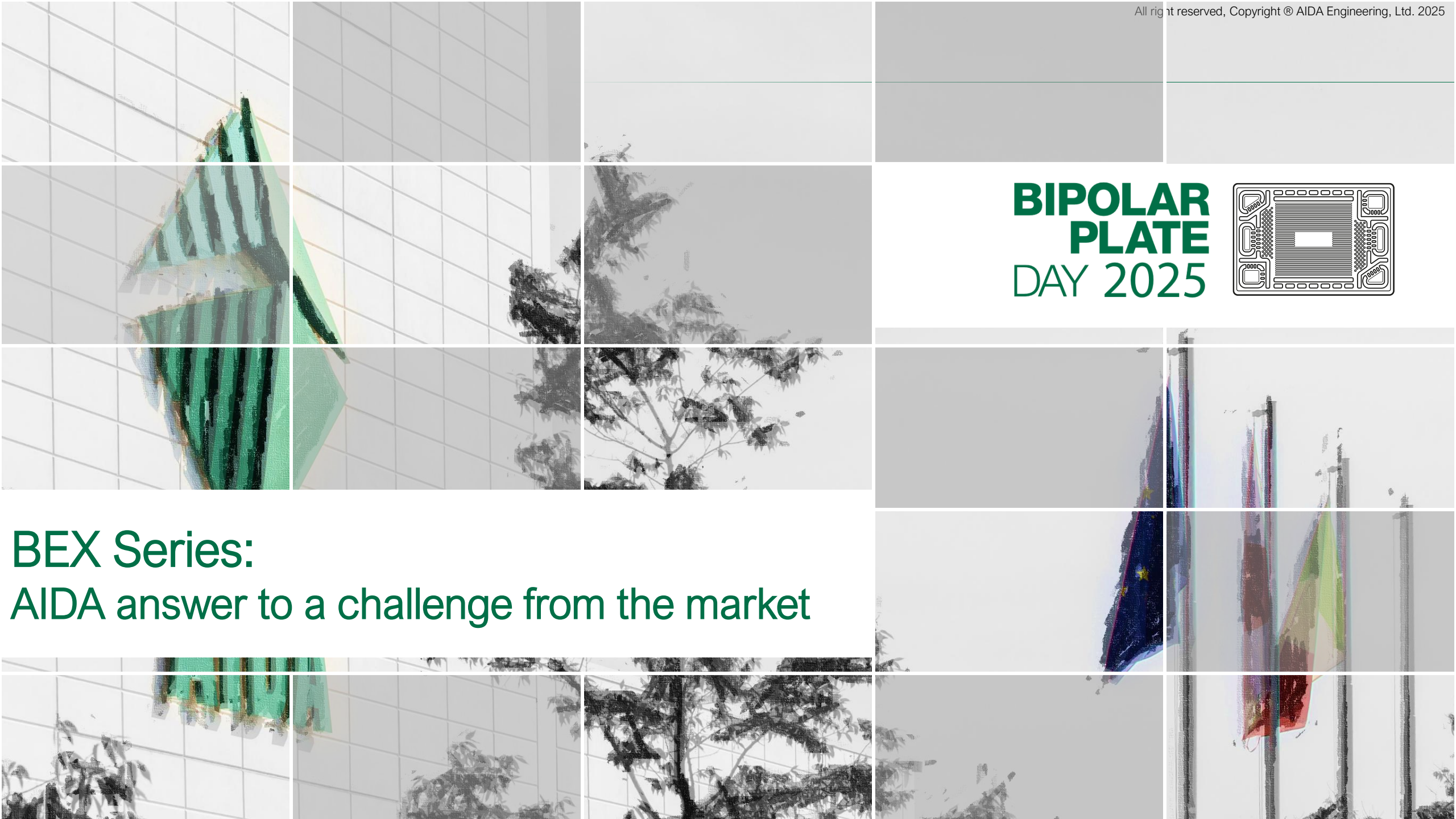
BIPOLAR PLATE DAY 2025



BEX Series:

