



FSW INDUSTRIAL RAIL CARS PRODUCTION

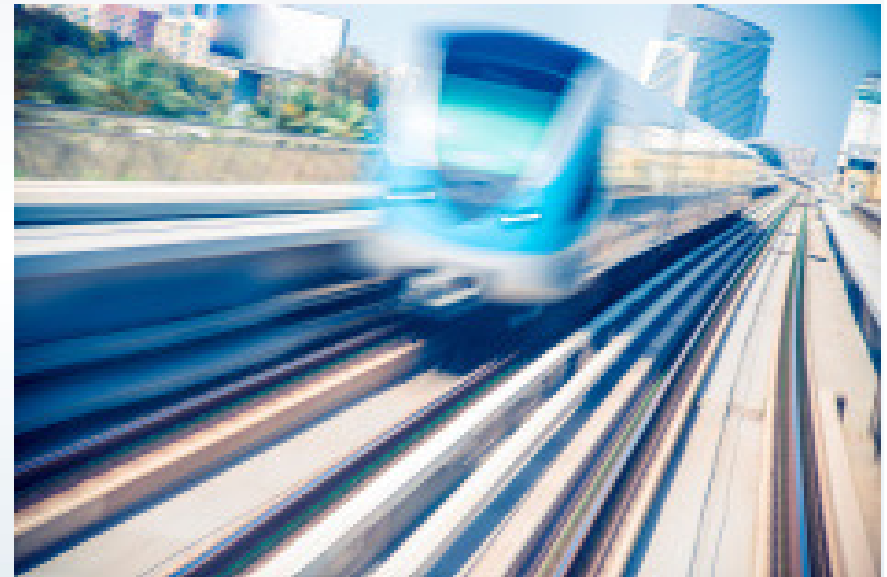
ESAB AUTOMATION, ANDERS WESTFELDT

RAIL VEHICLE INDUSTRY MEGATRENDS

- Rail industry at all time high and steady growth
 - Urbanisation and population growth
 - Increased demand for mobility
 - Environmental concerns
- On-going Consolidation in the industry
 - Acquisitions or mergers among suppliers
 - The top 5 suppliers are growing larger



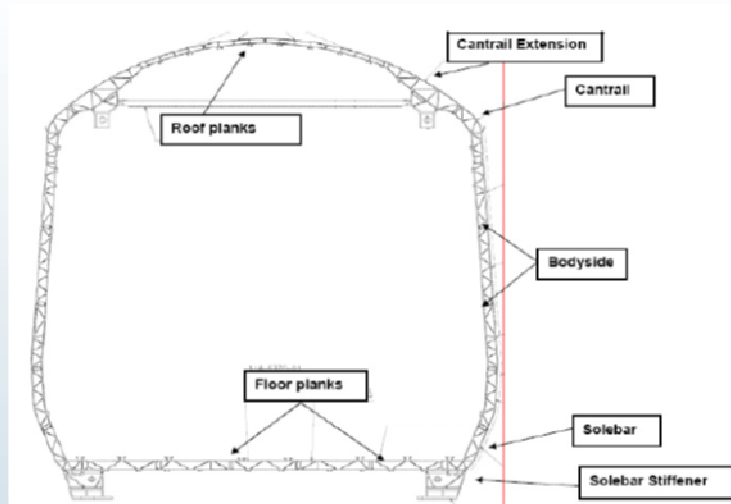
- Pushing rail car manufacturers to offer:
 - Lighter vehicles with higher capacity
 - Reducing material and energy consumption
 - Reduce cost to be competitive.



