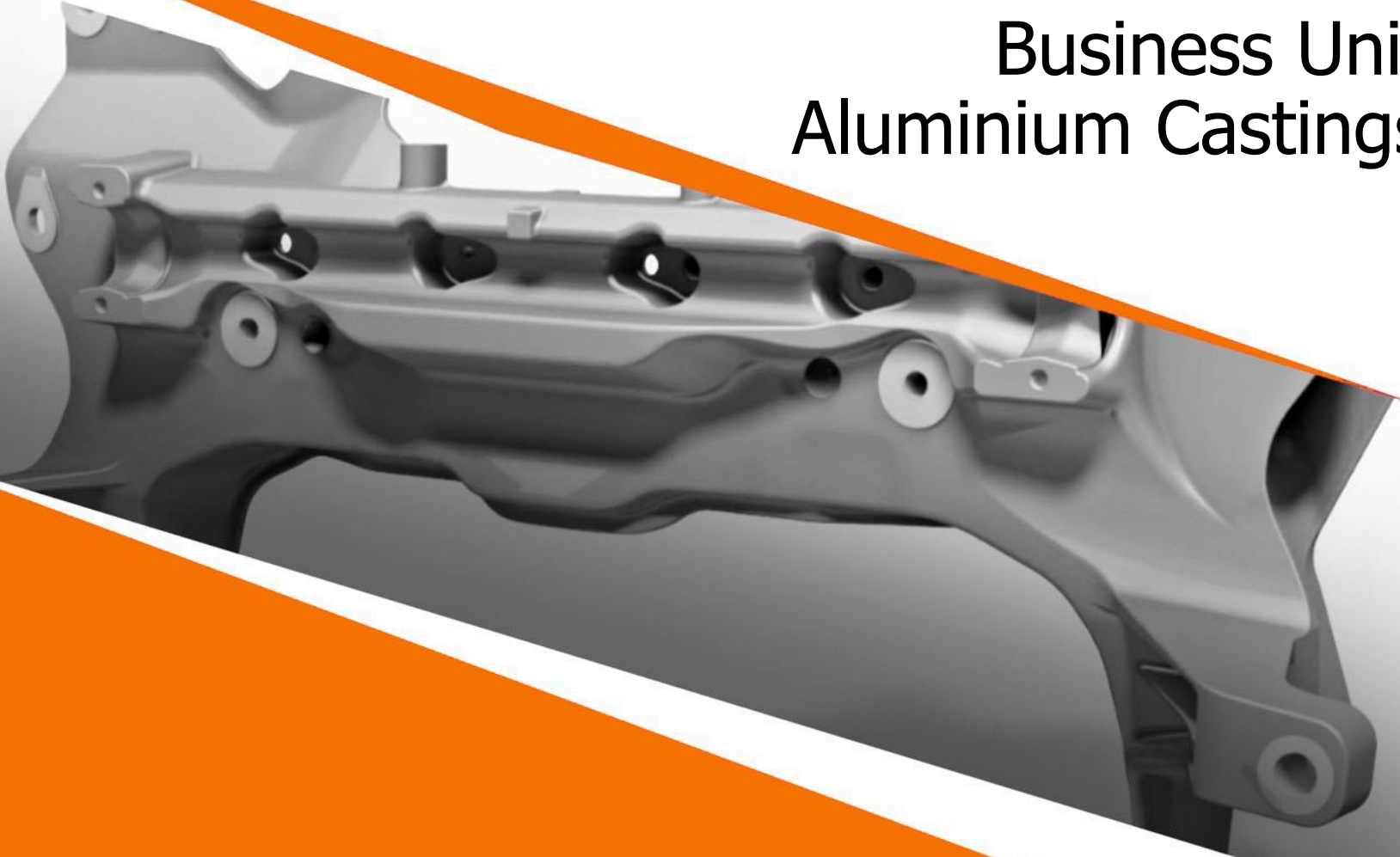
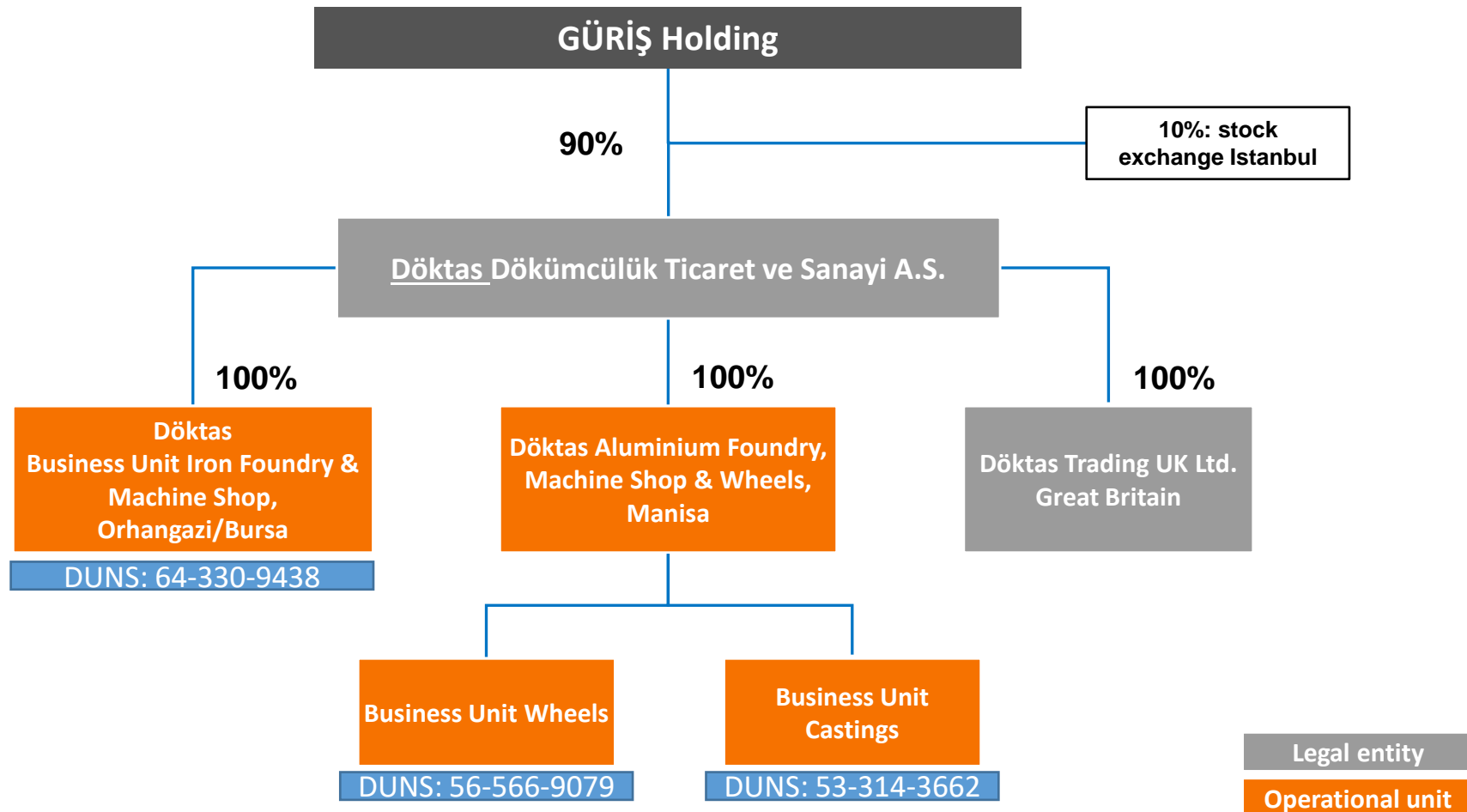