AIDA answer to a challenge from the market

Introduction

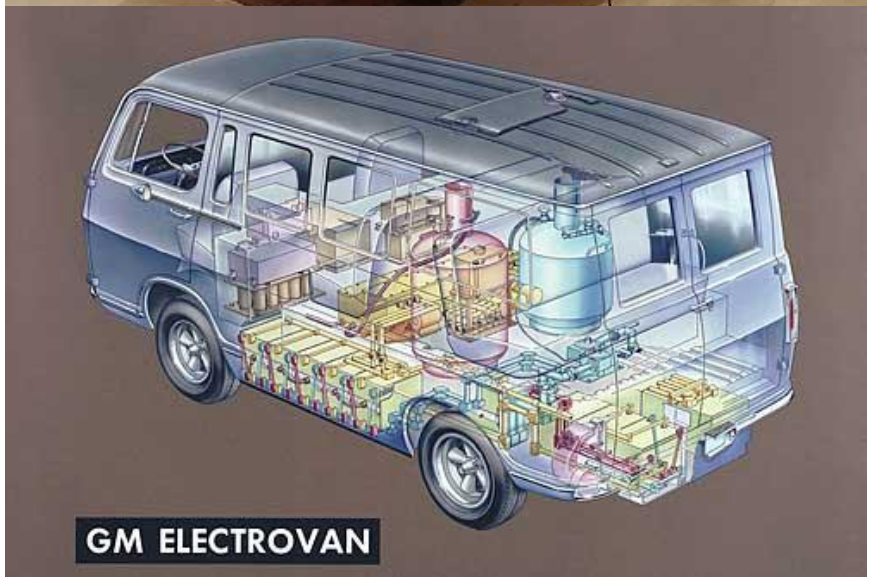
One important date:

August 21st, 1965, NASA Mission GEMINI V

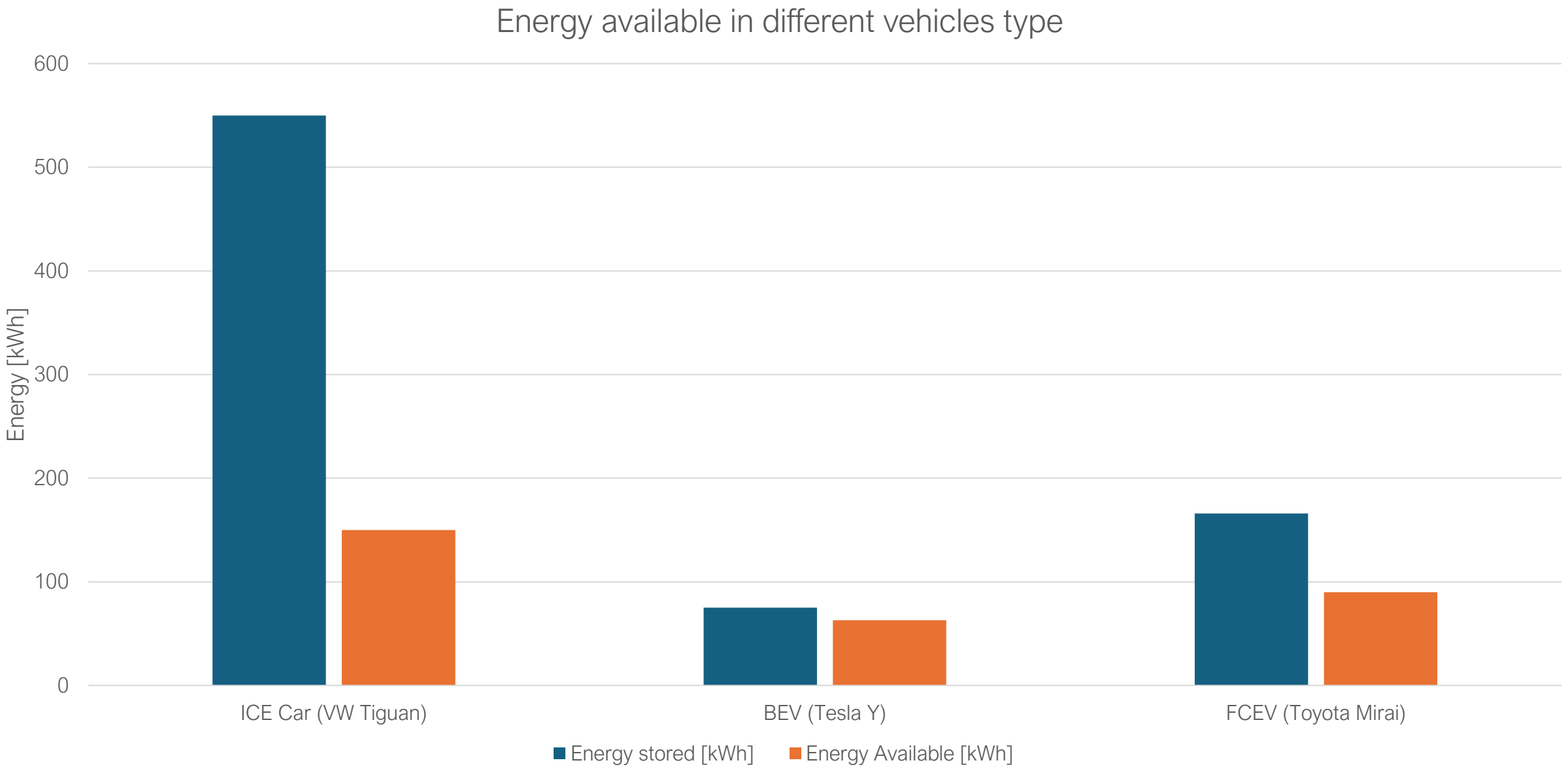
1st use of **Fuel Cells** as **Energy Generator** instead of batteries in the space programs

