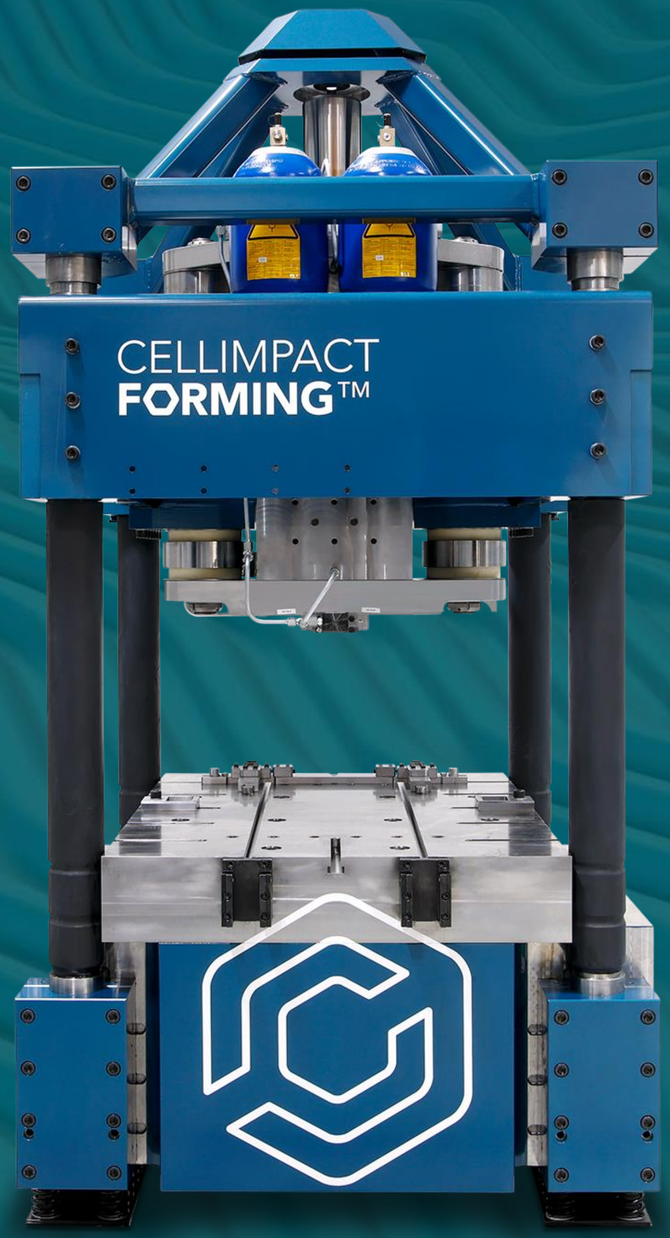
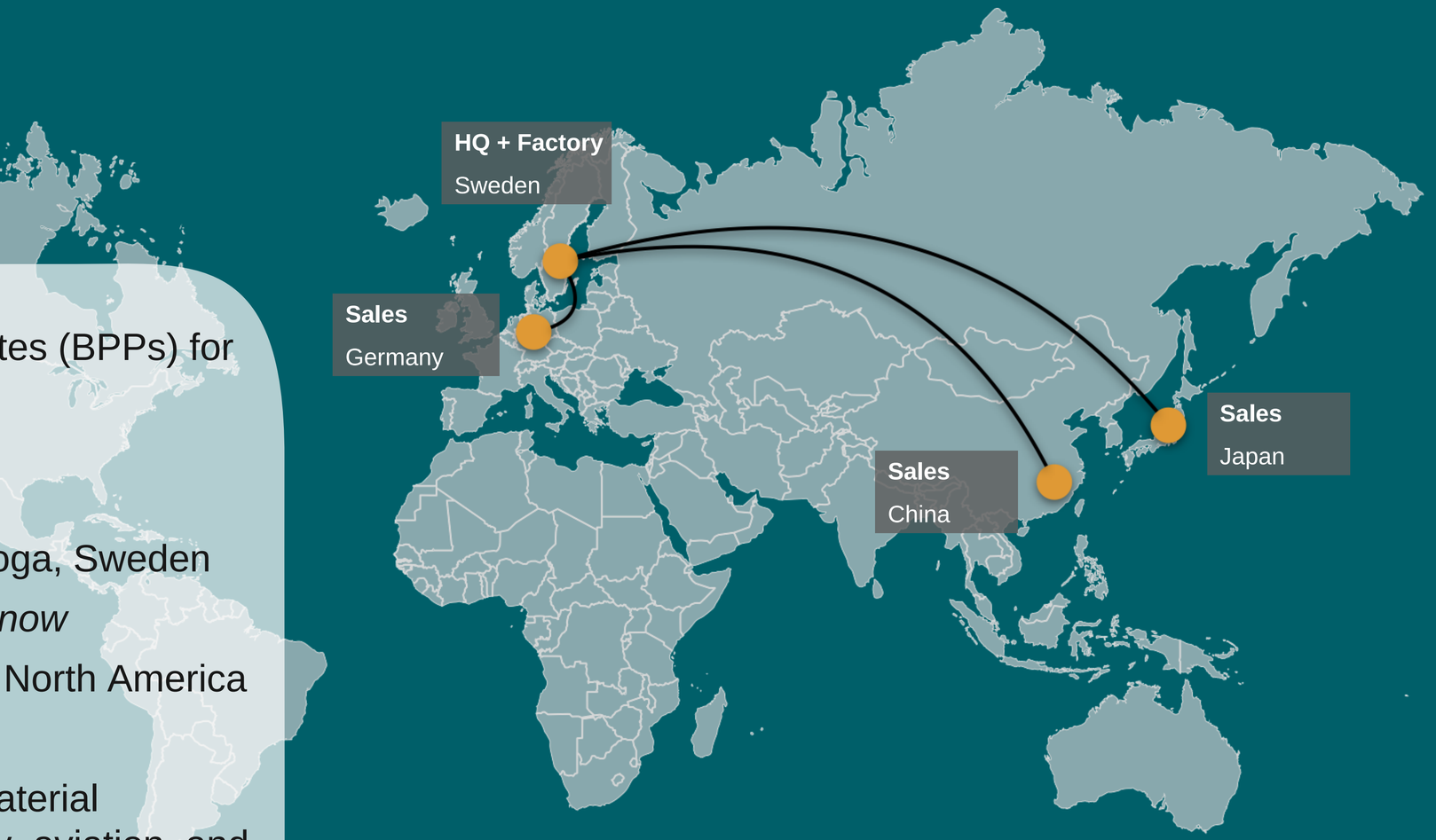