Döktas Business Unit Aluminium Castings



Döktas Structure



Sales by Customer Industry

%18



Construction and Mining

%19



Agriculture

%32



Heavy Truck

%28



Passenger Car

%3



Machine Building

%38



Light Vehicles

%57



Heavy Truck

%5



Agriculture



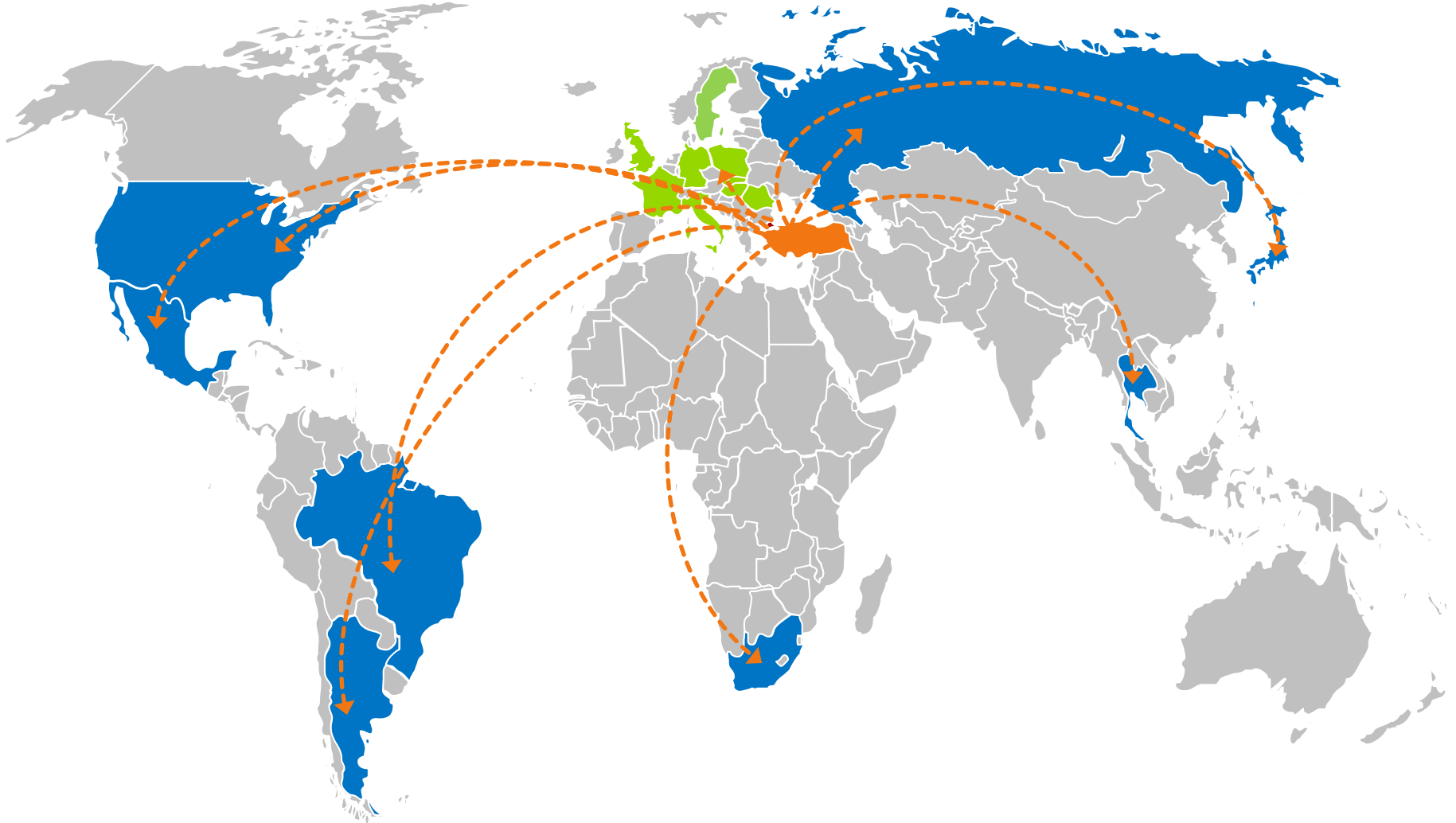
TOFAŞ TÜRK OTOMOBİL FABRİKASI A.Ş.