Early application in Automotive Sector

Electrovan by General Motor - 1966

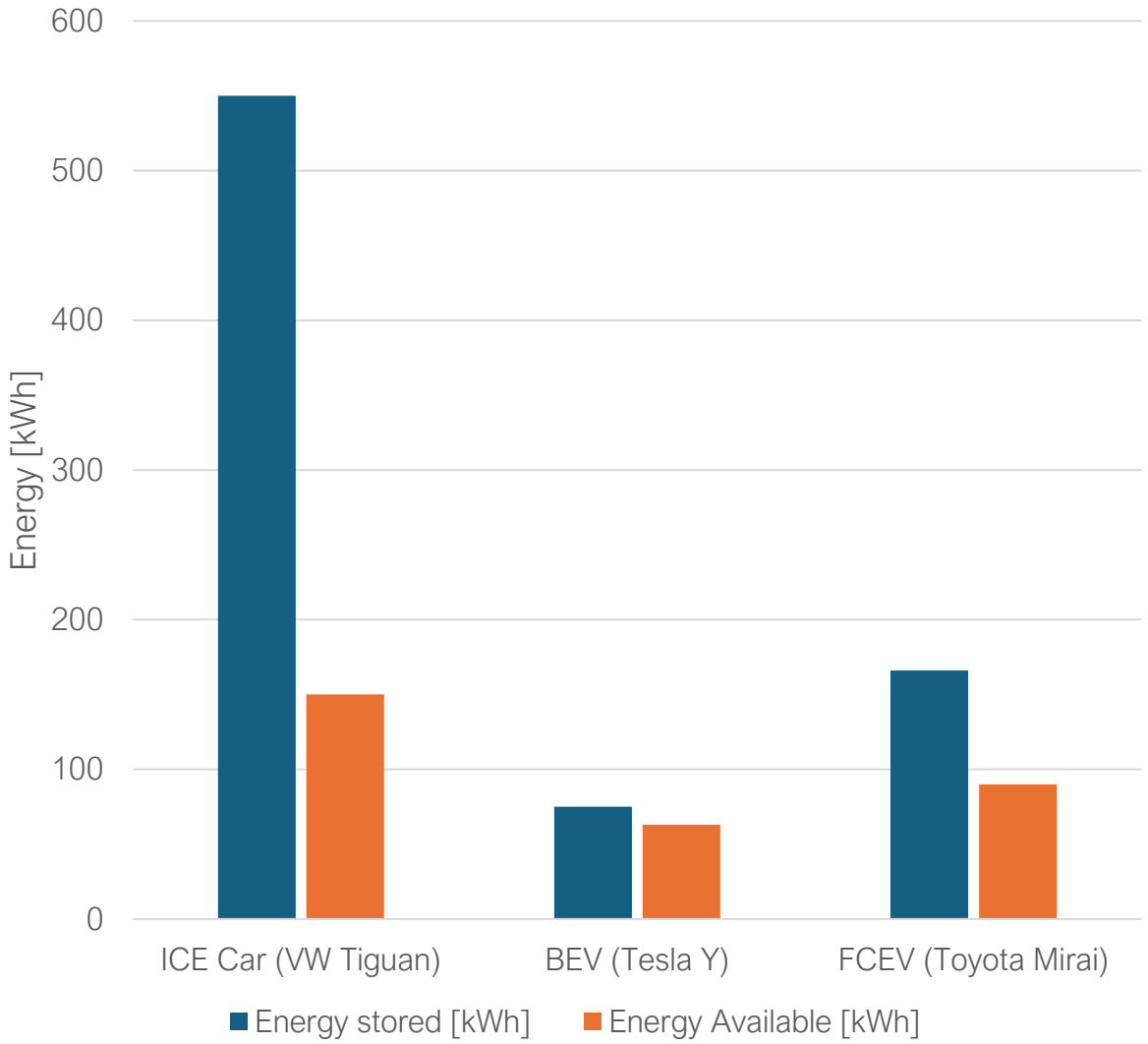


Introduction (Why Fuel Cells)

