



# **ALD Heat Treat Services Company Overview August, 2023**

# 2022 Supplier Quality Excellence Award

- ❑ Nine consecutive years for Port Huron
- ❑ Seven out of the last nine years for Ramos

general motors

## Supplier Quality Excellence Award 2022

Presented to:

813016524

**ALD TRATAMIENTOS TERMICOS SA DE CV**

For your outstanding **2022 performance to General Motors.**  
Thank You.



general motors

## Supplier Quality Excellence Award 2022

Presented to:

622103989

**ALD THERMAL TREATMENT INC**

For your outstanding **2022 performance to General Motors.**  
Thank You.



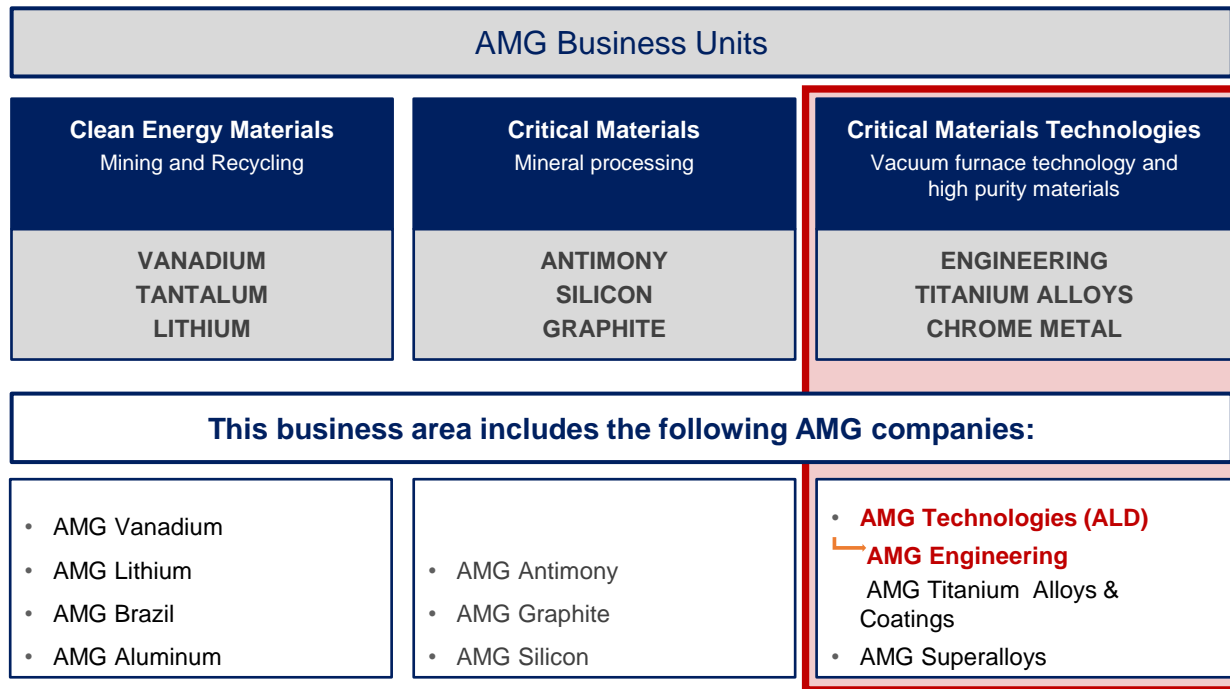
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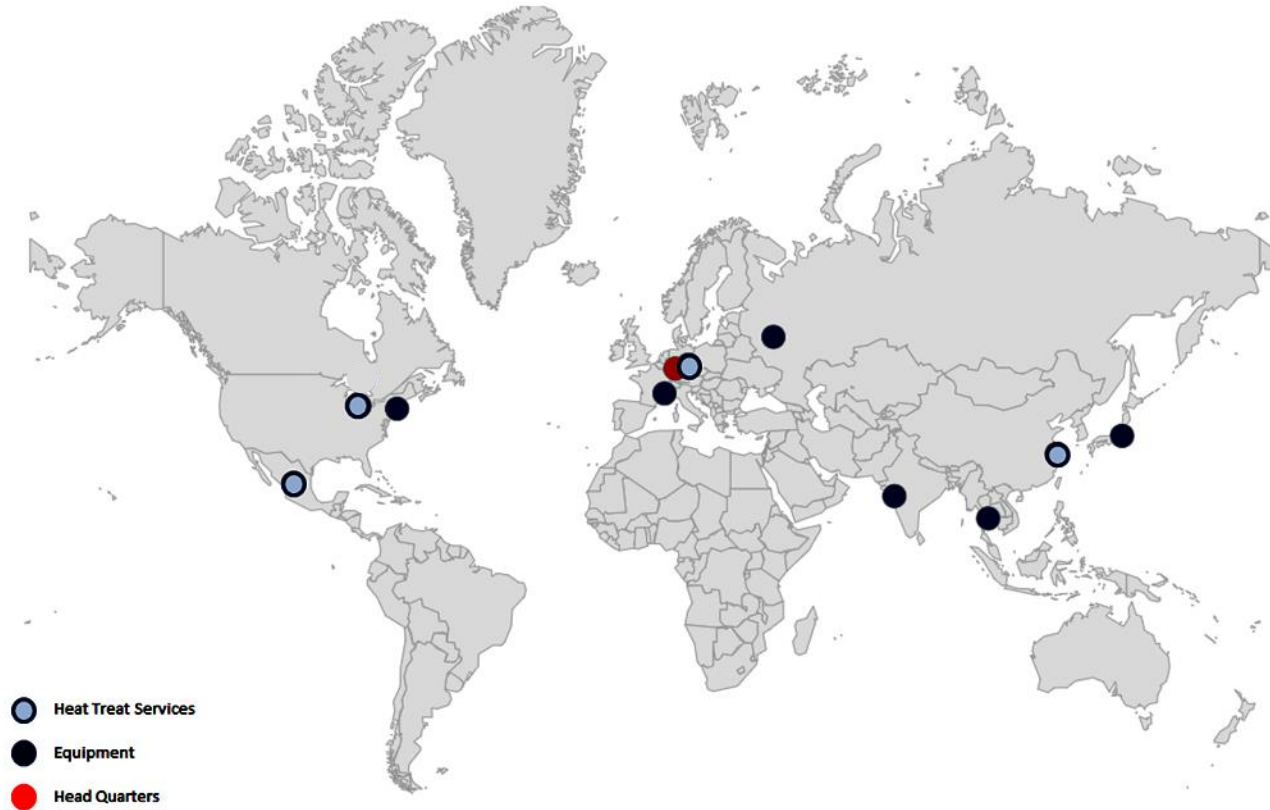
# Corporate Structure