TürkTraktör



Capable to deliver globally





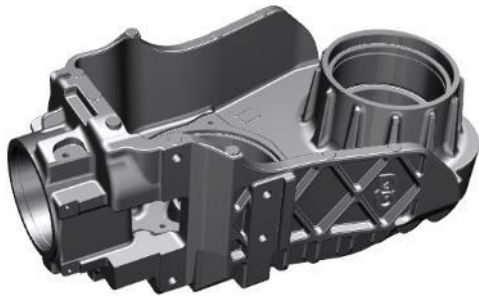
Front Drive Carrier

2,14 kg; machined



Transmission Housing

5,27 kg; raw



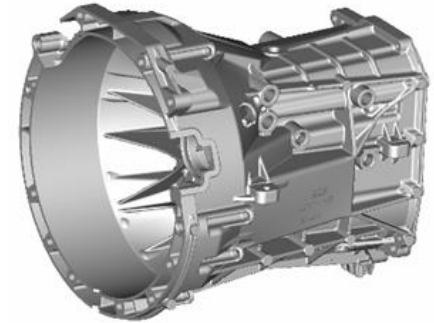
Gear Housing

8,51 kg; machined



Clutch Housing

7,04 kg; raw



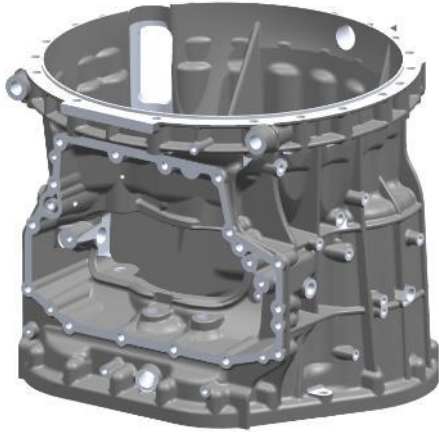
Transmission Housing

10,7 kg; machined

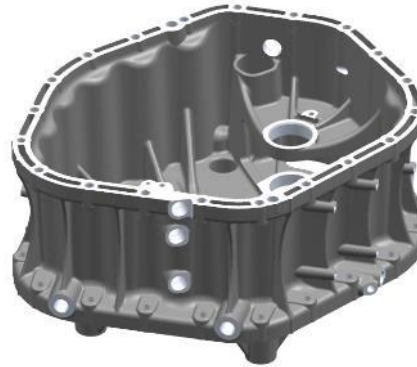


RENAULT
Passion for life





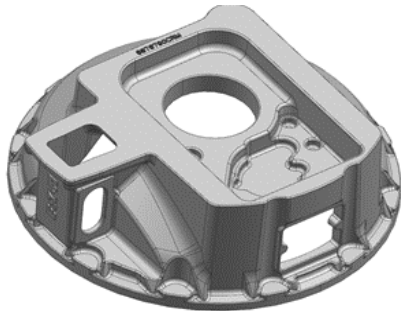
Main Case
32,5 kg; machined



Center Case
20,7 kg; machined



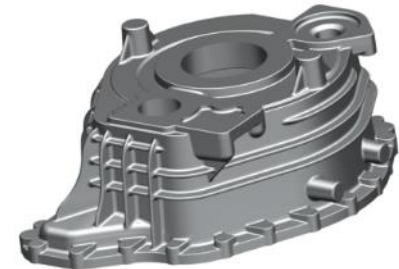
Rear Case
22,5 kg; machined



Clutch Case
16,24 kg; machined



Front Case
13,8 kg; machined



Rear Case
12 kg; machined



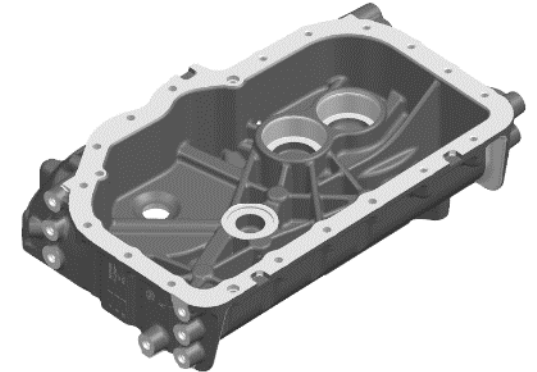
Extension Housing

15,6 kg; machined



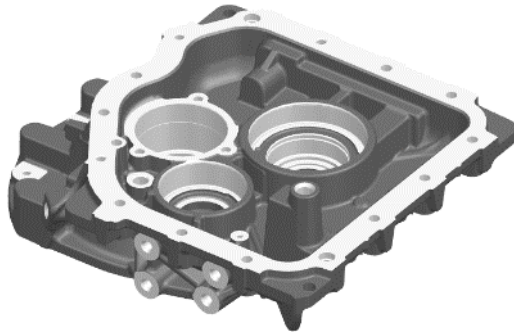
Intermediate Housing

19,2 kg; machined



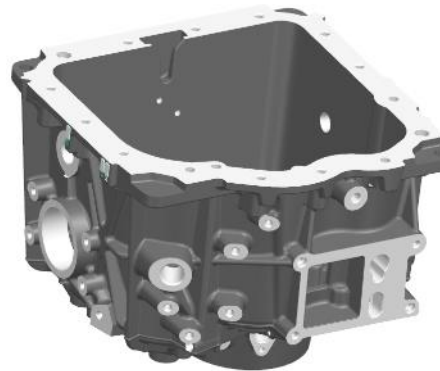
Adapter Housing

25,5 kg; machined



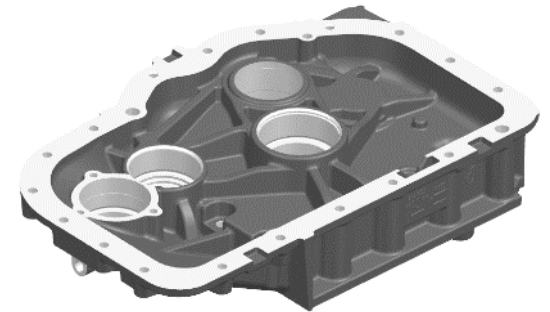
Adapter Housing

13,7 kg; machined