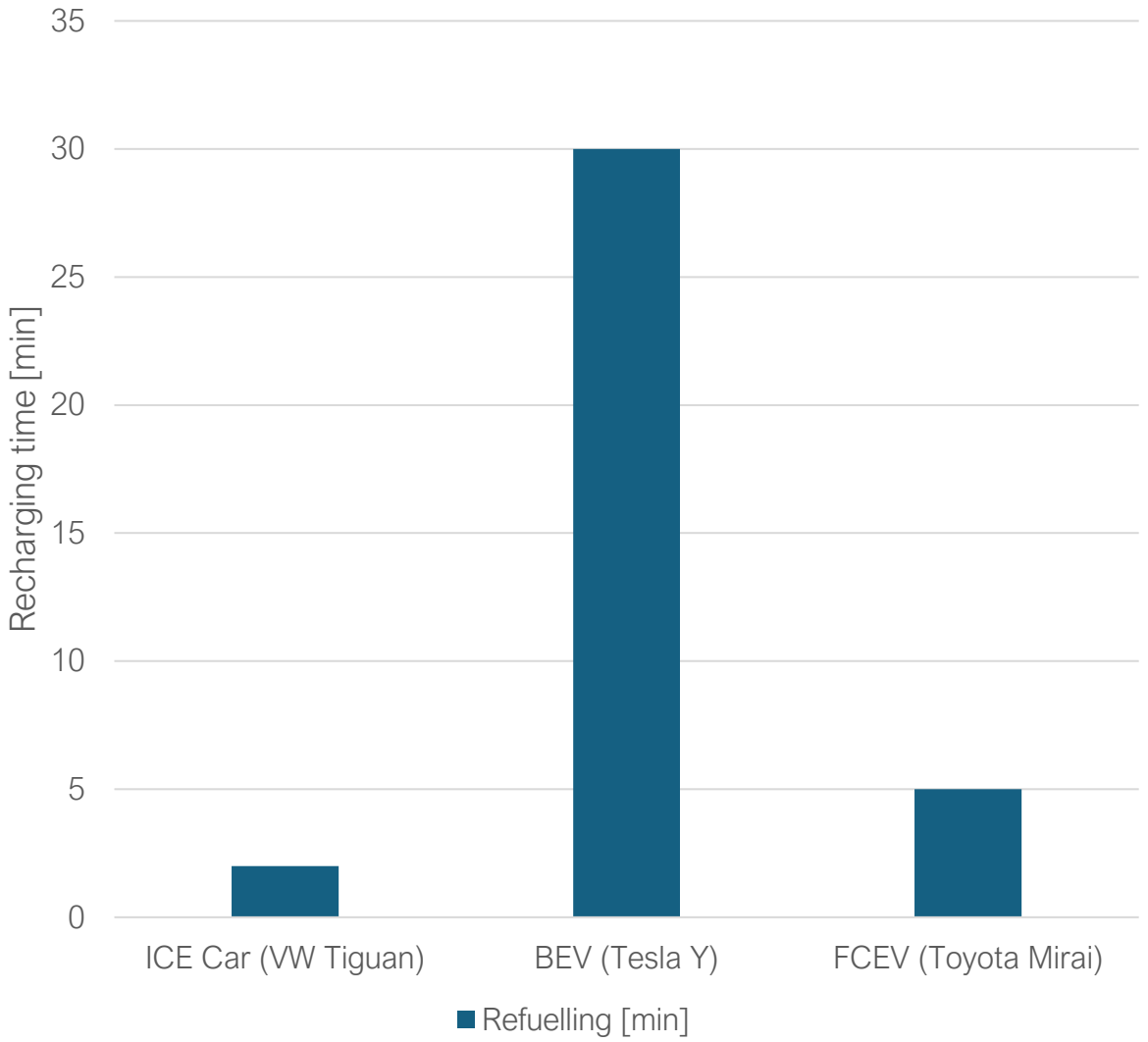


Introduction (Why Fuel Cells)

