

HIGH PERFORMANCE FORGINGS

for high flying requirements





BÖHLER AEROSPACE

OUR CORE COMPETENCE IS THE
NEAR NET FORGING OF TITANIUM ALLOYS,
HIGH ALLOYED STEELS AND
NICKEL-BASE ALLOYS.

voestalpine BÖHLER Aerospace GmbH & Co KG is a prominent forging house with more than 25 years of valuable experience in manufacturing high performance parts for the aerospace industry. As a global player in the challenging aerospace market, we offer our customers the advantage of advanced design approaches, concurrent engineering, material expertise and computer modeling of the complete forging procedure – from the early development stages through the forging process.

QUALITY EXCELLENCE ESSENTIAL IN OUR BUSINESS

We operate with proven quality standards on a truly international level – a necessity in the aerospace industry with its high profile of requirements.

voestalpine BÖHLER Aerospace GmbH & Co KG has established and maintains a Quality Management System certified according to the international Quality Standard ISO9001 and according to the Aerospace Quality Standard AS/EN9100.

Our special processes to comply with the most stringent specifications for heat treating and non-destructive testing of aerospace parts are approved by PRI/NADCAP.

Additionally, our Quality Management System and the special processes we use are approved by all of our major customers and leading OEMs.

Sustainability in environmental protection, efficient energy consumption along with the health and safety of our employees are issues that have become increasingly relevant in recent years. This prompted us to implement a certified EHS-System according to the international Environmental Standard ISO14001, the Energy Management Standard ISO50001 and the Health & Safety Standard OHSAS18001.





CERTIFIED
QUALITY

WEIGHT OPTIMIZATIONS TO SAVE MATERIAL AND MACHINING COSTS

Our dedication, excellent engineering and forging experience mean we offer our customers the idea of concurrent engineering with innovative and competitive solutions. This is even more beneficial when we get involved in an early development stage.

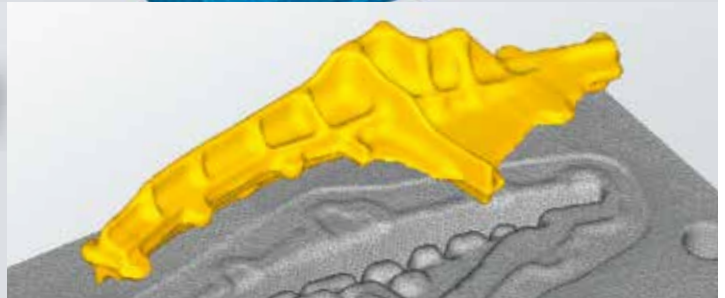
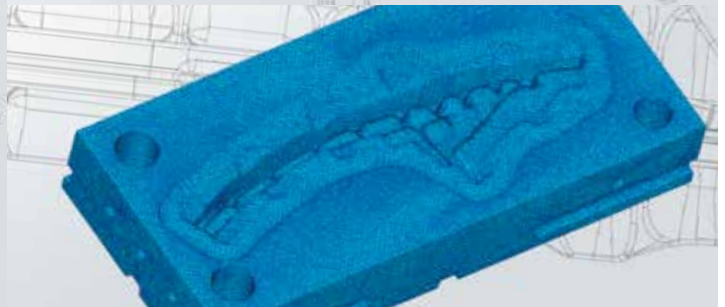
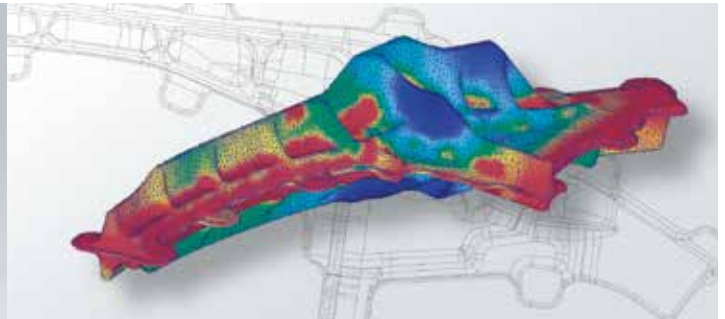
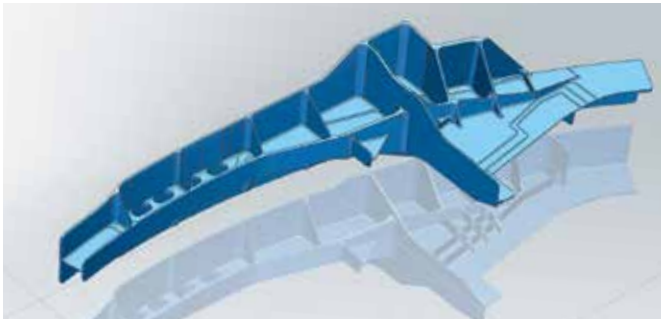
Our advanced design approaches result in a close-to-finish shape forging solution, giving you the best buy-to-fly ratio. This is how we keep subsequent machining operations to an economical minimum.

