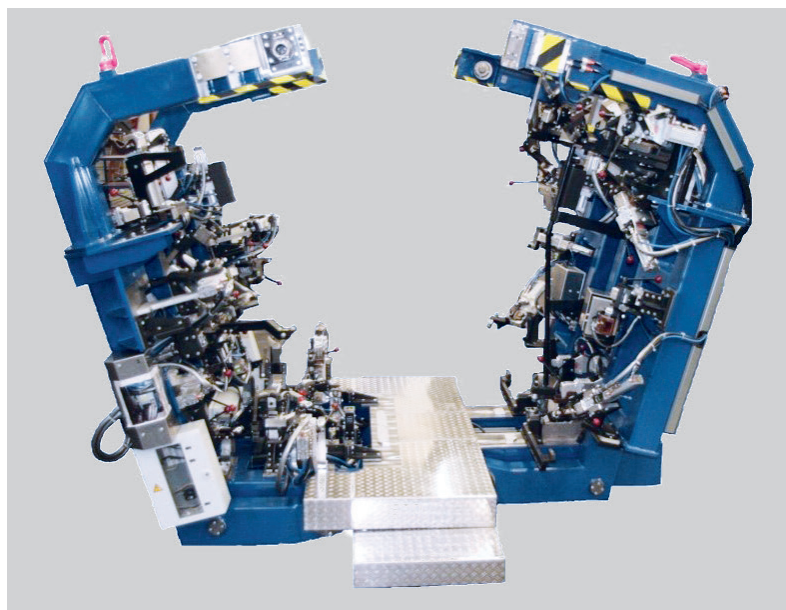


WELDING TECHNOLOGY

We develop complete solutions for measuring, testing and assembly systems from the design to the final production, assembly and commissioning.

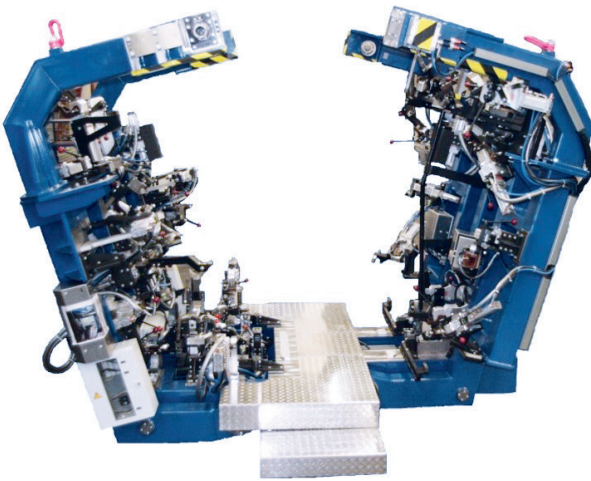
**See the difference for yourself. NMH –
Innovation is our world**



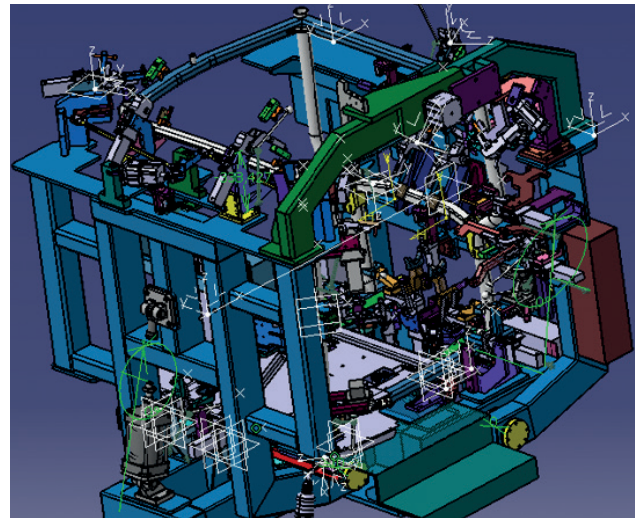
NMH

WELDING TECHNOLOGY

NMH designs and builds all types of welding fixtures according to customer specifications or in-house designs with manual or pneumatically actuated clamping /spreading mechanisms. Whether equipped with cooled clamping systems or high-strength and temperature-resistant materials, NMH delivers solutions according to your requirements for everything from simple clamping fixtures to complex robot-loaded multi-cells (e.g. as a 3-way multi-welding cell).