Energy available in different vehicles type



Recharging time



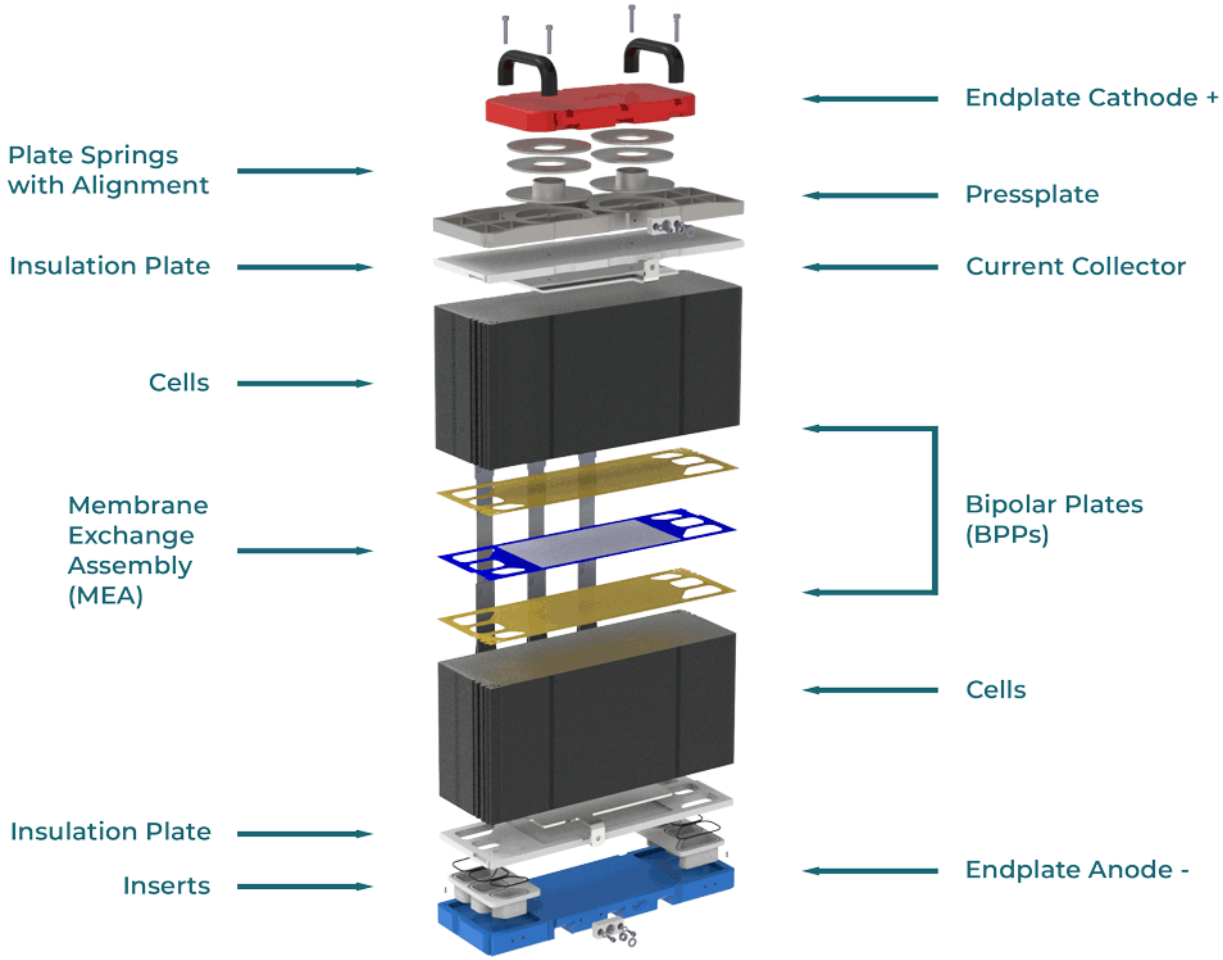
Introduction (Why are we here)

Fuel cells are an alternative to batteries because of their capability to store more energy per mass unit and for the faster recharge cycle

Fuel cells as a mean for:

Energy generation (Or storage) through hydrogen oxidation (Or reduction)

