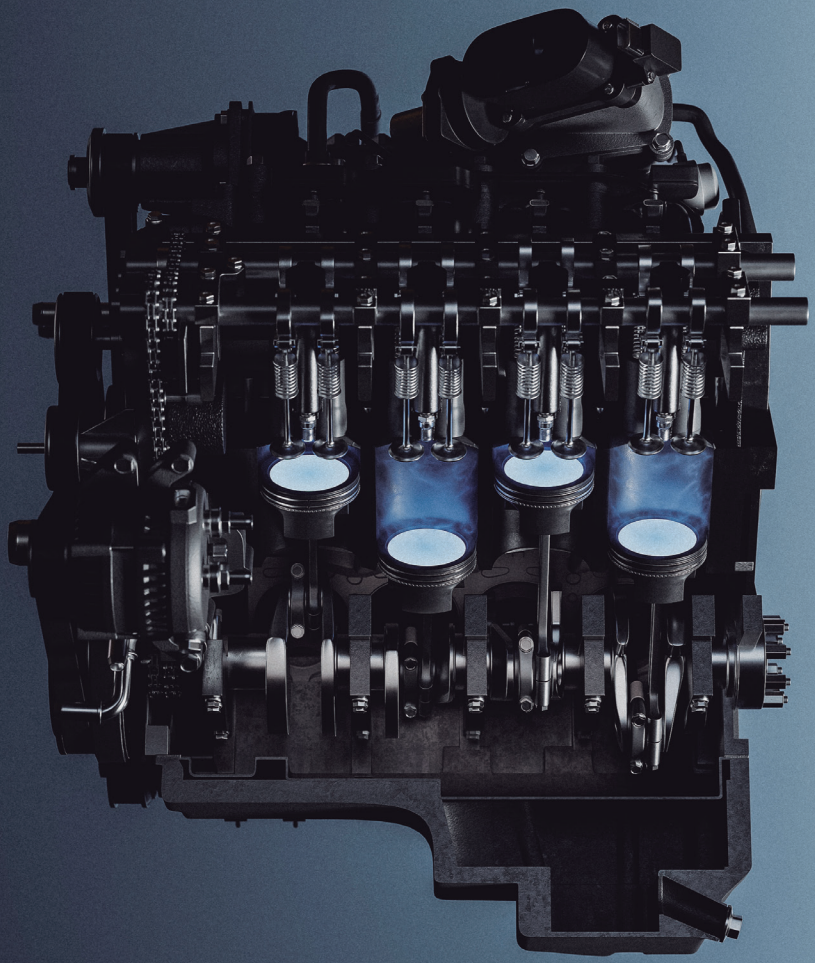
2025

Internal Combustion —Engine Solutions

Etxetar



Machining
& Laser Hardening

ICE

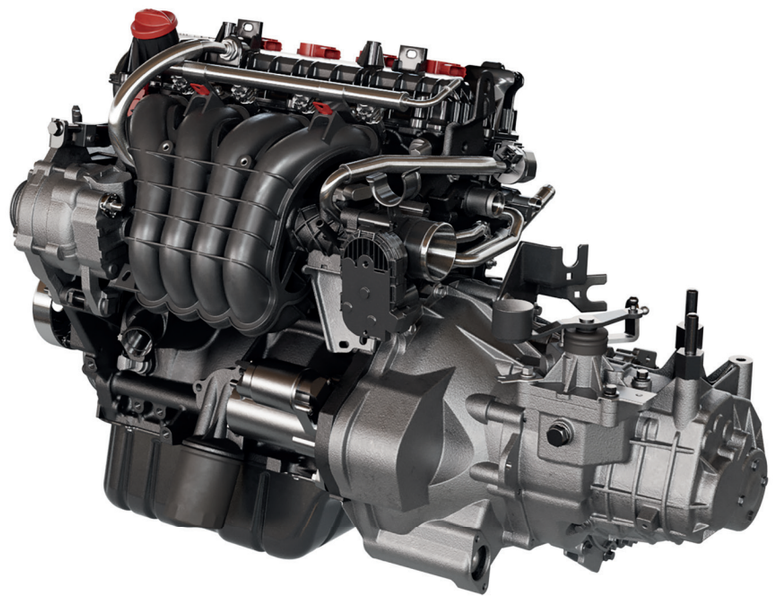
01

About —Us

At Etxetar, we are a global leader in the design and manufacturing of high-productivity machining solutions for critical and demanding applications in the automotive sector, with a strong focus on Internal Combustion Engine (ICE) components such as crankshafts, cylinder blocks/heads, and connecting rods.

With decades of experience and a strong commitment to innovation, we deliver high-value technological solutions that combine precision, efficiency, and flexibility.

Our advanced machining platforms—standard or fully customized—are engineered to meet the stringent requirements of ICE manufacturing, ensuring exceptional quality, reliability, and scalability for medium and high-volume production.



M

Machining

LH

Laser
Hardening

Crankshaft

Connecting Rod

Input Shaft

Balance Shaft

Bearing Cap

Camshaft

Clutch Housing

Cylinder Head

Transmission
Housing

Cylinder
Block

02

M

Machining

Xflex Family

Introduction:

The Xflex platform was born as a solution for all CNC operations for crankshaft, evolving into a robust and flexible machine concept for other part types like camshaft, connecting rods or shafts.

Over time, this modular design was further developed to handle complex machining tasks for cylinder blocks and heads—key components in Internal Combustion Engines.

With its flexible architecture, the Xflex platform can be configured to meet the high precision, productivity, and reliability requirements of ICE component manufacturing, making it an ideal solution for high-volume production environments.

P
06

Benefits:

Machining center solution for various components and operations.

Diverse configurations possible for different production scenarios.

Compatible with Dry, MQL or high-pressure coolant machining.

Lay-out friendly.

P
07

Product
Catalogue

03

M

Machining

Xflex

Our modular and flexible machining center solution for various parts and operations.

The Xflex series has been developed applying an extensive know-how of high productivity systems for steel, cast iron and aluminum parts. From its initial conception as a deep hole drilling machine for crankshafts to its current form as a flexible machining center for various parts and operations, the Xflex series has undergone a profound transformation.

Thanks to its modularity, these machining centers guarantee maximum stability and flexibility for high production environments.

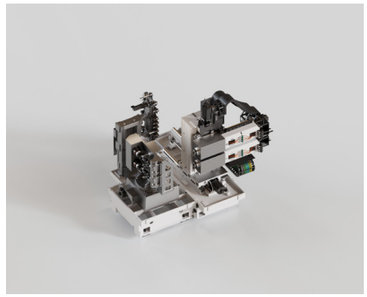
And always with a single purpose: to provide our customers with a machine that is optimized to their specific part and operation.

