

Extruded aluminium alloys and their applications



Picture: FWB

- ▶ Company FWB
- ▶ Aluminum market
- ▶ Aluminium alloys, Extrusion and machining
- ▶ Application examples in industry
- ▶ Typical applications in the automotive
- ▶ Outlook and Future

► Divisions



Automotive 50 %
Construction 25 %
Industry 25 %



► Process chain

FWB as a system supplier for complex products

Engineering

- products
- materials
- processes

Prototyping

- In-House
- as GU

Extrusion

- Semis
- cut
- autom. cut

Processing

- mech. proc.
- transform
- surface

Assembly

- components
- modules
- systems

► Production network

Ense

Dortmund

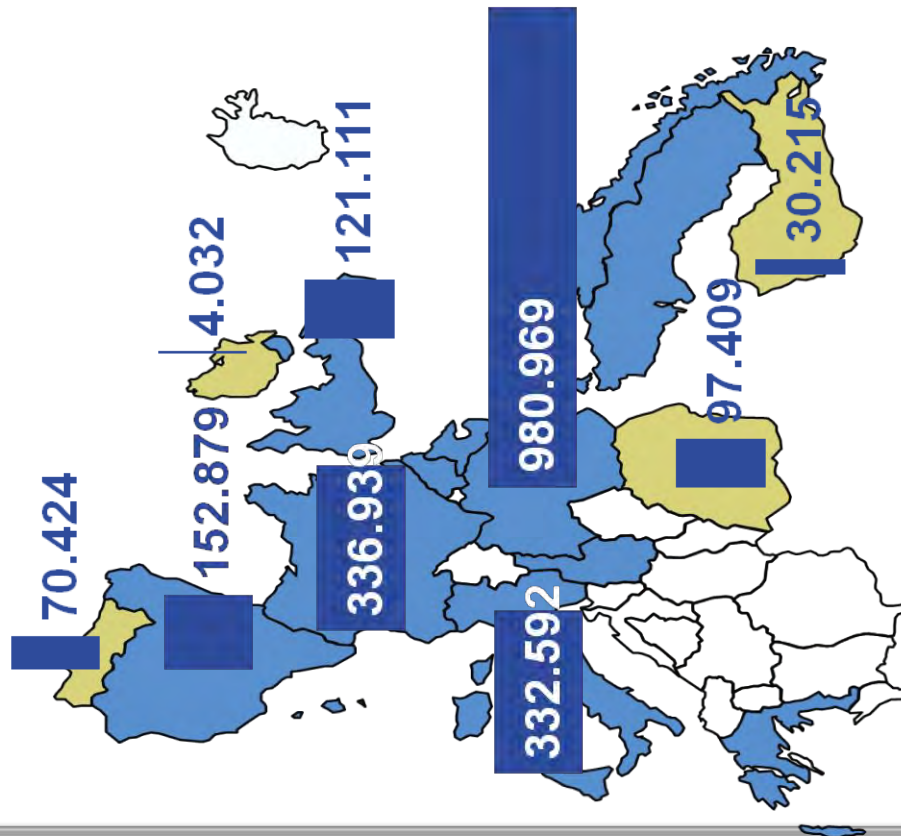
Opole / PL

EUROPEAN MARKET FOR EXTRUDED PRODUCTS? DELIVERY VOLUME BY COUNTRY



European deliveries in tons

EU27: 2.771.325 tons



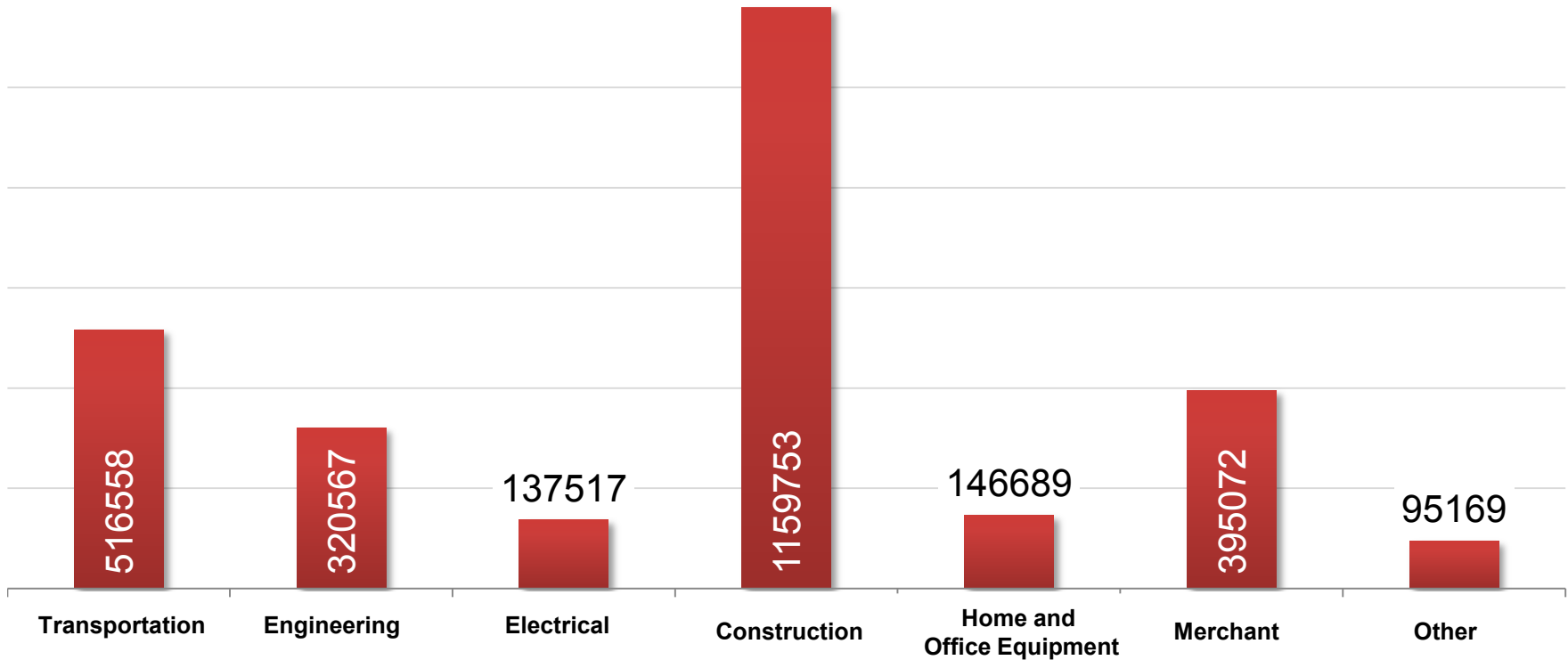
Source: EAA, GDA

EUROPEAN DELIVERIES OF EXTRUDED PRODUCTS

DELIVERIES BY CONSUMER GROUPS

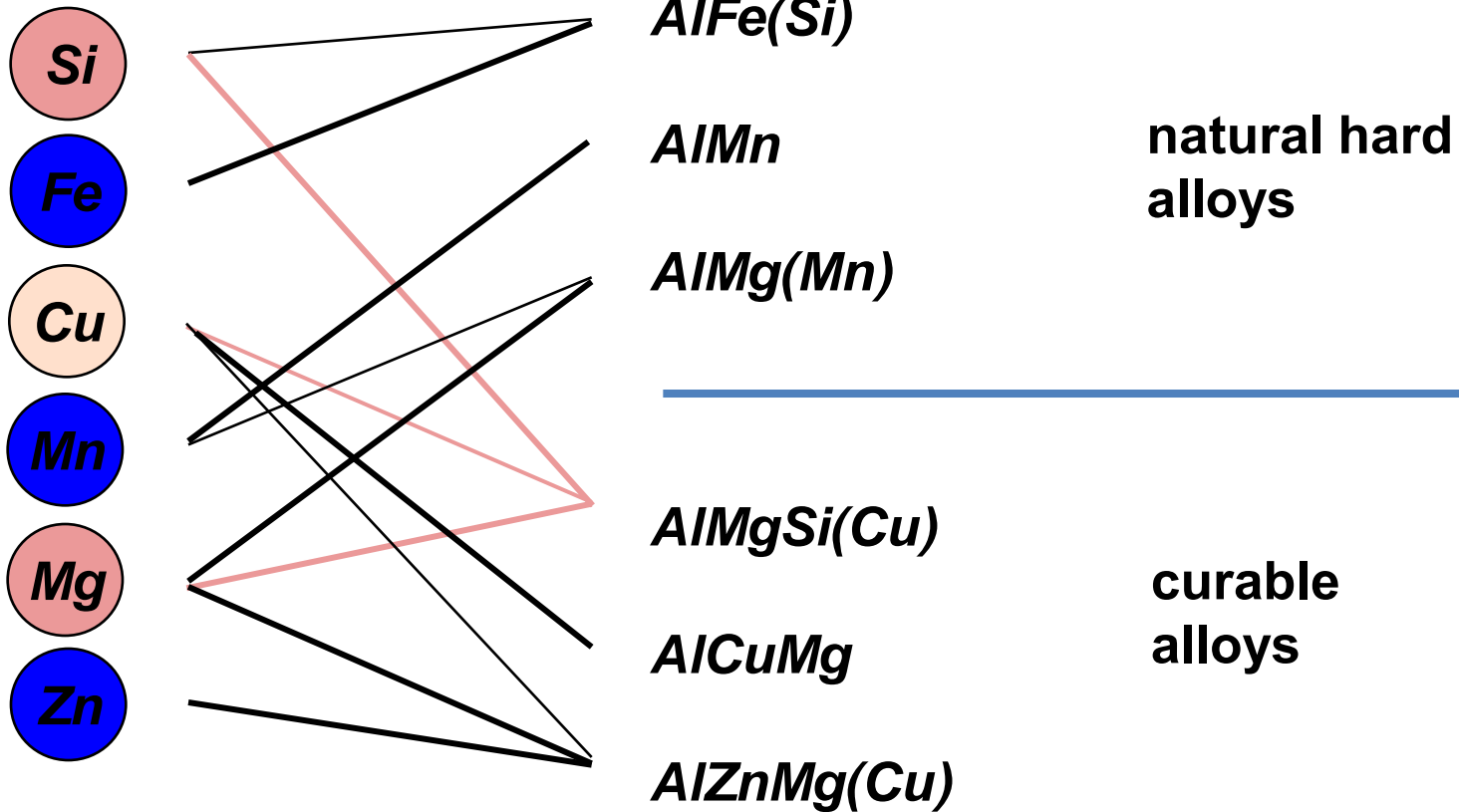


EU27
in Tonnen

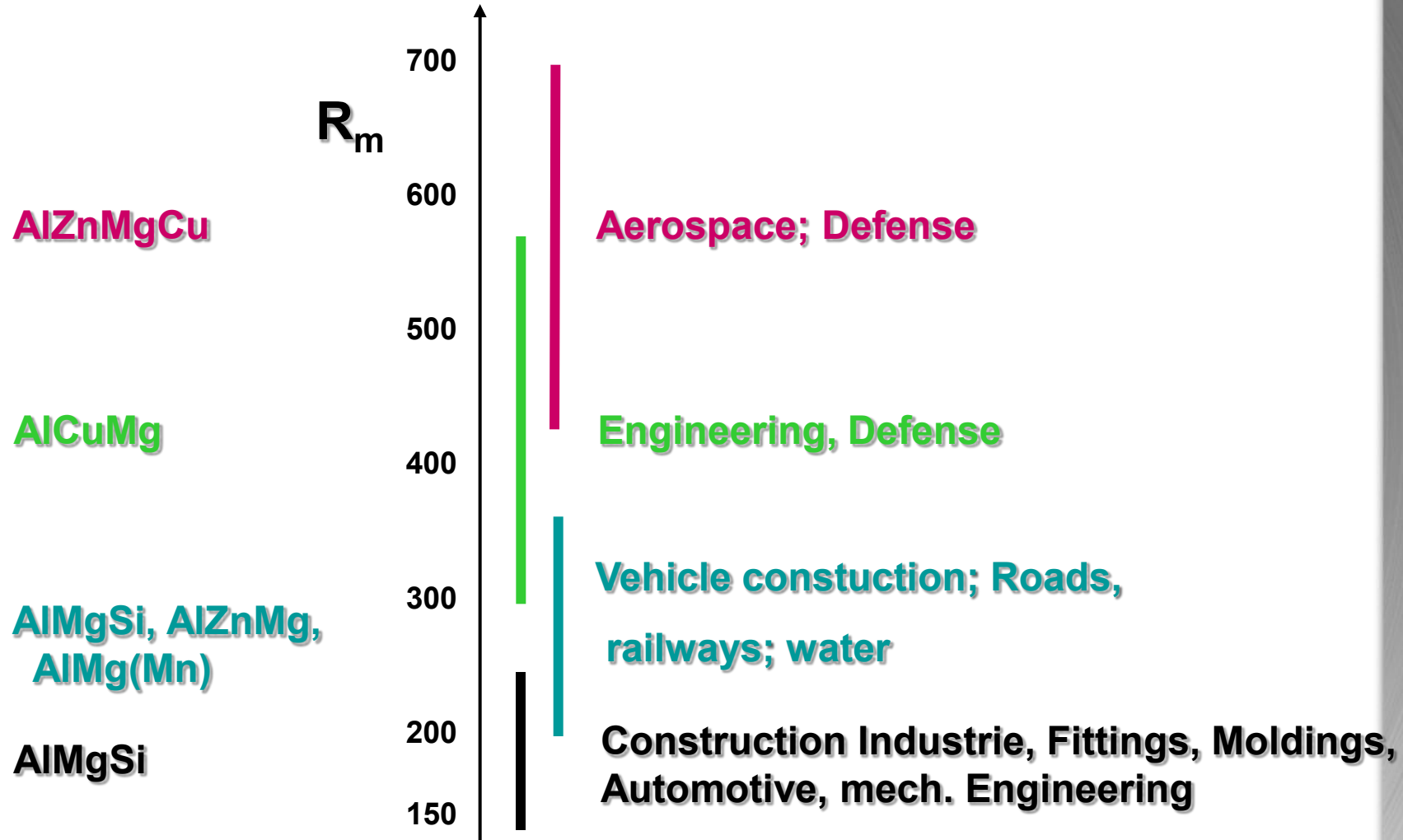