Uppskalning av grön vätgas med Cell Impact Forming™

2024

CELLIMPACT

Cell Impact



Cell Impact is a producer of bipolar plates (BPPs) for fuel cell and electrolysis applications

» Founded in 1999

» 6 000 m^2 production facility in Karlskoga, Sweden

» Producing and supplying flow plates *now*

» Customers in Europe, China, Japan, North America

» Key patents until 2035

» Cell Impact plates can be found in material handling, stationary power, E-mobility, aviation, and electrolyser applications.

PEM electrolysers and fuel cells

	In	Out
Electrolysers	$H_2O + e^-$	$H_2 + O_2$
Fuel Cells	$H_2 + O_2$	$H_2O + e^-$

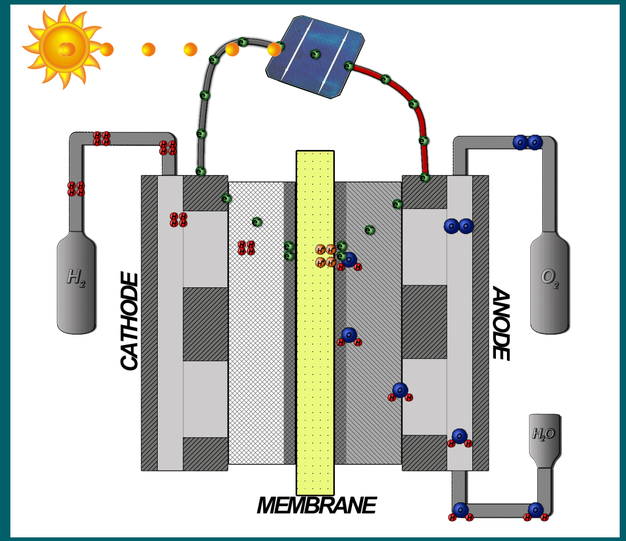


Image from: Davidlfritz, CC BY-SA, via Wikimedia Commons

» Cells stacked in series with one bipolar plate (BPP) per cell.