## AMG Advanced Metallurgical Group N.V.



- Approx. 3,600 employees
- 1,643 M US\$ annual revenues in 2022
- Founded in the Netherlands in November 2006, IPO July 2007, Euronext listed
- Production facilities in Germany, UK, France, U.S., China, Mexico, Brazil, India, Sri Lanka, Mozambique

# AMG ENGINEERING – Locations



## Europe

- Hanau, Germany
- Limbach-Oberfrohna, Germany
- Grenoble, France

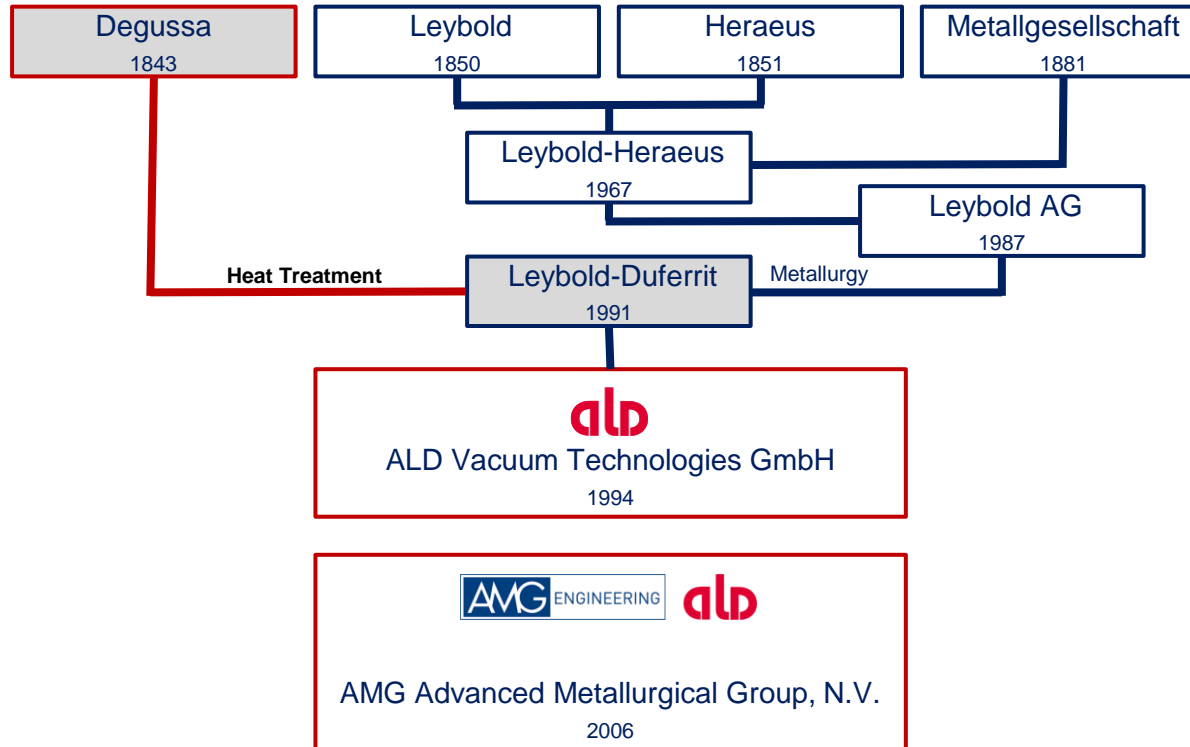
## America

- Port Huron, MI, USA
- East Windsor, CT, USA
- Ramos Arizpe, Mexico

## Asia

- Mumbai, India
- Suzhou, PR China
- Tokyo, Japan
- Bangkok, Thailand

# AMG ENGINEERING



- Individual solutions for vacuum metallurgy and vacuum heat treatment sector
- Worldwide care and maintenance service of ALD high-quality equipment for their entire lifecycle.
- ~ 850 employees
- Engineering facilities in Germany, France, U.S., India and China
- Four heat treatment service centers (HTS) in Germany, the U.S., Mexico, and China
- Owns 63 patent families



# ALD HTS Global Footprint

Port Huron US



**ALD HT HEADQUARTERS**  
Hanau, Germany



Limbach-Oberfrohna, Germany



Ramos Mexico



Central Mexico  
Considered 2024



Suzhou, China  
September, 2021



# ALD VACUHEAT Limbach-Oberfrohna, Germany

**Established** 1999/2000

## **Technologies/Services:**

- LPC & HPGQ (ModulTherm®, VZKQ)
- Tempering
- Brazing
- Annealing
- De-Oiling

## **Capacity:**

- 3 ModulTherm® systems with 14 treatment chambers
- 3 Dual chamber furnaces
- Various other pre- & post processing facilities

## **Production Record:**

**>150 Million Injection Components**

- (i.e. approx. 40 Million Cars)
- 0 Field ppm since 2000 SOP
- ~ 50 Employees

## **Limbach-Oberfrohna, DE - Equipment**



ModulTherm-4 System with individual Vacuum pump sets



De-Oiling Furnace (for PM Parts)



# ALD TT Port Huron, MI United States

**Established 2006**

## **Technologies/Services:**

- LPC & HPGQ (ModulTherm®)
- Washing / Pre-Oxidation
- Tempering / Gas Nitriding
- Ferritic Nitro Carburizing (FNC),
- Abrasive After Treatment (Shot Peen/Blast)
- Cryogenics

## **Capacity:**

- 4 ModulTherm® Systems with **24** treatment chambers
- 2 Dual chamber furnaces & 3 nitriding furnace
- Various other pre- & post processing capability

## **Production Record:**

**>10 Million Automatic Transmissions**

(up to ~5,500 Transmissions/Day... 60-70 Tons/Day)