Source: EAA, GDA

ALUMINIUM - ALLOY - TYPES

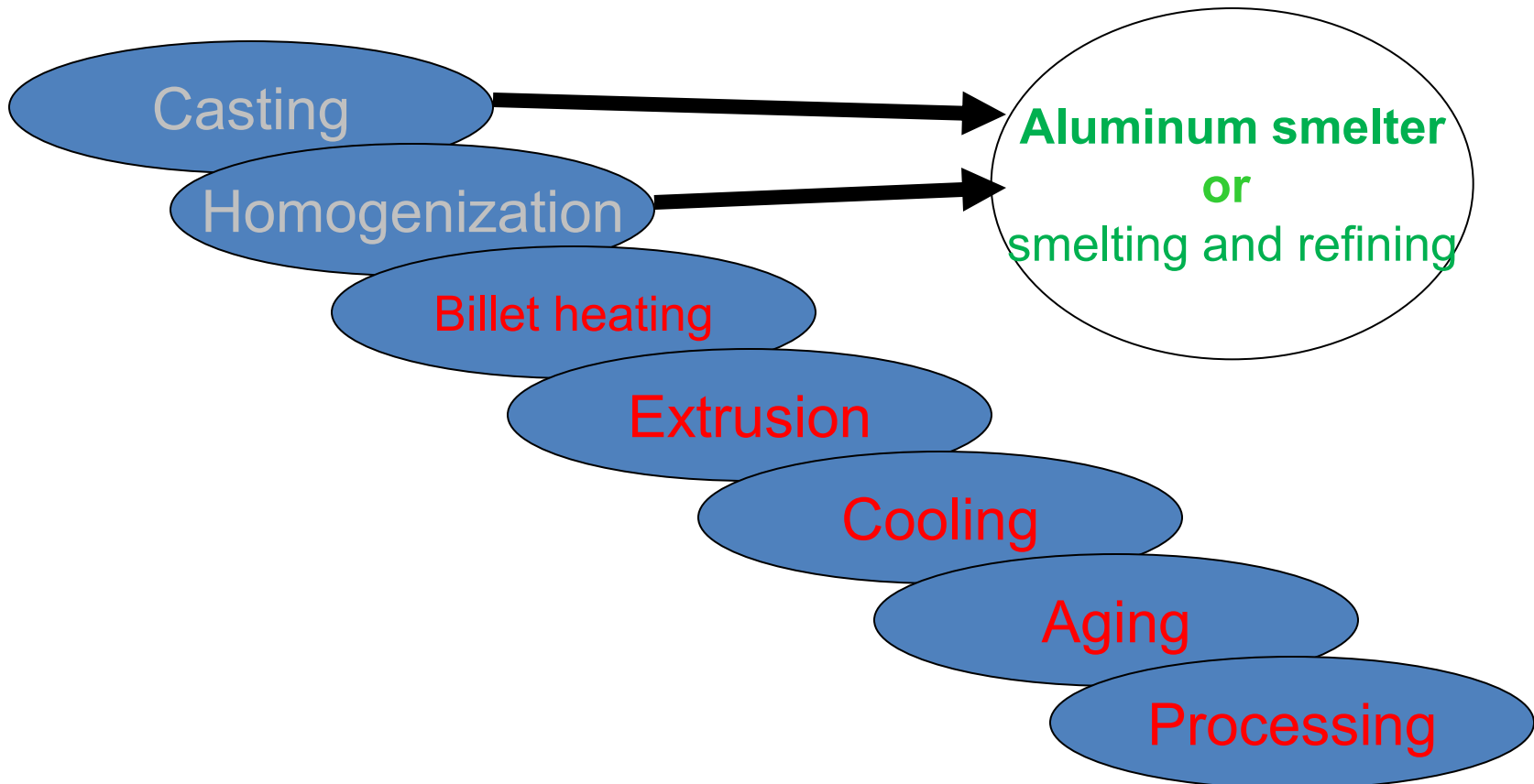


ALLOY - STRENGTH - APPLICATION



Production of aluminum extrusions

A single series of dependent steps



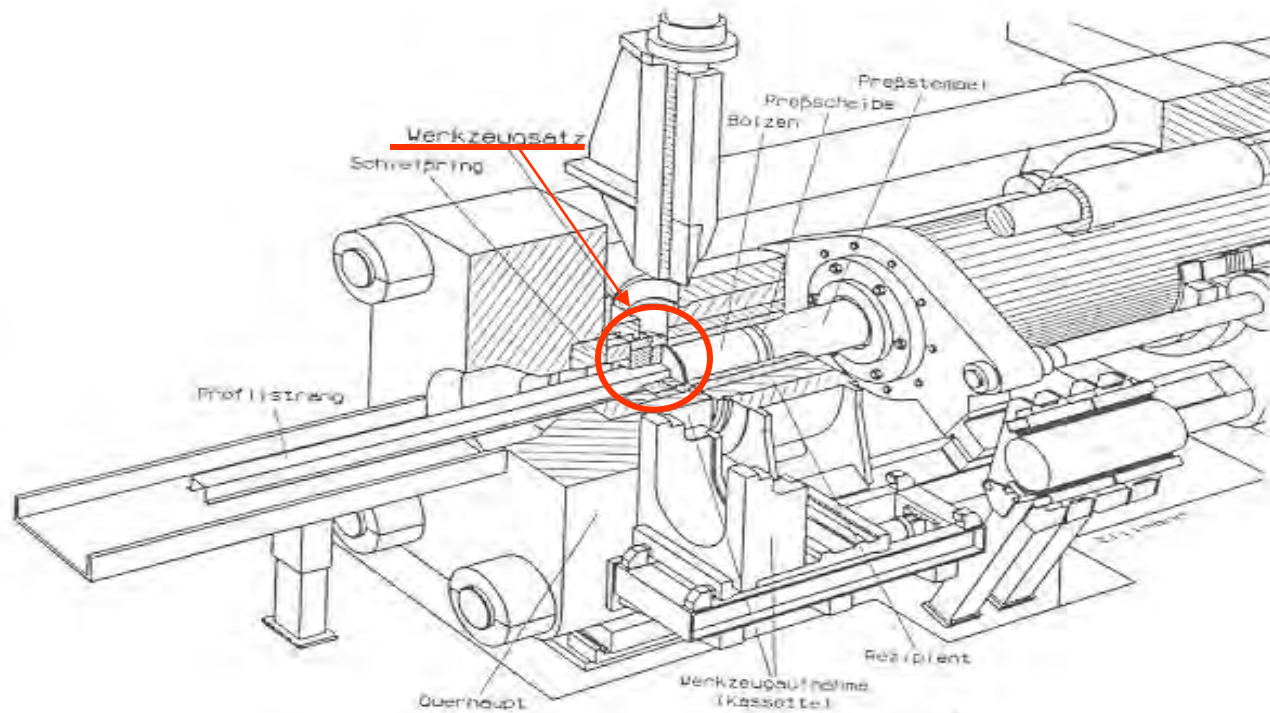


Aluminium Billets

Aluminium Extrusionpresses

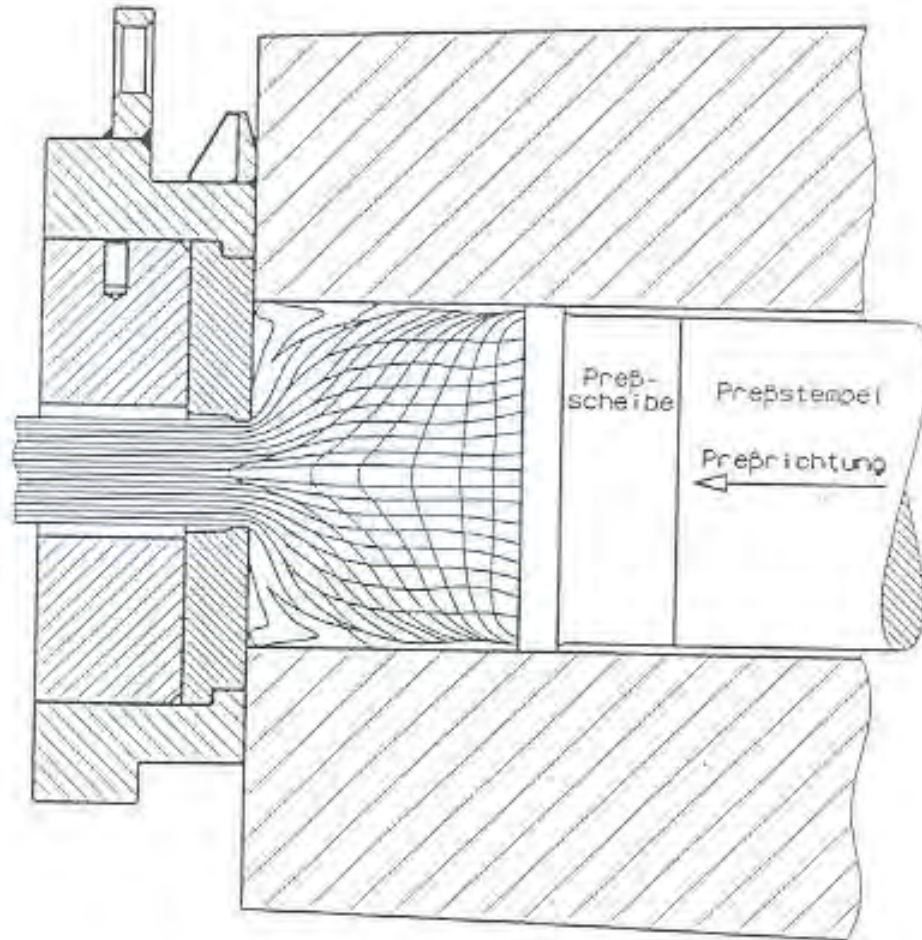


Building a Extrusionpresses with toolkit



Quelle: Ames, Strangpressen

Materialflow in the Container

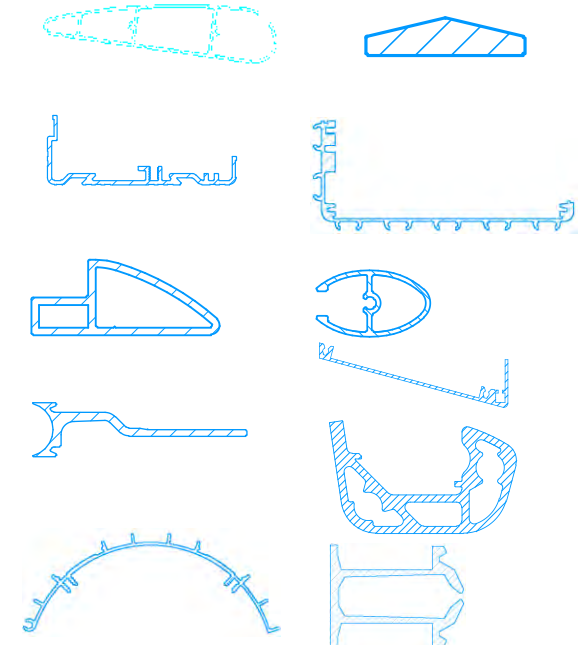
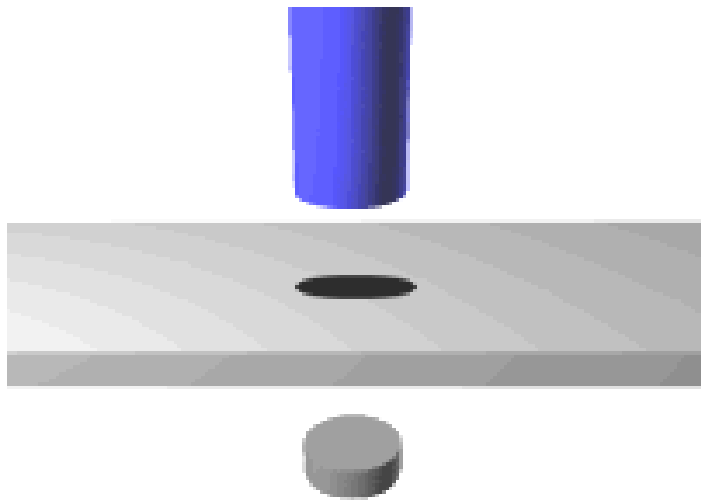


