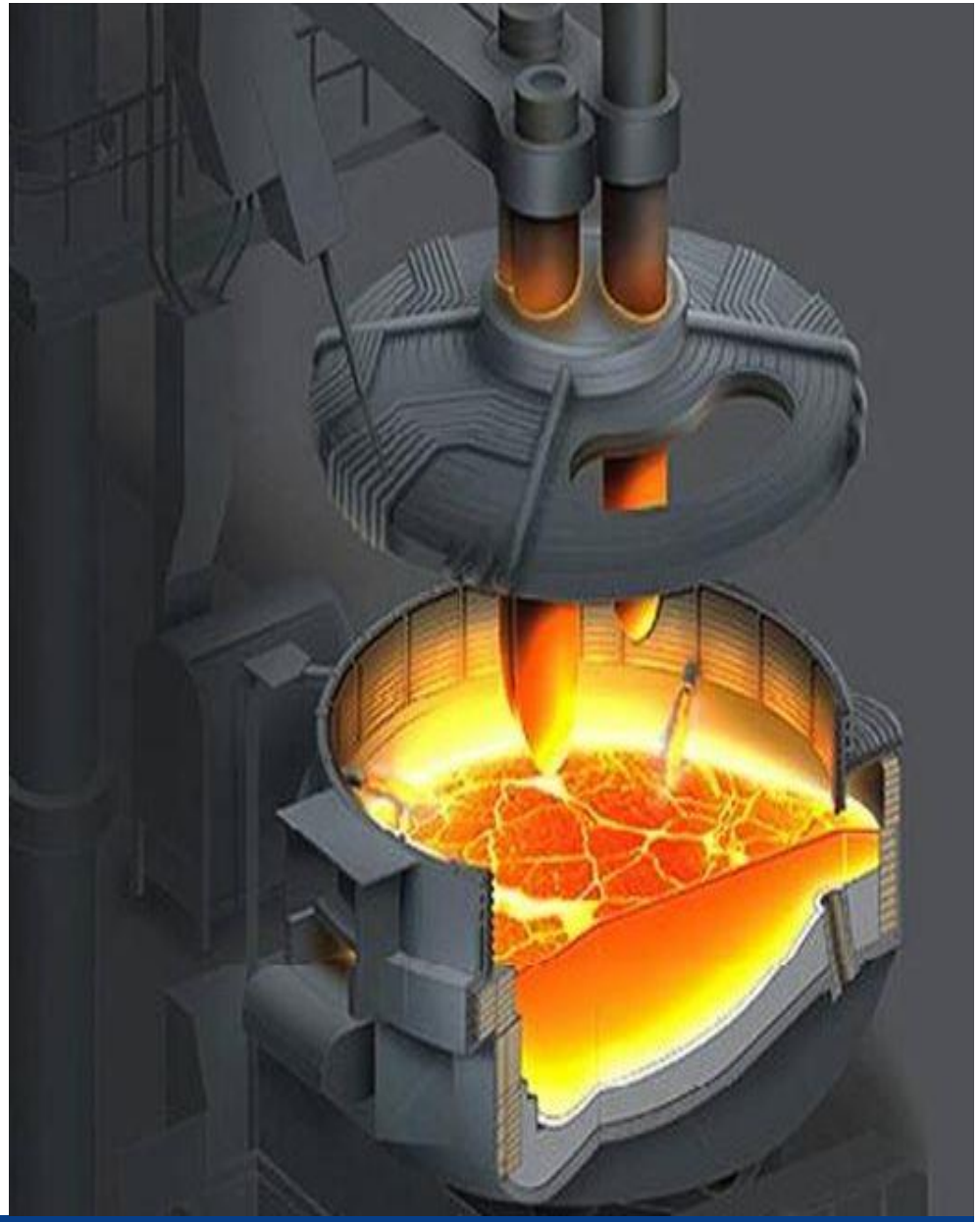
SAARLOHA

# Saarloha Advanced Materials Private Ltd, Pune



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# Kalyani Group Introduction