>> Pivoting and walkable NMH final welding fixture for cabs

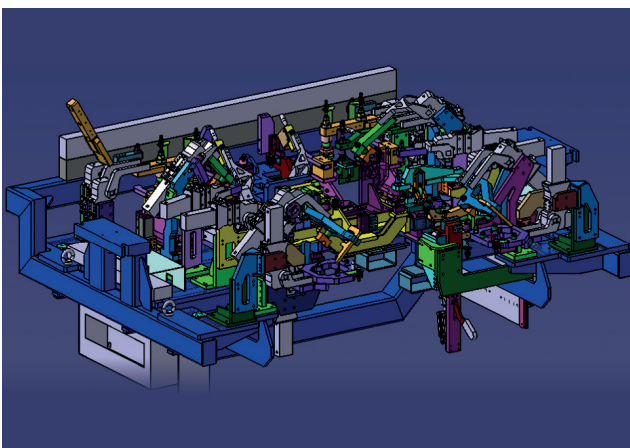


>> Cab final welding fixture CAD model

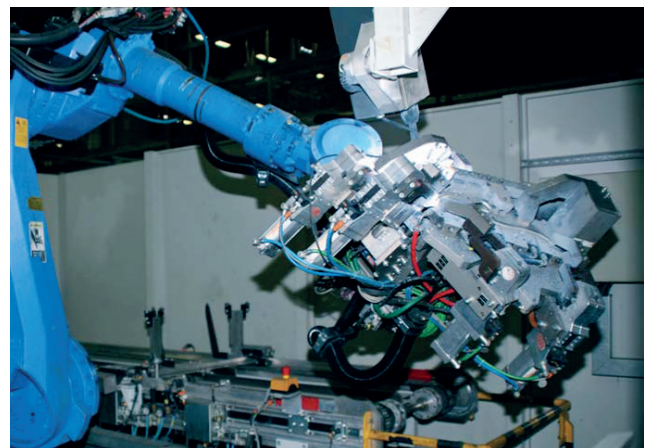
Cab welding fixture

>> Floor, roof and side elements are welded ahead of time in their welding fixtures

>> Then the prefabricated parts are welded together to build a complete cab in the final work step



>> Detail – bottom plate welding fixture



>> Robotic grabbers as TIG / MAG welding fixture

The implementation of designs for welding fixtures takes place in a 3D CAD system (primarily Catia).

This enables a study of the accessibility of the welding stations (collision analysis) with the help of ROBCAD.

- >> Programming of pick-to-place tasks of the part handling by the robot, including interface definition for the superordinate control unit
- >> User-friendly structuring of robot programs
- >> Adaptations of fixtures with respect to the welding system that is in use (fastening, media connections, etc.) to existing customer requirements

The individual components and the welded workpiece are held by a workpiece carrier, indexed and prepared for the grabber for transfer.

NMH designs and produces the workpiece carriers in observance of interfering contours with respect to the individual grabbers.