Quelle: Ames, Strangpressen

A selection of aluminum - extruded profiles

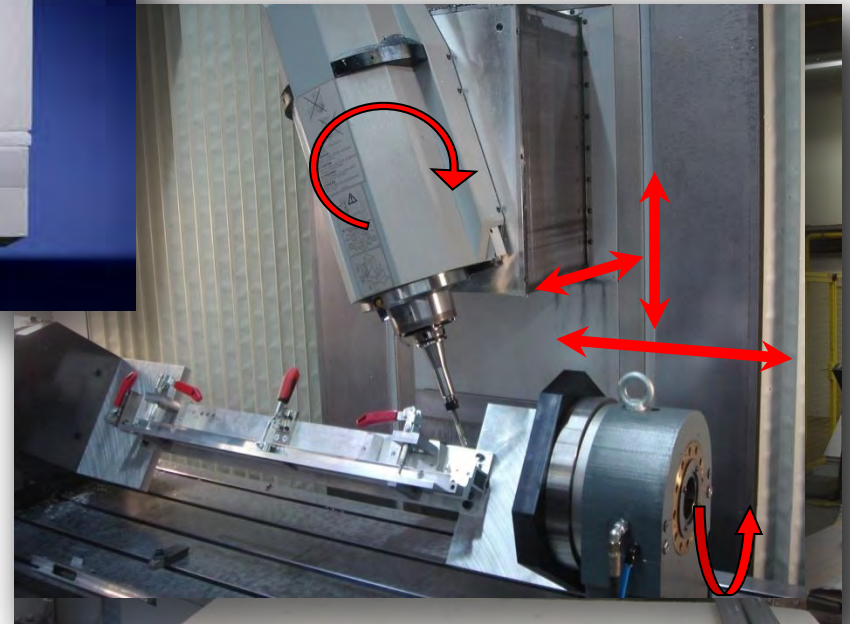


Machining of extruded profiles





5-axis machining center

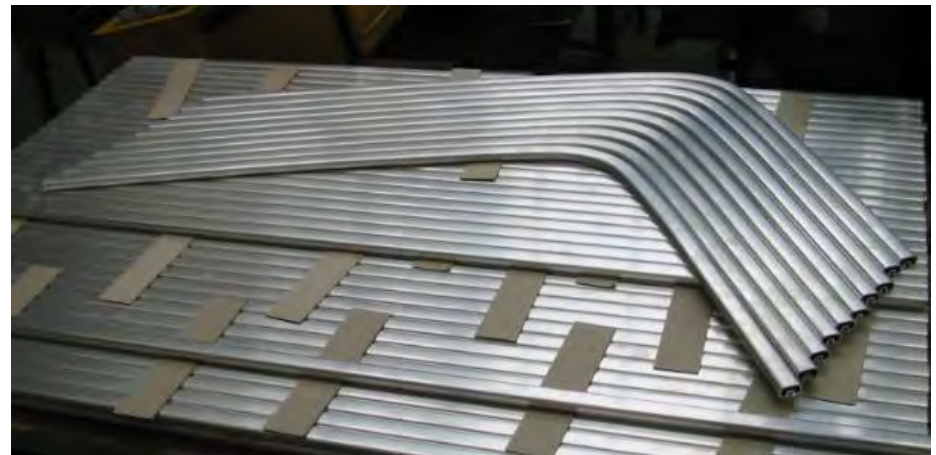


5-axis CNC – BAZ Chiron Mill 2000

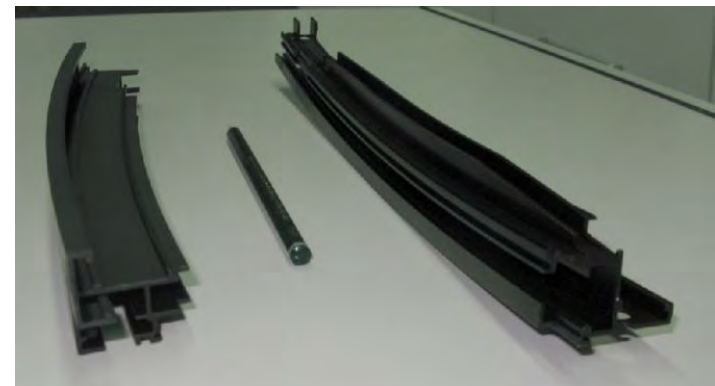
7-axis CNC stretch bending



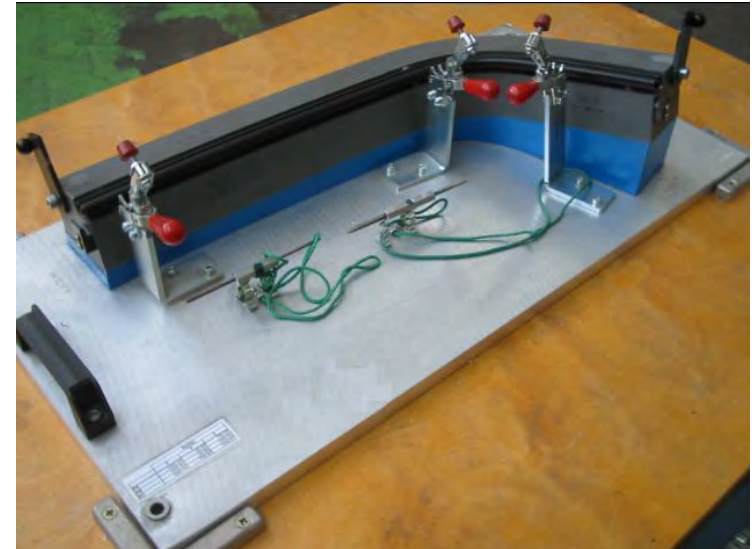
▶ roll bending



▶ Flexbending

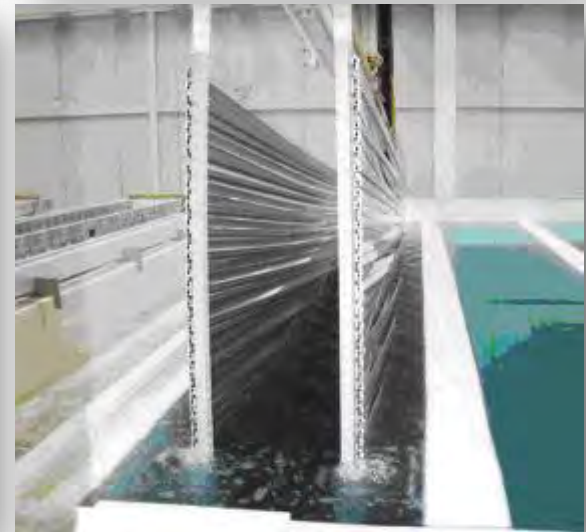


▶ Press bending

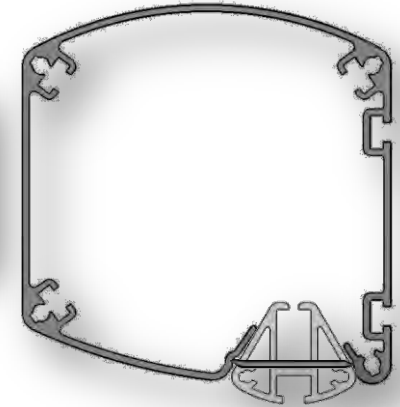
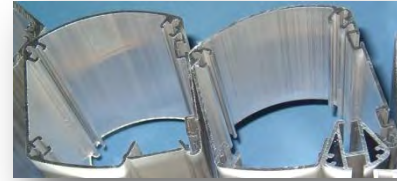
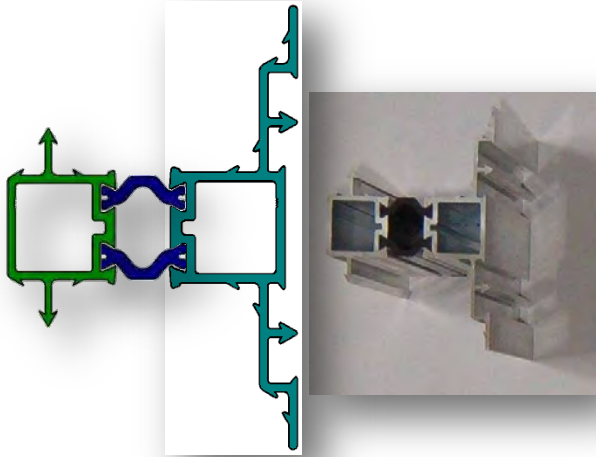


▶ Surface finishing

- Polishing
- Gloss anodizing
- Anodizing
- Painting
- Powder coating
- KTL coating



► Construction Profiles



Alloy EN AW- 6060

Quelle:  **SOLARLUX®**
Glas in Bewegung



Wintergarten SDL Akzent plus
Aluminium, 6° wärmegeklämmt



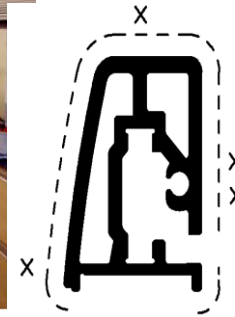
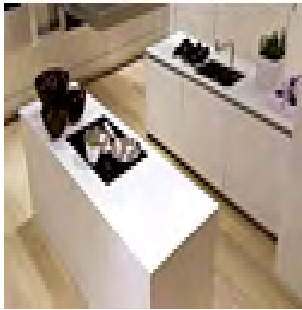
Alloy EN AW - 6082



