



**THE  
KNOW-  
HOW  
FACTORY**

**E-MOBILITY**

**END OF ARM TOOLING CHALLENGES**



ZIMMER  
group

1.91  
Act. position [mm]

ZIMMER  
group

3.05  
Act. pos. [mm]

41  
Temperature [°C]

## THE KNOW-HOW FACTORY - The success story



Handling Technology



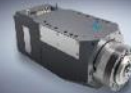
Damping Technology



Linear Technology



Process Technology



Machine Tooling  
Technology



System Technology



virtualZ

cloudZ

controlZ

visualZ

supportZ

Booth 1023

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group

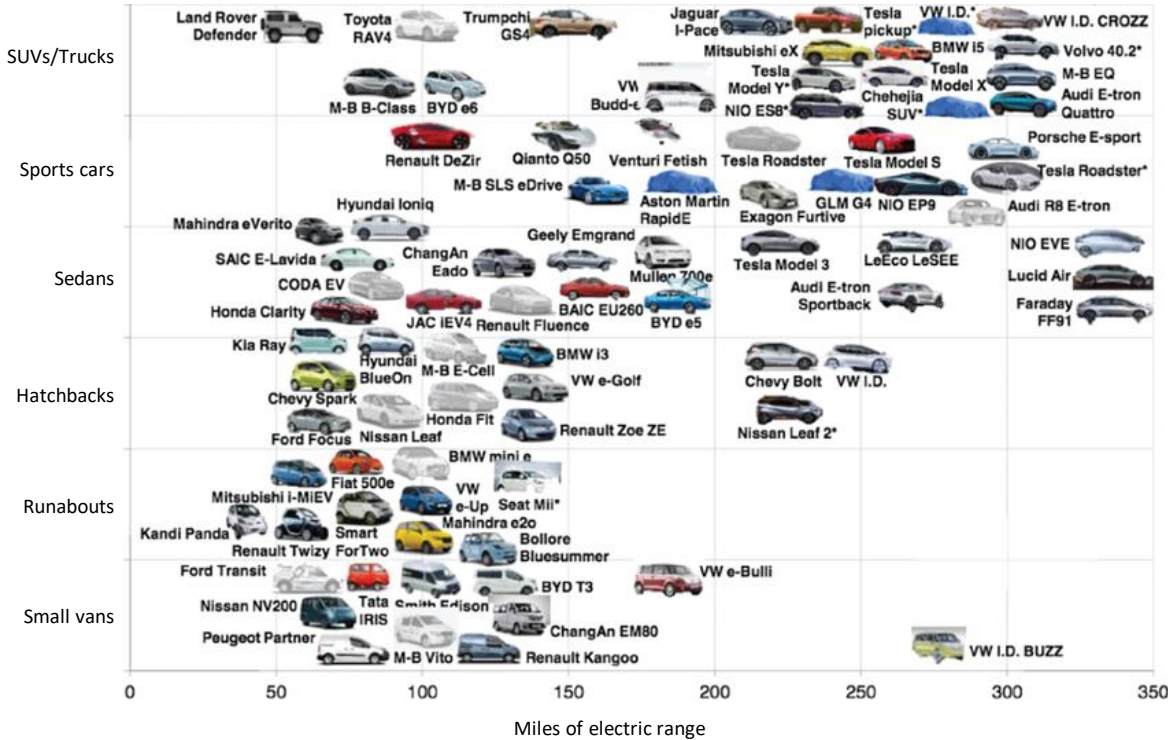
# EV PROJECTS

DESCRIPTION	SCOPE
Realized projects	40 projects 400 Grippers 2000 devices / fixtures
Experience since	2014
Engineering competence	More than 100,000 h engineering
Highlights	Development partner of premium automotive, OEM and plant manufacturers