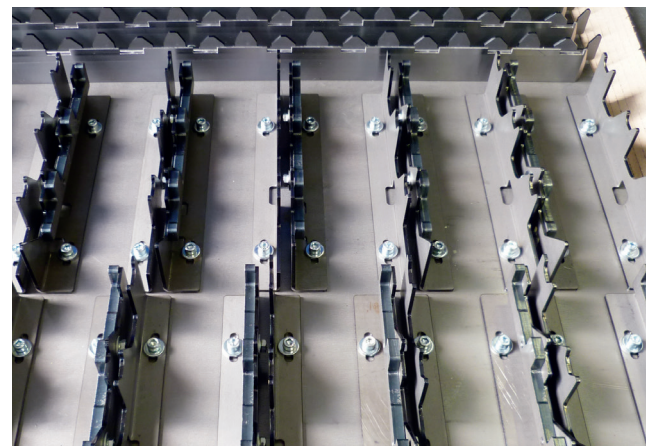
PSE 5 links

Nr	P1 Merkmal	P1 Job	P1 Formel	P1 Soll	P1 UTot	P1 OTot	P1 Formel
01	Hüllkurvenauswertung gesamt	*	Abs(E4)+Abs(E5)+Abs(E6)+Abs(E7)	0	0	0	
2	02 Rollenprüfung Auswertung	*	Abs(M33)-(LD(M30)/10)+TR(O)+LD(M31)/10+TR(O)	0	0	60	
3	03 Klassierung Federpaket gesamt	*	Abs(E9)+Abs(E10)+Abs(E11)	0	0	0	
4	04 Messwerte vom Graph 1 innerhalb [%]	*	(TRUNC(M125*10000)/100)	100	-10	0.5.2	
5	05 Messwerte vom Graph 2 innerhalb [%]	*	(TRUNC(M126*10000)/100)	100	-10	0.5.2	
6	06 Messwerte vom Graph 3 innerhalb [%]	*	(TRUNC(M127*10000)/100)	100	-10	0.5.2	
7	07 Messwerte vom Graph 4 innerhalb [%]	*	(TRUNC(M128*10000)/100)	100	-10	0.5.2	
8	08 Schweißprüfung	*	M8	1	0	0	
9	09 Federpaket R-Gang Max [N]	*	M369+(LD(M34)+TR(U)-LD(M35)+TR(O)) ²	0	0	0	
10	10 Federpaket R-Gang Endkraft [N]	*	M370+(LD(M36)+TR(U)-LD(M37)+TR(O)) ²	0	0	0	
11	11 Federpaket Gangrate Max [N]	*	M379+(LD(M32)+TR(U)-LD(M33)+TR(O)) ²	0	0	0	
12							
13							
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15							
16							
17							
18							
19							
20	20 Kräftefehler	*	T3+V50	0	-500	500	
21	21 Winkel Gang 1	*	T3	0	-1000	1000	
22	22 Winkel Gang 2	*	T3	0	-1000	1000	

>> Removal of components from the workpiece carrier

AKR [Grad/1000]	-1.011	
TR [Grad/1000]	+0.273	
3 frei	+0.000	
4 frei	+0.000	
5 frei	+0.000	
6 frei	+0.000	
7 frei	+0.000	
8 frei	+0.000	

>> Positioning of components in the workpiece carrier



>> Inlets for component feed

ROBOT GRABBER

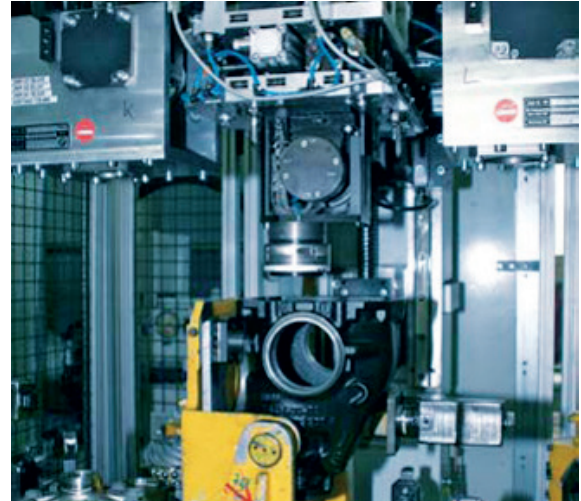
The part handling of the workpieces from the workpiece carrier to the fixture and back takes place with a robot-operated grabber. The design of the robot grabber takes place in consideration of the interfering contours on the workpiece carrier and in the fixture, as well as simulation of the robot movements.

