

Open Up new Applications with LaserHybrid Welding

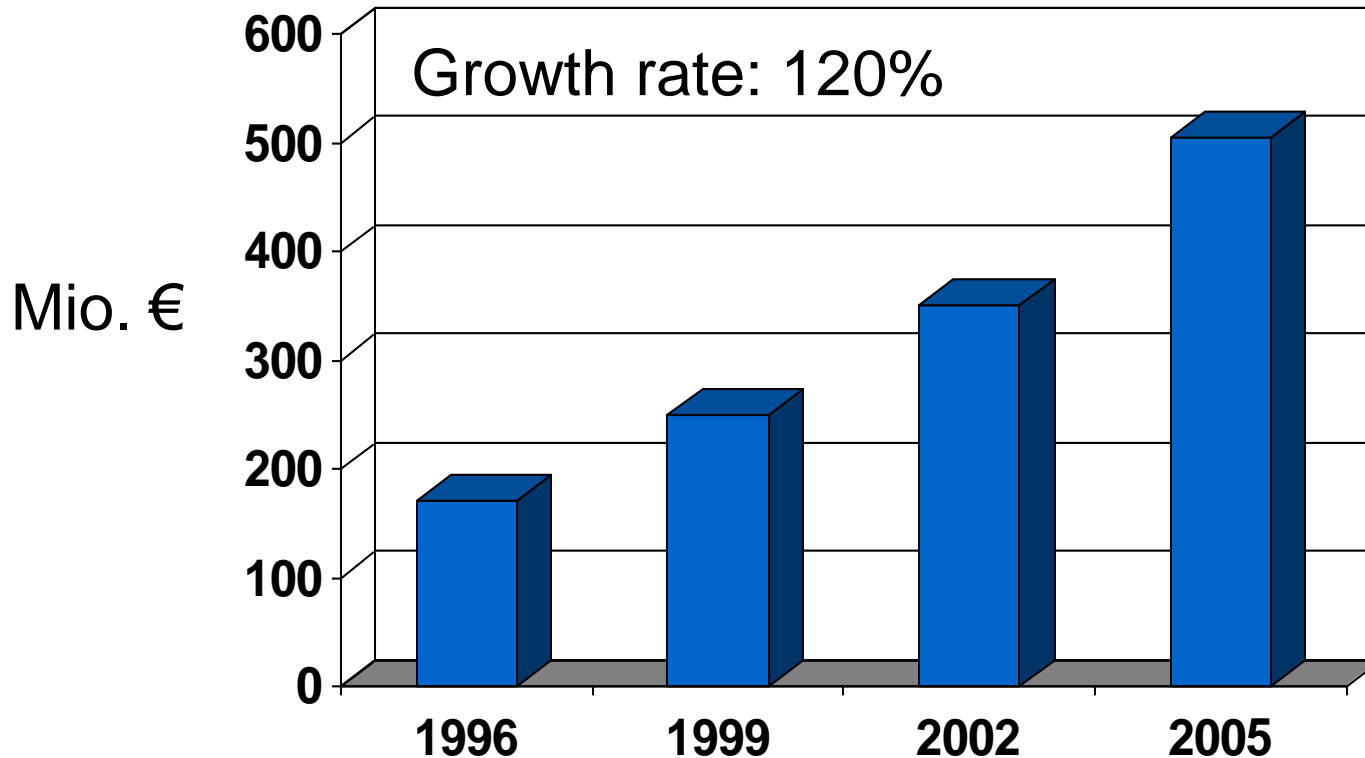
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Divisão de Soldas e Carregadores de Baterias