Picture: Fa. PERI

CEDES Testturm, Landquart, Schweiz

Alloy EN AW - 6060 / 6063

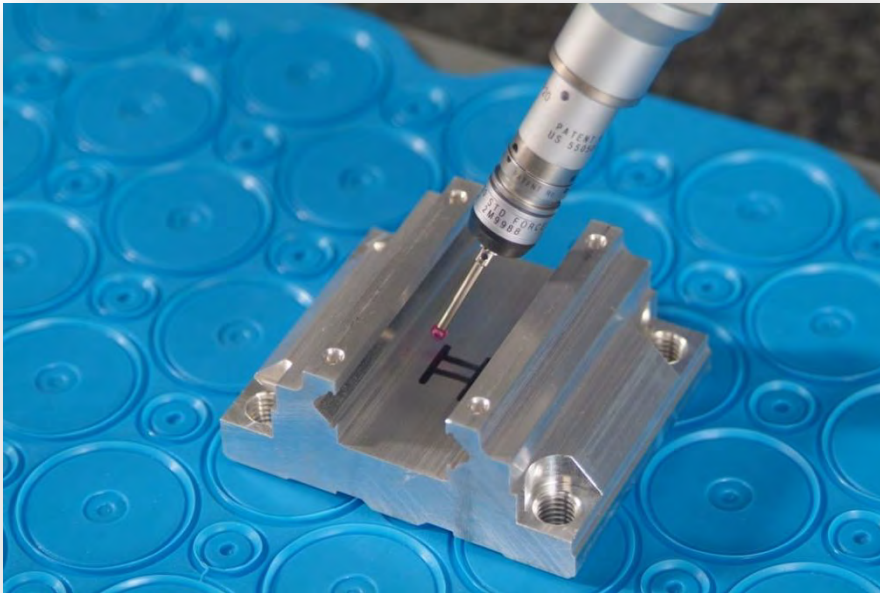


Picture Miele



Picture Koralle

Linear Guides



Picture Schaeffler INA

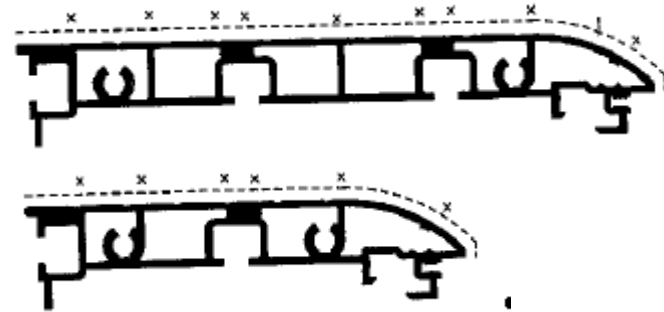
Alloy EN AW - 6060



Picture Rittal



Picture Loewe



Bicycle rim



Alloy EN AW – 6063 and 6082



Head frame profile



Alloy EN AW – 6060



BACKREST PROFILE

Alloy EN AW - 6082

Airbus (u.a. A380)

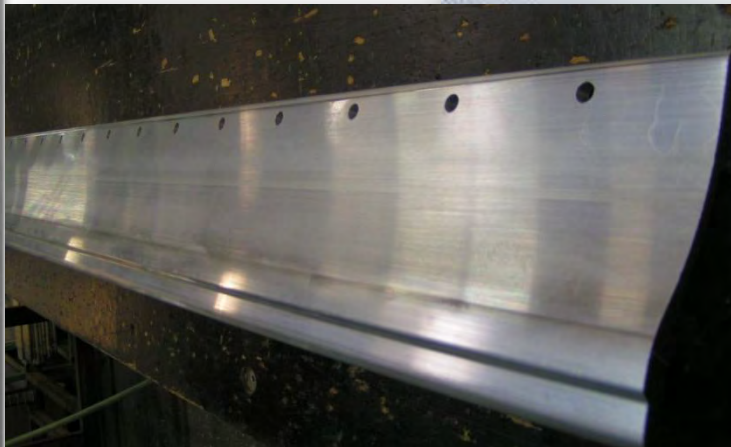


Picture Recaro Aircraft



Pisten – Raupen Stege

Alloy EN AW - 6082 / EN AW- 7020



Picture Prinot Leitner

Manual wheelchairs



Power wheelchairs



SCOOTER



REHA + CARE

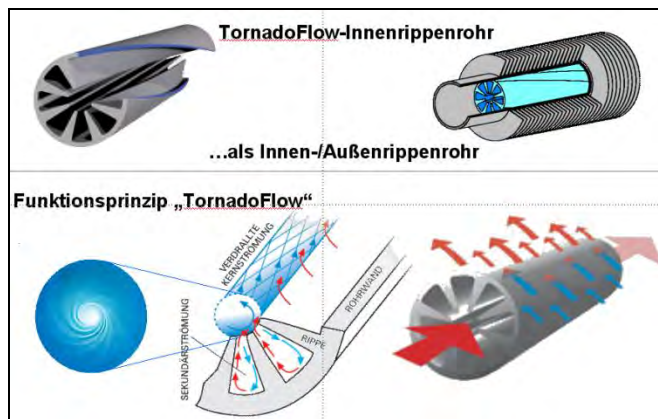
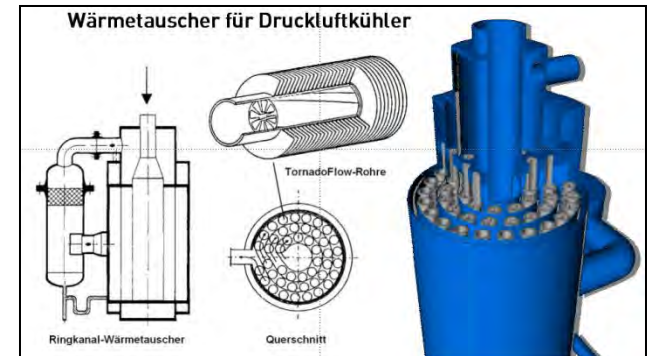
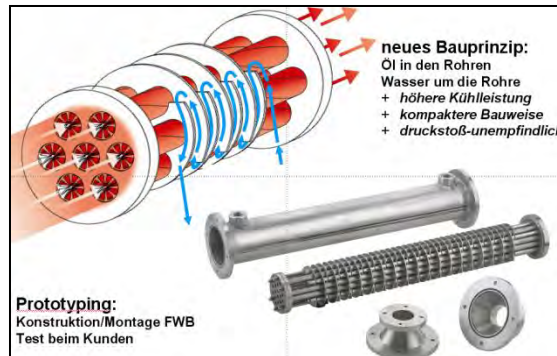


Alloy EN AW – 7020 and 6082

MEYRA
ORTOPEDIA
Wir bewegen Menschen.

Heat Exchanger Systems

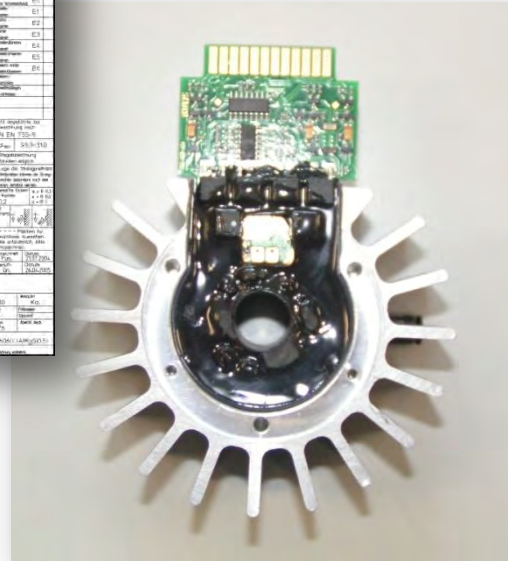
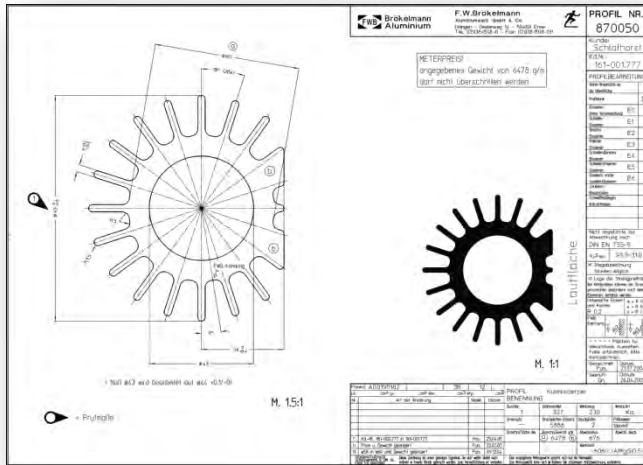
Alloy: EN AW 3003 / 3103