» Stacks can contain hundreds of cells.

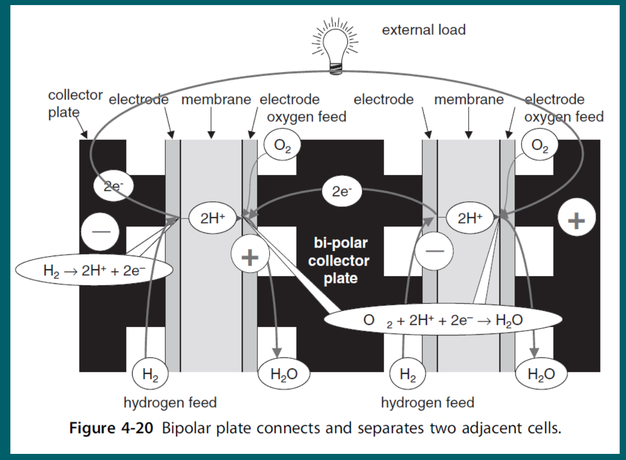
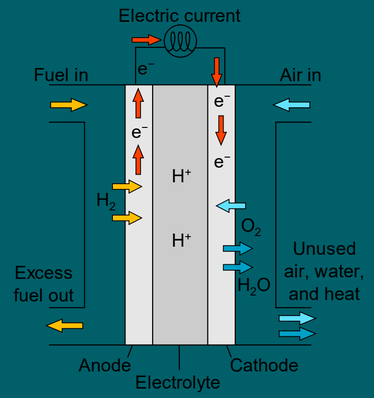
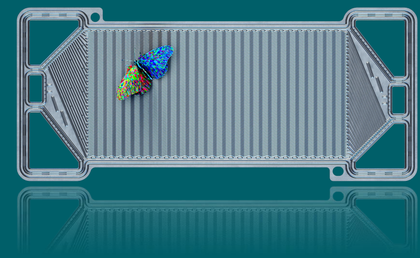


Figure 4-20 Bipolar plate connects and separates two adjacent cells.

Image from: Barbir, F. (2013). PEM Fuel Cells.

Heavy-duty trucks





2
Fuel Cell stacks

×

500
Cells

×

100,000
Vehicles

=

100,000,000
BPPs

Bipolar Plates

Functions:

- Distribute H_2, O_2, and cooling media
- Water and heat management
- Conduct current