World Market Laser Technology



Arc technology: push away competition

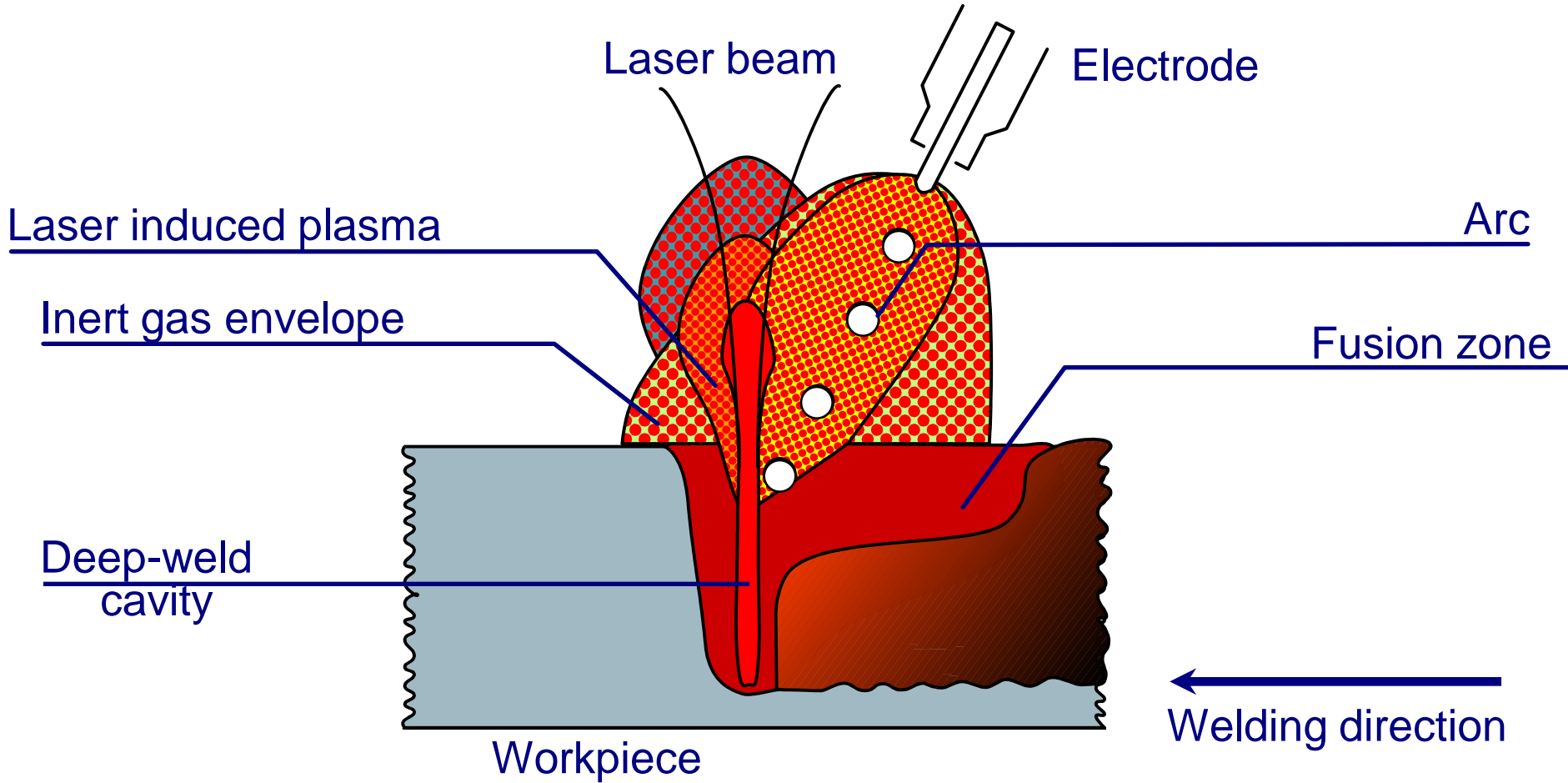
➡ Fronius has the right product

Quelle: Frost&Sullivan

Contents

- Principles of LaserHybrid welding
- Application on the VW Phaeton
- Practical Use on the New Audi A8
- Plant Engineering
- Economic Feasibility Considerations
- LaserBrazing
- Summary/Outlook