APPLICATION AREA

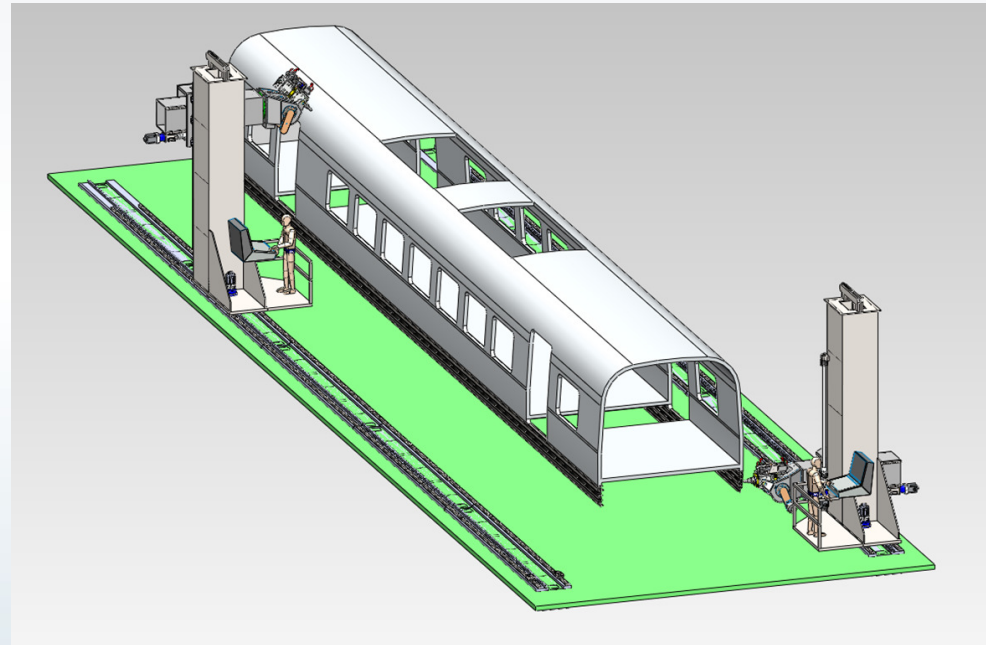
RAIL VEHICLES

- Industrial production since 1997
- Single and double sided extrusions, mainly 5xxx and 6xxx series
- Rail car body panels made of extrusion profiles



RAIL CAR BODY DESIGN FOR FSW

- Lightweight design
- Structures optimize
- Minimize number of parts
- Reduce amount of welding

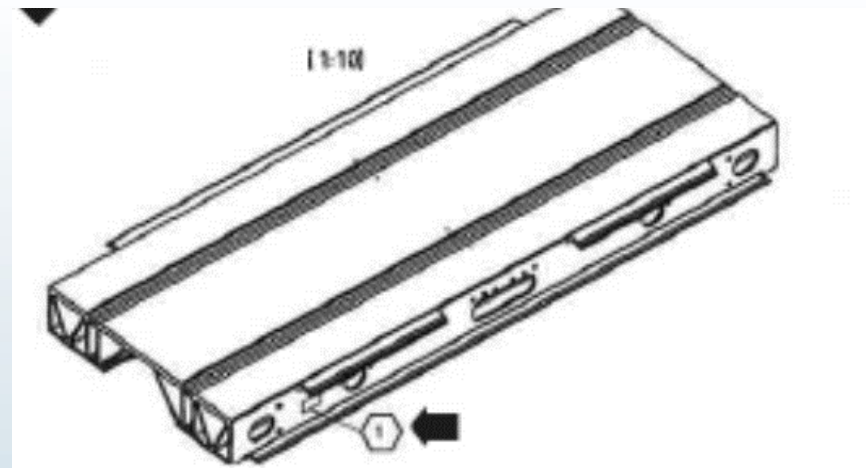
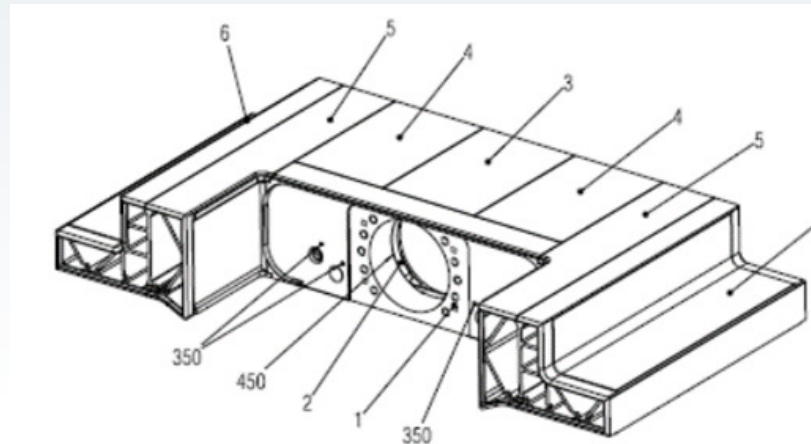


STRUCTURAL COMPONENTS

LIGHTWEIGHT DESIGN

- Coupling components
 - Thickness 25 – 30 mm

- Cross girders
 - Thickness 15 – 20 mm



PROCESS CHANGE

KEY DRIVERS

- High quality welds
 - Increased tensile strength
 - Outstanding fatigue properties
- Superior tolerances
- Minimum post treatment
 - Low distortion and shrinkage
- Weight savings

➤ Conversion from MIG to FSW

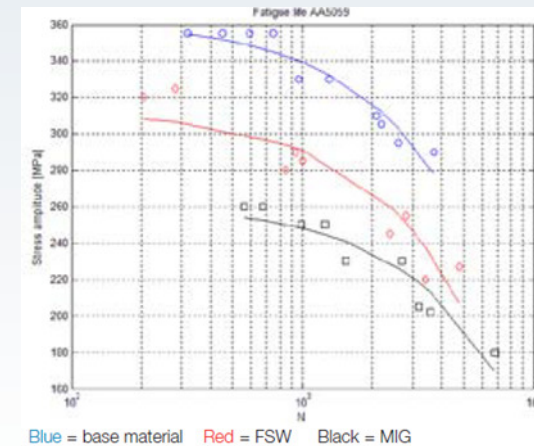
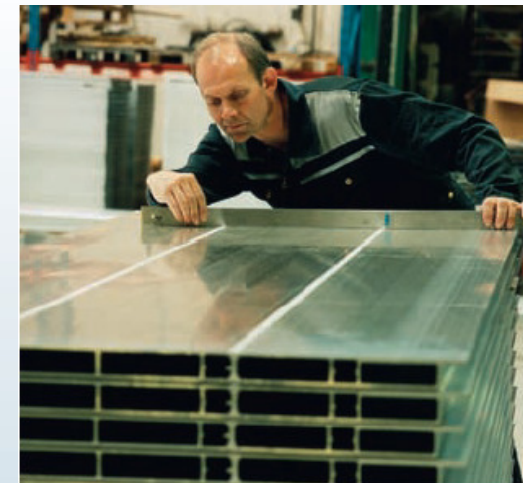


Figure 3. Fatigue life evaluation of AA5059.