Manufactured from sheet metal, e.g. SS and Ti

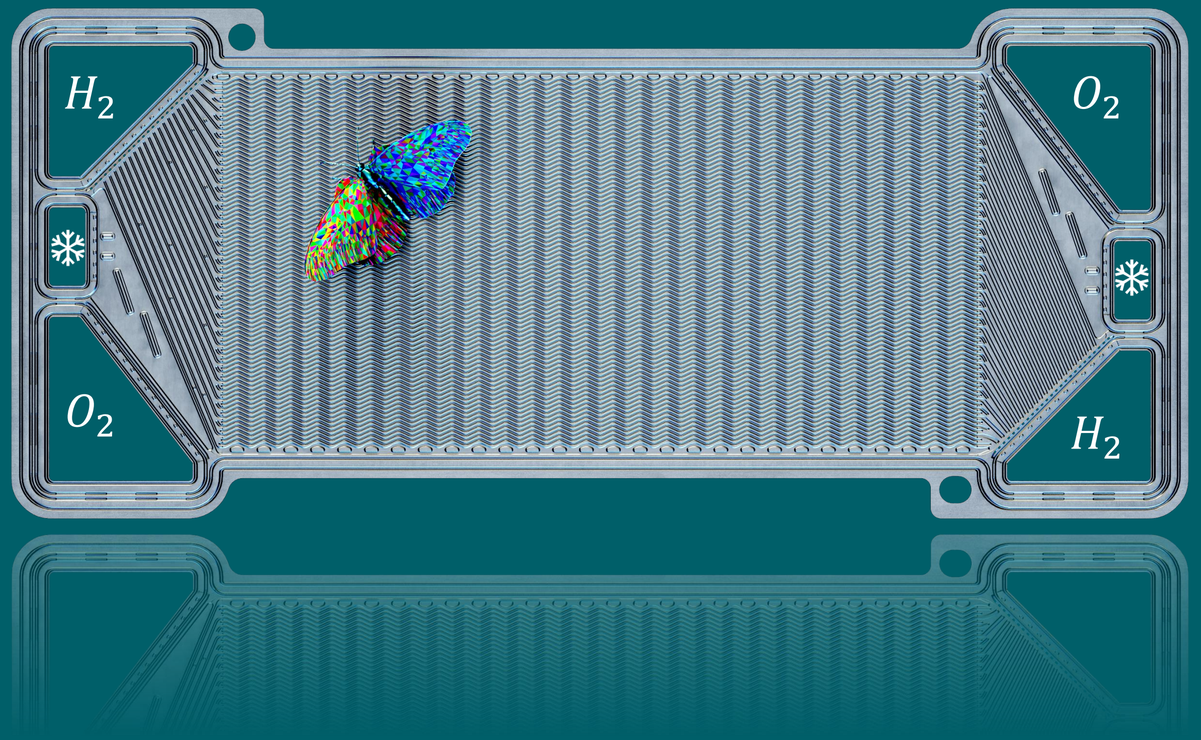
Important factors:

Uniform geometry with µm tolerances

Resistant to corrosion

Low contact resistance

Easy, fast, and cost-efficient to manufacture



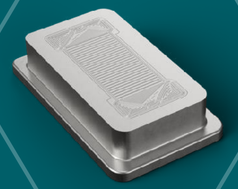
Making a BPP

Experience from 50+ plate projects!

1

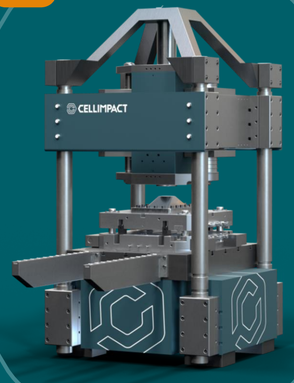
Design for Manufacturing, DFM

2



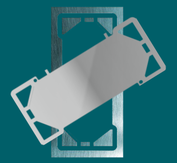
Tools and Fixtures

3



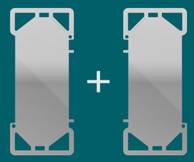
Cell Impact Forming™

4



Laser Cutting or High-Precision Punching

5

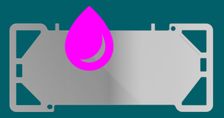


Laser Welding

6

Leak testing and QC

7



Cleaning

Legacy technology

Difficult and expensive to scale-up BPP manufacturing with existing conventional metal forming technology due to