Schematic Representation



Metal Transfer



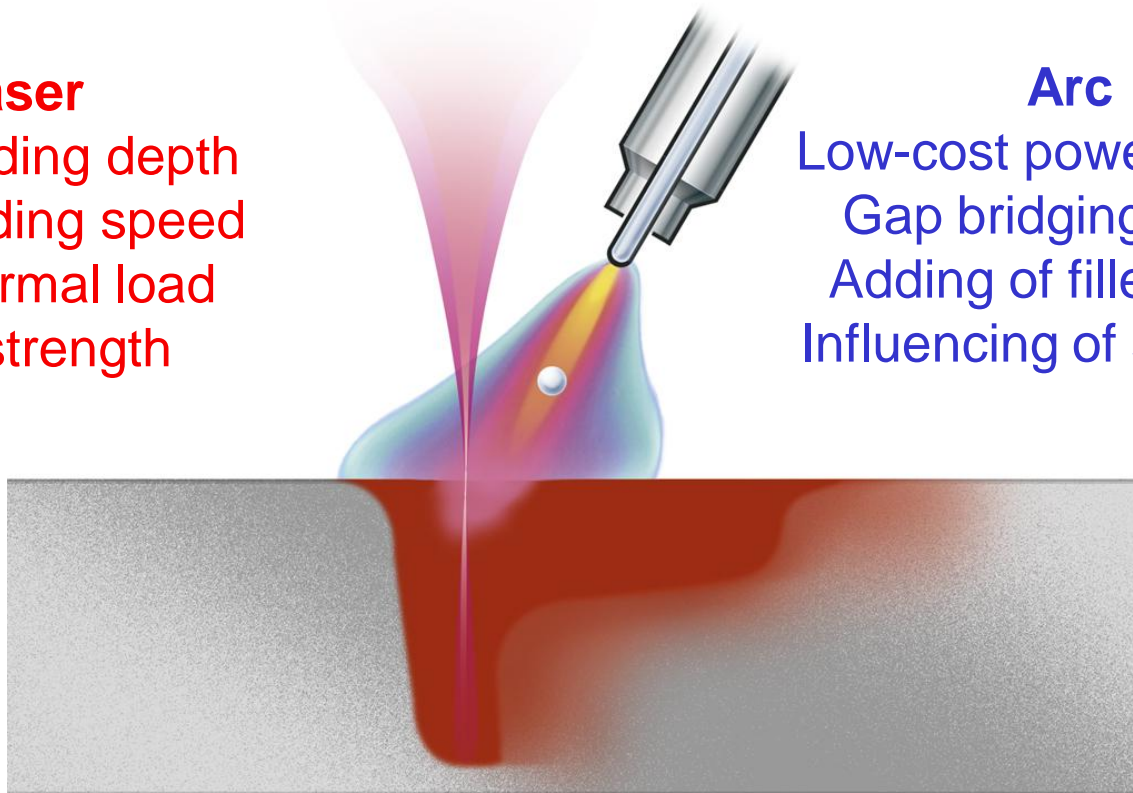
Synergies

Laser

- High welding depth
- High welding speed
- Low thermal load
- High strength

Arc

- Low-cost power source
- Gap bridging ability
- Adding of filler metal
- Influencing of structure



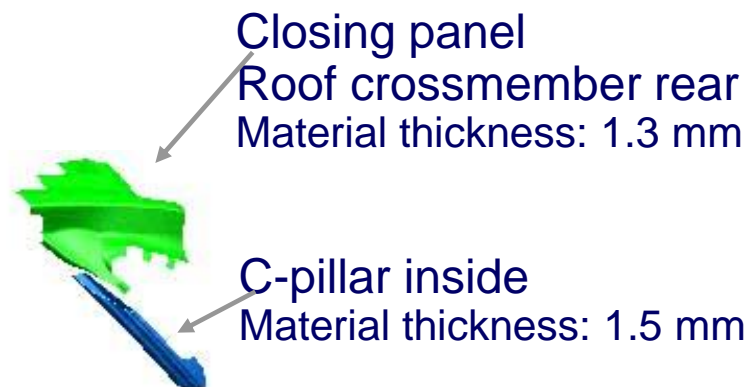
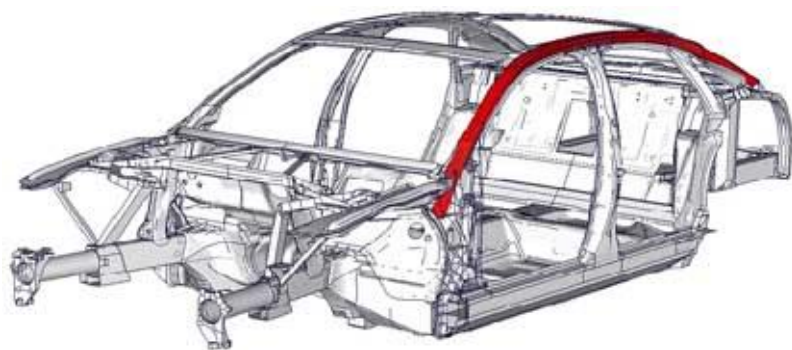
LaserHybrid

- Higher process stability, higher welding speed
- Good flow behaviour of weld edges
- Large weld volume, good metallurgical properties