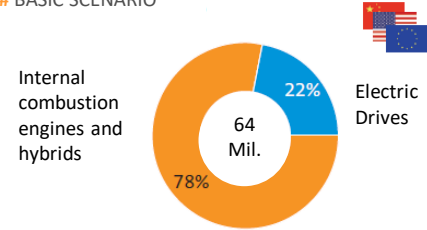


# ELECTRIC CAR RACE

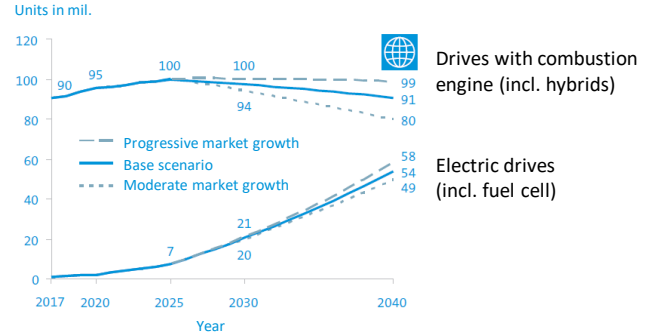


## Forecast passenger car sales in 2030

# BASIC SCENARIO



## Forecast for global vehicle sales















Source: FEV

# PARADIGM SHIFT IN DRIVE TECHNOLOGY

- ▶ Electric energy storage systems have become an indispensable part of our everyday lives
- ▶ Growth market for batteries, especially in the areas of **electromobility** and **renewable energy**
- ▶ Cost-efficient production of the battery crucial for success
- ▶ The trend toward electrification is already having an impact on the industry at a much earlier stage than is directly apparent from looking at the expected sales volume
- ▶ The necessary developments and the construction of the production facilities take place with considerable lead time and the race for the best production technology is in full swing



# COMPONENT OVERVIEW COMPARED TO THE COMBUSTION ENGINE

	Reference system	Component group 1	Component group 2	Component group 3
 <p><b>Electric powertrain</b></p>	<p>Battery electric powertrain            Electric motor: 100kW            Battery capacity: 65 kWh</p>	 <p>E-motor rotor</p>	 <p>Cooling system</p>	 <p>Battery modules</p>
 <p><b>Conventional powertrain</b></p>	<p>Gasoline engine            1.4 liter, T/C, 90 kW</p>	 <p>Crankcase</p>	 <p>Cranktrain</p>	 <p>Valve train</p>
 <p><b>Transmission</b></p>	<p>Dual clutch transmission            7 speed, 350 Nm</p>	 <p>Gear set</p>	 <p>Clutch</p>	 <p>Shift elements</p>

Source: FEV

# COMPONENT ASSEMBLY AND AUTOMATION CHALLENGES



## Engine block

30kg - 600kg

Understanding of handling, machining, assembly

Compact workpiece



# COMPONENT ASSEMBLY AND AUTOMATION CHALLENGES



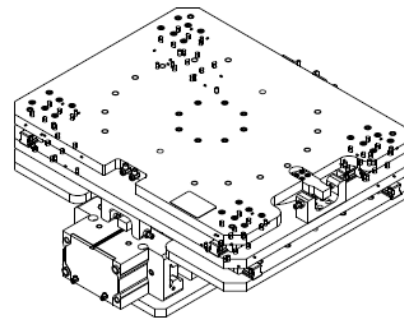
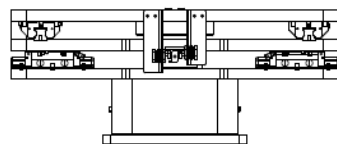
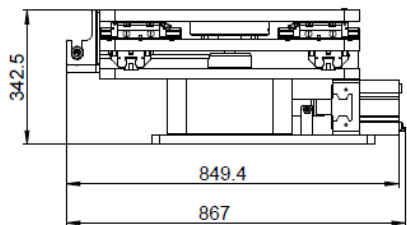
## **Battery Tray Handling / Battery module handling**

800kg for production car

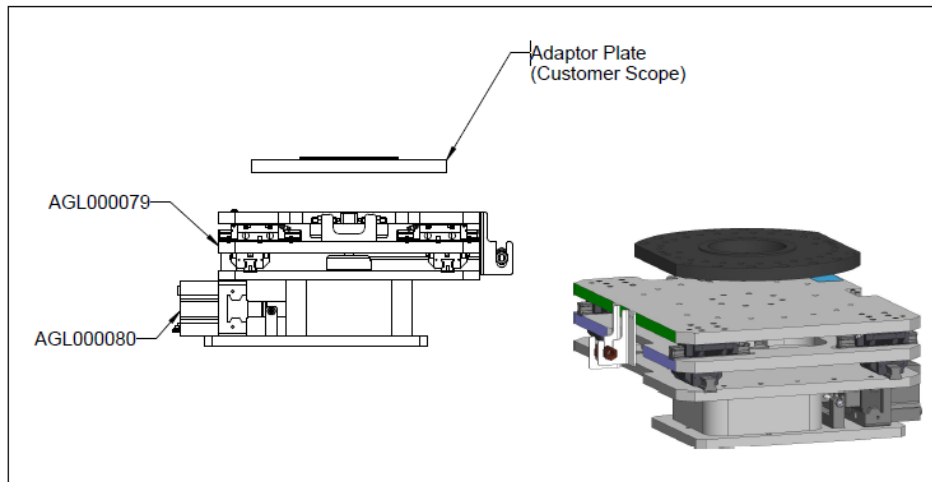
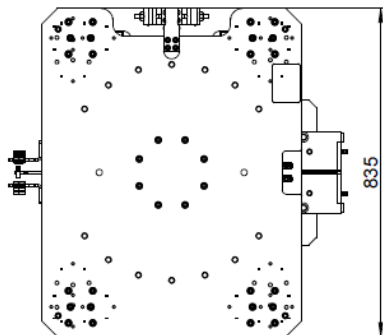
1.5 tons for truck