Heatsinks for high-speed Rotors



Alloy EN AW - 6060

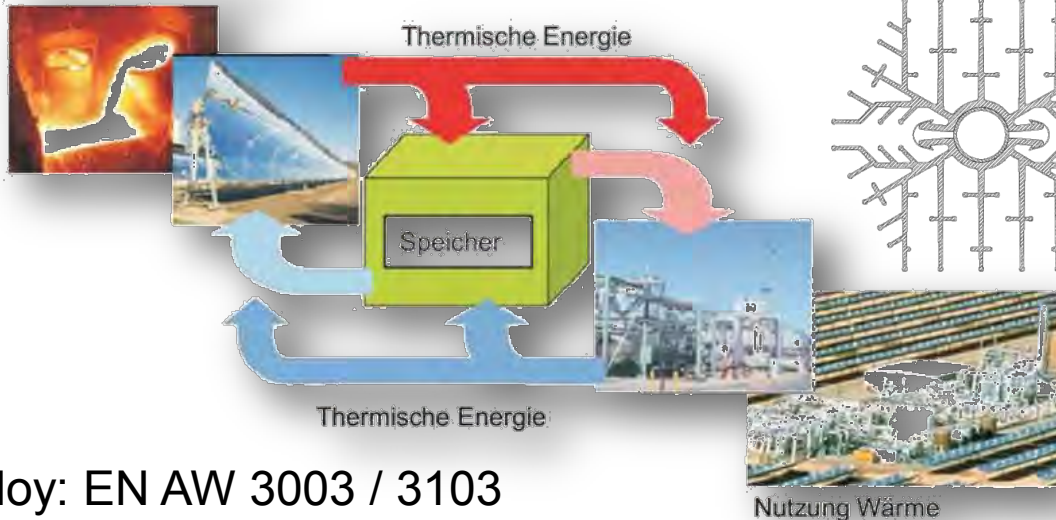


Picture FWB



Latent heat storage for solar power stations (DLR)

Bereitstellung Wärme:



Alloy: EN AW 3003 / 3103

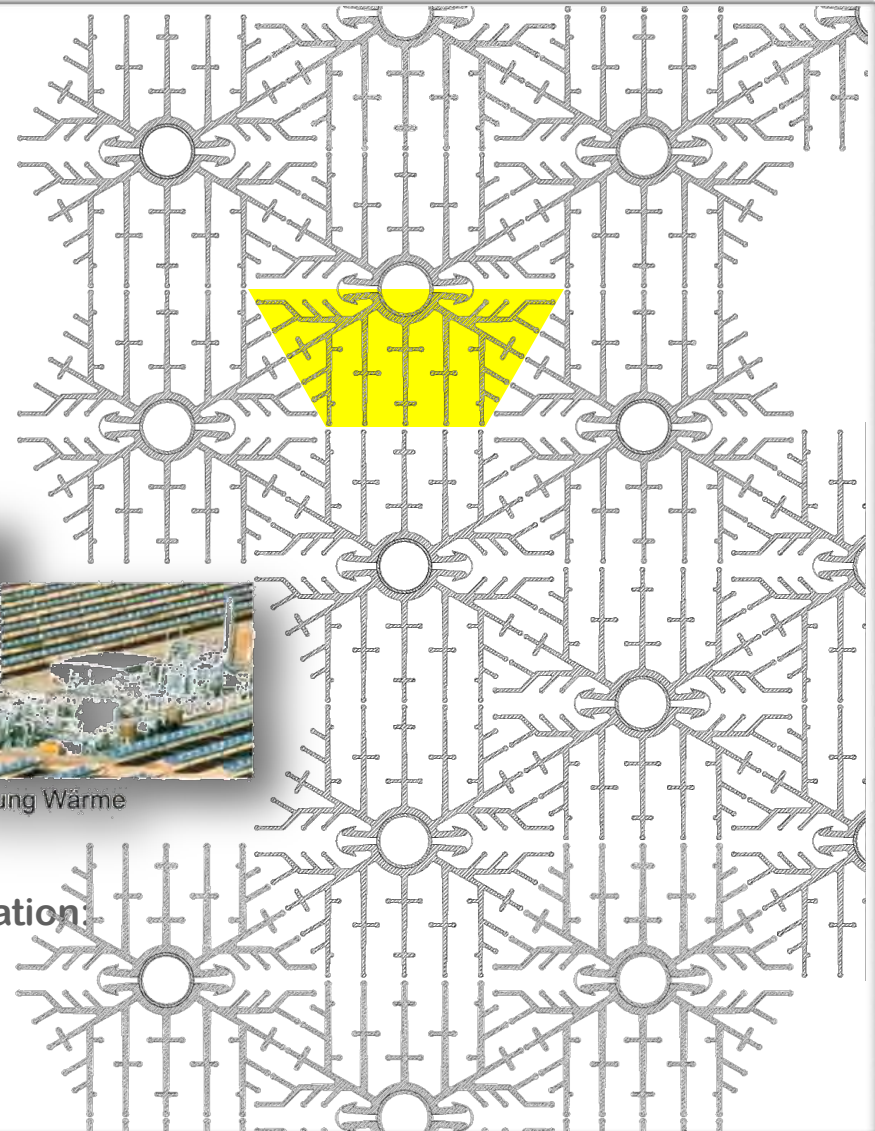
Requirement Al-Profil for a 50-MW-Solarpowerstation:

15 Vol-% von 20.000 to NaNO₃-Solution

=> 15% von 10.000 m³ => 1.500 m³

=> 4.000 to Aluminiumprofilis

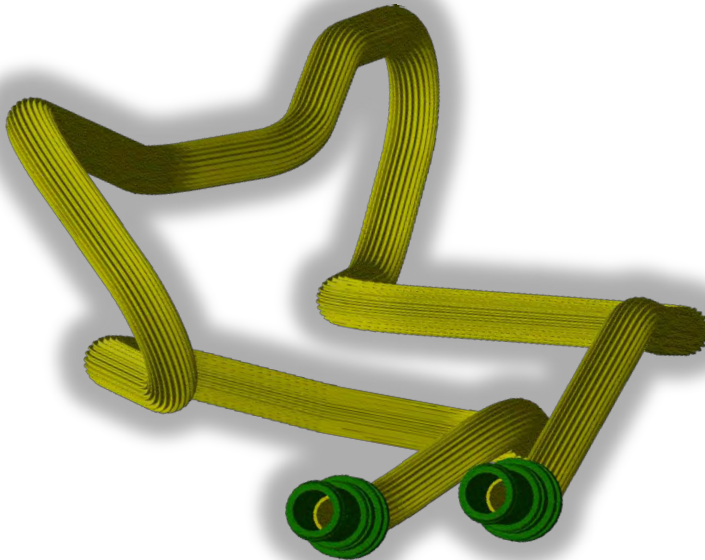
Picture FWB





Heat and coolingsystem for gear

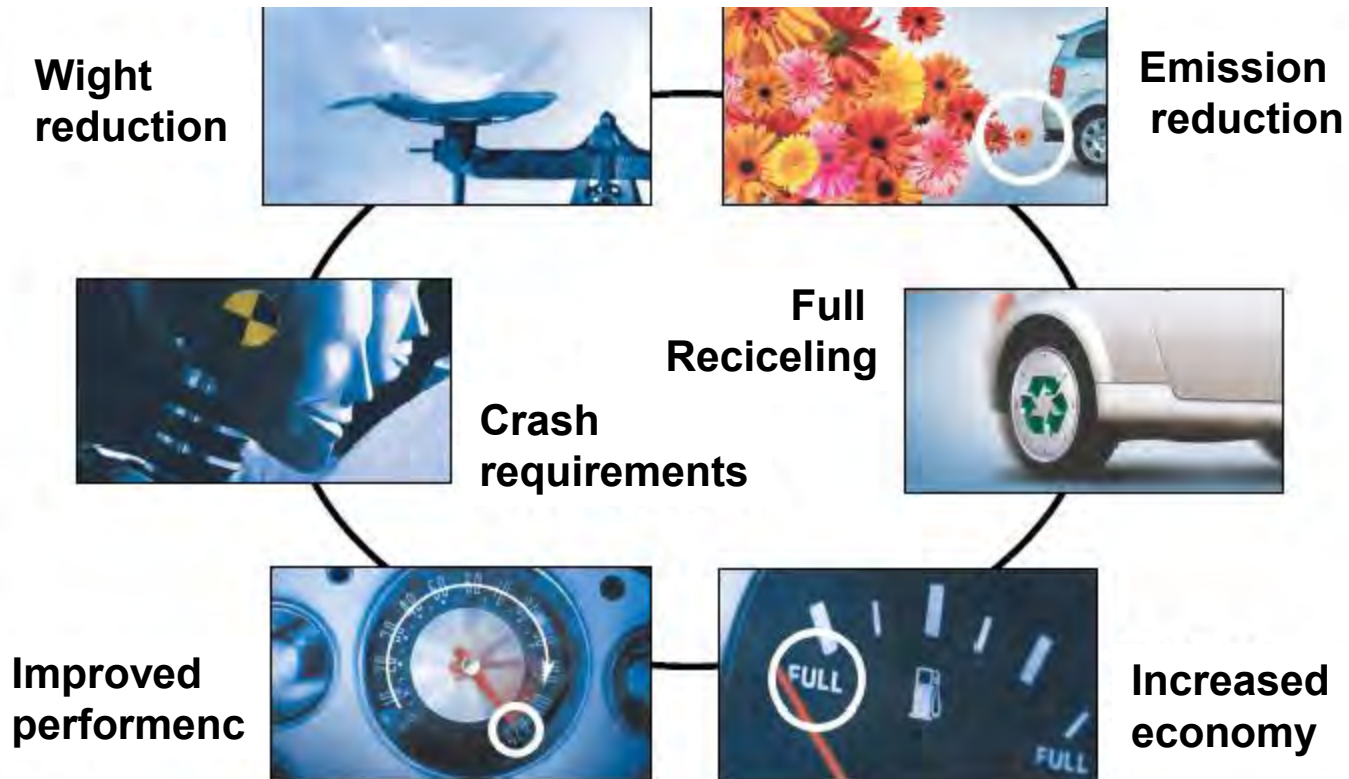
Alloy: EN AW 3003 / 3103



- ▶ 1,5 m Length
- ▶ 20 Bends



Motivation for the use of aluminum



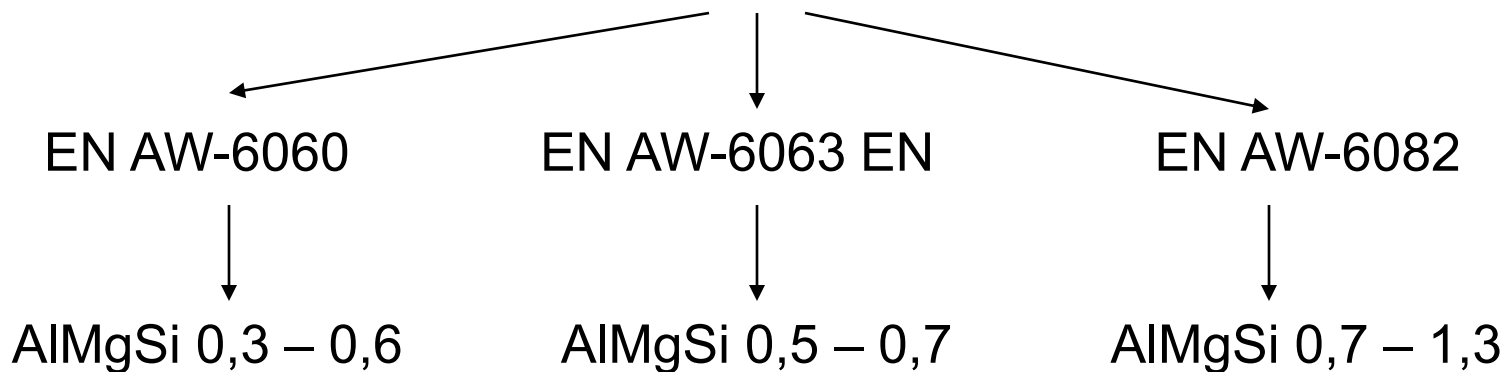
Pictures: Alcan/Audi

Materialspecification: AA 6XXX, Alloyssystem AlMgSi

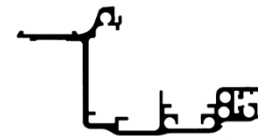
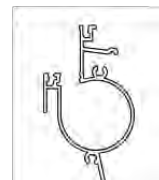
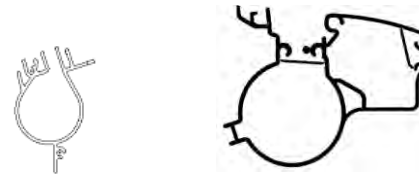
Chemical composition (to Mass- %, according to DIN EN 573-3)

maximum values

	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	V	Sonstige Einzeln	Sonstige Gesamt	Al
Requirements	≤ 1,30	≤ 0,4	≤ 0,30	≤ 1,00	≤ 0,9	≤ 0,30	≤ 0,50	≤ 0,25	≤ 0,25	≤ 0,05	≤ 0,15	Rest



- Body structure's profile
- sunroof components
- Door frame profiles
- Suspension Components
- Profiles for cooling and air conditioning
- airbag housing
- Steering system profiles
- Charging System Profiles
- trim
- Seat guide rail
- Cartridges cover blinds



WIND DEFLECTOR PROFILE

VW Eos, Porsche 911, Audi A3, A4, A5



Roof frame profile

Alloy EN AW - 6401



▶ Referenzen



▶ AUDI R8

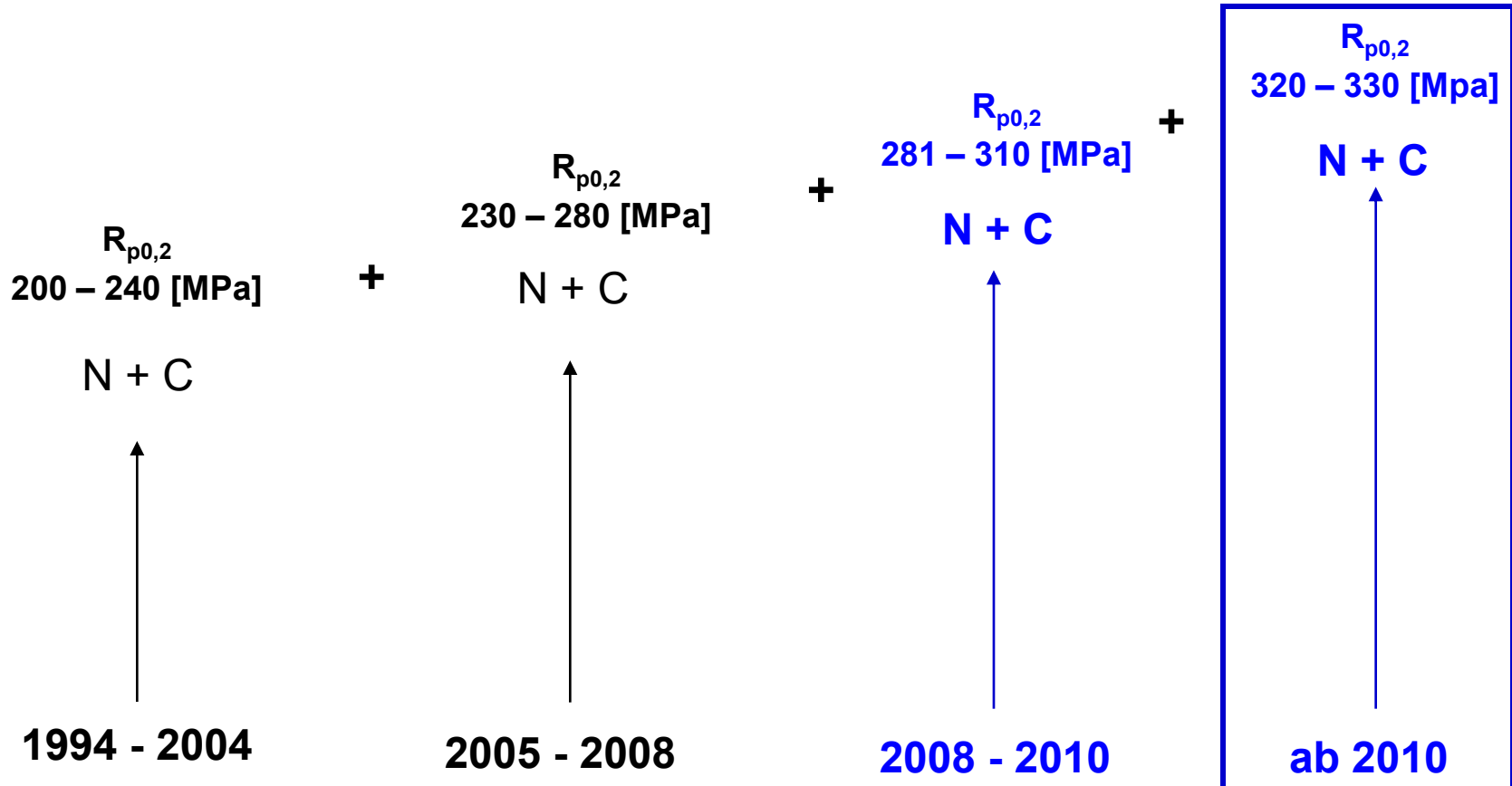


▶ Artega GT



▶ Daimler
SLS

Increase the strength requirements of aluminum profiles for body structure components



Crashfähigkeit

Quasi-static compression testing of aluminum components in the axial direction



Part o.k.



Part not o.k.