VW Phaeton Application

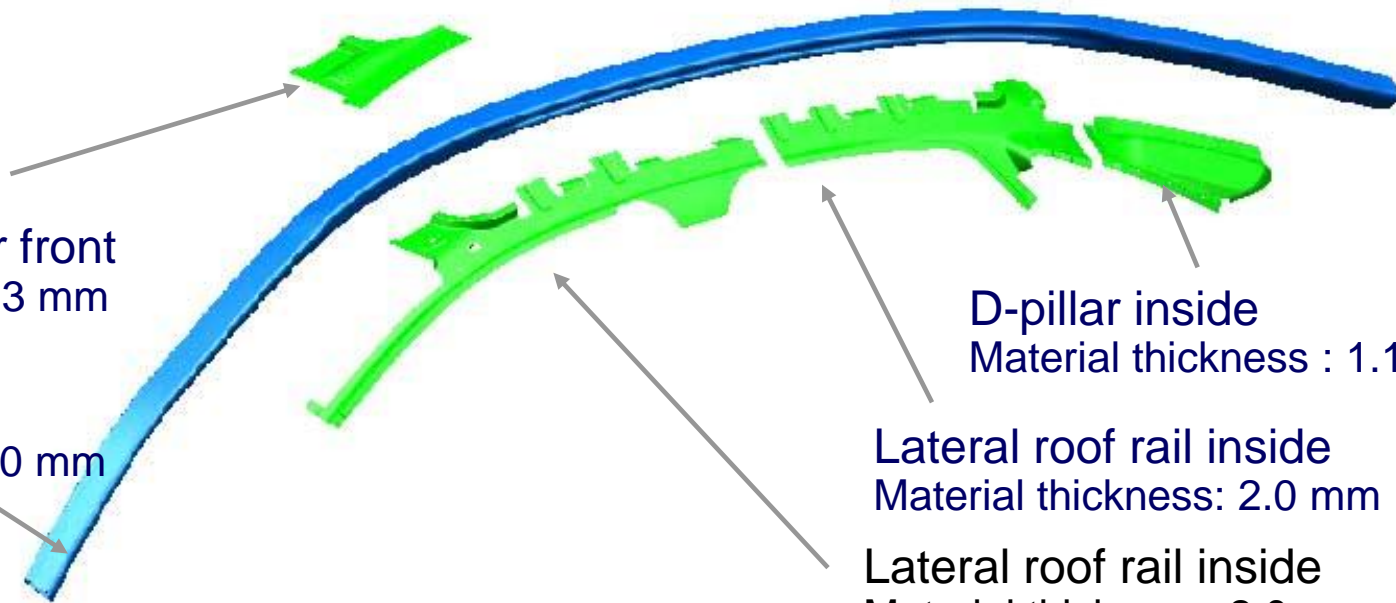


Lateral Roof Rail Welding Group



Closing panel
Roof crossmember rear
Material thickness: 1.3 mm

C-pillar inside
Material thickness: 1.5 mm



Closing panel
Roof crossmember front
Material thickness: 1.3 mm

Lateral roof rail
Material thickness: 4.0 mm

D-pillar inside
Material thickness : 1.1 mm

Lateral roof rail inside
Material thickness: 2.0 mm

Lateral roof rail inside
Material thickness: 2.0 mm

Source: Audi

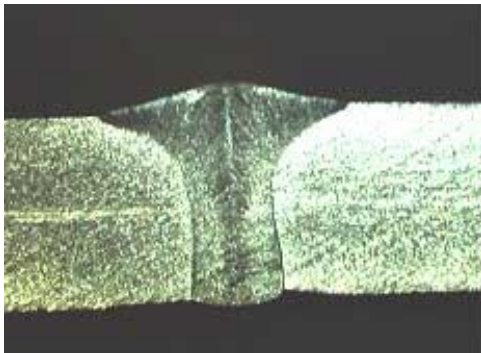
Application in the Audi A8



Requirements for a successful application

- ➡ Clamping device builder has to be involved into the process
- ➡ Designer has to be involved into the process
- ➡ System integrator has to be involved into the process

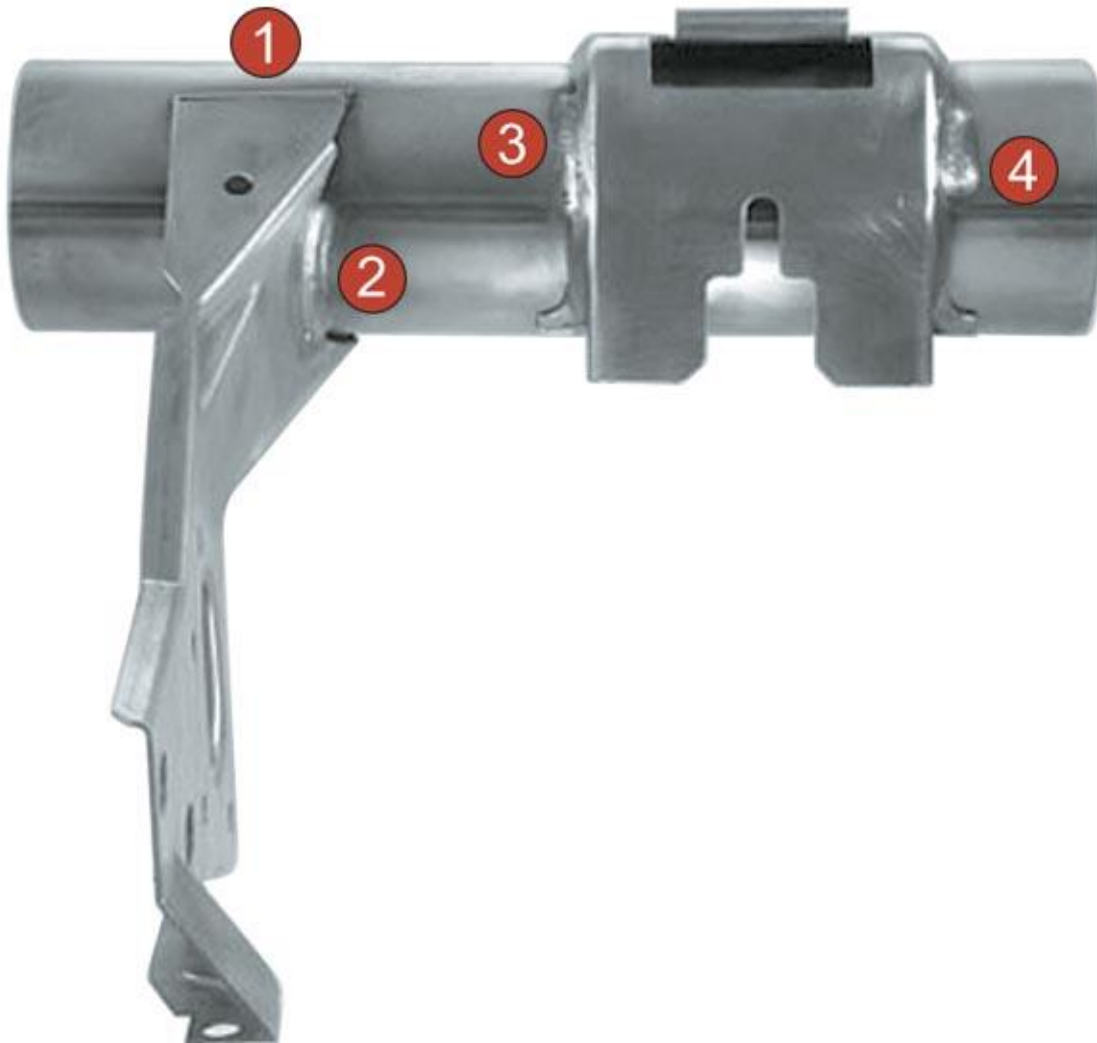
Maximum Cost-Efficiency with Maximum Quality



