PRECISION IN THE BIG DIMENSIONS

FLOOR TYPE MILLING-BORING MACHINES  ›  FR | FX | FXR
MACHINES WITH GREAT DIMENSIONS AND MACHINING CAPACITY

The new generation of SORALUCE FR - FX - FXR is the expression of SORALUCE’s values: reliability, precision and competitiveness. Within these concepts, customers find huge improvements in maintenance, ergonomics, high dynamics and safety in the work environment.

The SORALUCE FR - FX - FXR floor type milling-boring centres are multi-purpose milling-boring machines, offering high versatility and productivity for large component machining. Its rigid stable design provides the highest precision and productivity benefits when machining large components.

The SORALUCE FR - FX - FXR is ideal for several applications in different sectors such as Energy (wind and gas turbines), Shipyard, Capital Goods or Precision Engineering, ensuring the highest precision, productivity and reliability for heavy duty components and extremely complex machining operations. It is highly versatile, as it allows a wide range of configurations.
DESIGN

The design of the machine structure and dimensions have been optimised by an analysis based on “Finite Element Method” (FEM) simulation technique, optimising:

› Stiffness
› Antivibration
› Stress absorption
› Complete mechanical stability

PROVEN STABILITY
LOW FOUNDATION

Thanks to its flat longitudinal axis design and low profile column connection, the machine's centre of gravity is kept very low:

› Ensures high machine stability
› Saves on foundation construction costs
› Improves machine operation
› Enhanced maintenance ergonomics

LONG LASTING
PRECISION

Full cast iron, enabling:

› Accuracy: long lasting precision
› Stiffness: proven physical stability
› Productivity: high cutting capacity

Thanks to the unique mechanical features of the cast iron and the optimised design, the precision and robustness of the machine are ensured for all the machine’s life.

PRODUCTIVITY

QUALITY

FLEXIBILITY

MAINTENANCE

OWNERSHIP COSTS
COMBINED GUIDING AND DAMPING SYSTEM

SORALUCE is a pioneer in the use of linear guiding systems in high machining capacity equipment and heavy duty applications.

› The system combines our own specially developed hydrostatic damping elements with INA guiding systems on each axis

› The system guarantees immense stability eliminating any vibration during machining processes

› Using heavy duty linear guiding systems since 1992

› More than 1500 references in the market working with this system

› It guarantees high precision and dynamics, low friction, low heat levels, minimum maintenance and reduced grease consumption

HIGH ACCURACY

Optimised machine structure and guiding system that guarantee the precision along the machine’s life.

INCREASED PRODUCTIVITY

High dynamics on the axes and machine’s stability provide the right features to ensure stable machining on demanding applications while enables the high performance tools to give their best.

ENERGETIC EFFICIENCY

› Low maintenance costs
› Low heat levels
› Reduced grease consumption
THE NEXT LEVEL OF INNOVATION

DAS SYSTEM (DYNAMICS ACTIVE STABILISER)

Beyond machine tool limits

The DAS system is a device capable of actively increasing the dynamic rigidity of the machine, which reduces the risk of chatter and increases the cutting capacity by up to 300% improving dramatically the production time during the roughing process.

The DAS system measures the vibrations during the machining process and generates, in real and time, by means of ram built-in actuators, an oscillation force that opposes the vibration.

› Allows the use of maximum power throughout the whole working area
› Up to 300% improvement of productivity
› Better surface quality of the machined part
› Extends lifetime of the tools
› Avoids premature aging of machine components
DYNAMIC HEAD CALIBRATION

Even more accuracy in the working area

Thanks to specific SORALUCE developments, head articulation positioning deviations have been reduced to a minimum. This system allows the compensation of head’s kinematic values on the whole working area.

› Automatic calibration for any type of head
› Transparent for the user: Automatic calibration of the head without the need to use specific programming functions
› Calibration of the head for any working area
› Offset error compensation due to thermal expansion
› Easy-to-use interface, 100% integrated with HEIDENHAIN and SIEMENS
MODULAR QUILL

The benefits of traditional boring machines and the advantages of modern milling machines

The system fully automatically interchanges the quill spindle with the other heads, thus enabling different quill spindles with different diameters and lengths likewise all necessary milling heads to machine components. Compared to traditional quill solutions, the exclusive SORALUCE modular quill spindle enables the same distance between quill spindle and milling heads to be upheld, enabling 5-sided machining in the same set-up without any additional re-positioning of the workpiece at a long distance from the machine.