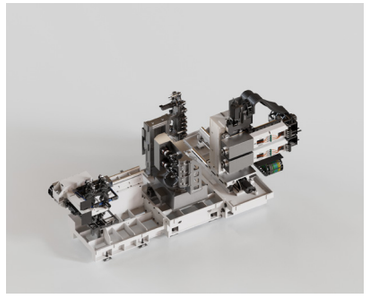
Xflex
Machine
→

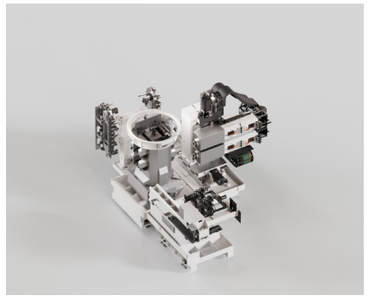
Machining unit: 3 axis unit with 1, 2 or 3 stacked horizontal spindles.

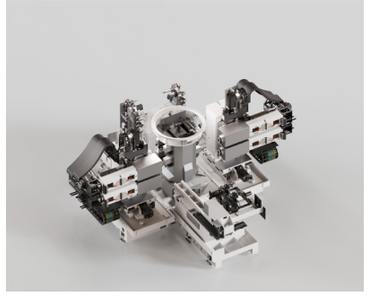
Clamping fixture: up to 4 stacked parts. Tombstone configurations.

Part loading unit to suit your loading preferences: linear gantry, robot or manual load. Arranged in line with the machine or rotated 90°.





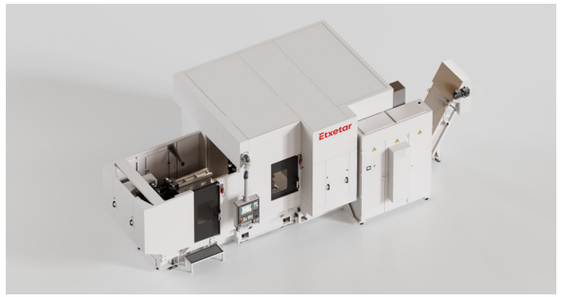




Different arrangements for different needs.

The Xflex series is composed of 3 modules. Using these modules, different configurations can be arranged.