Material	22MnB5
Material thickness:	2.4 – 3.2 mm
Vs:	4.2 m/min

Weld corresponds to EN ISO 13919 –1/Assessment group B (high)

4 Processes Possible with LaserHybrid



1 Laser

2 LaserHybrid

3 GMA

4 GMA Tacking

Practical Examples

Steel



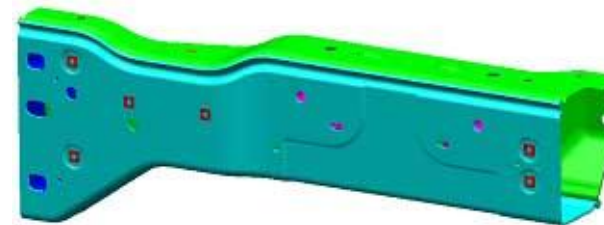
Al



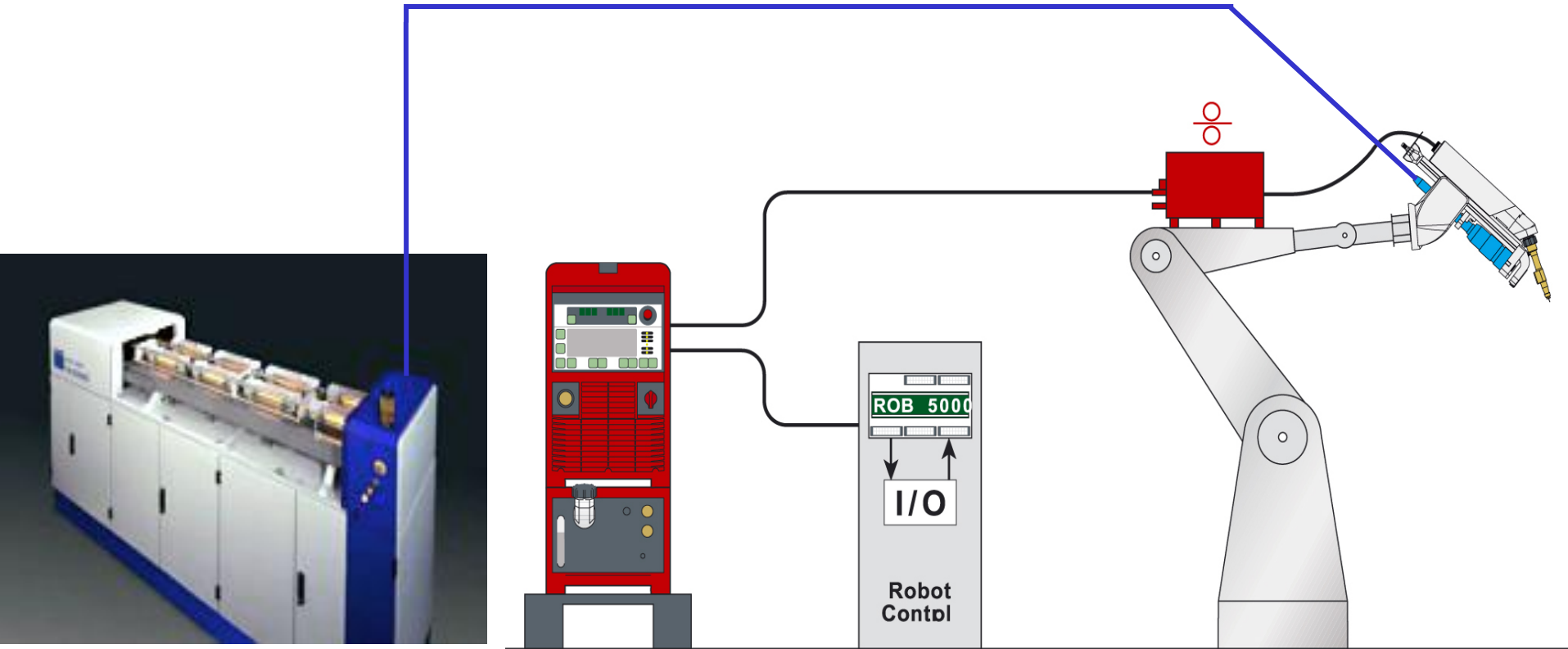
Vs: 2.4 – 4.2m/min



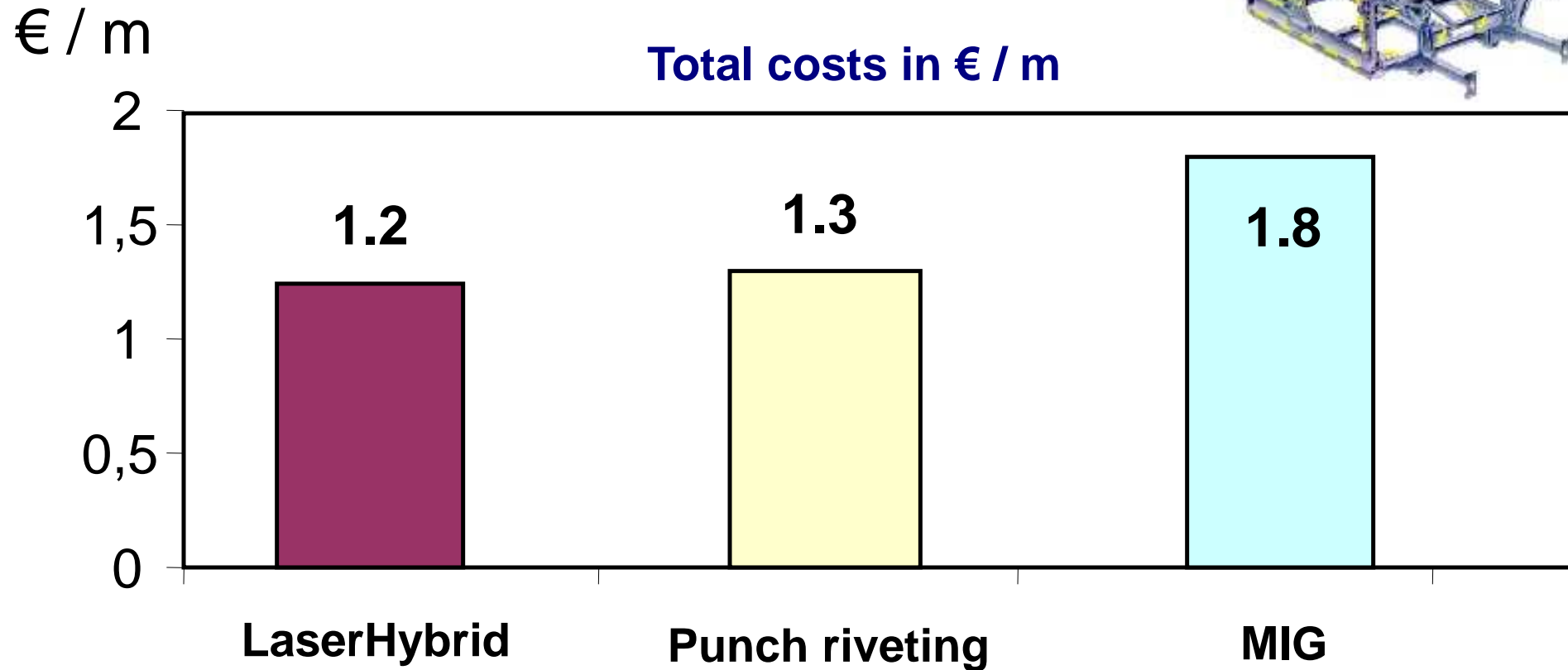
CrNi



Total System



Cost Comparison on the Audi A2



Source: Audi-Alu Centre

Seal Welding of Galvanised Steels without Defined Gap

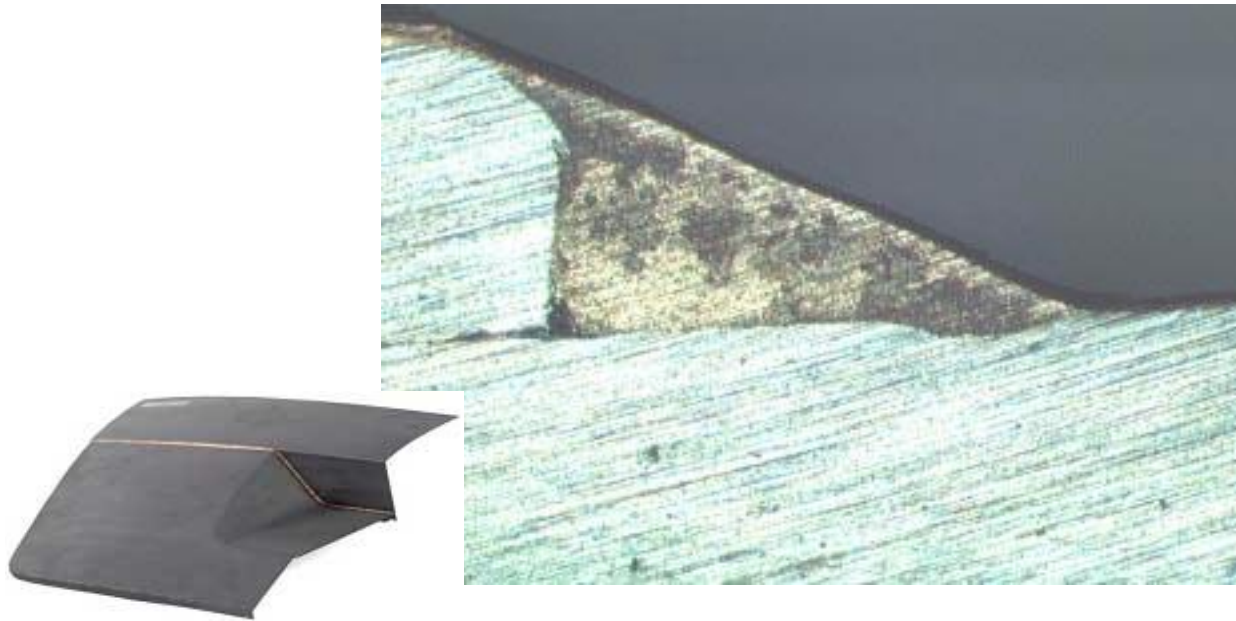
LaserHybrid: Material thickness: 1.7 mm, zinc coating: 7.5 μm