› Compact solution
› Different heads and quills in a single machine
› Full interchangeability
RAM BALANCE

Improved precision in big working volumes for any head

The Dynamic CNC Ram Balance System, patented by SORALUCE, takes care of ram geometrical accuracy, straightness and parallelism, when crossing vertical and cross axes and is specially indicated for machines equipped with head changing system.

The system consists of a CNC controlled electromechanical system assembled within the vertical saddle and measured by a linear scale. It increases the precision, specially when the machine is equipped with the automatic head changing system, as it allows for accurate correction of the mechanical ram deviation regardless of the different weights of individual milling heads.

› The system is 100% controlled at any time, in any position and with any head.
› Configurable compensation values
› Real-time compensation
› Works both in positive and negative directions
In the framework of Industry 4.0, SORALUCE offers a comprehensive monitoring package based on cloud computing.

Thanks to the revolutionary SORALUCE SMARTBOX M2C system (Machine-To-Cloud), the machine is connected online to the Cloud, where any significant events are recorded and can be used to deploy the associated services offered by SORALUCE under Industry 4.0.

SORALUCE uses this Cloud-connected hardware structure to offer its SORALUCE Monitoring and Reporting service.

› Machine control in real time at any time and from anywhere
› Complete reporting service
› Power consumption optimization
› Remote execution of machining programs
› Preventive maintenance
**ACCURACY**

Machines incorporate intelligent systems which improve accuracy and increases productivity.

**MONITORING**

This enables users to connect to their machines from anywhere in the world via the SORALUCE website and to use their smart phone, tablet or PC to check sensitive indicators in real time, such as machine status (cycle, stop, alarm, etc.), ongoing program, tool on headstock, shaft and head speeds, power, status of overrides, etc.

**Output monitoring**

Details of machine output are provided using indicators such as machine availability, performance, interim and total production times per workpiece, power consumption per workpiece, etc.

**Cutting process monitoring**

To assure the quality of the workpieces machined and to provide objective parameters for optimising production conditions, significant signals such as fluid levels, headstock status and ongoing alarms are monitored.

**Status monitoring**

The status of the machine is monitored at all times, including such construction elements as bearings, spindles and electronic components.

**REPORTING**

SORALUCE offers users a comprehensive reporting service with sensitive information on:

- Power consumption
- Running of machining programs
- Use of headstock and tool changer
- Degree of machine use
- Alarms
- Preventive maintenance
The new SORALUCE FR - FX - FXR Generation is based on a complete revision of the machine from the user's point of view focusing on improving operation efficiency and developing a Total Machine Concept.

The Total Machine Concept takes into account the machine but also the complete working area. All the interactions of the operator with the different machine elements are analysed for an optimal implementation.

Not only the machine, but the work area and its surroundings are analysed as a whole in order to guarantee an optimal final result. All of the interactions are studied to optimise from the clamping and loading of the workpiece to its removal once machined and its subsequent cleaning. The environment and its processes must be linked to the machine’s own work, making all parts of the entire process as simple, safe and ergonomic as possible.

With this new design concept, SORALUCE has added to its equipment large number of innovations not only with the aim of facilitating work and making them a safer environment, but also to simplify maintenance and to minimise stoppage times, thus increasing the productivity and profitability of the machine.
## TECHNICAL SPECIFICATIONS FR - FX - FXR