Xflex
Machine
↓

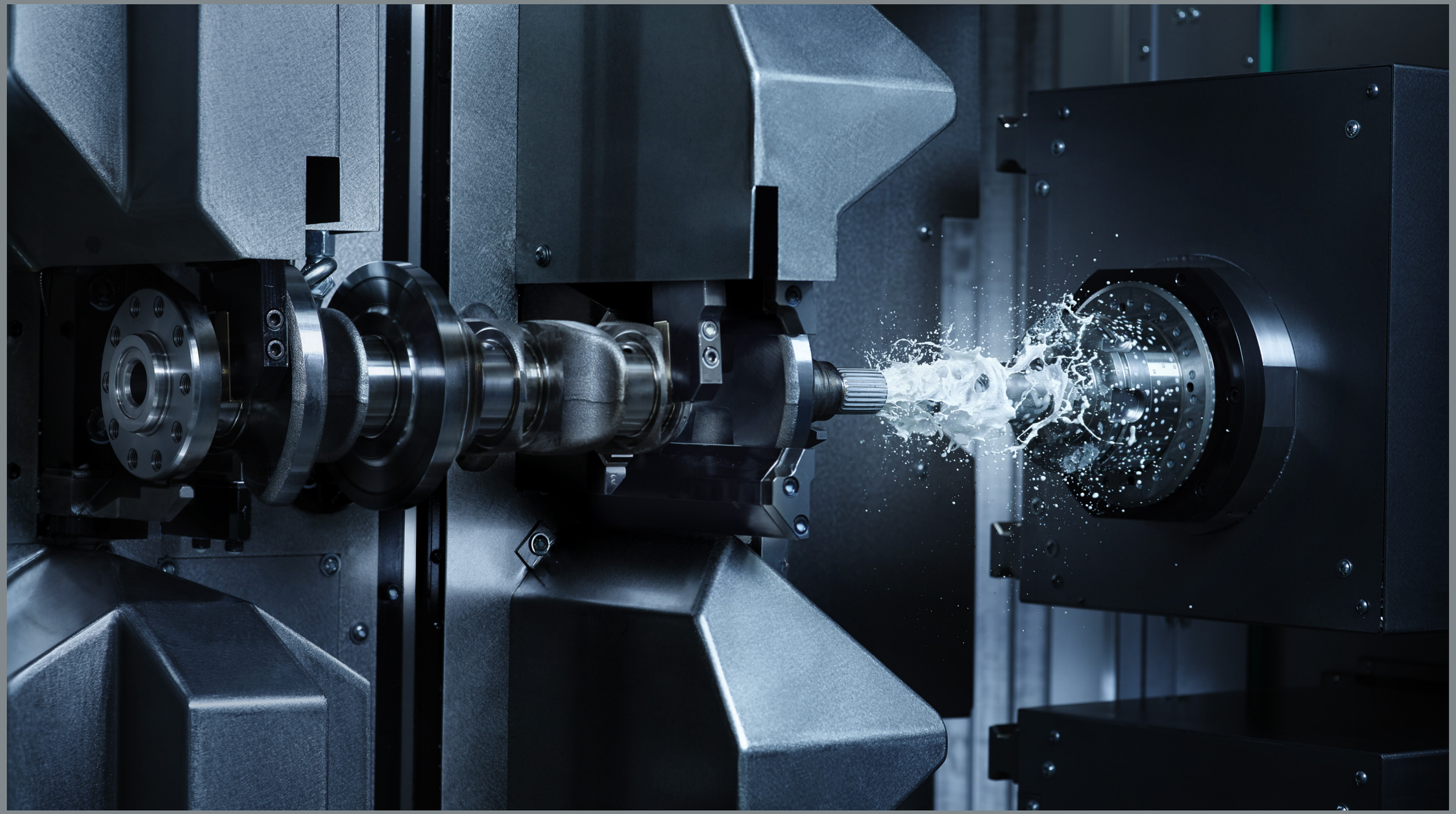


↑
Xflex
Machine

03

M

Machining



↑
Xflex
detail

P
10

P
11

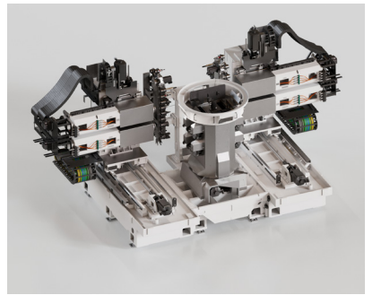
Product
Catalogue

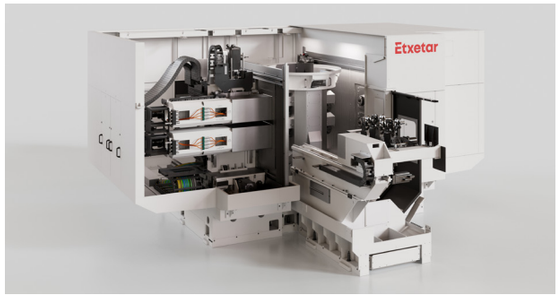
04

Xflex Duo

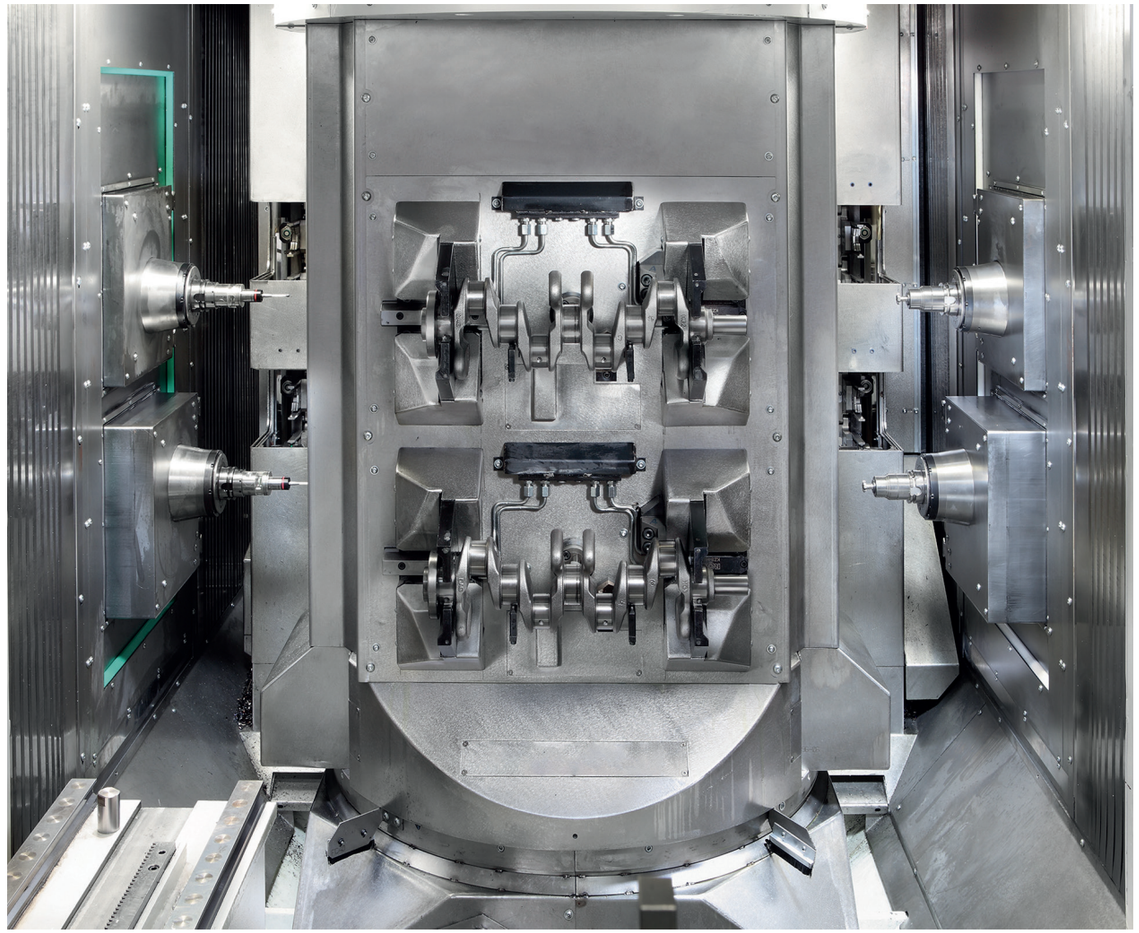
The Xflex Duo is a version of the Xflex with two opposed units that increase the machine's productivity while occupying less floor space. Our tombstone fixture configuration, with two identical fixtures on each side, allows maximizing spindle usage and loading/unloading parts while both units are machining. The Xflex Duo is an optimum solution in high productivity scenarios for rotating parts.