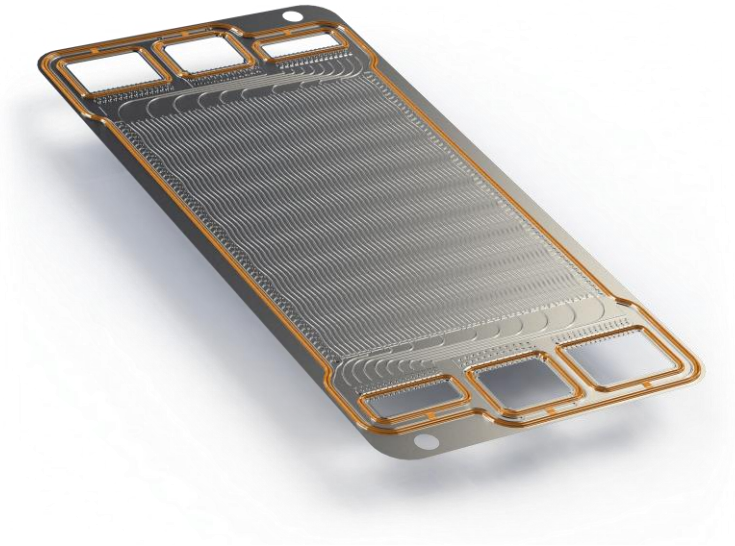
Energy is produced through the release of electrons during the oxidation process, with the resulting production of water and heat.



Bipolar plates characteristics

Bipolar plates characteristics

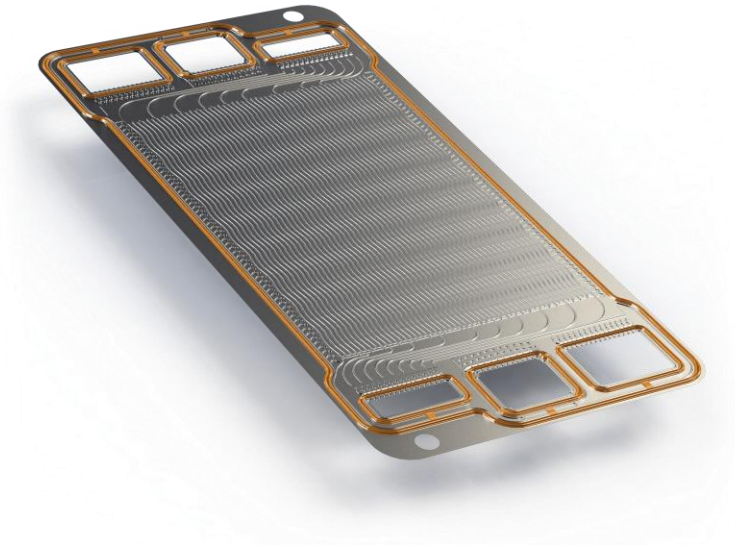
- Stainless steel material / Titanium, with coating



Bipolar plates characteristics

- Stainless steel material / Titanium, with coating

- Extremely thin gauge (~ 75 µm)



Bipolar plates characteristics

- Stainless steel material / Titanium, with coating
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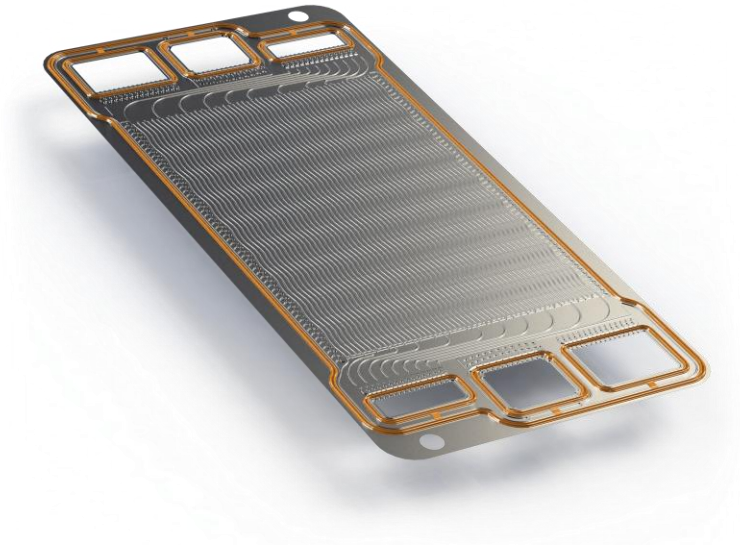
- High planarity required



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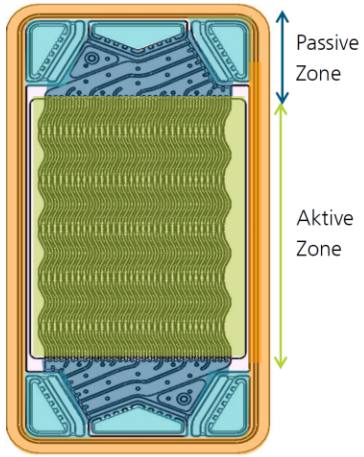
- Grooves depth / shape accuracy