# Kalyani Group Highlights



| | |
|---|---|
| **Turnover & Market Cap** | • Group Turnover ~US $ 3 Bn (in FY19)<br>• Market capitalization of listed entities ~ US $ 4.5 Bn (at the end of FY19) |
| **End-to-End product & service offering** | • Complete integrated chain from Iron Ore to Steel to Finished Component supplier with strong R&D support |
| **Leading Special Steels Manufacturer** | • India's leading producer of Micro-Alloyed steel, used for manufacturing of Critical Auto-components (engine, transmission, powertrain, axles etc.) |
| **Largest single location forging facility** | • Bharat Forge has world's largest single location forging facility with a production of ~0.36MTPA |
| **Largest Exporter** | • Largest Exporter of Auto-components from India<br>  • Every 2nd Heavy Truck in US carries a Front Axle manufactured by Bharat Forge India |
| **Global Leader in Powertrain & Chassis** | • Bharat Forge is the global Leader in Powertrain and Chassis components |
| **Global, skilled workforce** | • Global workforce of 10,000+ with best skills in Quality, R&D, Operations, Technology and so on |

# Kalyani Group: A professionally managed Global Conglomerate



| Segment | India | Europe | North America |
|---|---|---|---|
| Engineering Steel | • Saarloha (formerly Kalyani Carpenter Special Steels)<br>• Kalyani Steels<br>• Baramati Sp. Steels | | |
| Forgings | • Bharat Forge<br>• Kalyani Technoforge | • BF CDP, Germany<br>• BF Daun, Germany<br>• BF Aluminumtechnik, Germany<br>• Mecanique Generale Langroise, France<br>• BF Kilsta AB, Sweden | • Walker Forge, Tennessee, USA |
| Auto Components | • Automotive Axles<br>• Maxion Wheels | | |
| Energy & Infrastructure | • BF Utilities<br>• Khed Earth (SEZ) | | |
| Specialty Chemicals | • Hikal Chemicals | | |

# Kalyani Group's R&D Centers



## Kalyani Centre for Technology and Innovation (KCTI)

**Research -** Optimization of steel and forging process through advanced labs of Heat Treatment, Metallography, Fatigue, Creep Testing

**Innovation -** Nano Technology, Battery Technology & Electronic Labs

## Kalyani Centre for Manufacturing Innovation (KCMI)

- Joint Engineering support during Product development.
- Speedy Development of "A" and "B" Samples.
- Establishing design for manufacture processes and technology.

# Saarloha Introduction

# About Saarloha Advanced Materials Pvt. Ltd (Saarloha)



**1973:** Founded as Kalyani Steels as a backward integration of Bharat Forge

**1999:** JV with Carpenter Technology Corporation (CTC, USA) to form Kalyani Carpenter Special Steels Ltd (KCSSL)

**1999 – 2016:** KCSSL matured into a leading producer of premium Alloy Steel Long Products, catering to Automotive, Oil & Gas, Nuclear, Defense, Railways, Aerospace and other critical engineering segments.

**2016:** Kalyani group bought CTC, USA's stake and in 2018, changed the name of the company to Saarloha Advanced Materials Pvt. Ltd. (Saarloha)

**Saarloha has state-of-the-art Inert ESR and VAR furnaces**

**Today, it has an annual crude steel capacity of 244,000 MTPA;** Details of facilities are given in subsequent slides

# Our Strengths



- ✓ Manufacturing Flexibility – *in terms of raw material use & production routes*
- ✓ Customized Product Development
- ✓ Clean Steel Technology – *by virtue of re-melting facilities*
- ✓ Wide Range of Grades
- ✓ Wide Range of Sizes
- ✓ In-House Research & Development team and facility
- ✓ Expertise in understanding customer needs and hence offering best solutions

# Quality Policy



We are committed to high standards of Customer satisfaction and will strive for Continual Improvement in our manufacturing processes to ensure sustained and consistent quality of our products and services.