- Field ppm since 2006 SOP
- ~55 Employees



## **Port Huron, US – Equipment**



**ModulTherm-4 Furnace System**



**Eddy Current Testing**



**Metallurgical Lab**  
(Hardness/Microstructure)

# ALD TT Ramos Arizpe, Mexico

**Established 2008**

## **Technologies/Services:**

- LPC & HPGQ (ModulTherm®)
- Gas Nitriding & Ferritic Nitro Carburizing (FNC)
- Washing, Pre-Oxidation, Tempering
- Abrasive After Treatment (Shot Peen/Blast)
- Cryogenics

## **Capacity:**

- **3** ModulTherm® Systems with **19** Treatment Chambers
- **1** VZKQ Dual Chamber & **1** Nitriding Furnace
- Various other Pre & Post Processing Facilities
- Extensive Equipment Service Capabilities

## **Production Record:**

**>7 Million Automatic Transmissions**

- 0 Field ppm since 2008 SOP

## **Ramos Arizpe MX - Equipment**



### **ModulTherm-7 Furnace System**



**Nitriding Furnace**  
(Payload 2.5 tons)



**Abrasive Process**



**Cutting Lab**

# ALD HTS in China

## Equipment available in phase 1 :

- 1 ModulTherm® system with 6 treatment chambers
- 7 Temper furnaces
- 2 Industrial washer
- 3 Pre-oxidation furnaces
- Cryogenic units (upon request)
- Metallography and related equipment

## As expert in vacuum heat treatment we offer :

- Low Pressure Carburizing (LPC)
- High Pressure Gas Quenching (HPGQ) with  $N_2$  / He
- Vacuum Processing
  - Neutral hardening, brazing, annealing
- Pre-cleaning
- Tempering
- Cryogenics (upon request)
- Rust protection after treatment
- Metallurgical analysis
- Heat treatment consultancy
- Certified quality management

Wujiang Economic and  
Technological  
Development Zone

## Suzhou, CN - Equipment



## ModulTherm-7 Furnace System



# Why Choose ALD?

**World Leader in LPC/HPGQ with 35 Years of Operational Experience**  
**>1 Billion parts processed with 0 field ppm's**

- Delivering Minimal and Predictable Distortion Control
- Quality Control: (GM Supplier Quality Excellence Award 9 consecutive years)
- Traceability; Individual part traceability is possible (2D matrix pre-heat treat)
- On-time delivery with quick turnaround times
- Root cause analysis expertise
- Fast response for development
- Unique R&D capabilities





# Where is ALD's Expertise?

- Any Parts requiring low distortion & superior quality control
  - Gears for automotive and all other applications
  - Driveline systems (Joints, Cages, Tripods, Spiders)
  - Cam shafts and sliding cams
- Powder metal parts (e.g. Gears for automotive powertrain systems)
- Shafts and crankshafts
- Thin-walled parts (synchronizer rings, actuator components, etc.)
- Parts with blind holes
- Fuel injection parts
- Anything hard to clean / parts with higher cleanliness requirements