Aufbau und Funktionsbereiche von Bipolarplatten

Aufbau und Funktionen

Aufbau einer Bipolarplatte

BPP mit FCI-Design



Segment-Spezifikationen

	Segment	Funktion	Maßtoleranz
1	Medienkanäle / Hauptkanäle	Zulauf von Wasserstoff, Sauerstoff und Kühlmedium.	**Werkzeugtoleranzen:** Fertigungstoleranzen für Aktivteile **±5 µm** H ±5 µm Breite ±5 µm Radien ±5 µm
2	Verteilstruktur	Leitet Wasserstoff, Sauerstoff und Kühlmedium gleichmäßig zum aktiven Bereich.	
3	Aktiver Bereich	Gewährleistet homogene Verteilung der Reaktionsgase im elektrochemisch aktiven Bereich der aufliegenden MEA.	**Bauteiltoleranzen:** Abweichung von **20 %** des nominalen Wertes Ebenheitsabweichung ≤ **0,1 mm** Innen Radien: 0,1 - 0,3 mm **± 0,04** mm Höhe: 0,2 - 0,4 mm **± 0,06** mm Breite: 0,5 mm **± 0,1** mm
4	Dichtungsnut	Geometrischer Bereich der zum Auftragen der Dichtung dient	

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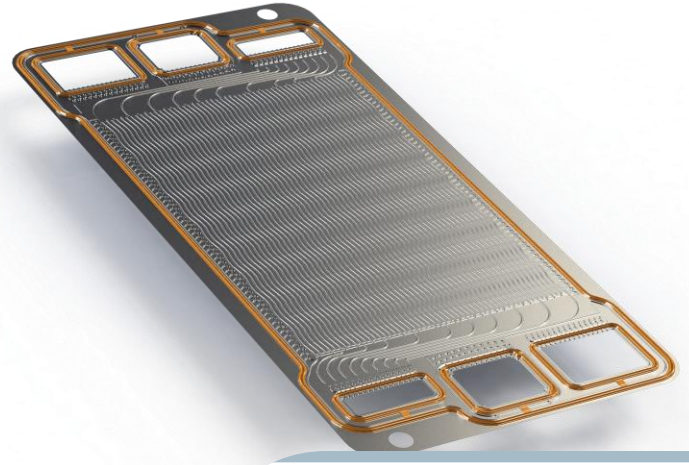

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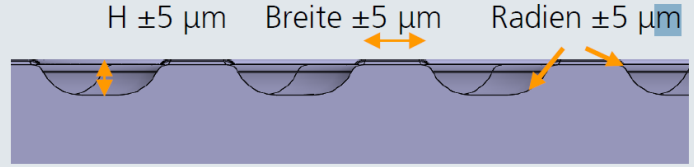

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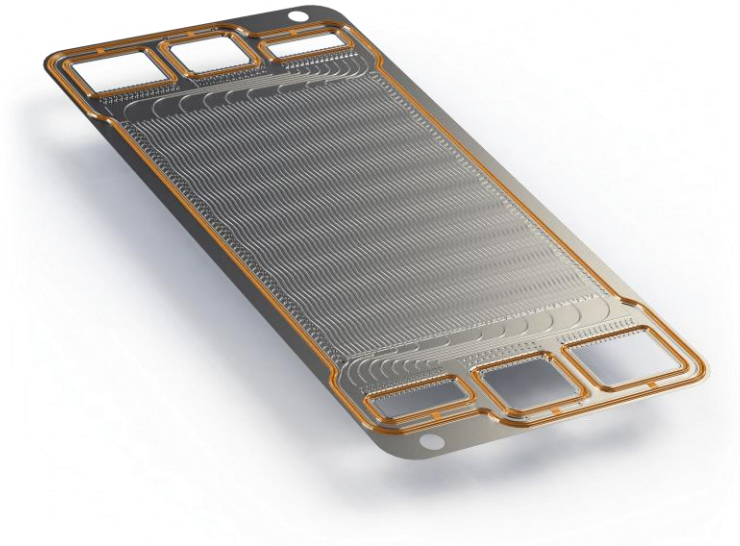
- Precise trimming of edges and hole / slot shape