Using the most advanced technology and software for any CAD system and a full range of data exchange interfaces, we are able to satisfy our customer's needs.





DESIGN AND
ENGINEERING FOR
THE WORLD'S
TOP PERFORMERS



OUR INVESTMENT IN THE FUTURE

WE STRONGLY BELIEVE THAT INVOLVING CUSTOMERS, SUPPLIERS, UNIVERSITIES, AND OTHER INSTITUTES ALONG WITH ALL OF OUR EMPLOYEES IS A KEY SUCCESS FACTOR FOR OUR INNOVATION PROCESS. THE IMPLEMENTATION OF OUR CUSTOMIZED INNOVATION SYSTEM OFFERS THE POSSIBILITY TO FOLLOW THOSE IDEAS WITH THE MOST PROMISING OUTPUT FOR THE FUTURE.

Our research focus is set on three main topics:

MATERIALS

We analyze thermomechanical, thermophysical and other properties of established or newly developed steels, nickel-base superalloys, titanium alloys and titanium aluminides together with our research partners in order to define optimized forging, heat treatment and machining processes for future aircraft forgings.

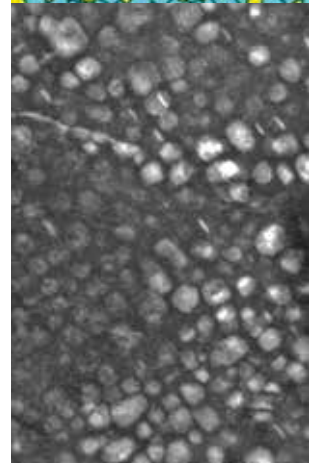
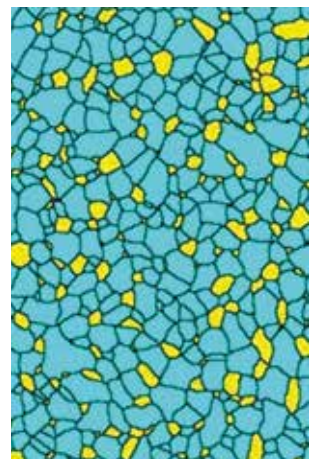
MODELING

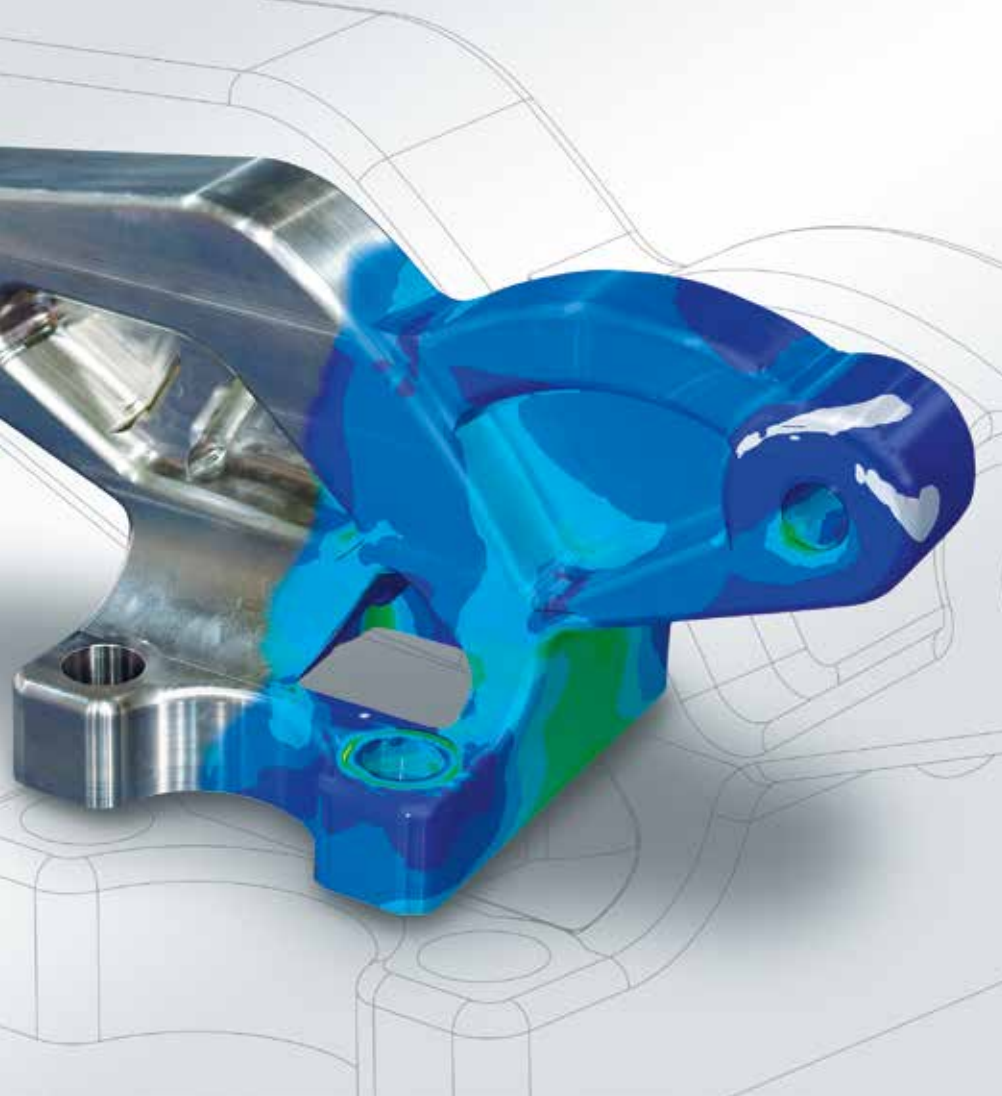
We develop new models and post-processing tools for the finite element analysis of our manufacturing processes in order to predict microstructure, residual stresses and mechanical properties. This offers the possibility to tailor position dependent properties and simultaneously reduce production costs in close collaboration with our customers.