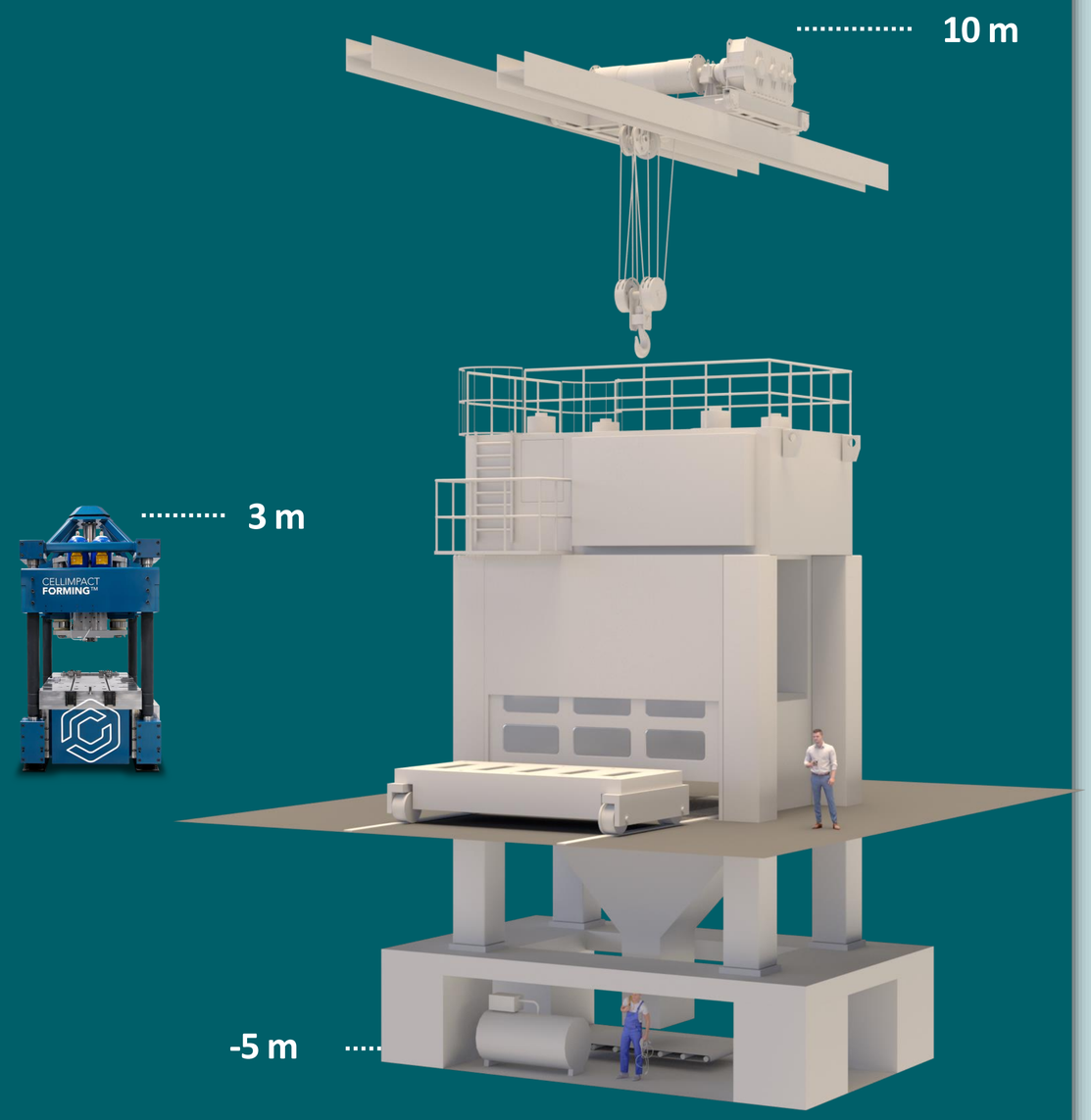
» Fine tolerances
» Large forces
» Short cycle times
» Cleanliness requirements

Conventional solution is large and expensive progressive presses

Cell Impact Solution

Cell Impact Forming™ with down stream production processes is a scalable technology

» Cost-efficient
» Short cycle time
» Dry process
» Standard industrial facility installation
» Each process tailored to ensure high quality and life-time