Due to partly tight cycle times and the fact that the arrangement of individual parts on the workpiece carriers does not always match the arrangement of the respective fixture, the grabbers themselves perform certain positioning tasks during the travel movements of the robot.

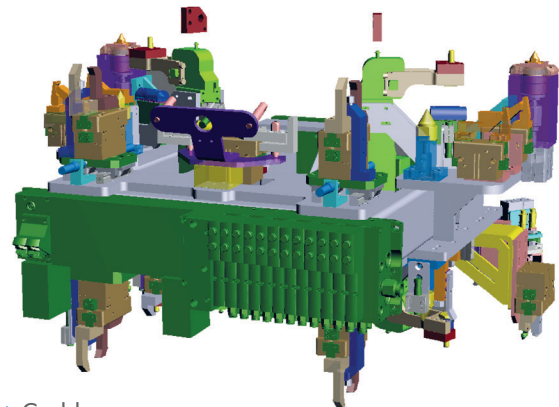
Robot grabber for MIG / MAG welding:

The burner is fastened stationary and the fixture with the parts to be welded is guided along the burner by the robot, so particular demands are made on the fixture:

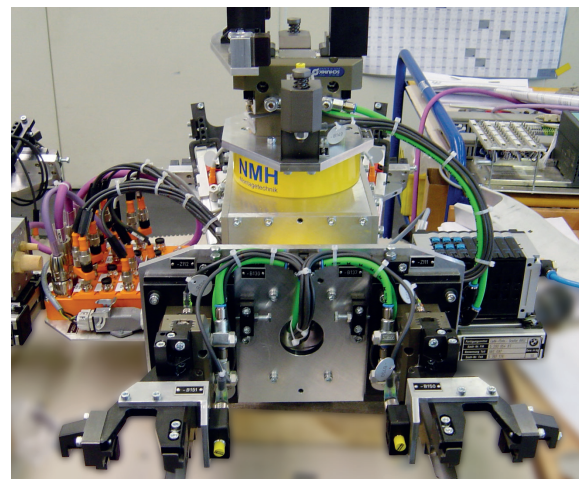
- >> The fixture must have a comparatively low mass with simultaneously high rigidity and the full range of adjustment possibilities
- >> The fixture also functions as a loading and unloading grabber based on the robot guidance. Pneumatic functions implemented on the fixture are designed for the grabbing of components when setting down on and / or removing from the workpiece carrier and for positioning and holding the components during the welding process