MACHINERY AND PROCESSES

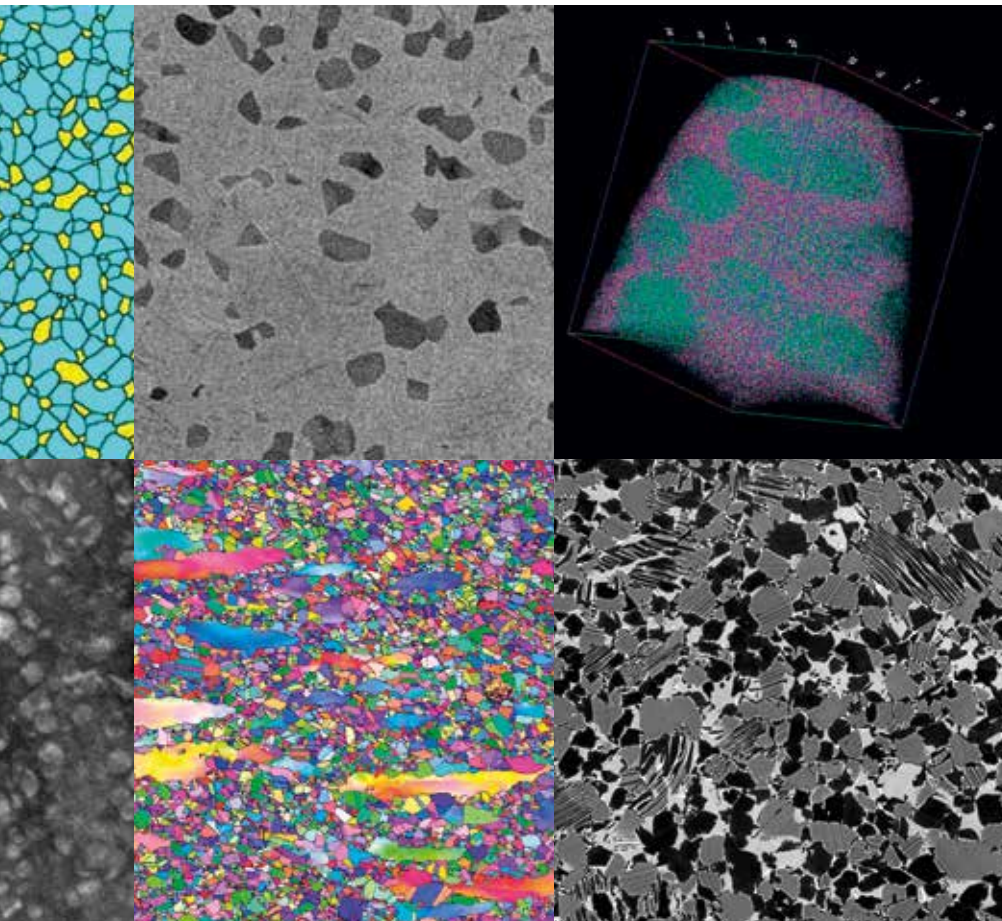
We analyze and develop new production processes together with our partners. We instrument our equipment to study its characteristics and implement it into our simulation tools.

Furthermore, we use this gathered processing data together with mechanical property test results from certified test laboratories and our research partners to verify our simulation models.





» RESEARCH
» DEVELOPMENT
» INNOVATION



CUSTOMIZED SERVICES – YOUR ADDED VALUE

SUPPLY CHAIN MANAGEMENT

Our aim is to give a competitive edge to our forgings and to guarantee smooth serial production, incorporating a customized supply chain: from raw material selection through the production process and advanced testing to pre- and final machining.

In close cooperation with our suppliers we secure the raw material needed – of the highest quality and in the customer-demanded dimensions, aiming at constantly reducing raw material lead-time.