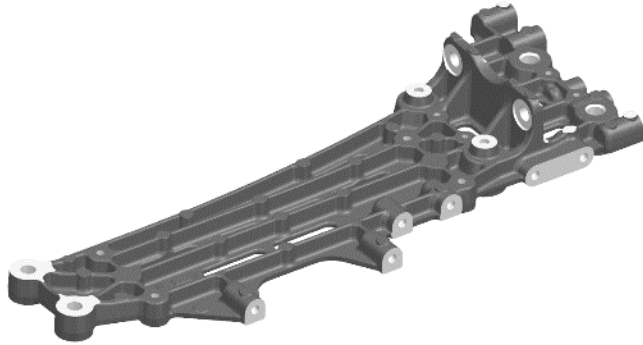
Transmission Housing

17,7 kg; machined



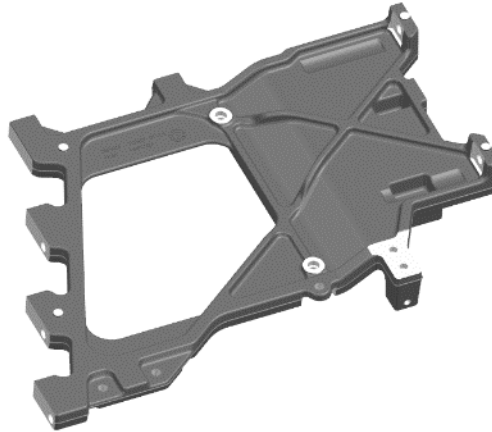
Intermediate Housing

15,1 kg; machined



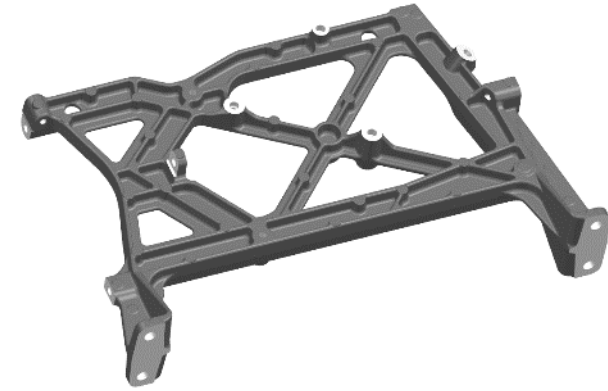
Base Plate

4,7 kg; machined



Support Bracket

13,7 kg; machined



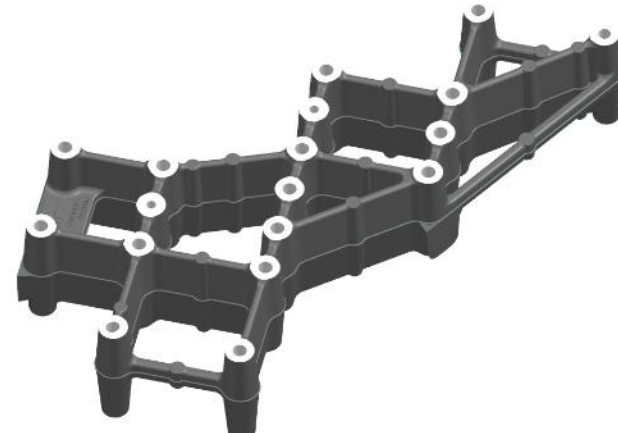
Rear Wall

5,8 kg; machined



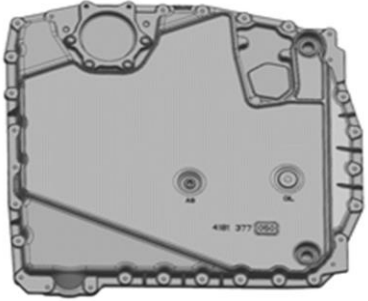
Front Wall

6,05 kg; machined



Battery Spacer

5,8 kg; machined



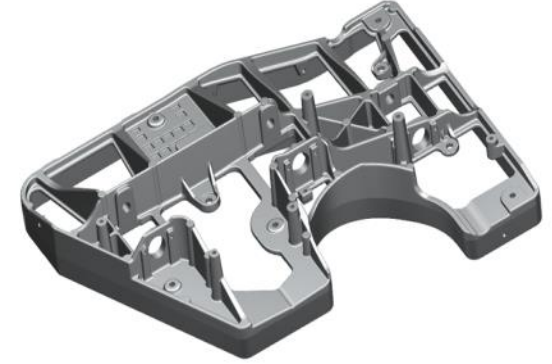
Oil pan

5,9 kg; machined



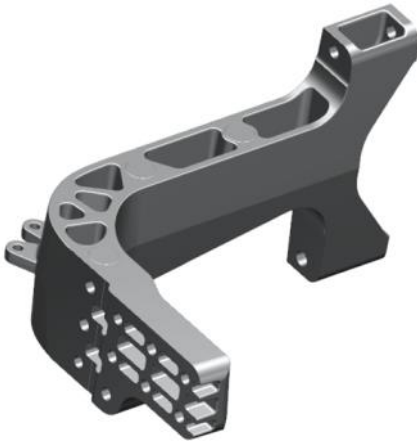
Anchorage Muffler

7 kg; machined



AdBlue Tank Bracket

9,65 kg; machined



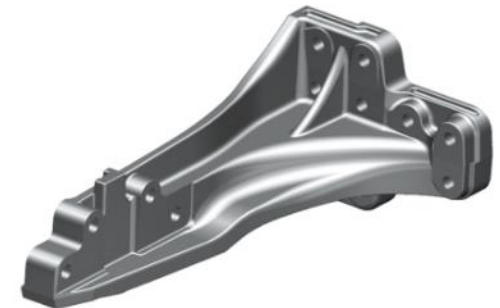
AdBlue Tank Bracket

12,3 kg; machined



PCCU Bracket

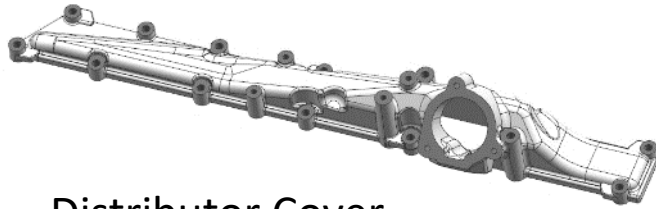
3,5 kg; machined



Rear Muffler

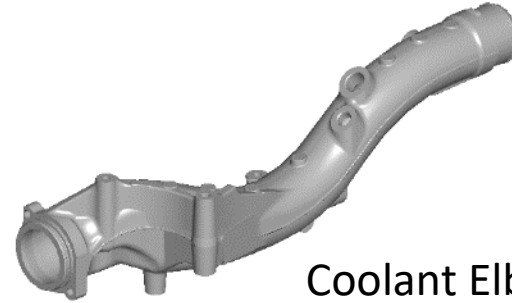
9 kg; machined





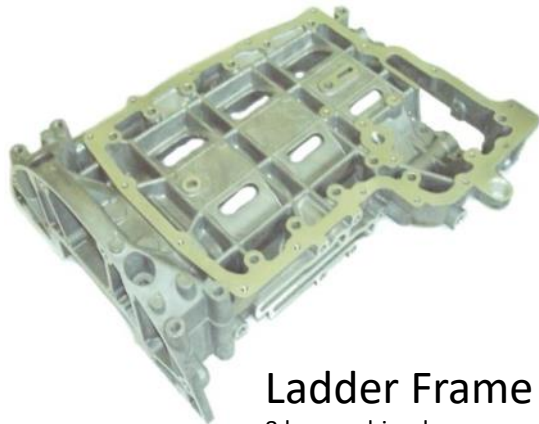
Distributor Cover

2,1 kg; machined



Coolant Elbow

2,4 kg; machined



Ladder Frame

8 kg; machined



Cam Carrier