## Objectives

- Implement and maintain effective quality system.
- Make continual improvement in manufacturing.
- Up-grade technology for higher efficiency.
- Control process through statistical techniques.
- Endeavour to produce first time right.
- Ensure timely delivery and consistent quality.
- Train employees and monitor effectiveness.
- Encourage active participation of employees.

# Saarloha's In-house R&D (1/2)



Saarloha R&D center is approved by DSIR (GOI) and involved in continuous improvement of steel.

**Major thrust Areas of R&D:**

1. **New Product Development**
2. **FEM Modeling & Simulation**
3. **Process Improvement**
4. **Advanced Material Characterization**

Saarloha's in-house R&D center consists of metallurgical experts, process experts and is well equipped with testing facilities like Mechanical Properties, Metallography, chemical analysis and NDT. FEM & Simulation is a major strength of R&D team to predict the properties of wide range of steel grades which supports in process improvement. We are continuously working to improve the product quality along with our customers and are successfully meeting their expectations.

# Saarloha's In-house R&D (2/2)



We have successfully developed products and processes for our customers from segments like Energy, Defence, Aerospace, Oil & Gas sectors etc.

Saarloha' s testing facility and experts team provides technical support and in-house failure analysis for our customers.

**R&D also has a 100 kg Prototype Induction Furnace – which is utilized to develop special and new steel grades.**

# Certifications



- NADCAP Accreditation for H2 determination in Ti alloy
- IATF 16949:2016
- ISO 9001:2015
- ISO 14001:2015 & OHSAS 18001:2007
- LRS (Lloyds Register of Shipping)
- DNV (DET NORSKE VERITAS) Norway,
- ABS (American Bureau of Shipping)
- KR (Korean Register of Shipping)

- NKK (Nippon Kaiji Kyokai)
- Central Boiler Board of India " Well Known Steel Maker"
- Laboratory Accredited by NABL
- CCS (China Classification Society)
- IRS (Indian Register for Shipping)
- RINA, Geneva,
- PED, TUV Nord
- GL (Germanischer Lloyds)

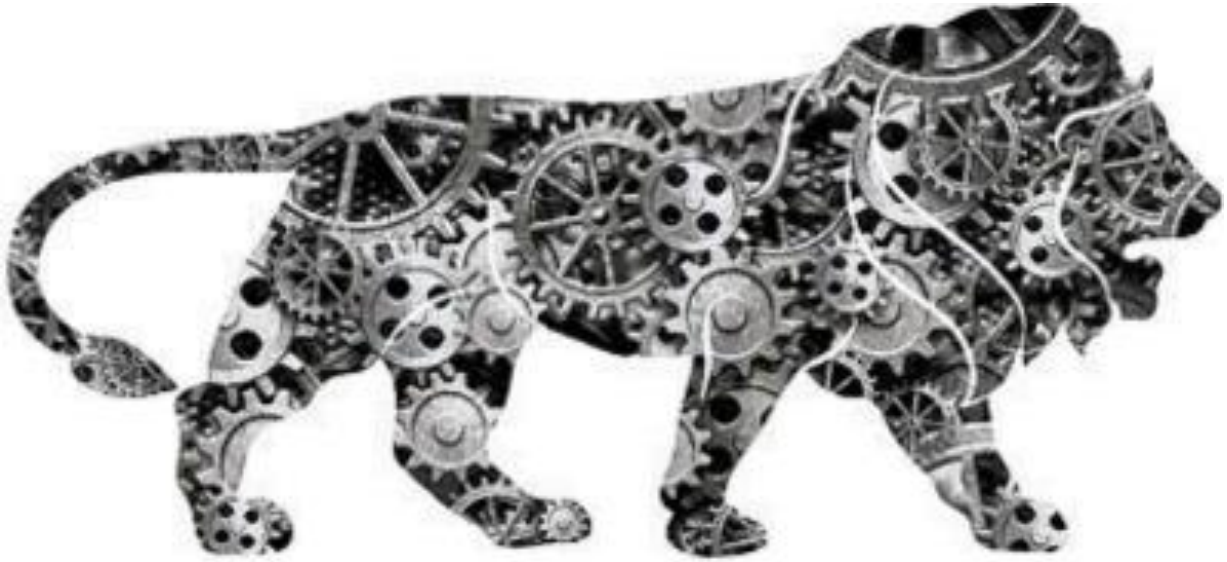
- Bureau Veritas
- AS 9100 D
- Germanischer Lloyd (GL)
- Ordnance Factory, Ambajhari SO/IEC 17025:2005 (NABL)
- Heavy Vehicle Factory, Avadi,
- Ordnance Factory, Trichy