Tailor-made planning of our aggregates ensures smooth production processes and secures the delivery of our products at the right time and in perfect quality. Our internal non-destructive testing facilities and our close cooperation with renowned external testing laboratories for destructive testing are an integral part of testing and quality, allowing us to provide all the necessary certificates for our customers.

NEW PARTS MANAGEMENT

Together with his interdisciplinary project teams each of our experienced project managers ensures the successful development and implementation of new parts and their respective supply chains, well aligned with our customers' needs.

An efficient path to readiness for serial production is guaranteed by our internal stage gate process for new parts. A detailed project organization chart and a well-defined project plan is the basis for the management of a new part in terms of quality, deadlines and costs.

We live up to our commitment to risk management by performing an ongoing risk analysis right from the RFQ phase up until the successful transfer to serial production.

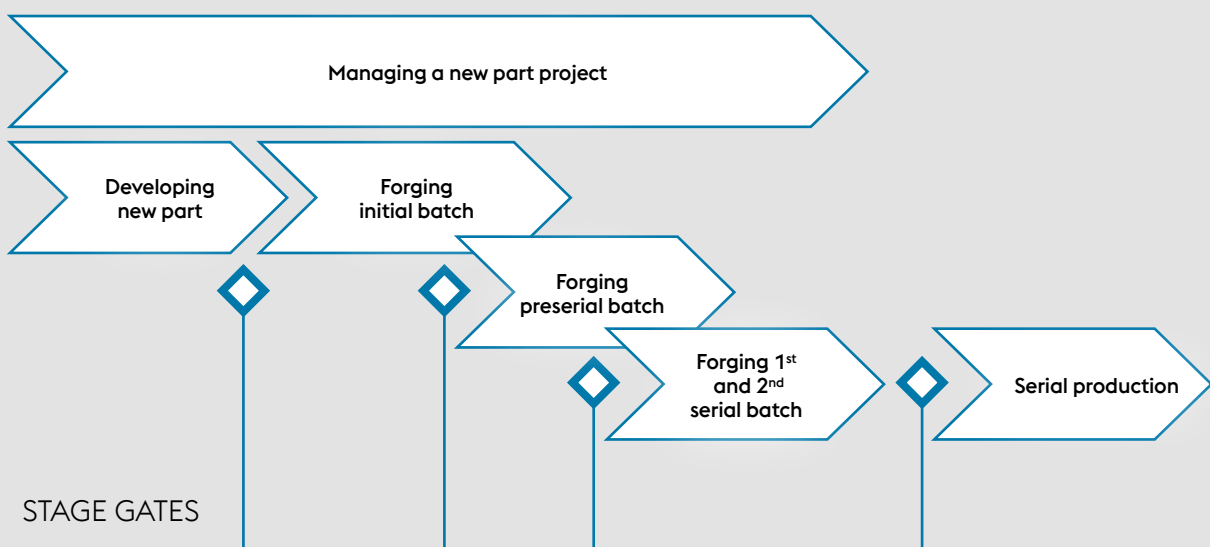
SUPPLY CHAIN - LOGISTICS

NEW PARTS MANAGEMENT



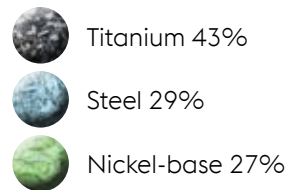


STAGE GATE PROCESS

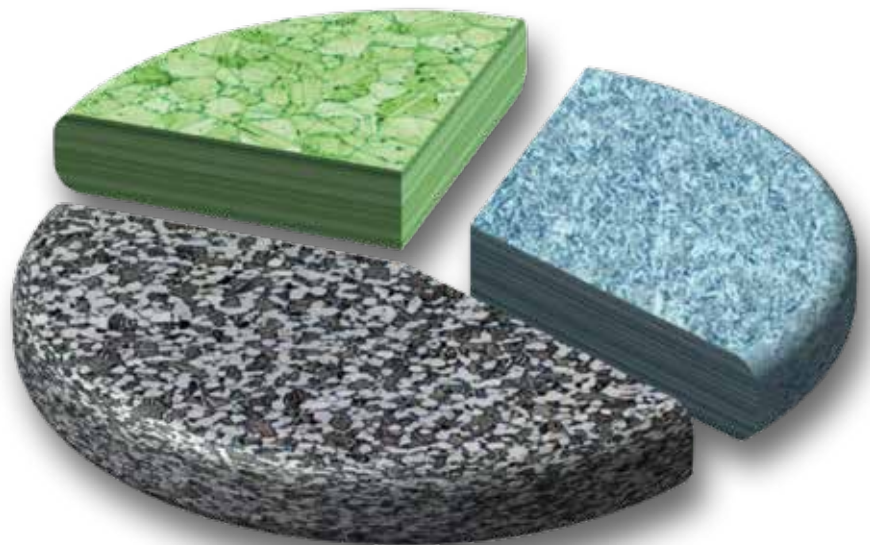


HIGH FLYING MATERIALS AND TAILOR-MADE PROCESS LAYOUTS

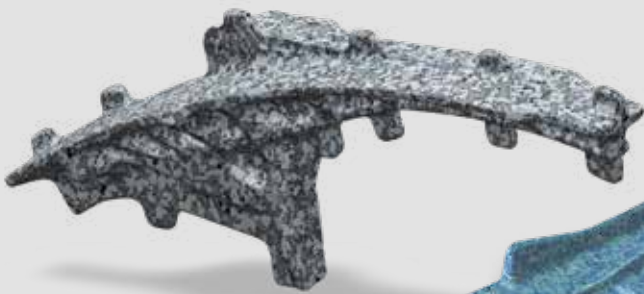
Material Consumption
Sales values fiscal year 2017/18