### Common Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross traverse “Z” axis</td>
<td>mm 1600 / 1900</td>
</tr>
<tr>
<td>Heads</td>
<td>Universal / Orthogonal / Quill Spindle / Special heads</td>
</tr>
<tr>
<td>Spindle power</td>
<td>kW 46 / 70</td>
</tr>
<tr>
<td>Spindle nose taper</td>
<td>ISO-50 / HSK-100</td>
</tr>
<tr>
<td>Spindle speed range</td>
<td>min⁻¹ 2500 ÷ 6000 / 30000 / 40000</td>
</tr>
<tr>
<td>CNC system*</td>
<td>HEIDENHAIN TNC 640 / SIEMENS 840 D SL</td>
</tr>
<tr>
<td>Coolant system</td>
<td>External coolant system over a ring / Internal coolant system up to 70 bar</td>
</tr>
</tbody>
</table>

### Machine version with Modular Quill (FR / FX / FXR - W)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quill Diameter</td>
<td>mm 130 150 180</td>
</tr>
<tr>
<td>Quill cross traverse, “W” axis</td>
<td>mm 700 1000</td>
</tr>
<tr>
<td>Ram traverse</td>
<td>mm 1600 / 1900</td>
</tr>
<tr>
<td>Spindle power</td>
<td>kW 53 / 74 / 101</td>
</tr>
<tr>
<td>Spindle speed range</td>
<td>min⁻¹ 2500 - 3000</td>
</tr>
</tbody>
</table>

### FR - 4000 FR - 6000 FR - 8000 FR - n X 2000

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal traverse, “X” axis</td>
<td>mm 4000 6000 8000 n x 2000</td>
</tr>
<tr>
<td>Cross traverse, “Y” axis</td>
<td>mm 3600 / 4000 / 4500</td>
</tr>
<tr>
<td>Rapid traverse</td>
<td>mm/min 25000</td>
</tr>
<tr>
<td>Tool magazine</td>
<td>No. tools 60 / 80 / 100 / 120 / 150 / 200</td>
</tr>
<tr>
<td>Machine weight</td>
<td>Kg 61000 67400 73800 61000+n x 3200</td>
</tr>
</tbody>
</table>

### FX - 4000 FX - 6000 FX - 8000 FX-10000 FX-12000 FX- n X 2000

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal traverse, “X” axis</td>
<td>mm 4000 6000 8000 10000 12000 n x 2000</td>
</tr>
<tr>
<td>Vertical traverse “Y” axis</td>
<td>mm 4300 / 4800 / 5300</td>
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<tr>
<td>Rapid traverse</td>
<td>mm/min 25000</td>
</tr>
<tr>
<td>Tool magazine</td>
<td>No. tools 80 / 100 / 120 / 150 / 200 / 250</td>
</tr>
<tr>
<td>Machine weight</td>
<td>Kg 64800 72000 79200 86400 93600 72000+n x 3600</td>
</tr>
</tbody>
</table>

### FXR - 6000 FXR - 8000 FXR - 10000 FXR - 12000 FXR - n X 2000

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal traverse, “X” axis</td>
<td>mm 6000 8000 10000 12000 n x 2000</td>
</tr>
<tr>
<td>Vertical traverse “Y” axis</td>
<td>mm 6000 / 6500 / 7000 / 8000</td>
</tr>
<tr>
<td>Rapid traverse</td>
<td>mm/min 25000</td>
</tr>
<tr>
<td>Tool magazine</td>
<td>No. tools 80 / 100 / 120 / 150 / 200 / 250</td>
</tr>
<tr>
<td>Machine weight</td>
<td>Kg 78000 85200 92400 99600 72000+n x 3600</td>
</tr>
</tbody>
</table>