FSW process gives superior fatigue properties



Flat hollow profiles inspected after welding

FSW GANTRY IN PRODUCTION

RAIL CAR BODY PANELS

- Multiple fixture stations for high productivity
Floors, roofs, walls panels, up to 26 m
- Single & Double sided profiles
- Welding of bended profile
Laser joint tracking system
- Monitoring of the weld zone
Industrial video cameras
- High productivity
Welding speed, up to 3 m/min
Transport speed, up to 20 m/min



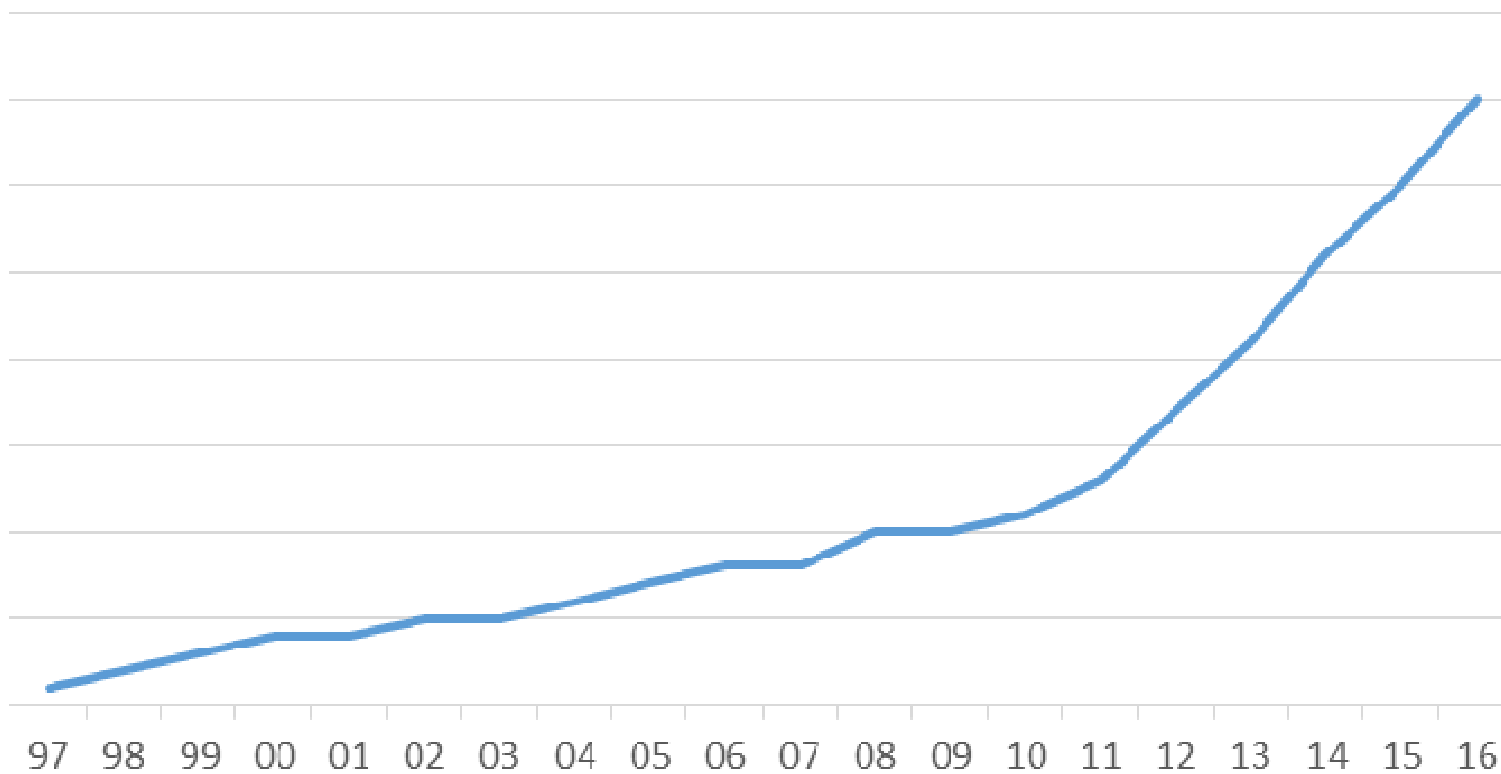
FSW GANTRY - DUAL HEADS

HIGH VOLUME FABRICATION



FSW CAPACITY - GLOBALLY AT LARGE SCALE

FSW machinery for Rail Car body panels





esab.com

THANK YOU



ESAB AUTOMATION, ANDERS WESTFELDT