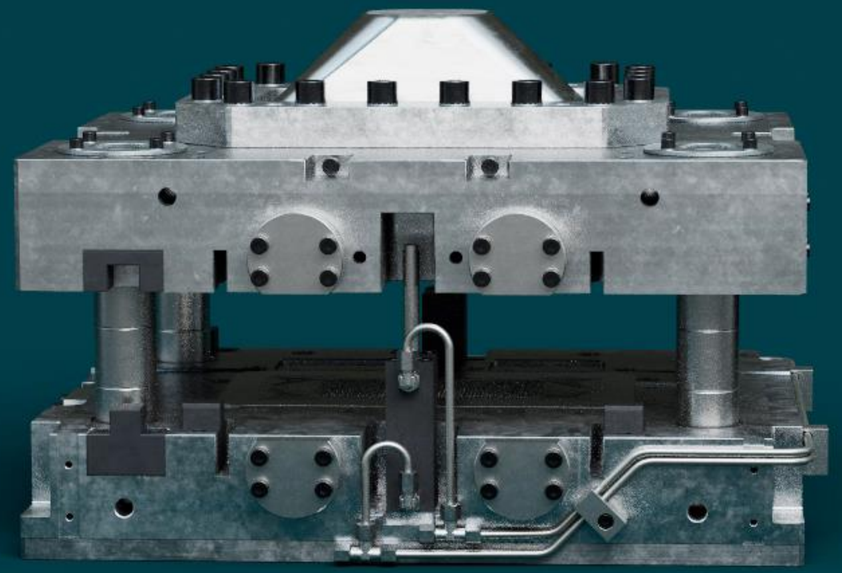
Cell Impact Forming

» Impact cylinder is accelerated to a specified velocity

» Impact cylinder knocks impact head and retracts

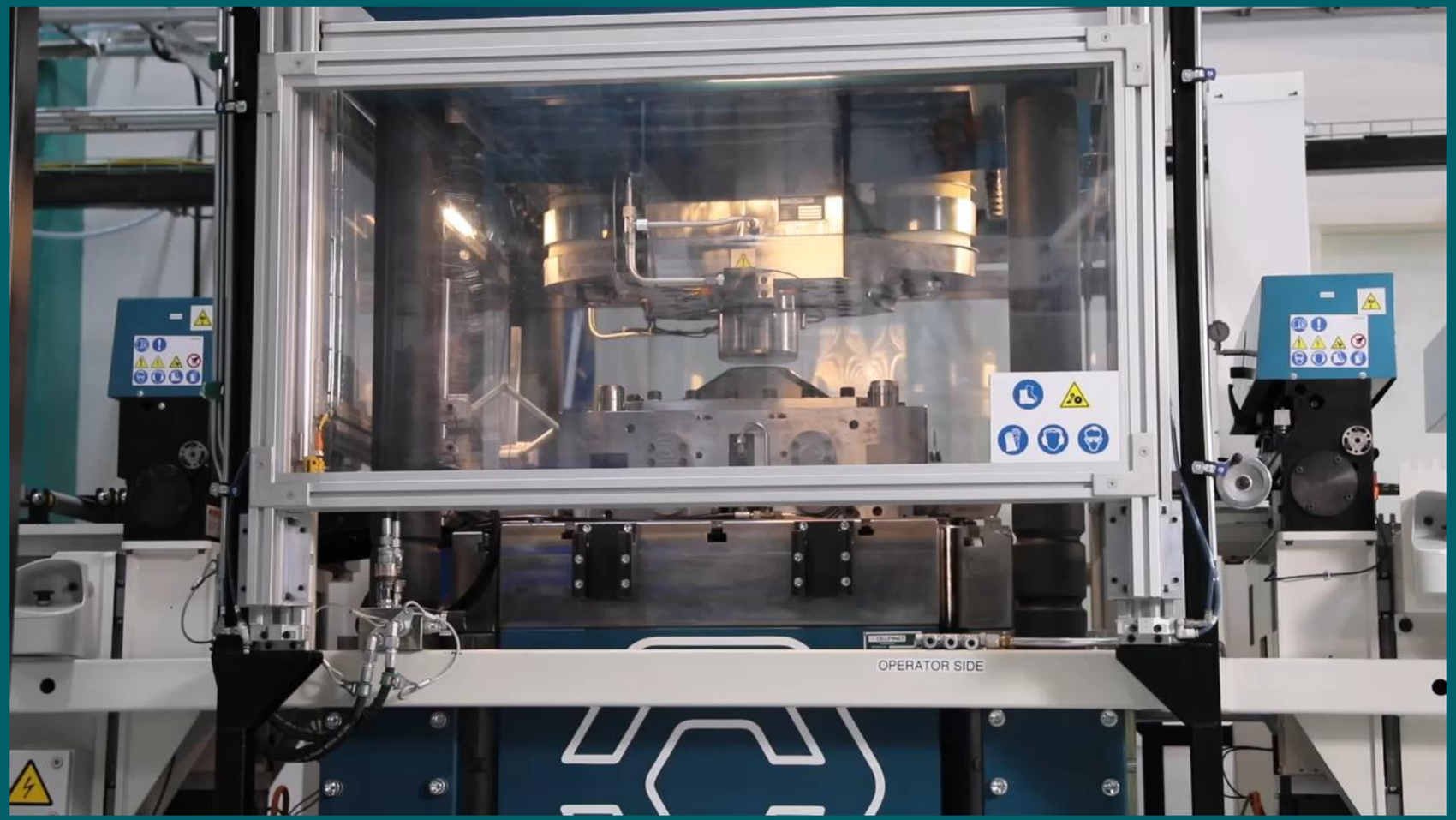
» Impact head and upper tool continues down