4 kg; machined

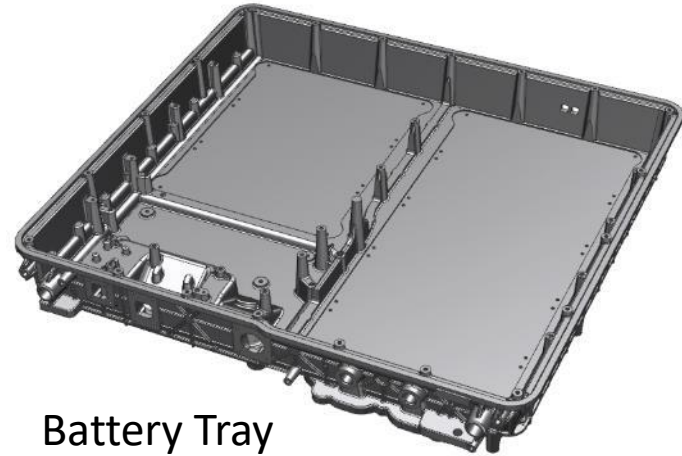


Cylinder Head

13 kg; machined



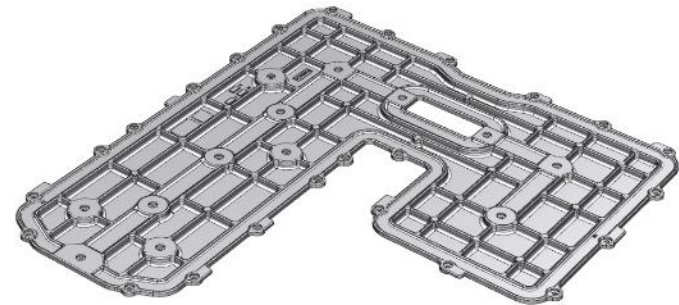
Simple Housing
1,60 kg; machined



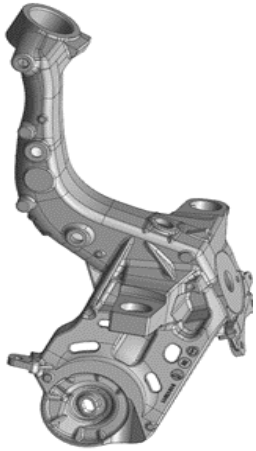
Battery Tray
26,25 kg; machined



Connector Housing
7,33 kg; machined



Coolant Cover
7,65 kg; machined



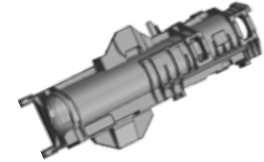
Control Arm

5,40 kg; machined & assembled



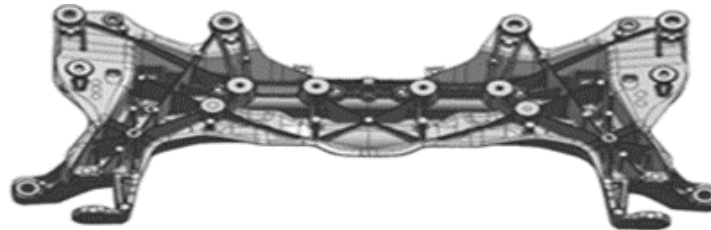
Rear Cross Member

3,32 kg; machined



Steering Box Rocker

0,9 kg; machined



Front Cross Member

10,1 kg; machined



Steering Housing

3,1 kg; raw





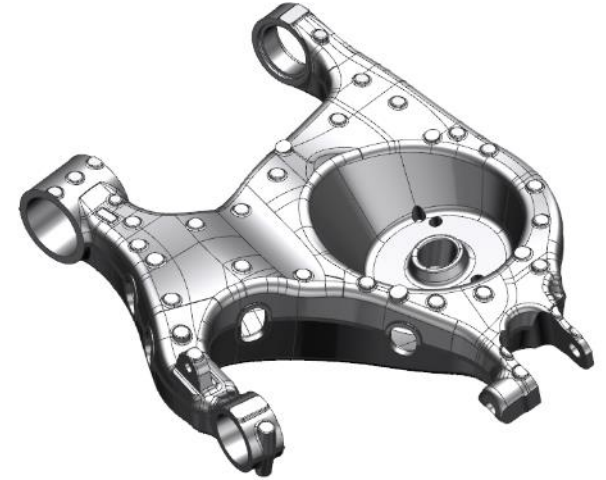
Front Knuckle

4,65 kg; machined & assembled



Rear Knuckle

4,95 kg; machined



Spring Arm

6,60 kg; machined

Plant size



**Water
Storage**

**Annex-2
1.815 sqm**

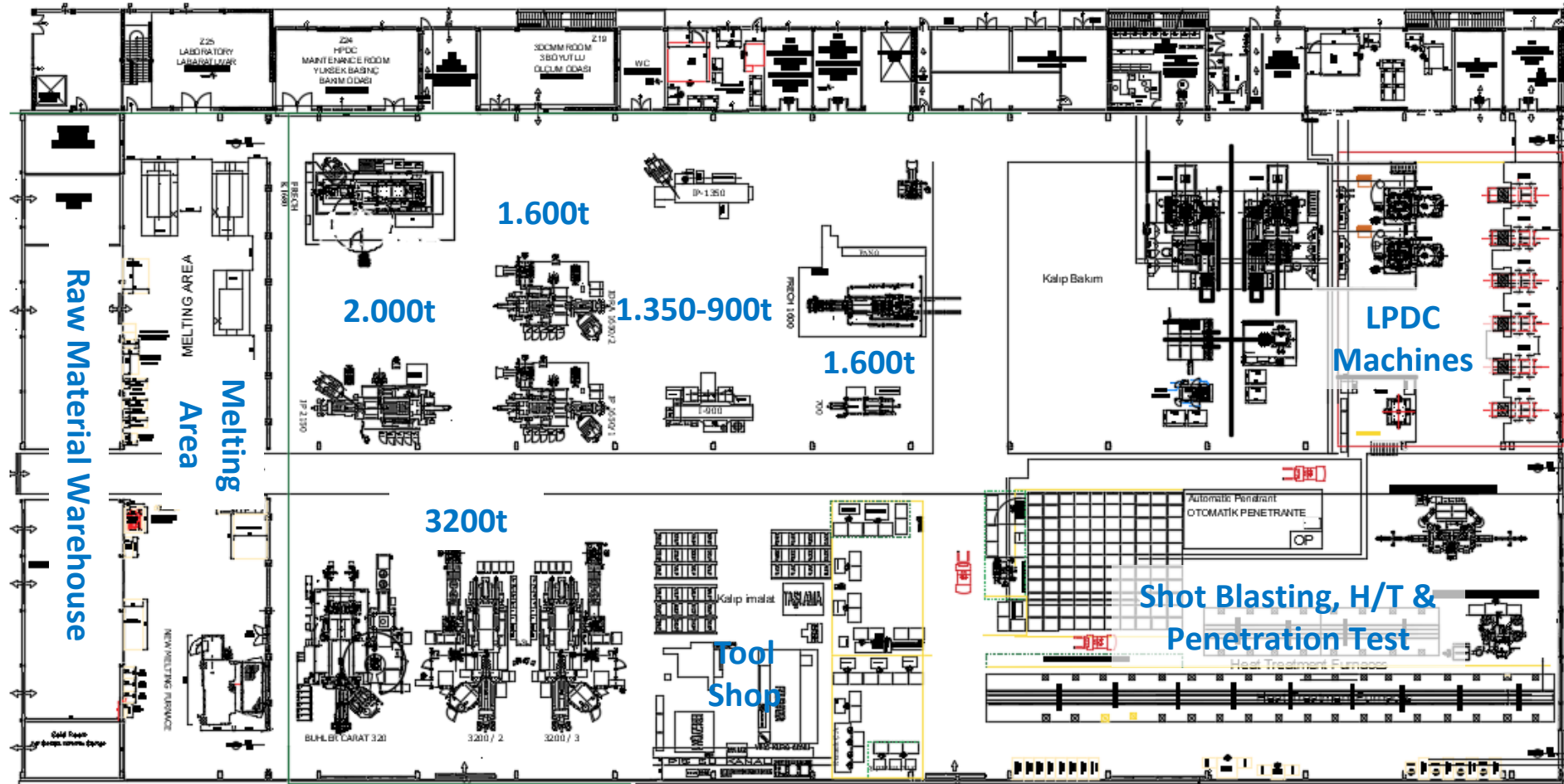
**Annex-1
7.211 sqm**

Phase II
(Future expansion possibility)
15.000 sqm / 15.000 t/yr

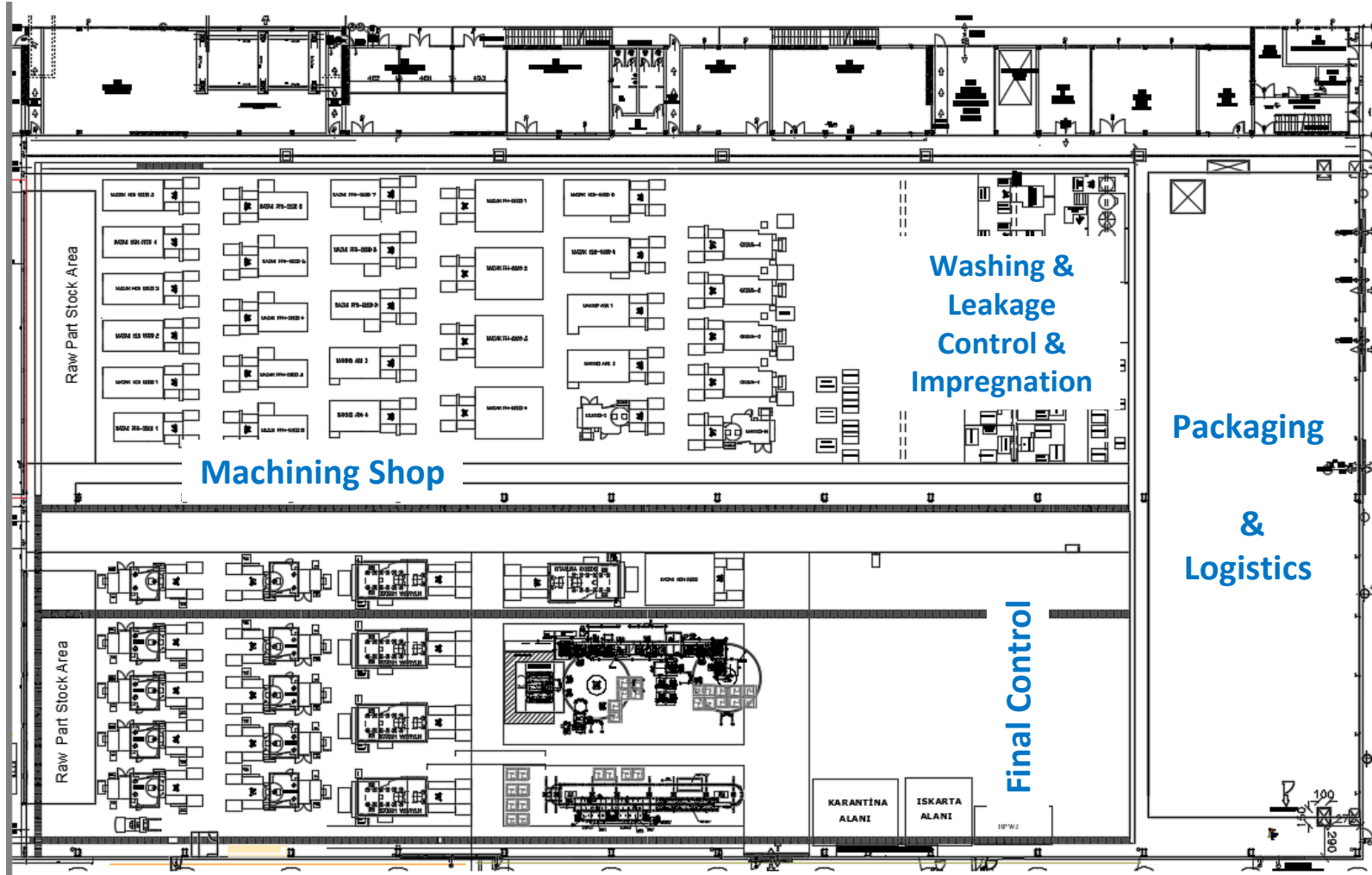
Factory Building
20.735 sqm / 18.000 t/yr
SOP 2016 Q2