→
Xflex Duo
configuration





Xflex Duo
part loading
system
←



↑
Xflex Duo
detail

↑
Xflex Duo

M
Machining

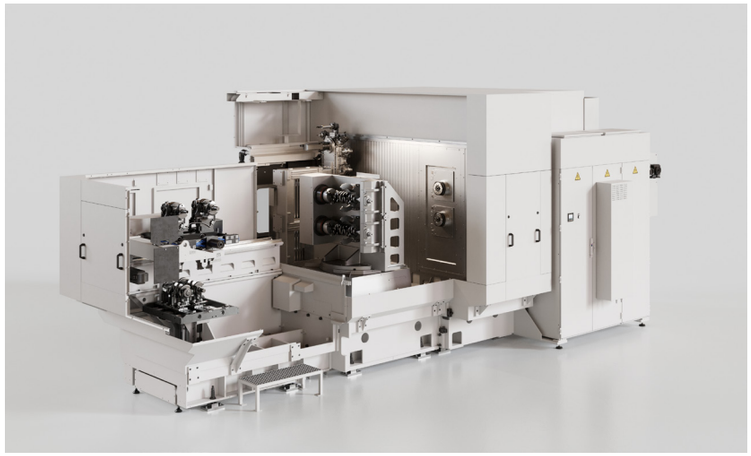
05

Xflex MT

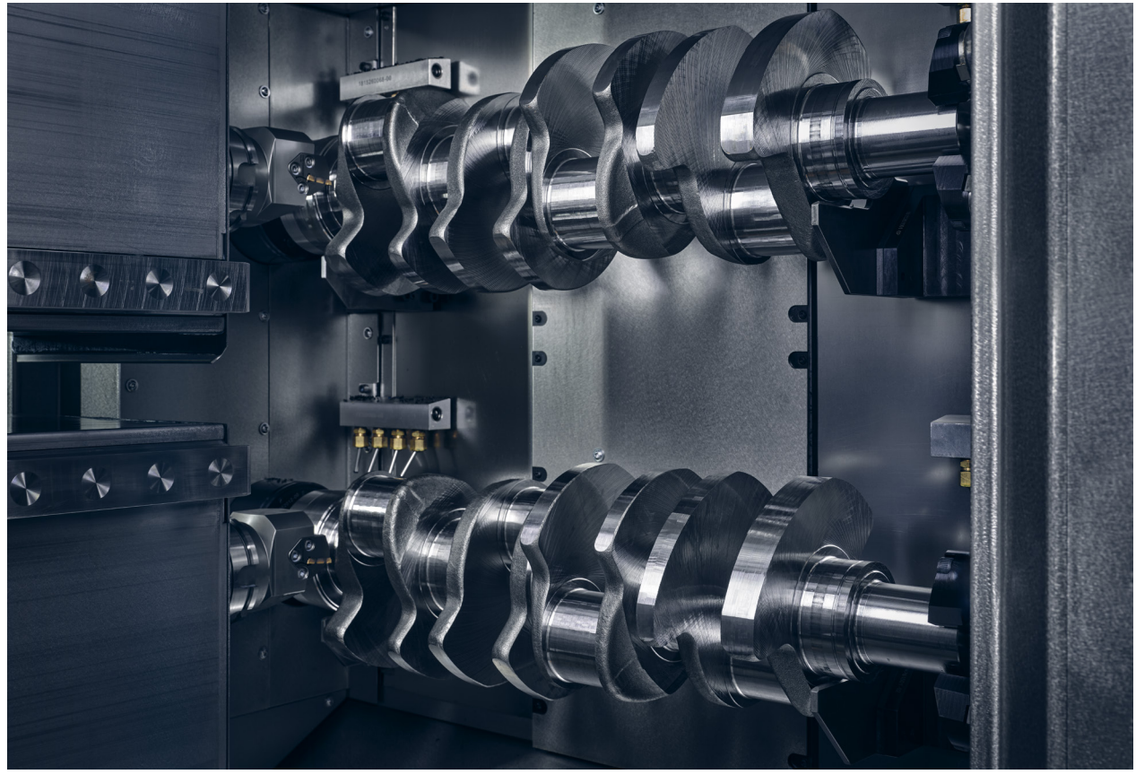
Multi–task Xflex machine that includes turning and gear and spline skiving operations.

From its initial conception as an Xflex machine, the Xflex MT has evolved to a multi–task machining center capable of turning, gear/spline machining, as well as performing conventional milling/drilling operations of a machining center.

Thanks to its modularity, these machining centers guarantee maximum stability and flexibility for high production environments. It is also a flexible solution for low–mid volume lines that allows increased productivity by performing as many operations as possible in one single clamping.



↑
Xflex MT



↑
Xflex MT
detail

Xflex MT
part loading
system
→

M

Machining

05

M

Machining

↑
Xflex MT
detail

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P
17

Product
Catalogue

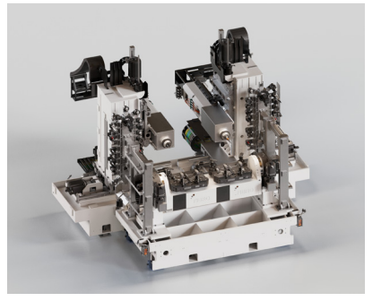
06 Xflex Dual

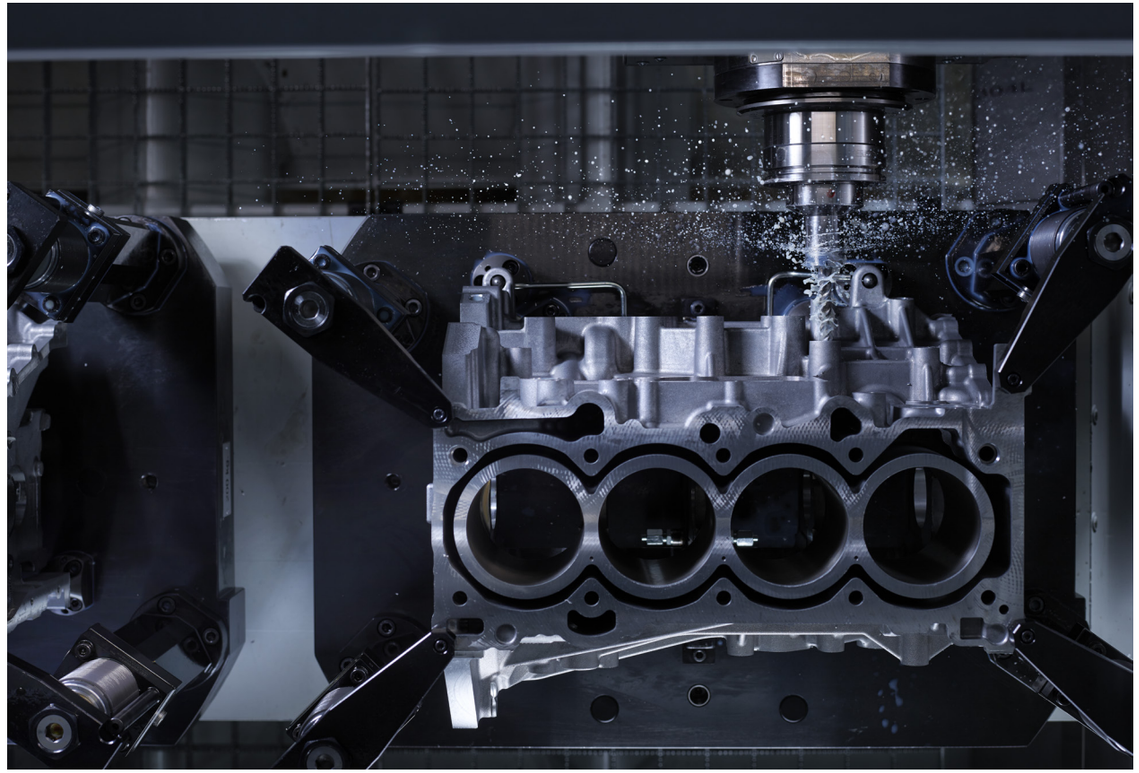
The Xflex Dual is a variant of the Xflex platform designed for cylinder block and head machining. Its architecture with two independent columns, each equipped with one spindle, allows the simultaneous machining of two parts, doubling productivity compared to conventional solutions.

Thanks to its U-axis bed design, the machine provides precise and robust adjustment, ensuring stability in critical operations on structural surfaces and cylinder areas of the block. This configuration optimizes fixture usage and enables parallel load/unload, minimizing non-productive times.