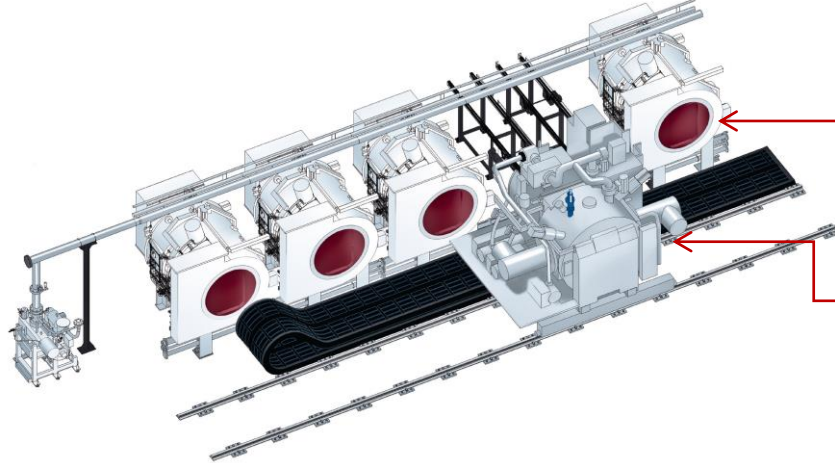




# What we do and How we do it

## ModulTherm® (LPC & HPGQ)

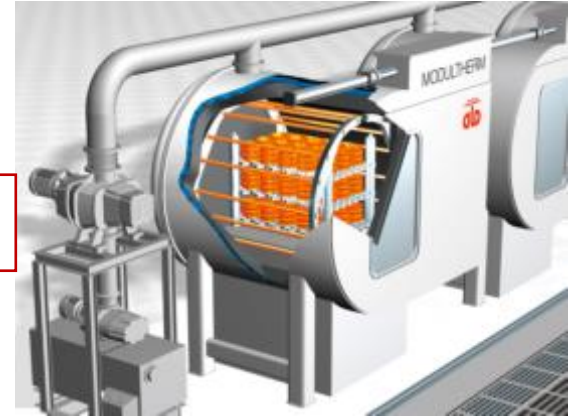
- Best-in-class for superior distortion control
- Elimination/minimization of hard finishing of processed parts
- Capability for Helium or Nitrogen quench
- Cryogenic processing in place for specific metallurgical requirements (no retained austenite)
- Development trials in process for high performance eDrive components and additive manufacturing fixtures



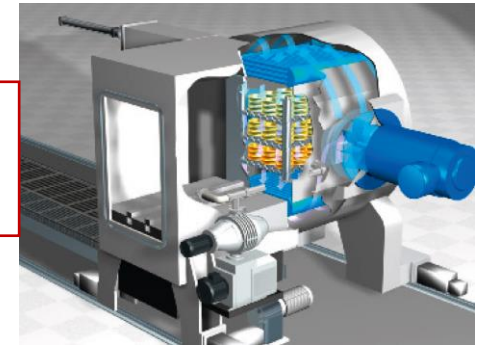
Treatment Chamber

Shuttle Module  
Transport and  
Quench Chamber

## Low Pressure Carburizing (LPC)



## High Pressure Gas Quench (HPGQ)



# What we do and how we do it

## Nitriding / Ferritic Nitro Carburizing (FNC)

- Low temperature process for minimal distortion
- Used where a hard wear resistance surface is required
- Cost effective, large loads, long cycle times



# ALD's Total Cost Advantage

## Conventional Process Chain



## ALD Streamlined Process Chain



## Benefits of HPGQ vs. Liquid Quench

- Reduced Distortion
- Clean Surfaces
- Better Fatigue Resistance
- Minimal Variation (load to load)
- Fewer Steps ➤ Less Cost
- Clean Shiny Parts
- Environmentally Friendly > 99%
- Flatness & Additional Distortion Control

# Certificates, Awards & Highlights

## Certified to:

- IATF 16949 : 2016
- AS9100D\*
- ISO 9001 : 2015
- Nadcap



## Compliant to:

- CQI-9
- OHSA 18001
- ISO 27001
- ISO 14001

\*Recommended for Continued Certification



## GM Supplier Quality Excellence 7 of 9 in Ramos, 9 years running in Port Huron



- Safety: On Average <1 LTA/year
- Low employee turnover in all facilities
- International Engineering Network (GER, US, MX, CHN) including unique expertise in the world

# Certificates, Awards & Highlights



Administered by PRI

## ACCREDITED

**ALD** is capable of adhering to aerospace material specifications for multiple alloy families related to:

- Stress Relieving
- Low-Pressure Carburizing (LPC)
- Gas and Solution Nitriding
- Neutral Hardening
- Vacuum Heat Treating.