# Contribution to Indian Space, Defense , Nuclear & Railways “Make in India” Programme



We have successfully developed & supplied Critical application Steels to:

- ✓ **Nuclear Power Corporation Ltd (NPCIL)**
- ✓ **Nuclear Fuel Complex (NFC)**
- ✓ **BHAVINI, Kalpakam** (Nuclear power plant)
- ✓ **Bhabha Atomic Research Centre (BARC)**
- ✓ **Vikram Sarabhai Space Centre (VSSC)**
- ✓ **Liquid Propulsion Systems Centre (LPSC)**
- ✓ **Ordnance Factories – Ambajhari / Avadi**
- ✓ **Rail Wheel Factory – Bengaluru**



# Our customers / End users (1/3)



# Our customers / End users (2/3)



# Our customers / End users (3/3)



HALLIBURTON

AkerSolutions

FMC Technologies

CAMERON

Ingersoll Rand
Inspiring Progress™

LIEBHERR
*(Material handling)*

JOHN DEERE

Rexroth
Bosch Group

WÄRTSILÄ

vetco

GE

T3 Energy Services

# Product Range

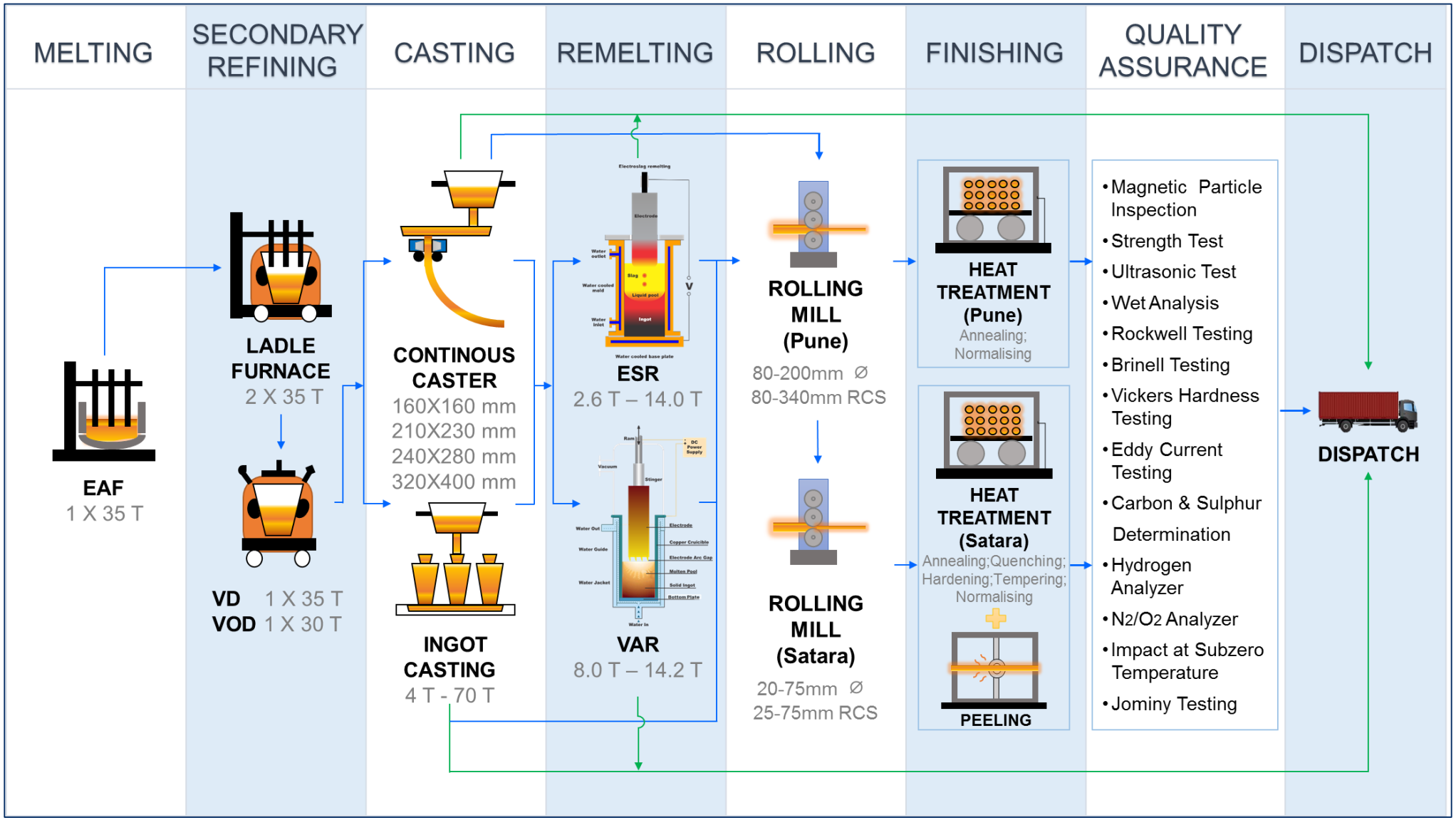


- **Carbon & Alloy Steels** for Forgings & Engineering Applications
- **Tool & Die Steel** – H11, H13, A2, SXI 99, S1, S7, O1
- **Valve Steels** – En 52, SUH 3, SUH 11 etc.
- **Stainless Steels** – AISI 304/304L, 316/316L, 403, 410, 17-4PH, Custom450 Etc.
- **Micro Alloyed Steels**
- **Customized steels as per requirement**
- ESR & VAR route steels (elaborated separately)

# Facilities at Saarloha

# Process Flow (Steel Plant)





# I-ESR & VAR Facilities at Saarloha
(Remelting Steel Process)

# Superior quality steels through Re-melting



a) Decreased gas content
b) Improved cleanliness
c) Improved hot and cold work workability
d) Higher Mechanical Properties:
    i. Fatigue Strength
    ii. Impact Strength
    iii. Tensile ductility
    iv. Hardness Uniformity
    v. Creep rupture
    vi. Transverse properties
e) Improved magnetic properties
f) Improved soundness and uniform composition
g) Consistent product – heat to heat