Xflex Dual
→

Xflex Dual
configuration
↓





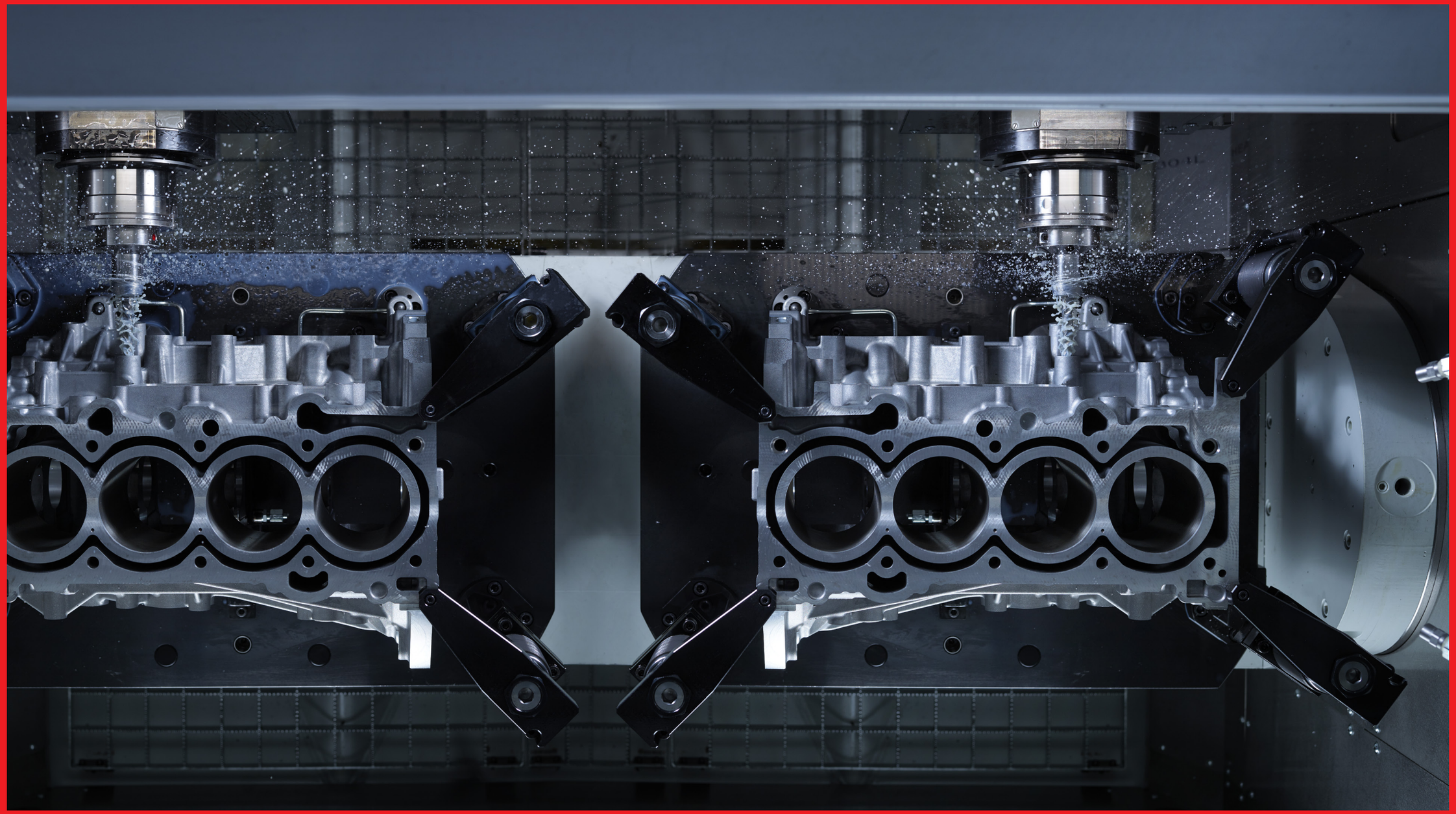
↑
Xflex Dual
detail

↑
Xflex Dual

06

M

Machining



↑
Xflex Dual
detail

07

—Journal
Milling & Turning Solutions

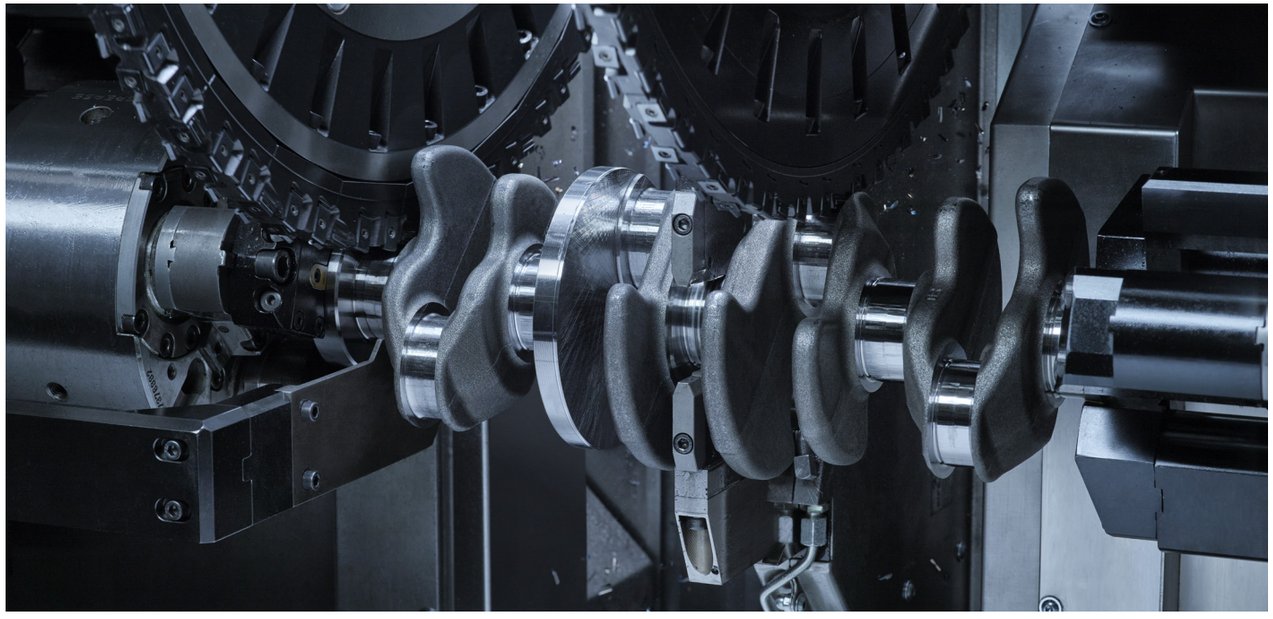
The R Series of machines have been developed applying extensive know-how of high productivity systems for steel and cast iron crankshafts and camshafts.

Based on a milling center configuration and our experience with the Xflex series, it is equipped with 2 sliding NC controlled workpiece driving spindles, an NC independent steady rest and 2 tool spindles, offering extra capabilities and flexibility.