Gentle touch – load cells

# CUSTOM AXIS COMPENSATION



- 275kg
- X, Y and C compensation
- 1400kg capacity



# COMPONENT ASSEMBLY AND AUTOMATION CHALLENGES



## **Battery Tray Handling / Battery module handling**

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# COMPONENT ASSEMBLY AND AUTOMATION CHALLENGES



## **Battery Tray Handling / Battery module handling**

800kg for production car

1.5 tons for truck

Gentle touch – load cells

**Development of components!**



# DEVELOPMENT OF COMPONENTS AND AUTOMATION

How do we automate a process where the product design is still in development and changing?

- Change orders
- What did Tesla do?
  - In house development and buying expertise (Grohmann Automation + others)
  - Design and build version 1
  - Use integrators / line builders for repeat lines
- Partnerships
  - Daimler, Grob, Durr and Manz

# COMPONENT ASSEMBLY AND AUTOMATION CHALLENGES



## **Battery Tray Handling / Battery module handling**

800kg for production car

1.5 tons for truck

Gentle touch – load cells

## **Development of components!**

## **Wide flat workpiece?**

New EV models or Hybrid

High variation for Hybrid models

### CELL PRODUCTION



10X GRIPPERS FOR CYLINDRICAL CELLS



LOGISTICS GRIPPERS FOR INTERMEDIATE LAYERS



6X GRIPPERS FOR CYLINDRICAL CELLS



### CELL TO PACK



10X GRIPPERS FOR CELL ASSEMBLY



INSTALLATION OF ATTACHMENT PARTS



TURNING STATION FOR PRISMATIC CELLS



DOUBLE GRIPPERS FOR BATTERY MODULES



HANDLING GRIPPERS FOR BATTERY MODULES



### MODULE TO PACK

#### CONTAINER PLACEMENT LOGISTICS



HANDLING GRIPPERS FOR COVERS OF LOAD CARRIERS



COVER REMOVAL PORTALS WITH GRIPPER



HANDLING GRIPPERS FOR INTERMEDIATE LAYERS



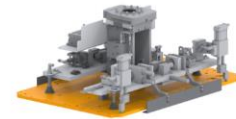
#### MOUNTING THE BOTTOM HOUSING PART



DOUBLE GRIPPERS FOR INTERMEDIATE LAYERS AND FRAME ELEMENTS



DOUBLE GRIPPERS FOR INTERMEDIATE LAYERS AND COOLING PLATES



HANDLING GRIPPERS FOR BASEPLATES



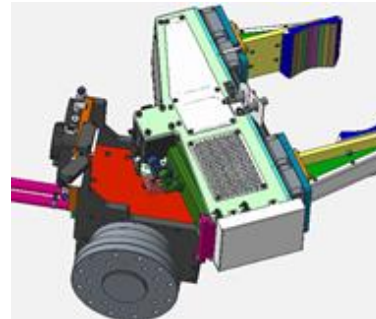
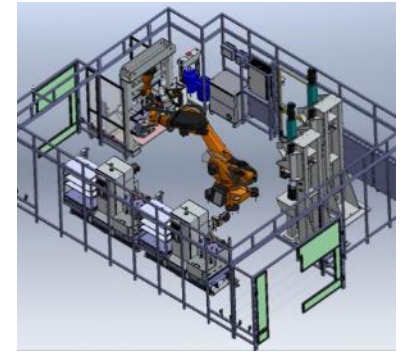
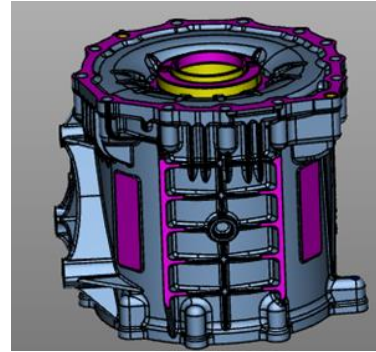
HANDLING GRIPPERS FOR INTERMEDIATE LAYERS