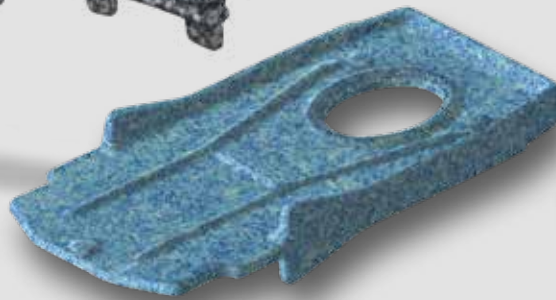
voestalpine BÖHLER Aerospace materials and processes experts define the proper solutions of process layouts for a wide range of aerospace materials in combination with complex part geometries. With regard to the type of alloy, forging and heat treatment parameters are chosen and optimized to achieve the highest process capability. The possibility to apply computer modeling for forging and heat treatment steps in the product development phase guarantees the successful introduction of critical structural and rotating parts right from the beginning.



AIRCRAFT MATERIALS FOR FORGED COMPONENTS



TITANIUM ALLOYS



STEEL ALLOYS



NICKEL-BASE ALLOYS

Alpha & Near-Alpha Alloys:

- » Ti-6Al-2Sn-4Zr-2Mo-0.1Si

Alpha-Beta Alloys:

- » Ti-6Al-4V, Ti-6Al-4V-ELI
- » Ti-4Al-4Mo-2Sn-0.5Si
- » Ti-6Al-6V-2Sn
- » Ti-6Al-2Sn-4Zr-6Mo
- » Ti-6Al-2Sn-2Zr-2Mo-2Cr

Beta & Near-Beta Alloys:

- » Ti-10V-2Fe-3Al
- » Ti-5Al-5V-5Mo-3Cr
- » Ti-5Al-2Sn-2Zr-4Mo-4Cr(Ti17)

Case Hardening Steels:

- » 9310
- » 4% Ni-Cr-Mo

High Strength Steels:

- » 4330, 4340
- » 35NCD16
- » 4340M, 300M
- » Airmet 100®

Maraging Steel:

- » M250
- » M300
- » M350
- » Custom465

Precipitation Hardening Steel:

- » 17-4 PH
- » 15-5 PH
- » PH 13-8 Mo

High Temperature Alloys:

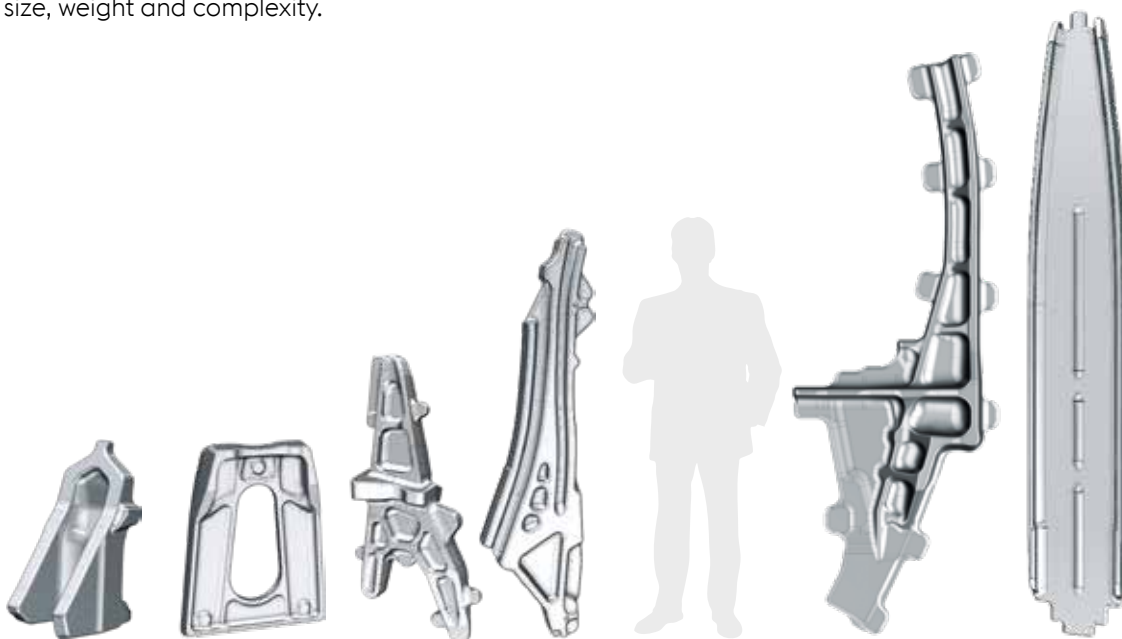
- » Alloy 625
- » Alloy 901
- » Alloy 80A
- » Alloy 90
- » Waspaloy
- » Alloy 718
- » Alloy 720
- » Haynes 282
- » RENE65
- » Allvac 718Plus

EQUIPMENT AND SCOPE OF PRODUCTION

Each work piece requires its own unique forging line utilizing specifically designed forging tooling.