Thanks to its modularity, it can be configured as an internal milling machine, an external milling machine or a turn / turn-broach machine.

We offer two machine sizes in this range of machines: R700 series for parts up to 800 mm, and R1300 series for parts up to 1350 mm.

Our unique configuration allows for increased machine stiffness, improved chip shedding, and safe and easy access for maintenance.



↑
Milling & Turning
Solutions

iR

oR

tR

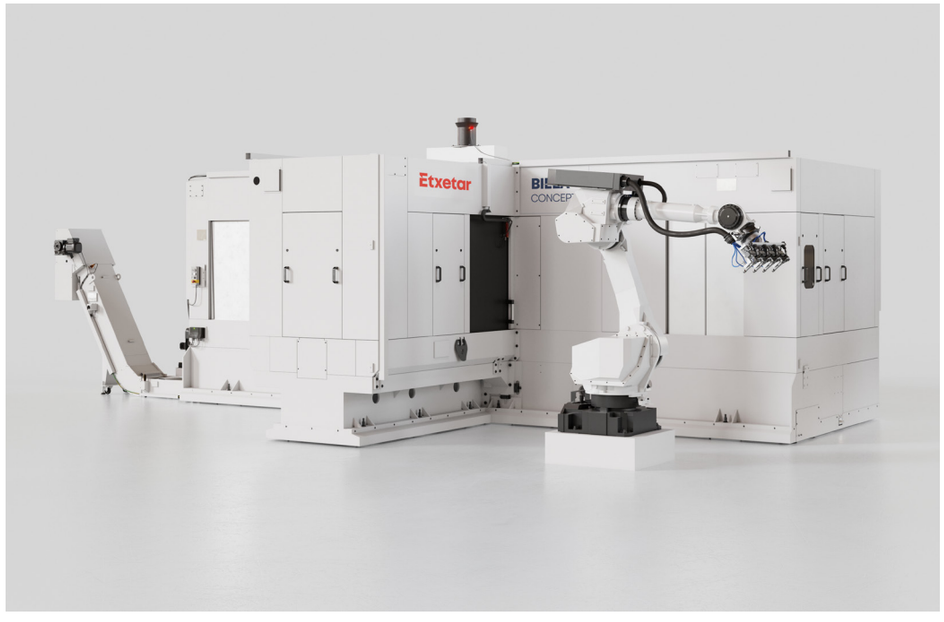
08 Biela Concept

Our multi–spindle modular design ma–chine for connecting rods.

Based on a common platform of compo–nents, the Biela Concept offers a robust and modular design that is arranged to address the full spectrum of connecting rod machining operations.

Biela concept can be configured in a number of arrangements to meet your needs for flexibility and throughput.

It is composed of two module types. Using these modules, different configu–rations can be arranged:



↑
Biela
Concept

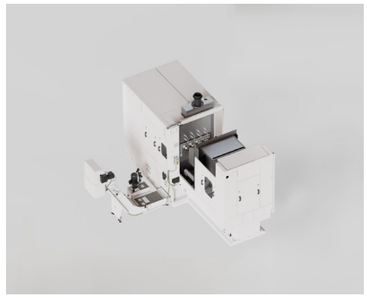
P
24

Different arrangements for different needs.

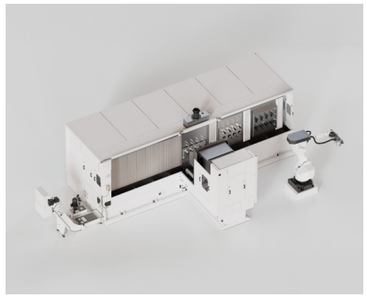
Machining unit: 1 or 2 multi–spindle heads with independent X axes to reduce machine height. Each multi–spindle head provided with several rows of spindles.

Clamping fixture: over column with Y, Z axes.

I



TG



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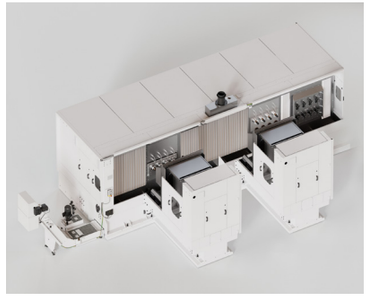

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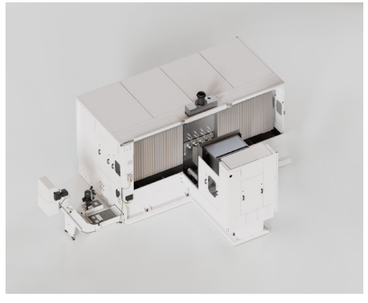

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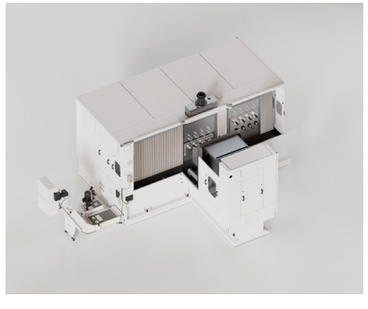


P
25

Product
Catalogue

08

M

Machining

Biela Concept

Connecting rod finish: true precision under load & temperature.

The Biela concept is engineered to deliver a precision-grade finish on the connecting rod, ensuring dimensional accuracy even under heavy clamping forces and operating temperatures, for medium-high production volumes.

↑
Biela Concept
detail

Biela Concept
detail
↓

What we control. And why it matters.

Control of special geometries: ovality and trumpet.

Many connecting rods have special geometries requirements such as ovality and trumpet shape.

At Etxetar, we have decades of experience in achieving challenging geometries and tolerances within the time-cycle constraints of high production volumes.

Trumpet defects typically arise from excess tool over-travel or incorrect dwell.

By precisely tuning stroke length and dwell windows, we keep end geometry straight and validate corrections in-process.

Automatic Compensation — Closed-Loop Control.

Integrated in-process air gauging provides real-time feedback on size, taper and straightness, enabling automatic tool-wear compensation.

Crank Bore & Pin Bore Geometry — Verified.

We finish to tight circularity, cylindricity or special geometries on both crank bore and pin bore, then verify with in line/post-process SPC so geometry remains within spec throughout volume production.

09

Special —Purpose Machines (SPM)

Roller Finishing
Machine
←

M

Machining

Dial Transfer Machine.

A modular dial transfer system for various parts and operations.

Over its 60 years of experience, Etxetar has built multiple Dial Transfer Machine configurations. An optimum solution for very high production volumes, where our engineering efforts are focused on keeping the same flexibility level as in a machining center solution, while saving floor space and reducing investment.

Roller Finishing Machine.

A dedicated connecting-rod roller finishing machine, integrating the rolling operation into a single, compact platform.