Laser alone: Material thickness: 1.7 mm, zinc coating: 7.5 μm



LaserBrazing: Fillet Weld on Overlap Joint



v_s : 3 m/min

I_s : 205 A



Material:

DC 04 + ZE 25/25

Material thickness:

1.5 mm

Filler metal:

SG CuSi 3; d: 1.6 mm

References (41 Systems)

- 1 Laser Centre Hanover (Prototype version, longitudinal welds on pipes)
- 4 Audi Neckarsulm (Roof rails, Audi A8)
- 8 Volkswagen Wolfsburg (Phaeton, doors)
- 13 Daimler Chrysler (Mettingen, Singelfingen)
- 1 General Motors USA (Pilot plant)
- 1 Trumpf Laser USA (Pilot plant)
- 1 Fraunhofer Institute for Laser Technology USA (Pilot plant)
- 2 Volvo (Steel axles)
- 1 Fiat (Pilot plant, LaserBrazing on galvanised steel)

References (41 Systems)

- 2 Vito (Belgian Institute for Technology, aluminium stringers)
- 1 Aldinger D (Heat exchangers)
- 1 French Institute for Laser Technology (Bourgogne, pilot plant)
- 1 Institute for Advanced Engineering (Korea, rail car profiles)
- 1 Sungwoo – Korea (Vehicle components)
- 1 Katech – Korean Automotive Technology Institute (Vehicle components)
- 1 University of Technology Madrid
- 1 AWL Netherlands

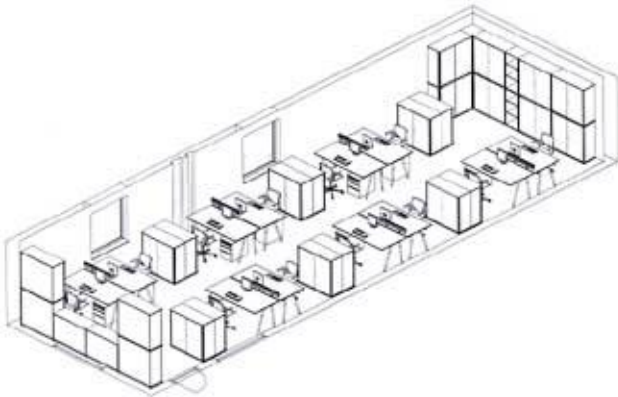
Application Center in the Technology Center in Wels