>> Corner reinforcement robot grabber

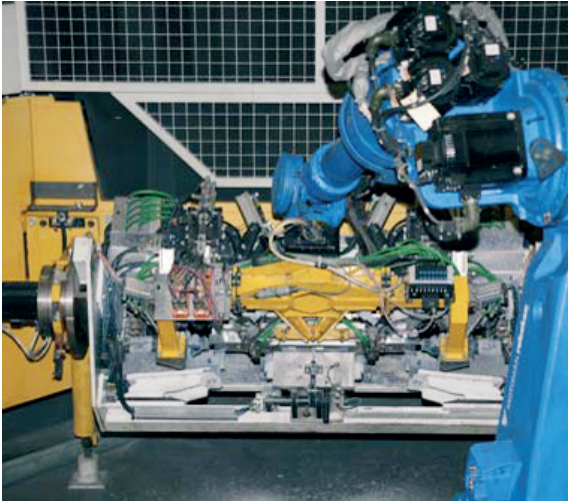


>> Grabber

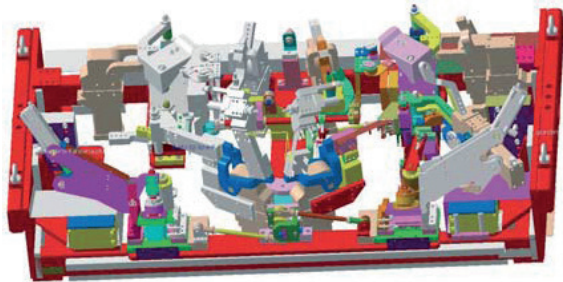


>> Cross beam robot grabber

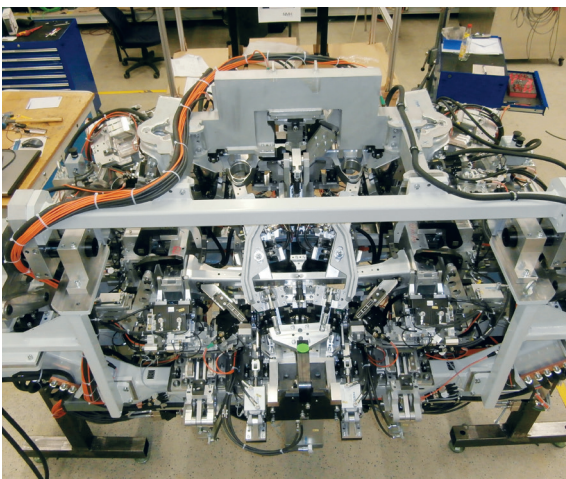
WELDING FIXTURES



>> Grabber places components in the pivotable robot welding fixture



>> Robot welding fixture

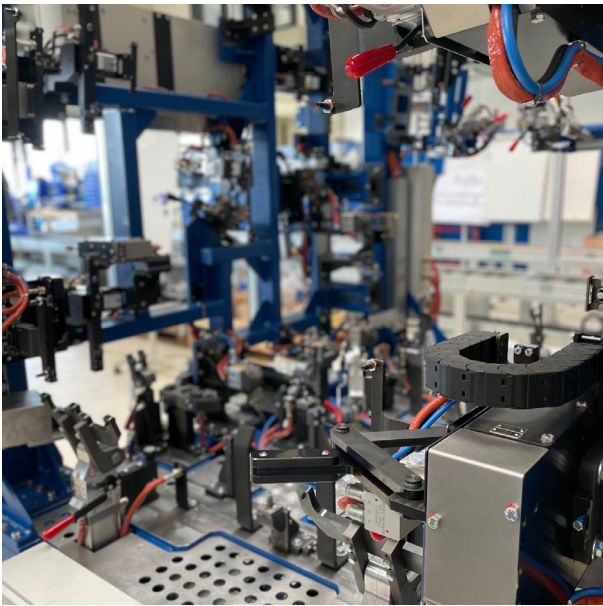


>> Robot welding fixture

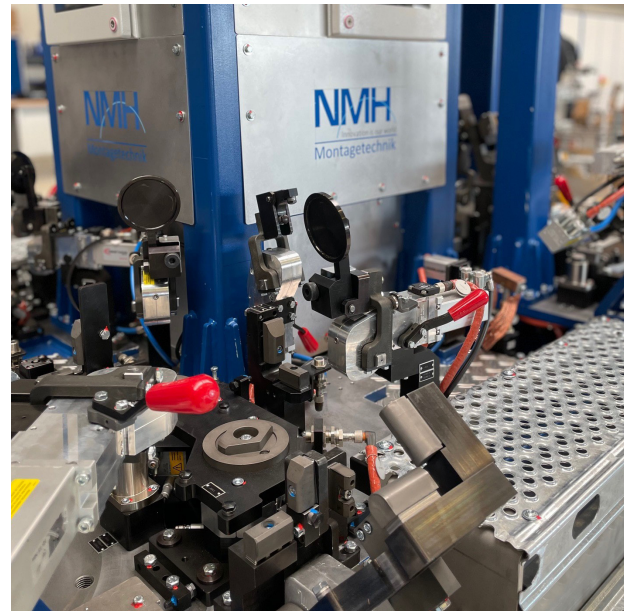
- >> Clamping and spreading of workpieces to be welded (high-pressure tube hydroforming parts and string-press sleeves) on the fixtures can be operated with a manually or pneumatically actuated clamping / spreading mechanism
- >> Workpiece accommodation adjustable or dimensionally variable, as needed, in 3 to 4 degrees of freedom in order to compensate for the dimensional changes resulting from welding distortion
- >> To guarantee the avoidance of collisions in the welding system and to safeguard the welding process, the closed positions of the feed and clamping and spreading mechanism are scanned with electrical sensors
- >> If necessary, water-cooled workpiece holders ensure that welding-intensive workpiece areas, in particular, are not overloaded thermally
- >> Material selection takes place in consideration of the stress resulting from the welding process (temperature and UV radiation) and in consideration of the corrosive behaviour of the workpieces
- >> For quality assurance, fixtures are measured and the measurement results are recorded prior to delivery