Foundry

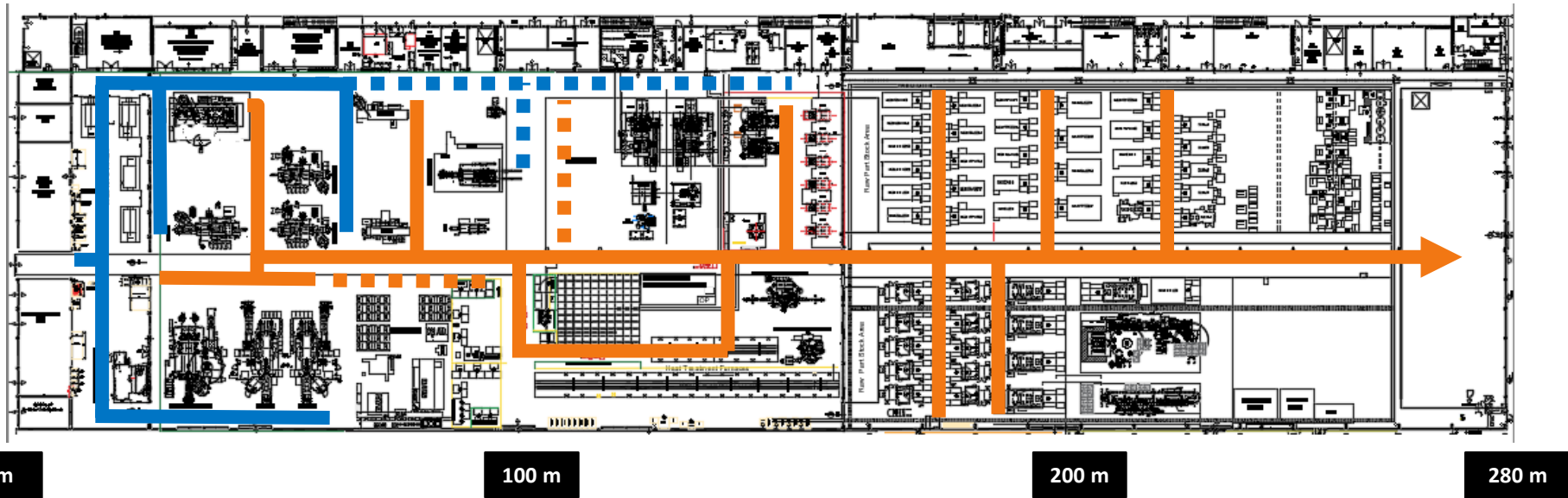
← Laboratories, quality inspection, maintenance, stock, ... →



Machine Shop



Material Flow



Metal flow

Part Flow



current



further invest



current

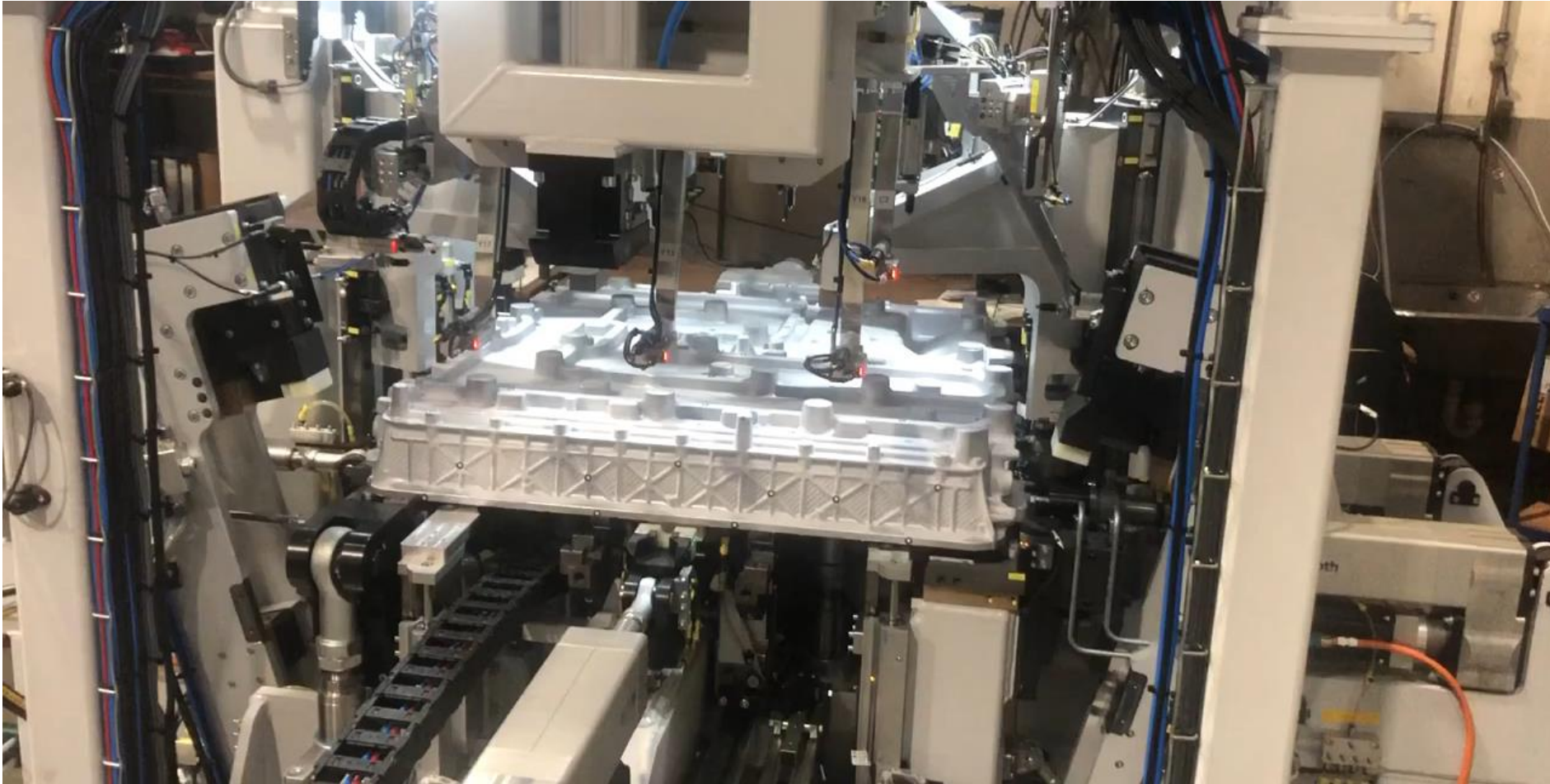


further invest









- Automated straightening equipment to ensure dimensional quality of heat treated parts.