Together with our production experts, our engineers determine the perfect equipment usage depending on parts size, weight and complexity.

- » Two large screw presses with press forces of 35,500 t and 31,500 t
- » Open and closed die forging hammers in various energy ranges
- » Product range from an input weight of 1 kg to more than 1000 kg





FORGING EQUIPMENT
MEETING THE HIGHEST
INDUSTRIAL STANDARDS







MACHINING

THE RIGHT PARTNER
FOR TECHNOLOGY
ALL ALONG THE
VALUE CHAIN



voestalpine BÖHLER Aerospace wants to be your technology partner from the forged part to the ready-to-assemble part. We ensure your competitiveness by managing the entire value chain, by reducing interfaces, lessening administrative efforts and increasing transparency. Expertise in forging and in the further value chain steps, such as machining and surface treatment, is our target.

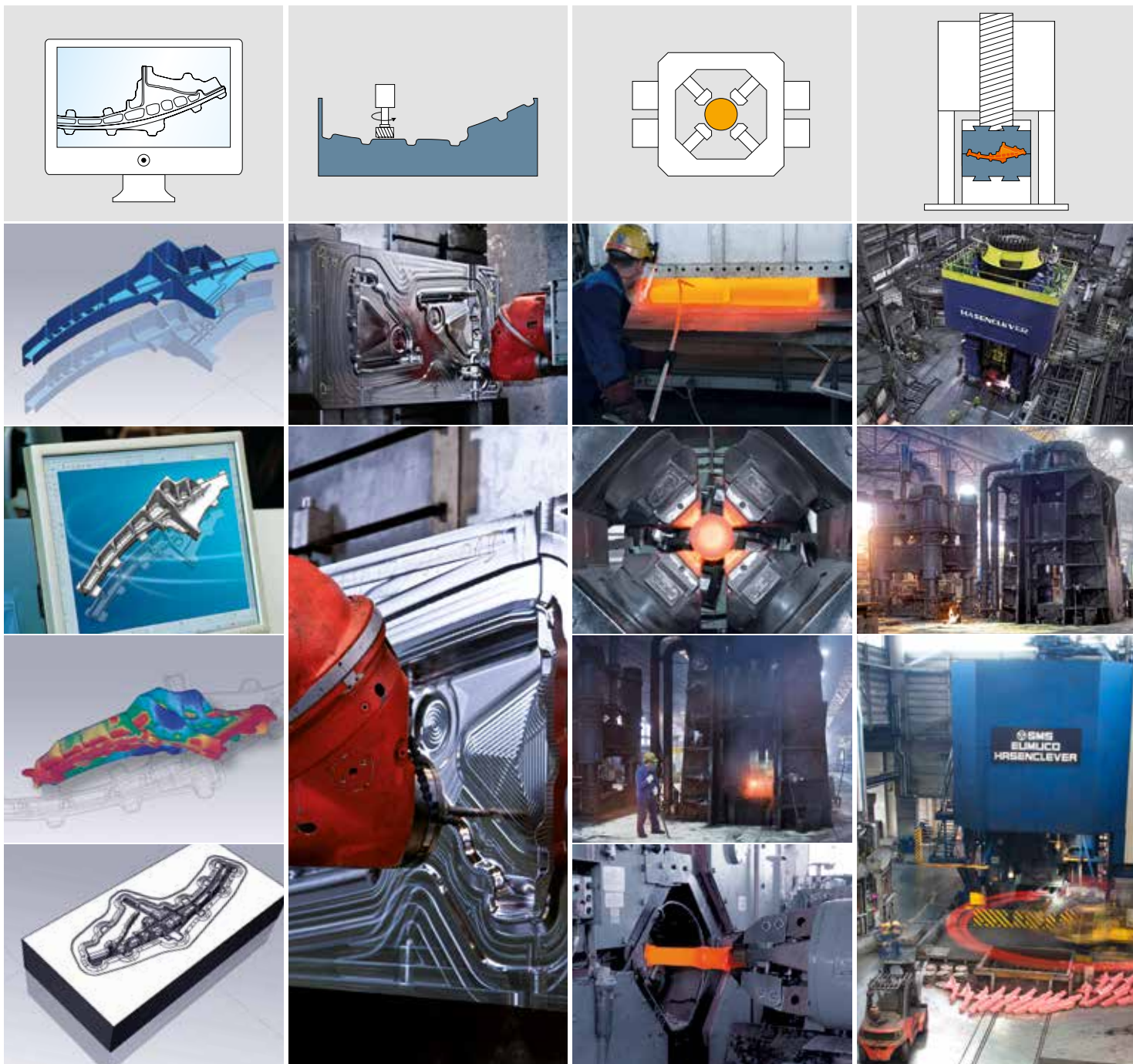
STATE-OF-THE-ART PRODUCTION PROCESS

→ DESIGN ENGINEERING
& MODELING

→ DIE MANUFACTURING

→ PRE-FORMING

→ CLOSED-DIE FORGING



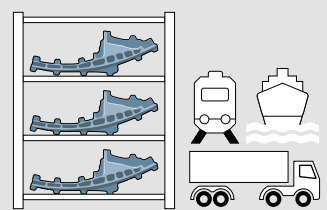
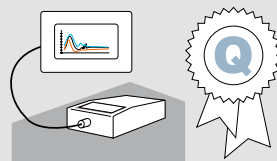
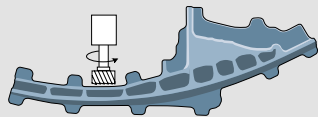