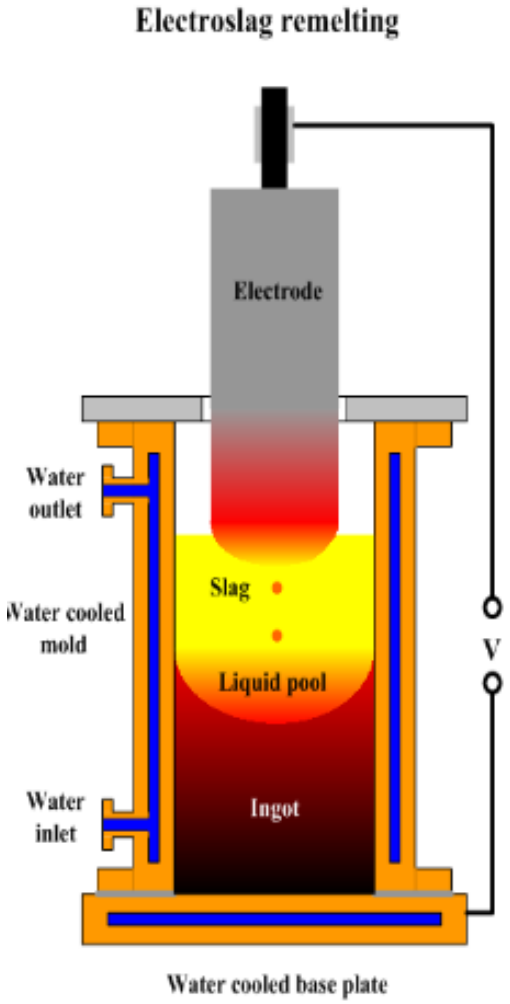
# Inert-ESR Features



**Make: ALD, Germany**

**Commissioned: Jan, 2019**

- ✓ One furnace head & two melt stations
- ✓ Fully computerized auto melt control system
- ✓ Inert atmosphere: No gas pick up from atmosphere
- ✓ ESR input and out put gas level is same.
- ✓ Highly accurate and precise load cells for better melt rate control
- ✓ Auto slag addition facility
- ✓ Start up and hot topping fully computer controlled
- ✓ Provision for Furnace design as per industry 4.0 standard



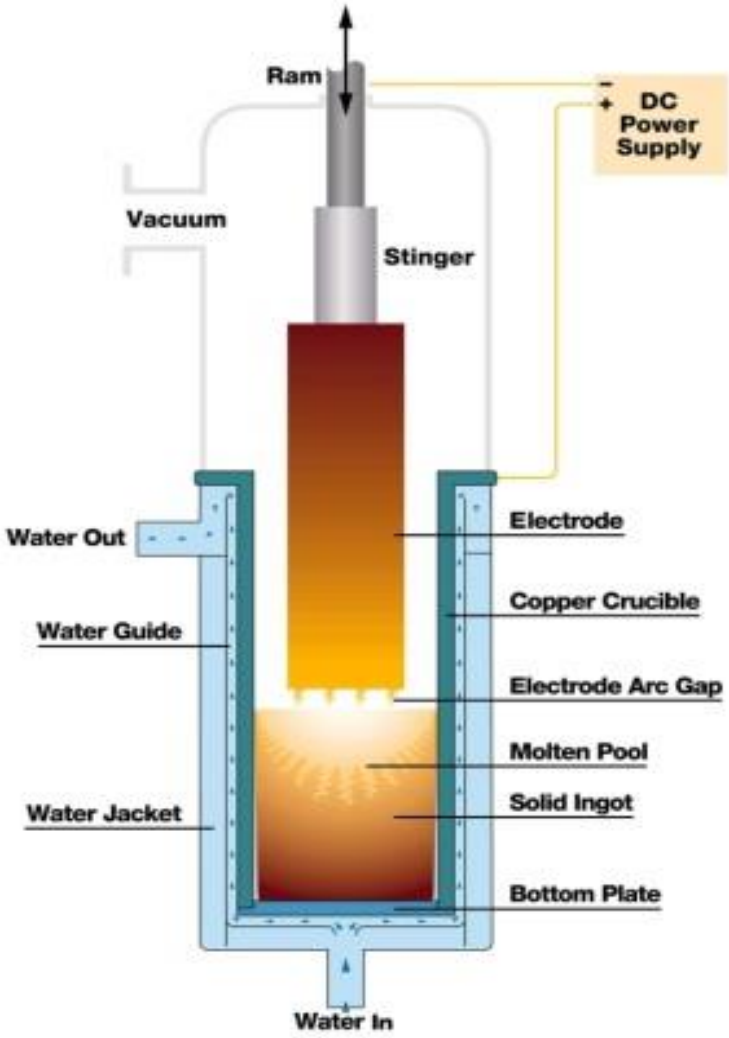
# VAR Features



**Make: ALD, Germany**

**Commissioned: Nov, 2018**

- ✓ One furnace head & two melt stations
- ✓ Fully computerized auto melt control system
- ✓ Capable of achieving 1 x 10-3 vacuum level
- ✓ Arc voltage control
- ✓ Start up and hot topping fully computer controlled
- ✓ Provision for Furnace design as per industry 4.0 standard