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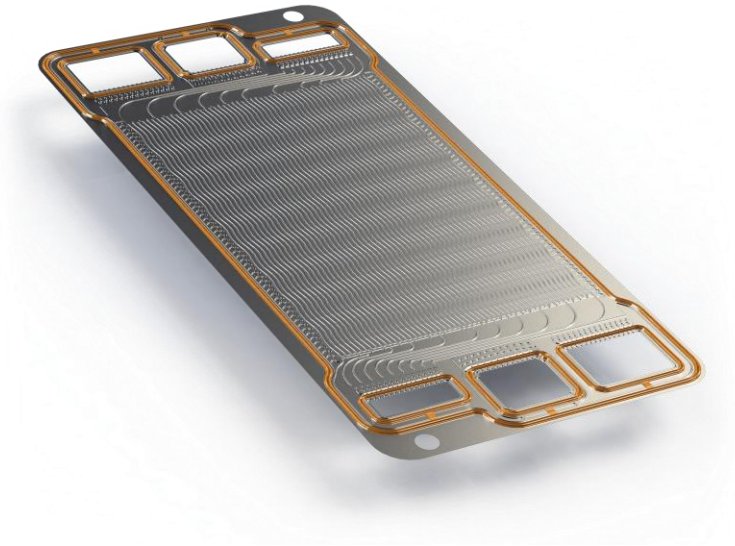
- Burr – free result



Machine requirements

From the part to the process:

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- Unsensitiveness to thermal distorsion, to guarantee the proper process capability metrics.
- Maintaining a throughput compatible with the typical “Automotive” industry rates

The development phase

The ULX Series as a starting point:

Machine designed for precision stamping, hence:

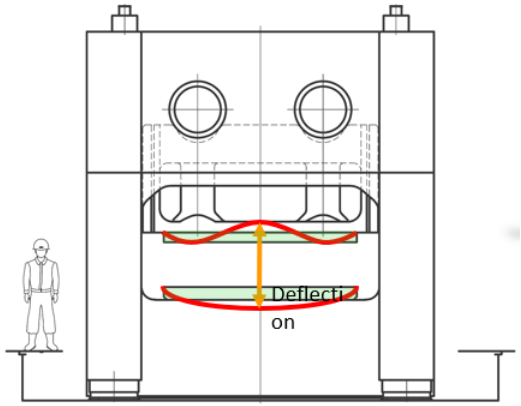
- Machine with high rigidity
- Precise guiding system
- No connection rods (Scotch – Yoke drive)

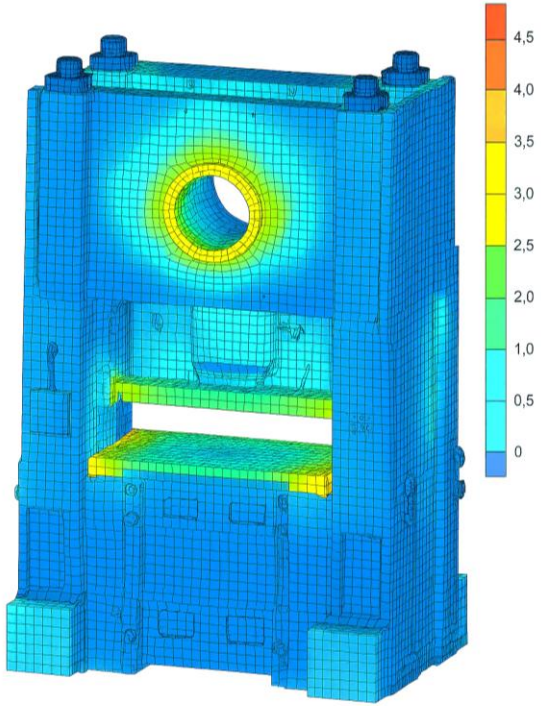
Necessary improvements, process oriented

- Two pressure points design generates “symmetrical deformation”, premature tools wearing possible

- Process repeatability wasn’t inside required tolerances, due to thermal variations

- Though ULX series features a native low deflection design, the parts tolerances require higher rigidity numbers





The final concept – BEX series

- Designed by AIDA ENGINEERING Co., Ltd. (Japan)
- Manufactured by AIDA S.r.l. (Italy)

Main Technical Data:

• Nominal capacity	16.000	kN
• Slide stroke	170	mm
• Max. stroking rate	70	min^{-1}
• Max. die height	700	mm
• Slide adjustment	150	mm
• Table dimension	3.000 x 1.600	mm

Thank You For Your Kind Attention

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https://www.aida-europe.com