This Special Purpose Machine provides a targeted, workflow-efficient solution for roller finishing. It offers the performance of dedicated systems with smart modularity for flexible high-volume operations.

↑
Dial Transfer
Machine

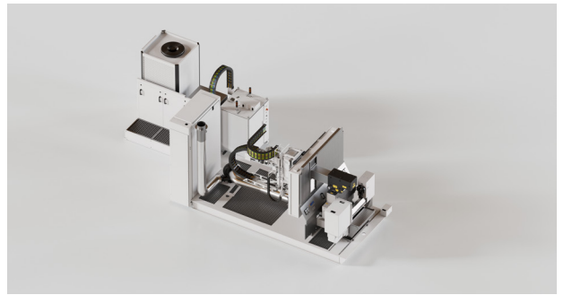
10

Laser Hardening —& Tempering Solutions

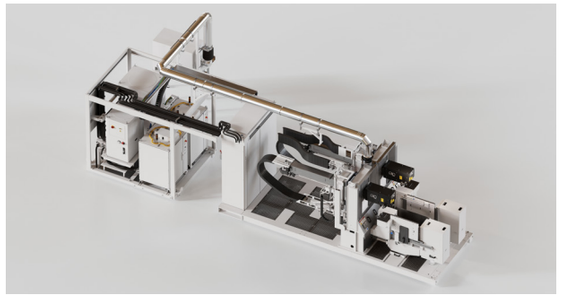
Laser technology can be applied to harden or soften several components in a broad range of industries. It is suitable for surface modification of complex geometries, achieving tailored properties that improve the function of the components.

Award-winning:
"Received the Henry Ford Technology Award for advancements in laser heat treatment for crankshafts."

XR
configuration
↓



XR Duo
configuration
↓

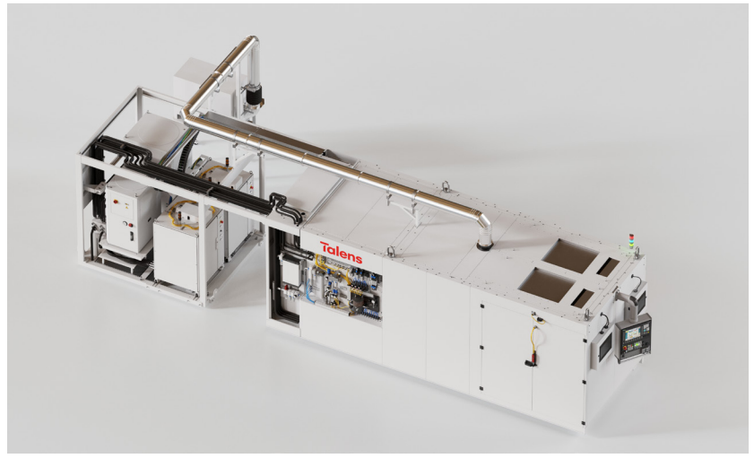


Xr

Our one-station laser hardening solution up to 10 kW laser power.

The Xr is a machine designed to offer our customers the highest flexibility. It includes one laser station to harden multiple parts just by changing the part program.

↑
Xflex
Duo

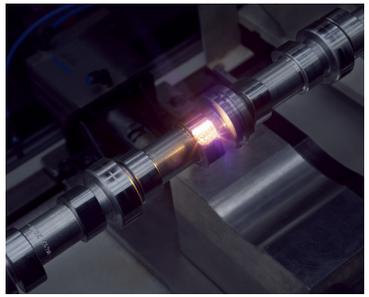


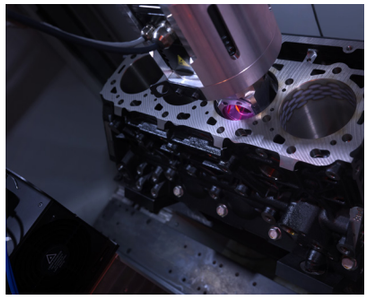
Xr Duo

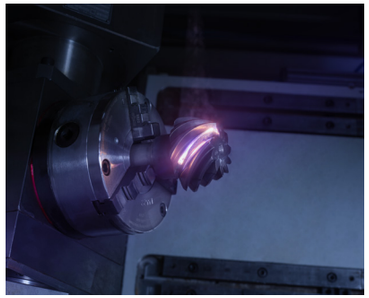
Our two-station laser hardening solution up to 10 kW laser power.

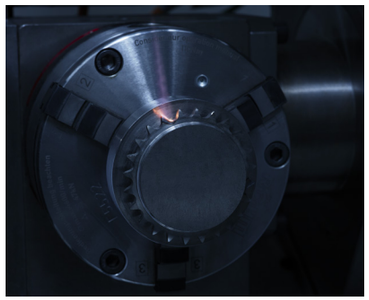
The Duo is a machine designed to offer our customers the highest flexibility and productivity. It includes two laser stations to give a proper response to the high volume demands of the different industries for laser heat treatment processes.