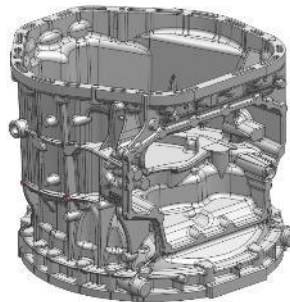
Process Examples

LPDC casting units



Transmission Main Case

- AlSi10Mg0,3 (T5)
- 32,5 kg – machined
- 39,7 kg – as cast
- 590 x 560 x 470 mm
- Machined



One shot – 55 kg
from LPDC

Engineering & Quality Challenges

- **Design improvement**
Design improvement with customer engineering for LPDC
- **Prototyping**
Sample parts from prototype tooling
- **Casting**
Complex part design
- **Tool Engineering**
Complex casting tool design with 4 sliders to cast 55 kg in one shot

LPDC process flow (Main Case)

Melting

Casting

Fettling

X-Ray
(Process Check)

T5 Heat
Treatment

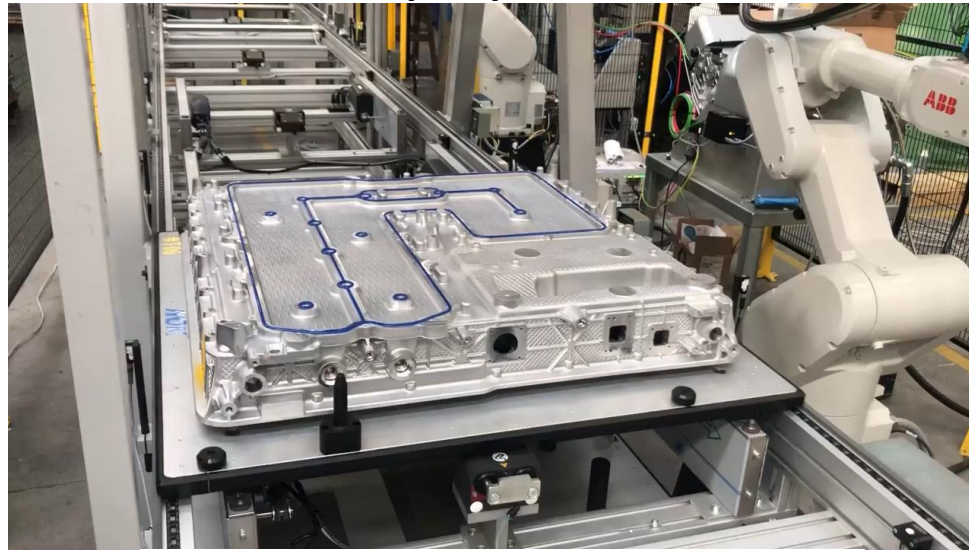
Machining

Leakage

Final Check
100%

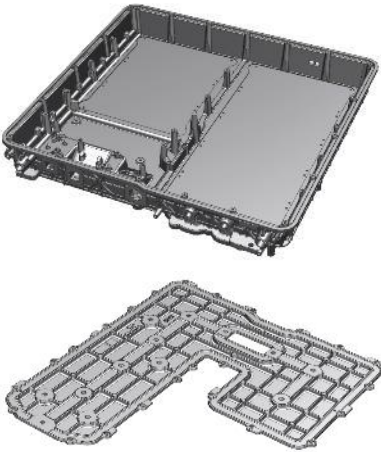
Process Examples

Battery Tray Process



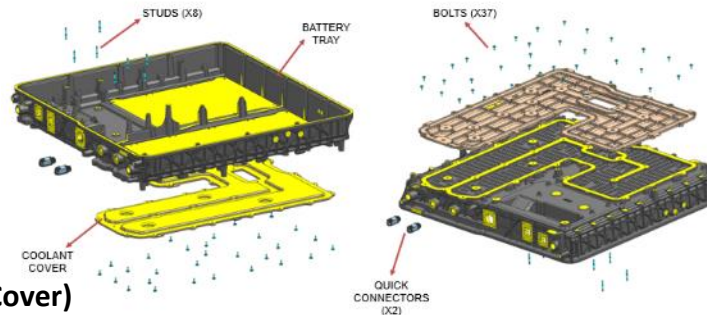
Engineering & Quality Challenges

- **Design improvement**
Part design improvement with customer engineering for LPDC
- **Tool Engineering**
Complex casting tool design for large LPDC parts
- **Casting Simulation**
Filling and solidification optimization to achieve project targets
- **Assembly Engineering**
Plasma Surface Treatment
Liquid Sealant Application
Assembly of 2 parts by 37 bolts



Battery Tray & Coolant Cover

- AlSi10Mg0,3 (T6)
- Battery Tray:
 - 26,25 kg (machined)
 - 933 x 862 x 144 mm
- Coolant Cover:
 - 7,65 kg (machined)
 - 840 x 775 x 16
- Machined & assembled



LPDC process flow (Battery Tray & Coolant Cover)

Melting

LPDC
Casting

Fettling

T6 Heat
Treatment

Straightening

X-Ray
Process Control

Machining

Plasma &
Assembly

Final Check
100%

Process Examples

LPDC casting units



Connector Housing

- AlSi10Mg0,3 (T5)
- 7,33 kg
- 390 x 343 x 132 mm
- machined & assembled



Sand core



Assembled Product

LPDC process flow (Connector Housing)

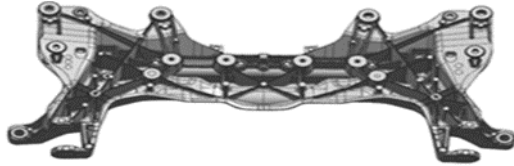


Engineering & Quality Challenges

- **Design improvement**
Part also designed for sand casting, improved for LPDC process
- **Casting**
Part geometry needs complex sand core
- **Material Engineering**
First use of AlSi10Mg0,3 material with T5 H/T proposed by DT team

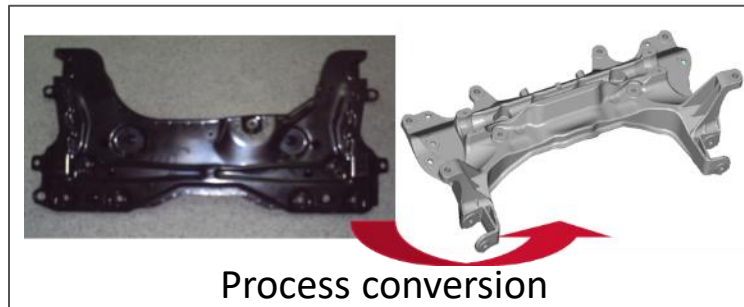
Process Examples

HPDC casting cell



Front Cross Member

- 1.400.000 pcs. since 2006
- Silafont36 (AlSi9MgMn)
- 10 kg
- 930 x 455 x 220 mm



Process conversion

Engineering & Quality Challenges

- **Resident Engineer**
at customer engineering center for collaboration
- **Material Change Project**
from welded sheet to single casting
- **Quality**
Safety part



HPDC process flow (front cross member)

Melting

Casting

X-Ray 100%

Crack Test 100%

Fettling

Machining

Final Check 100%

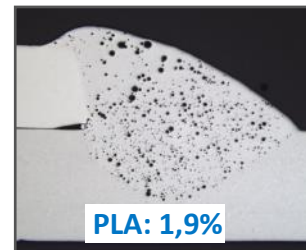
Prototype of structural part

HPDC casting cell

Technical approval from OEM!