Hall 380 m²



Laser aggregate

Accessoires



3 Laboratories



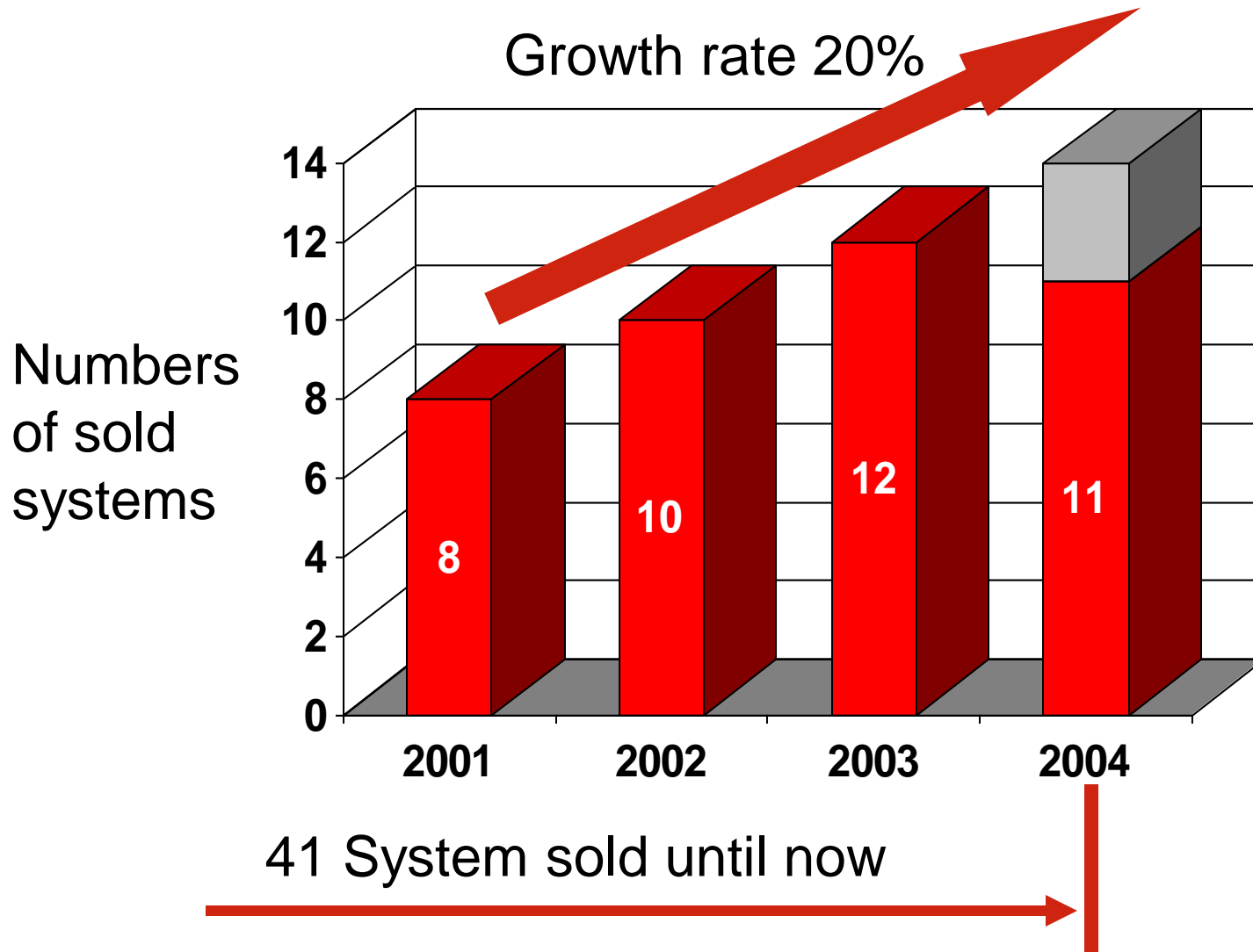
Demonstration cell	12 m ²
Robot + external axle	20 m ²
Robot cell	20 m ²



Summary / Outlook

- High welding speed with low thermal input
- 1 System: LaserHybrid, GMA, GMA-Tacking, Laser
- Higher compatibility with gap tolerances than with laser welding
- LaserHybrid: 1 – 6 mm in Al, St, CrNi
- Outlook:
 - Laser-Tandem for higher deposition rates
 - LaserHybrid on galvanised sheets

Growth rate of LaserHybrid





PERFECT WELDING