» Kinetic energy is absorbed by the sheet material



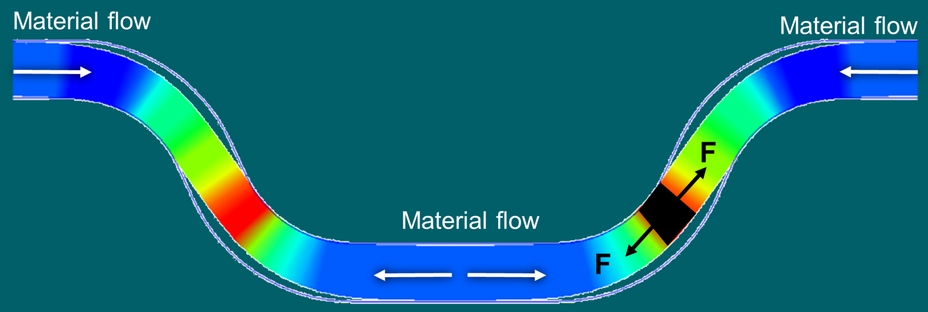
Cell Impact Forming

In action



Increased formability and uniform depth

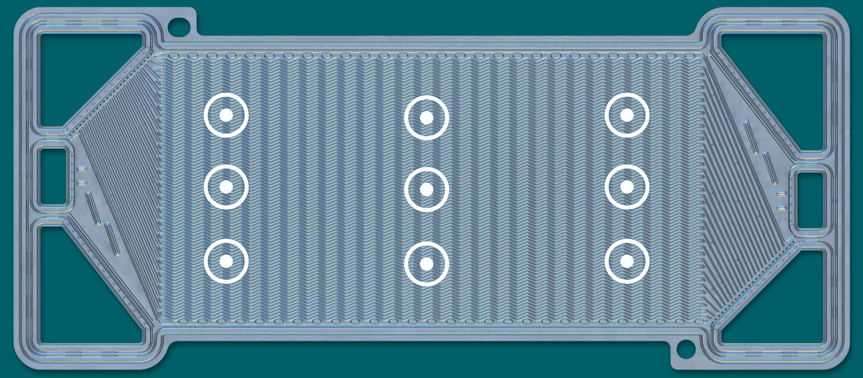
Forming at high velocities increases the formability through a phenomenon called strain rate hardening.



Cell Impact Forming™ distribute the energy evenly, resulting in a very uniform channel depth across the flow field.

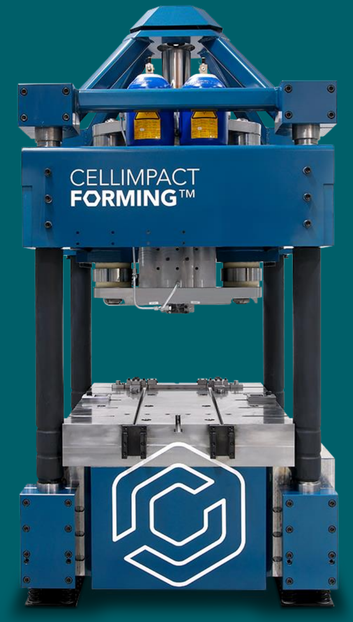
Depth typically varies less than 0.01 mm.

$$t_{form,max} - t_{form,min} < 0.01\ mm$$



CELLIMPACT FORMING™

- Scalable
  Compact, Low complexity, Cost-efficient, Quick to build
- Short cycle time
- Dry process
- Tailored to ensure high quality and little wear



CELLIMPACT FORMING™

Thank you!