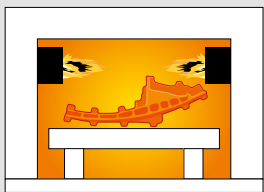
FLOW OF MATERIAL

→ HEAT TREATMENT

→ MACHINING

→ TESTING / CERTIFICATION

→ STOCK / DISPATCH



PRODUCT RANGE AEROSPACE

Worldwide, major OEM suppliers have chosen voestalpine BÖHLER Aerospace GmbH & Co KG to provide Class 1 parts. The major aircraft programs are equipped with our high quality forgings to meet the stringent requirements ensuring safe flights.

Throughout the whole process, our team of experts is there to give advice and support. Starting with customer requirements, moving into the development phase, our technicians are involved in designing the final parts or systems.

State-of-the-art simulation programs give our technical experts the tool to define the part, the process and the impact on mechanical properties and microstructure.

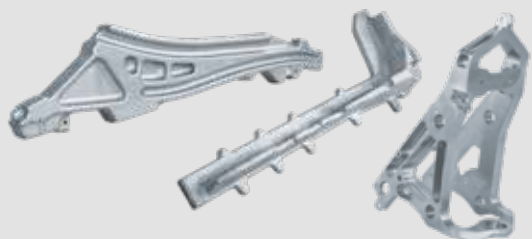
Accurate customer-specific drawings enable us to implement the best possible production process. This process, of course, is agreed upon by both voestalpine BÖHLER Aerospace GmbH & Co KG and the customer, giving the green light for initial forging operations.

This is how we ensure high quality products, conforming to standards.

QUALITY FIRST. SAFETY FIRST.