Shock Tower

- Serial part from OEM
- AlSi10MgMn (EN 43500)
- 2,4 kg
- 530 x 410 x 300 mm



Engineering & Quality Challenges

- **Prototyping**
Sample parts from serial tool in two test series
- **Achieved Parameters**

| | | |
|---------------|---------|-----------|
| R_m | 200 MPa | (>180MPa) |
| $R_{p0,2}$ | 130 MPa | (>120MPa) |
| A | 12 % | (>10%) |
| Bending angle | 70° | (> 60°) |
- **Welding test achieved**
MIG joint-welding test - pore loss area < 10 %

HPDC process flow (shock tower)

(sub supplier)

Melting & Casting

HT T7
Air Quench

Straightening

Machining

Brushing

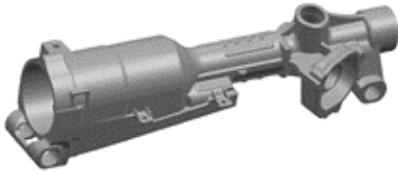
Check
100%

Surface
Treatment

Final Check
100%

Process Examples

HPDC casting cell



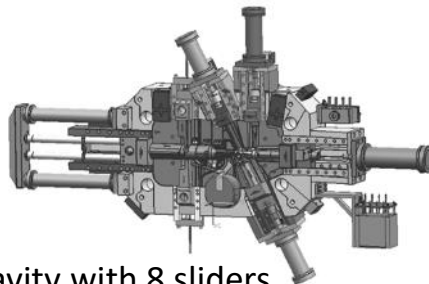
Steering Housing

- 2 types B8/Q5
- Total 1.700.000 pcs.
- AlSi9 (226D)
- 3 kg
- 570 x 137 x 137 mm

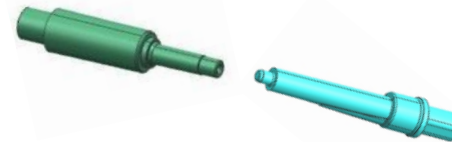


Engineering & Quality Challenges

- **Casting Simulation**
Complex part that needs advance gating system
- **Tool Engineering**
Casting tool with 8 sliders.
Changeable main inserts to keep surface quality
- **Quality**
Safety part



Single cavity with 8 sliders



Long sliders with 0.5° draft. Coating application to prevent erosion

HPDC process flow (steering box)

Melting

Casting

Fettling

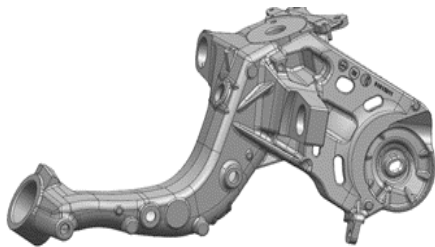
Shot Blasting

X-Ray 100%

Final Check 100%

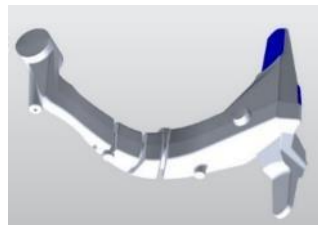
Process Examples

LPDC casting units



Control Arm

- 380.000 pcs. since 2009
- AlSi10Mg0,3 (T6)
- 5,7 kg
- 620 x 340 x 270 mm
- machined & assembled

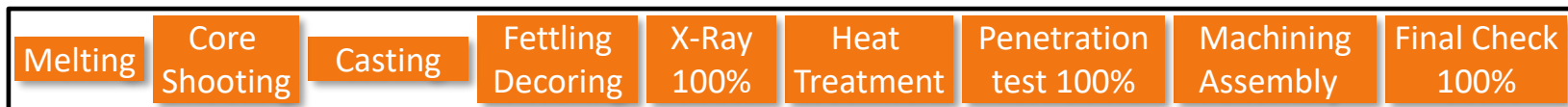


Sand core & T6 H/T



Assembled Product

LPDC process flow (control arm)









Engineering & Quality Challenges

- **Design improvement**
Part also designed for sand casting, improved for LPDC process
- **Prototyping**
Several prototype stages both rapid and serial tool
- **Material Engineering**
First use of AlSi10Mg material with T6 H/T proposed by DT team

- **Quality**
Safety part



Engineering Software

| Software | |
|---------------|--|
| MAGMA V5 HPDC |  Committed to Casting Excellence |
| MAGMA V5 LPDC |  Siemens PLM Software |
| NX – Siemens |  |
| CATIA V5 |  |
| AutoCAD |  |
| PowerMILL CAM |  |

Solution Center for All the Design Needs

PRODUCT DEVELOPMENT

Design partner

Weight reduction practices

Product conversion from cast iron to alu

Casting simulation by Magmasoft

Feasibility for casting & machining

Prototyping by HPDC & LPDC

PROJECT MANAGEMENT

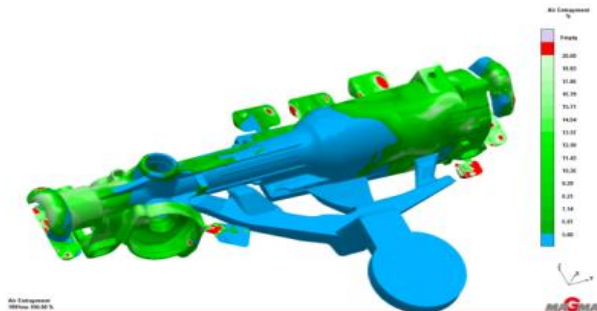
Project leader & Team approach

Management

Status reporting

Single contact during the project

Regular meeting



Simultaneous Engineering with Customer



ISO 9001



since
1999

IATF 16949



since
2003

ISO 14001



since
2002

OHSAS 18001



since
2008

ISO 27001



since
2016

ISO 50001



since
2020

Summary

- The **biggest casting group in Turkey** (tons/yr)
- **Biggest and widest HPDC** machine range in Turkey
- Management with avg. **18 years experience** in Aluminium castings
- High level of expertise in complex **HPDC/LPDC castings**
- **In-house final CNC machining applied to >85% of castings**
- Max capacity of approx. **18.000 tons/year**
- Component casting weight **up to 55 kg** and quantity of **>500.000 pcs/year**
- **Full value chain**: tooling design, product/process development, prototyping, volume production and final machining & assembly
- One **straight lean production line** and **material flow**
- West-EU presence with **local sales staff** (UK & Germany)
- Strong focus on **future growth** and investment



TOFAŞ TÜRK OTOMOBİL FABRİKASI A.Ş.

TürkTraktör



CLAAS



EATON



JOHN DEERE

GRÜNER
systemtechnik



anvis
SUMITOMO RIKO GROUP



TOGG
Türkiye'nin Otomobili Girişim Grubu



www.doktas.com