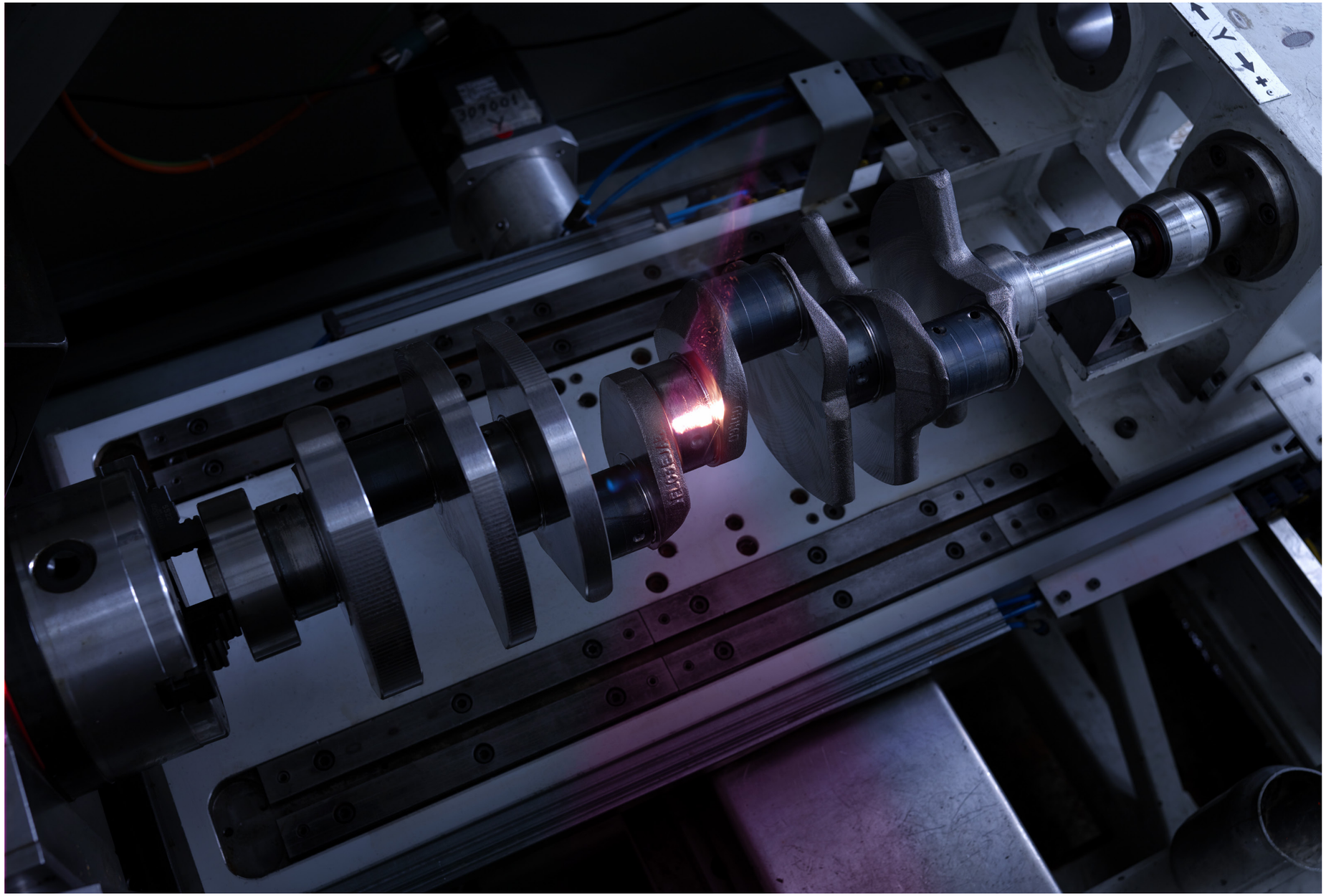
10











Laser
Hardening

P
32

↑
Laser Hardening
& Tempering
Solutions

P
33

Product
Catalogue

11

Turnkey Solutions

M
Machining

LH
Laser
Hardening

At Etxetar, we don't just deliver machines—we deliver complete, production-ready solutions for Internal Combustion Engine manufacturing.

Our turnkey approach goes beyond standalone equipment. We design and integrate full manufacturing cells specifically for ICE components such as crankshafts, connecting rods, cylinder blocks, cylinder heads, camshafts, and bearing caps.

These cells combine machining, journal milling, turning, drilling, honing, deburring, sawing, washing, laser hardening, and automation into a single, seamless system. Every step is engineered to meet your exact part specifications, process requirements, and productivity targets.

What sets our ICE turnkey solutions apart:

Proven Experience.
Decades of delivering turnkey systems for leading automotive OEMs and Tier 1 suppliers worldwide.

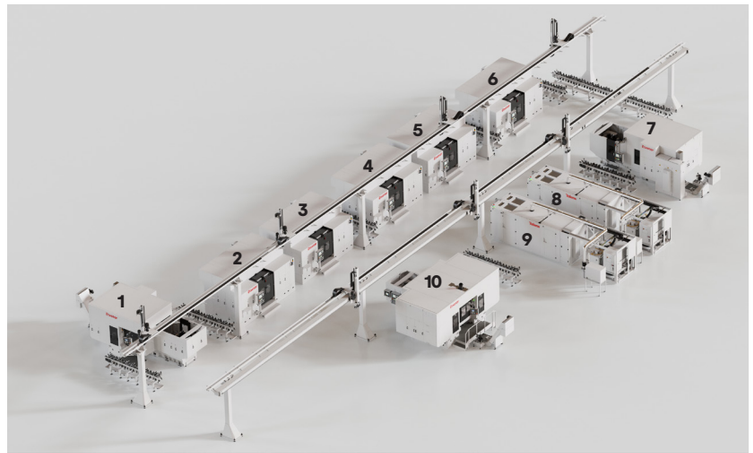
Full Process Integration.
From raw material handling to final inspection, every stage is automated, traceable, and optimized for ICE production efficiency.

Reduced Footprint, Lower Costs.
Smart layouts and multi-functional machines minimize equipment count, streamline automation, and lower operational costs.

One Partner, One System.
We provide all hardware, software, fixturing, automation, and support—fully integrated, tested, and ready for high-volume ICE manufacturing.

Built-in Quality & Traceability.
Inline measurement and process monitoring guarantee consistent quality and 100% traceability, even in the most demanding production volumes.

Crankshaft Rough Line.



1.
Mill to length and centering.

2–3.
Rough milling mains and pins.

4–5.
TTB turning concentrics.

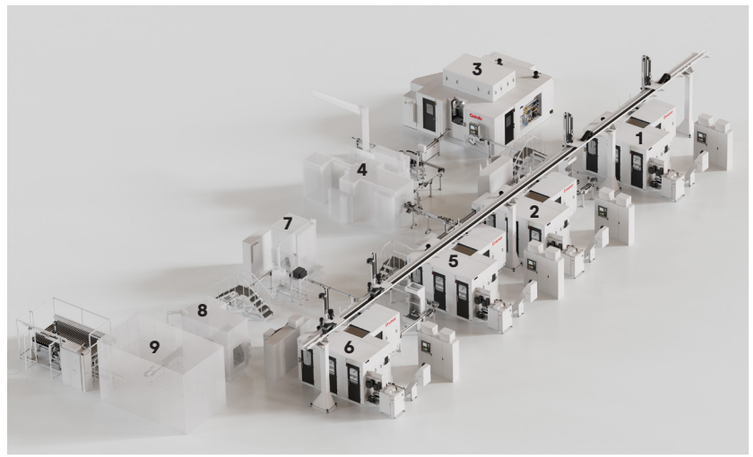
6.
Semi-finish milling.

7.
Oil hole drilling.

8–9.
Laser hardening.

10.
Ends machining.

Connecting Rod Line.



1.
Pin and crank rough boring.

2.
Bolt holes machine.

3.
Cracking & Assembly.

4.
Grinding.

5.
Crank bore semi finishing & TP milling.

6.
Pin & crank finishing bore.

7.
Honing.

8.
Washing machine.

9.
Final gauging and classification.

11

M

Machining

LH

Laser
Hardening

↑
Xflex

Paper:
Fedrigoni Arena Smooth.
140 gr / 300 gr (Covers).

Inks:
CMYK and Pantone®.
485 / 877.

ICE

Internal Combustion
Engine Solutions

inzugroup

Etxetar