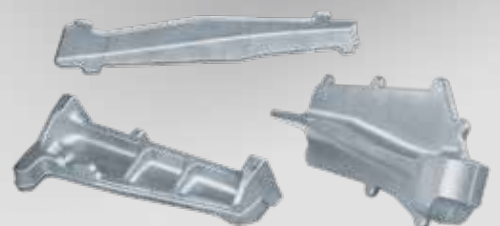
1 Wing Components / Pylon Parts



2 Engine Mounts



3 Structural Parts Fuselage



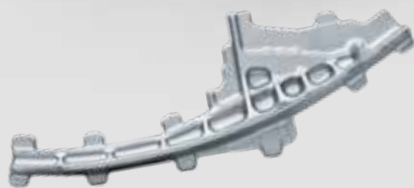


SUCCESSFUL PRODUCTS
WITH A SUCCESSFUL TEAM

4 Horizontal Stabilizer



5 Structural Parts Wing Box



6 Landing Gear Components

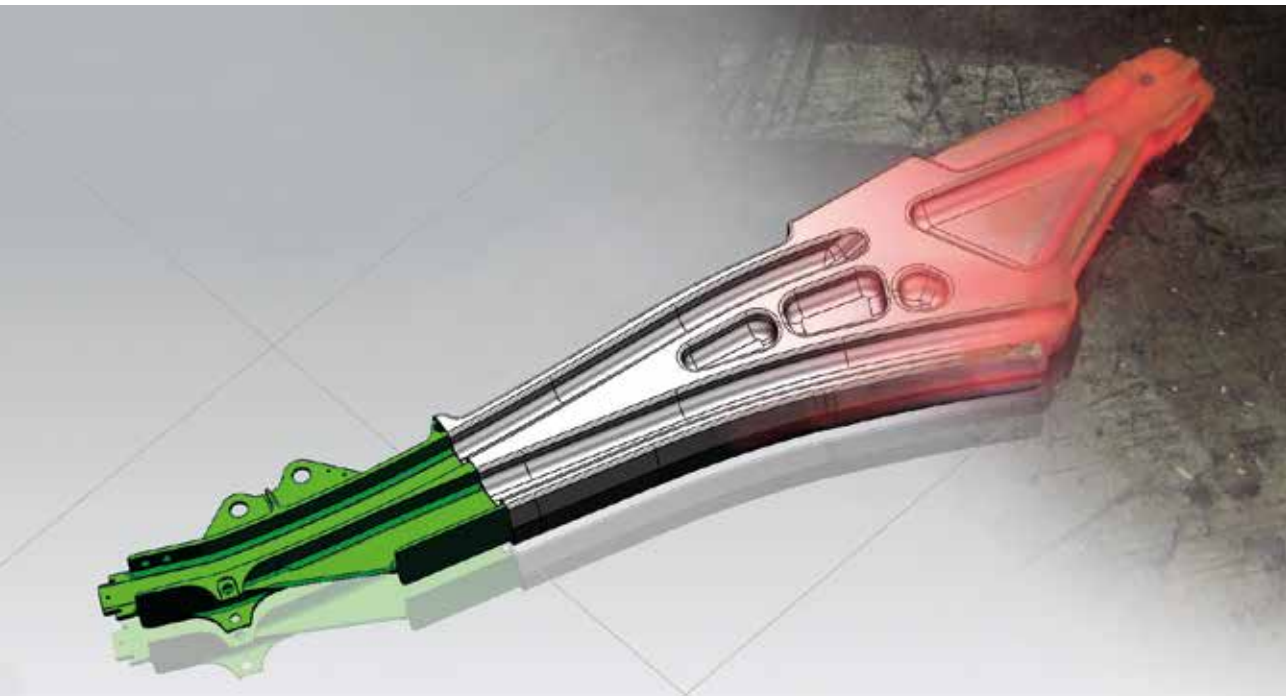


7 Engine Discs



CUTTING EDGE FORGINGS

- » Near net shape forging
- » Concurrent engineering for high flexibility concerning design changes
- » Expert know-how of all applicable materials
- » Capability to produce large batch sizes and high quantities
- » Material certifications for all known titanium and steel grades
- » Forging aggregates fit perfectly to the size-range of the parts
- » Ability to alternate between near net shape forging and rough forgings

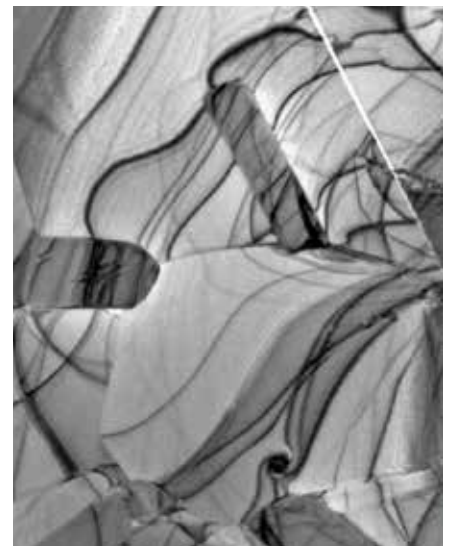
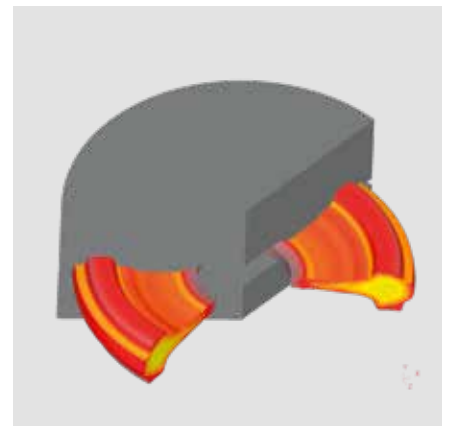


IT'S ALL ABOUT ROTATION

THE MOST ADVANCED MATERIALS FOR THE MOST DEMANDING TECHNOLOGY.



Engine Discs



The jet engine disc business has developed considerably throughout the past few decades and so has the simulation and modeling process at voestalpine Böhler Aerospace.

Advanced computer simulation and modeling programs result in defining stable forging processes and predicting micro-structure and mechanical properties.

Today's material specifications demand new forging process design. Our materials & processes team together with R&D are trained in developing

both new forging strategies and new alloys. Major OEMs and Tier 1 suppliers are supplied by discs from voestalpine Böhler Aerospace, ranging from small helicopter discs weighing a few kilos up to the largest scale engines at forging weights exceeding 350 kg.

Our production spectrum includes high volume parts like LPT discs for legacy engines and recent applications such as large LPT discs. We are also very proud to be the partner in development for many major new programs which require a lot of concurrent engineering support at an early development stage.

voestalpine BÖHLER Aerospace GmbH & Co KG

Mariazeller Straße 25

8605 Kapfenberg, Austria

T. +43/3862/20-7418

F. +43/3862/20-7570

www.voestalpine.com/boehler-aerospace

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voestalpine

ONE STEP AHEAD.