*Other CNC systems under request*
### LAYOUT FR

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-4000</td>
<td>4000</td>
<td>3600 / 4000 / 4500</td>
<td>1600 / 1900</td>
<td>9340</td>
<td>1880</td>
<td>3480</td>
<td>6900 / 7300 / 7800</td>
<td>3950 / 4300</td>
</tr>
<tr>
<td>FR-6000</td>
<td>6000</td>
<td>3600 / 4000 / 4500</td>
<td>1600 / 1900</td>
<td>11595</td>
<td>2025</td>
<td>3570</td>
<td>6900 / 7300 / 7800</td>
<td>3950 / 4300</td>
</tr>
<tr>
<td>FR-8000</td>
<td>8000</td>
<td>3600 / 4000 / 4500</td>
<td>1600 / 1900</td>
<td>13835</td>
<td>2145</td>
<td>3690</td>
<td>6900 / 7300 / 7800</td>
<td>3950 / 4300</td>
</tr>
<tr>
<td>FR-10000</td>
<td>10000</td>
<td>3600 / 4000 / 4500</td>
<td>1600 / 1900</td>
<td>15965</td>
<td>2210</td>
<td>3755</td>
<td>6900 / 7300 / 7800</td>
<td>3950 / 4300</td>
</tr>
<tr>
<td>FR-12000</td>
<td>12000</td>
<td>3600 / 4000 / 4500</td>
<td>1600 / 1900</td>
<td>17965</td>
<td>2210</td>
<td>3755</td>
<td>6900 / 7300 / 7800</td>
<td>3950 / 4300</td>
</tr>
</tbody>
</table>

### LAYOUT FX | FXR

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX-4000</td>
<td>4000</td>
<td>4300 / 4800 / 5300</td>
<td>1600 / 1900</td>
<td>10000</td>
<td>2187</td>
<td>3813</td>
<td>7750 / 8250 / 8400</td>
<td>4330 / 4630</td>
</tr>
<tr>
<td>FX-6000</td>
<td>6000</td>
<td>4300 / 4800 / 5300</td>
<td>1600 / 1900</td>
<td>12000</td>
<td>2187</td>
<td>3813</td>
<td>7750 / 8250 / 8400</td>
<td>4330 / 4630</td>
</tr>
<tr>
<td>FX-8000</td>
<td>8000</td>
<td>4300 / 4800 / 5300</td>
<td>1600 / 1900</td>
<td>14100</td>
<td>2237</td>
<td>3863</td>
<td>7750 / 8250 / 8400</td>
<td>4330 / 4630</td>
</tr>
<tr>
<td>FX-10000</td>
<td>10000</td>
<td>4300 / 4800 / 5300</td>
<td>1600 / 1900</td>
<td>16200</td>
<td>2287</td>
<td>3913</td>
<td>7750 / 8250 / 8400</td>
<td>4330 / 4630</td>
</tr>
<tr>
<td>FX-12000</td>
<td>12000</td>
<td>4300 / 4800 / 5300</td>
<td>1600 / 1900</td>
<td>18300</td>
<td>2337</td>
<td>3963</td>
<td>7750 / 8250 / 8400</td>
<td>4330 / 4630</td>
</tr>
<tr>
<td>FX-14000</td>
<td>14000</td>
<td>4300 / 4800 / 5300</td>
<td>1600 / 1900</td>
<td>20400</td>
<td>2387</td>
<td>4013</td>
<td>7750 / 8250 / 8400</td>
<td>4330 / 4630</td>
</tr>
<tr>
<td>FXR-6000</td>
<td>6000</td>
<td>6000 / 6500 / 7000</td>
<td>1600 / 1900</td>
<td>12000</td>
<td>2187</td>
<td>3813</td>
<td>9100 / 9600 / 10100</td>
<td>4330 / 4630</td>
</tr>
<tr>
<td>FXR-8000</td>
<td>8000</td>
<td>6000 / 6500 / 7000</td>
<td>1600 / 1900</td>
<td>14100</td>
<td>2237</td>
<td>3863</td>
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<td>4013</td>
<td>9100 / 9600 / 10100</td>
<td>4330 / 4630</td>
</tr>
</tbody>
</table>

**Dimensions in mm.**

*Dimensions depending on the head*
In order to cater to the diverse needs of each customer, SORALUCE’s contrasted head technology is fundamental and provides the necessary customisation for an optimal configuration, with the possibility of including a large variety of standard heads and special solutions.