# SPEED TO MARKET... BUT, DON'T BITE OFF MORE THAN YOU CAN CHEW

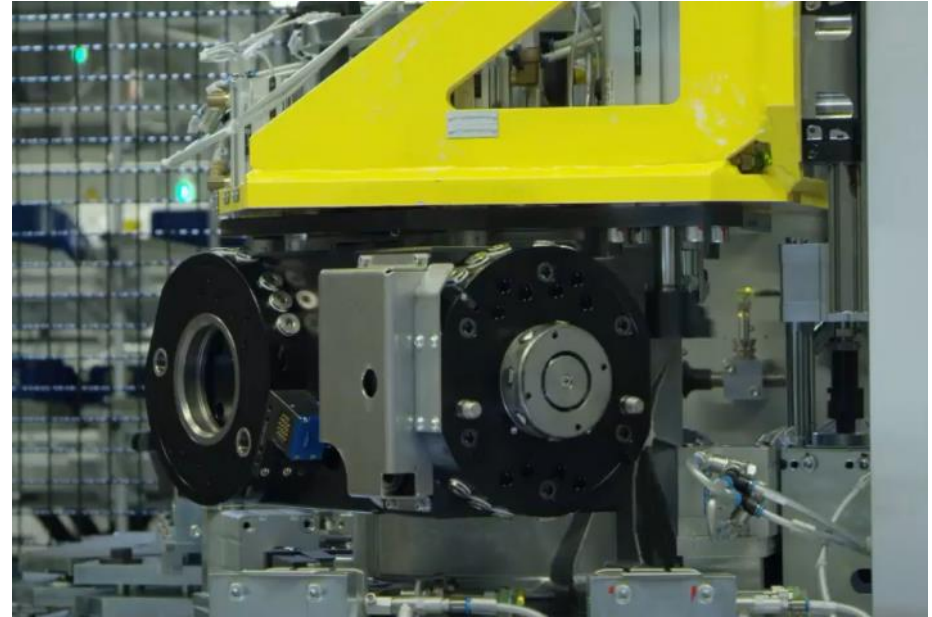
DESCRIPTION	HOUSING GRIPPER
Project description	Pick up of rotor and stator from conveyor and place them in different operations
Scope of delivery	1 gripping system, 50 workpiece carriers
Project parameters	<ul style="list-style-type: none"><li>▶ Servo gripper with a max. gripping force of 7900 N</li><li>▶ Prism jaws made of non-magnetic steel</li><li>▶ Additional workpiece carrier hold</li></ul>
End customer	Porsche
Integrator	Kuka Bremen
Reference number	01SYS002290





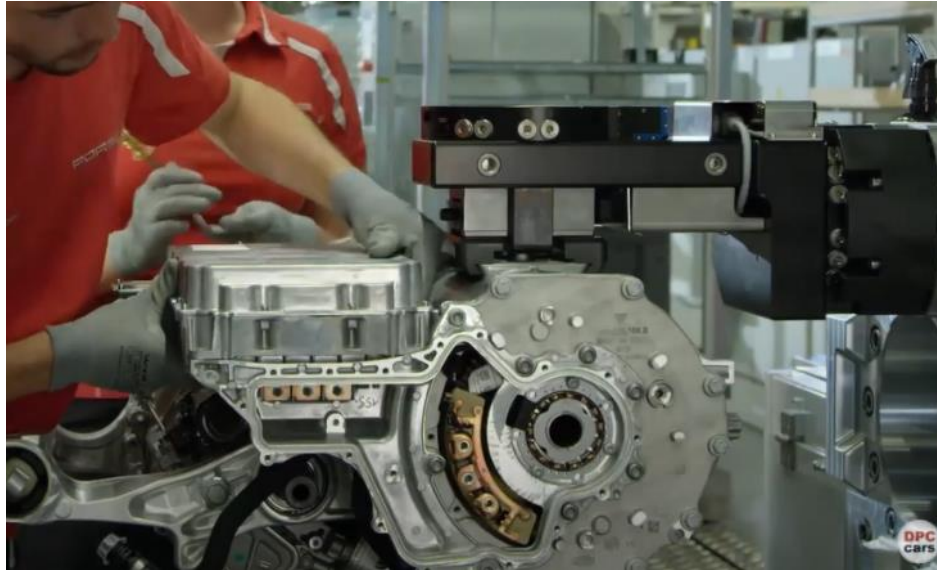


# E-MOBILITY ENGINE PRODUCTION





# E-MOBILITY ENGINE PRODUCTION





**THANK YOU**

**[RUSSELL.TYLER@ZIMMER-GROUP.COM](mailto:RUSSELL.TYLER@ZIMMER-GROUP.COM)**

**BOOTH 1023 ON MAIN STREET**

**ZIMMER**  
group