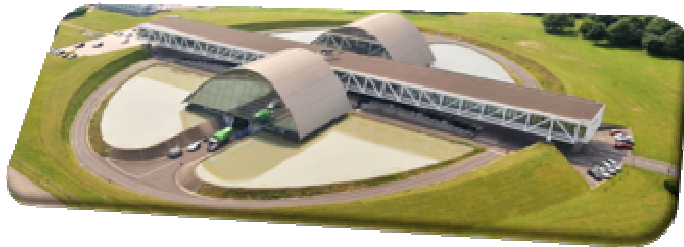
Roadmap



The company

MISSION AND HISTORY

To contribute to the Hydrogen Economy by developing a leading and efficient production infrastructure of thin metal bipolar plate assemblies (for fuel cells and electrolyzers) and providing excellence in metal forming, cutting, welding, coating and sealing.



Borit NV (www.borit.be) is a spin off company (2010) of OCAS NV (www.ocas.be) - a metal research center belonging to ArcelorMittal and the Flemish Region - and Borit Leichtbau-Technik GmbH (www.borit.de)

Main shareholders: FININDUS & PMV TINA



THANK YOU FOR
YOUR ATTENTION



Dr. Joachim Kroemer
Borit NV

Lammerdries 18e
2440 Geel
Belgium
joachim.kroemer@borit.be
contact@borit.be