# Proven Production Quality

- **ALD Port Huron:**

Processed > 233M parts for GM in PH @ 0 field ppm since 2006

- Supported > 10M transmissions
- Processed > 176M parts for other customers in PH @ 0 field ppm since 2006

- **ALD Ramos:**

Processed > 120M parts in Ramos @ 0 field ppm since 2008

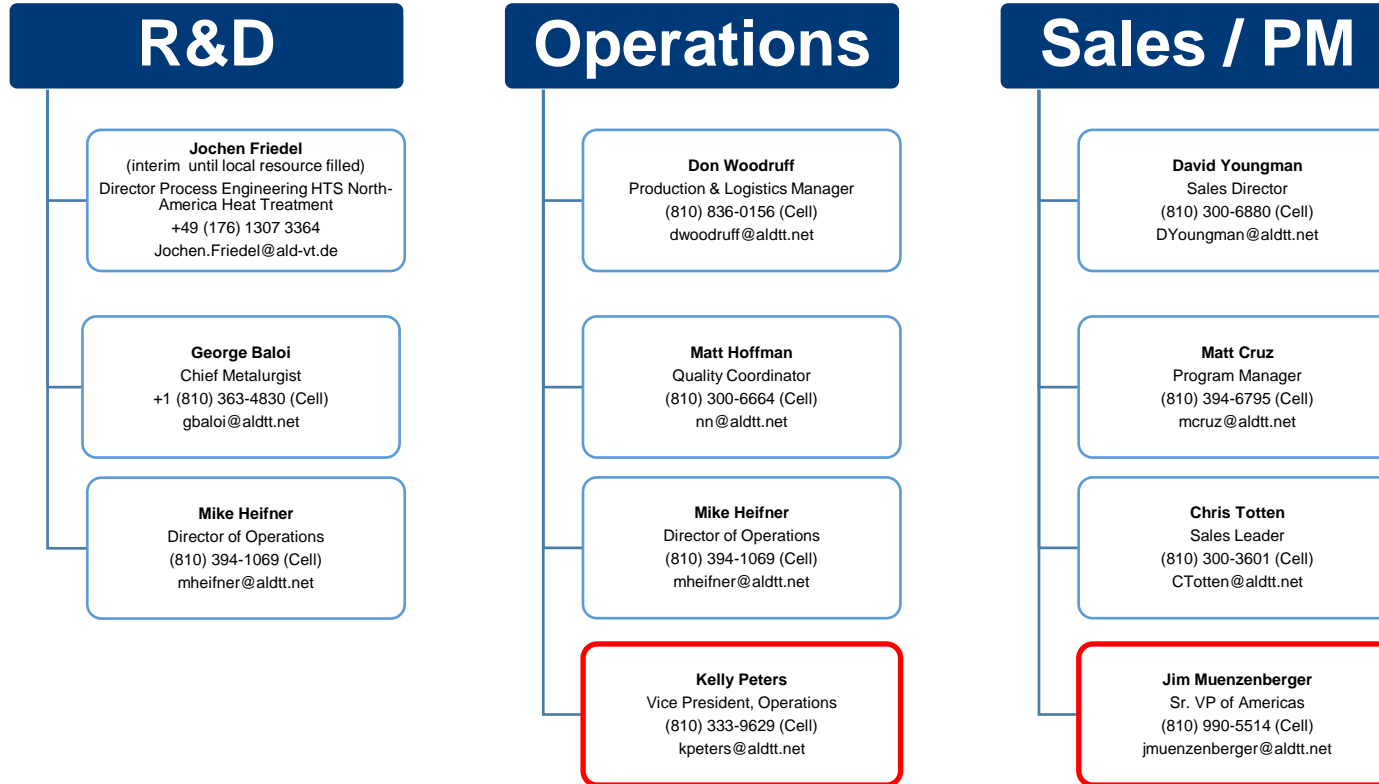
- Supported > 8M transmissions

- **ALD VACUHEAT Limbach-Oberfrohna:**

Processed > 200M high pressure fuel injection nozzles

- 0 field ppm since 2000

# ALD Port Huron Support Team



# ALD Ramos Support Team

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**Samples of typical production parts**

# Sample of Heat Treatment Parts (I)



Gears



Shafts



Driveline Systems Joints





# Sample of Heat Treatment Parts (II)

Driveline Systems Cages



Crankshafts



Spiders



Tripods



Sprockets



Pistons



# Sample of Heat Treatment Parts (III)

Races



Couplings



Drill bits



Steering Nuts



Dies



Bearings



# Sample of Heat Treatment Parts (IV)

Drive Transfer



Internal Gears



Arrow Heads



Iniector bodies



Studs for Aircraft



Engine Lobes



# Thank You