Upsetting behavior: compression samples after short-term thermal stability test



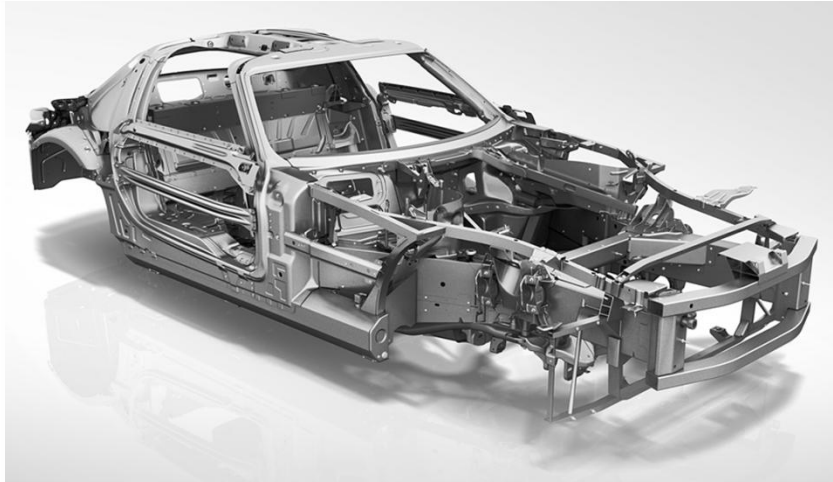
3 - Chamber hollow profile

o.k.

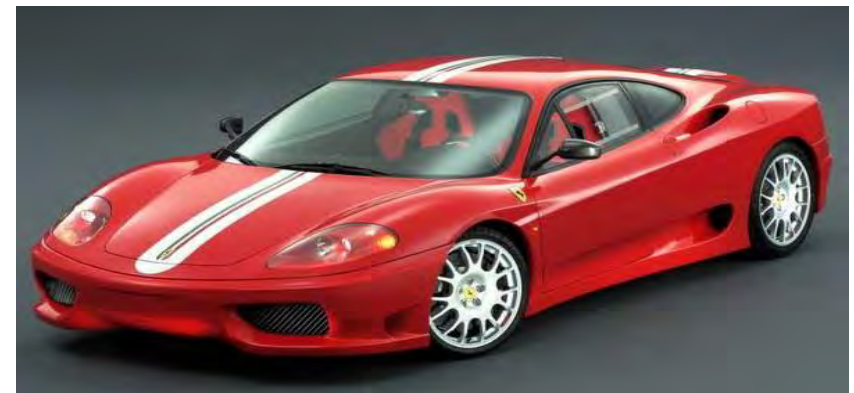


4 - Chamber hollow profile

o.k.



Mercedes SLS



F360 Modena

Original Design (Steel)



Krafteinleitung	Steifigkeitssteigerung
Lastfall 1	+87%
Lastfall 2	+75%
Lastfall 3	+46%

Modalanalyse	Frequenzerhöhung
Mode 1	+56%
Mode 2	+56%
Mode 3	+63%
Mode 4	+62%
Mode 5	+52%
Mode 6	+52%
Mode 7	+51%
Mode 8	+37%
Mode 9	+41%
Mode 10	+15%

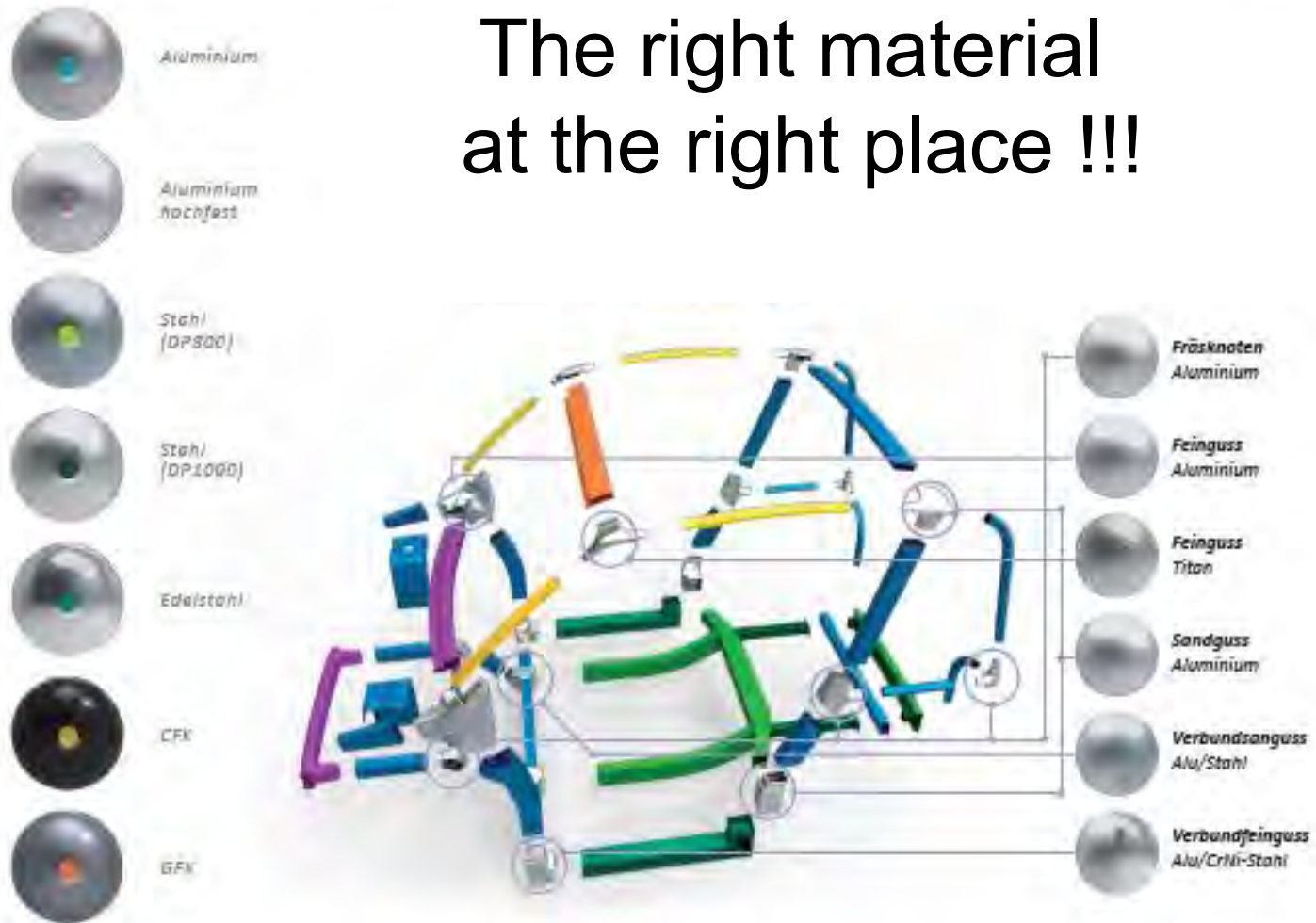
Gewicht -52%

Aluminium Conzept

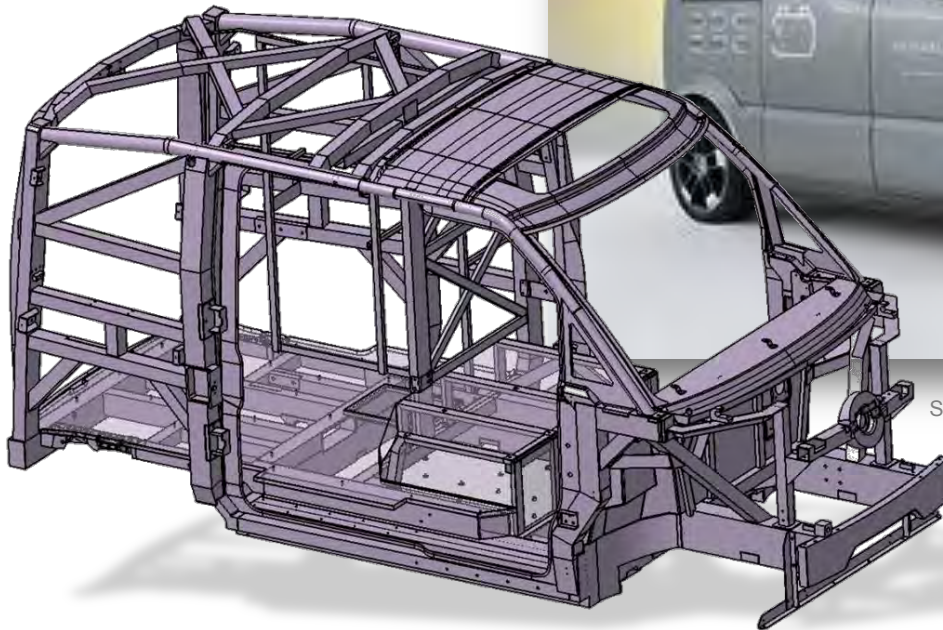


Aluminum use in the future ! ?

The right material at the right place !!!



▶ Development projects in the area of commercial vehicles



Soure: www.auto-motor-sport.de



BMW i8



Renault Zoe



For more Information from FWB:



Invitation to the Joint Stand Key Enabling
Technologies from North Rhine-Westphalia

Hall 2, Stand A26



Thank you for your attention