# ESR & VAR Capacities



| Inert-ESR (~3000 MT per year) | |
|---|---|
| **Ingot Size (mm)** (Approx.) | **Ingot Net Weight (MT)** (Approx.) |
| 883 Dia. | 16.6 |
| 630 Dia. | 8.4 |
| 305 x 360 | 2.7 |
| **VAR (~3000 MT per year)** | |
| **Ingot Size (mm)** (Approx.) | **Ingot Weight (MT)** (Approx.) |
| 897 Dia. | 15.2 |
| 670 Dia. | 8.5 |

*Apart from Inert-ESR, we also have an **Atmospheric-ESR** with sizes 325 mm Sq, 410 mm Dia, 620 mm Dia and 790 mm Dia and ingot weights from 3.5 T to 15.8 T*

# Production capability

*(Through re-melting route i.e. ESR / VAR)*



| Defence | Aerospace | Oil & Gas | Energy | Others |
|---|---|---|---|---|
| AISI 4130 | AISI 4340 (similar to 300M) | Custom 450 | Custom 450 | EN24 |
| 45XH2MOA-W | 15-5 PH | 15-5 PH | SS 403Cb | EN36C |
| 18X2H4MA | 17-4 PH | | X20Cr13 | 17-4 PH |
| 20XH2MOA-W | 15CDV6 | | SA266Gr.3 | 50CrMo4+Ni+V |
| 30XH2MOA-W | SS 304 / 304L | | SA350LF2 | SCM420H |
| APC-CrNiMo-V | AISI 420 | | EN36C | |
| Class F431 | AISI 316 | | AISI410 | |
| | 08X14H7M | | SS321 | |
| | SS 321 | | 12Cr | |
| | 30CD12 | | EN24 | |
| | 35NCD16 | | X10CrNiMoV12-2-2 | |
| | 08X14H7M | | X22CrMoV12-1 | |
| | 14X18H4 | | | |
| | SS0814C | | | |

# New Grades under development



| Steel | Chemical Composition (wt %) | | | | | | | | Size (mm) | Heat Treatment | Mechanical Properties | | | | | | | Applications |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grade | C | Si | Mn | Cr | Ni | Mo | Co | V | | | YS | UTS (MPa) | %E | %RA | CVN, J | KIC, MPa√m | YS/ UTS | |
| **K190** | 0.36 | 1.93 | 0.75 | 2.5 | 3.06 | 0.49 | - | | 65 RCS | Hardening - 1040°C/2hrs/OQ Tempering - 210°C/4hrs | 1421 | 1882 | 12.96 | 40 | 34 | 87 | 0.82 | Defense & Aerospace |
| **DMR 1700** | 0.35 | 1.92 | 0.55 | 1.15 | 3.05 | 0.51 | 0.3 | - | 60 RCS | Hardening - 940°C/2hrs/OQ Tempering - 280°C/4hrs | 1602 | 1889 | 10.14 | 37.96 | 30 | 77.08 | 0.85 | Missile casing |
| **K150** | 0.26 | 0.28 | 0.42 | 1.63 | 2.54 | 0.51 | - | - | 60 RCS | Normalizing – 925°C/2Hrs Hardening - 885°C/2hrs/WQ Tempering - 220°C/4hrs | 1376 | 1584 | 11.54 | 47.89 | 34 | 78.14 | 0.87 | Armour vehicles |
| **K43** | 0.33 | 0.1 | 0.46 | 2.0 | 3.53 | 0.59 | - | - | 100 RCS | Normalizing – 950°C/2Hrs Hardening - 860°C/2hrs/WQ Tempering - 565°C/4hrs | 964 | 1070 | 14 | 62 | 81@ - 20°C | 190 | 0.9 | Oil & Gas and Engineering |
| **300M** | 0.4 | 1.5 | 0.7 | 0.8 | 1.8 | 0.4 | - | 0.07 | 75 RCS | Hardeniing - 870°C/2.5Hrs/OQ Double tempering - 300°C/4Hrs | 1718 | 1983 | 8.5 | - | 24 | 59 | 0.87 | Landing Gear |

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# Thank You