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INNOVATIVE EXAMPLES



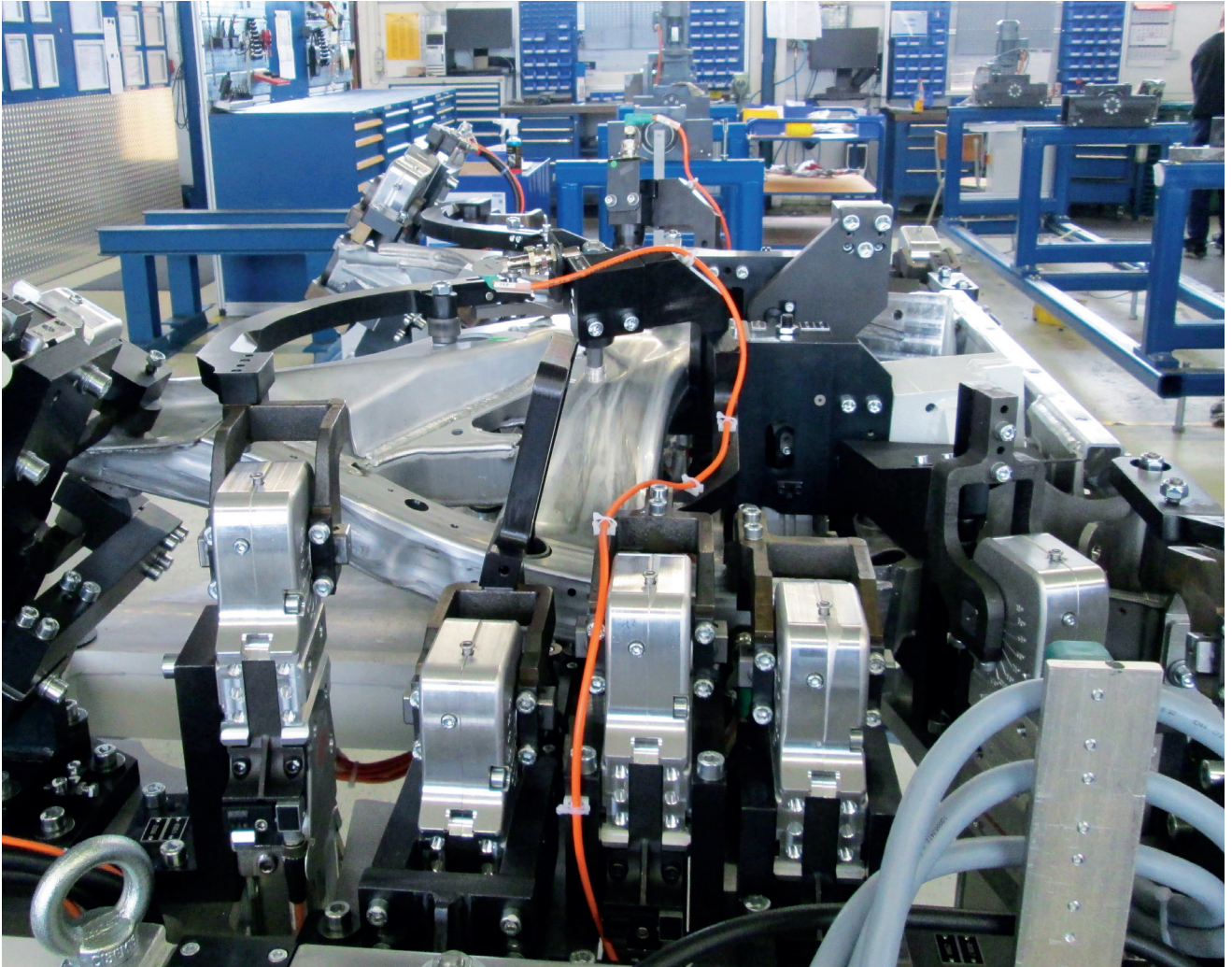
>> Welding fixture: Driver's cab



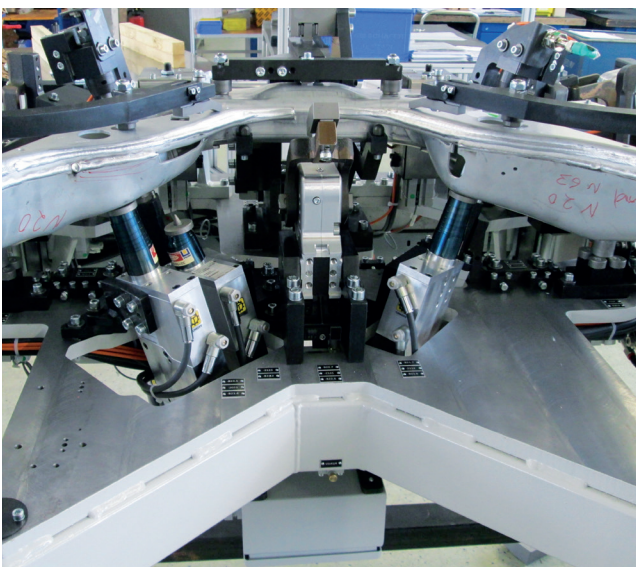
>> Welding fixture: Driver's cab



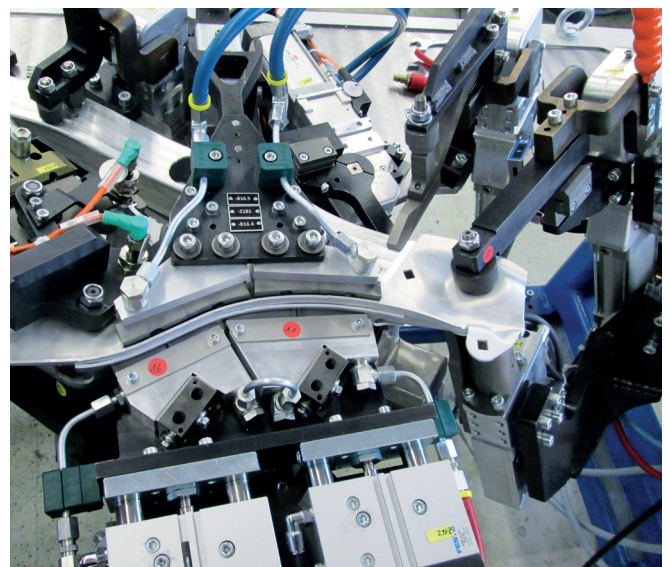
>> Welding fixture: Driver's cab



>> Welding fixture: Passenger vehicle front axle carrier



>> Welding fixture: Corner reinforcements



>> Welding fixture: Form elements for component cooling

**MORE THAN 3,400 CUSTOMERS
WORLDWIDE – INNOVATION IS
OUR WORLD**



About NMH

NMH is one of the “hidden champions” for complex measuring, testing and assembly systems. The company employs around 100 employees at the Hohentengen location. NMH offers complete solutions – from the design to the final production, assembly and commissioning. Nearly all German premium automotive manufacturers and their suppliers are NMH customers.

**Excerpt of
references**



Company film



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