### MILLING AND TURNING HEADS

**IN-HOUSE MANUFACTURED**

**HIGH RELIABILITY**

**BROAD RANGE**

<table>
<thead>
<tr>
<th>UNIVERSAL HEAD</th>
<th>ORTHOGONAL HEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Universal Head" /></td>
<td><img src="image2" alt="Orthogonal Head" /></td>
</tr>
<tr>
<td><strong>46 kW</strong></td>
<td><strong>46 kW</strong></td>
</tr>
<tr>
<td><strong>2.5° X 2.5° / 0.001° X 0.001°</strong></td>
<td><strong>1° X 1°</strong></td>
</tr>
<tr>
<td>4000 / 5000 / 6000 min⁻¹</td>
<td>4000 / 5000 min⁻¹</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FIXED HORIZONTAL BORING HEAD</th>
<th>MODULAR QUILL SPINDLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Fixed Horizontal Boring Head" /></td>
<td><img src="image4" alt="Modular Quill Spindle" /></td>
</tr>
<tr>
<td><strong>46 kW</strong></td>
<td><strong>46 kW</strong></td>
</tr>
<tr>
<td><strong>3000 / 4000 / 5000 min⁻¹</strong></td>
<td><strong>3000 / 4000 / 5000 min⁻¹</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUTOMATIC ANGULAR ROTARY HEAD WITH MANUAL TOOL CHANGE</th>
<th>NC FACING AND BORING HEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image5" alt="Automatic Angular Rotary Head" /></td>
<td><img src="image6" alt="NC Facing and Boring Head" /></td>
</tr>
</tbody>
</table>

- Ø130 mm, W=700 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø150 mm, W=1000 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø180 mm, W=1000 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø200 mm, W=1200 mm, 53-101 kW / 2500÷3000 min⁻¹

- Ø130 mm, W=700 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø150 mm, W=1000 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø180 mm, W=1000 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø200 mm, W=1200 mm, 53-101 kW / 2500÷3000 min⁻¹
CUSTOM MADE HEADS

ANGULAR HEAD FOR RAILWAY BOGIE MACHINING  ANGULAR HEAD FOR MOTOR BLOCK MACHINING  5 AXIS CONTINUOUS HEAD FOR MOULD AND DIE AND AERONAUTICS

HEAD CHANGING SYSTEM

SORALUCE has developed an automatic head / quill changing system with adapter flanges. The system consists of a specially prepared machine ram and a specific head adapter flange in each head / quill.

Accurate ram and the head fitting is achieved by hirth couplings, with each milling head clamped by several hydraulic clamping cylinders. Fluid and electricity supplies are provided via quick release couplings.

A fully enclosed pick-up station is provided to protect heads from pollution from the machining processes and workshop environment when not in use.

› Experience since 1996
› Fully modular system
› More than 400 machines working with this system
VERSATILITY HIGHLY CONFIGURABLE

WORKSTATIONS

As it is a floor type machine, the work area can be configured according to the specific needs of each customer, with one or several workstations, which makes it possible to carry out simultaneous machining and part preparation operations.

It can integrate floor plates, angle plates, auxiliary tables, rotary or rotary-travelling milling tables and turning tables.
MULTITASKING

SORALUCE FR – FX – FXR machines can be converted by a multi-tasking machine that integrates several cutting processes including turning, milling, boring, drilling and tapping in one machine, offering increased capability and functionality.

Full complement of multi-tasking capabilities by SORALUCE design turning heads, tables and customer cycles.

Multitasking option enables complex heavy duty components being machined in a single set-up.
**TOOL MAGAZINE**

SORALUCE offers a wide range of standard tool magazines as ad-hoc systems responding to customer requirements.

**Tool management features:**
Length, diameter, tool wear, coolant section

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**CNC UNITS**

**Heidenhain TNC 640**
The TNC 640 NC system by Heidenhain boasts the qualities demanded by highly technological machines now including multitasking capabilities.

- Wide variety of milling and turning cycles
- Time and cost saving
- HEIDENHAIN conversational or DIN/ISO programming with the simple Klartext dialogue

**Siemens 840 D SL**
The SINUMERIK 840D SL is a premium class CNC, with a superior system flexibility. It is the CNC of choice when opening up completely new technology fields.

- Modular and scalable
- Benchmark in open architecture
- Communicative at all levels
SORALUCE provides high performance productive solutions upon customer’s requirements. SORALUCE FR – FX – FXR machines have a suitable architecture for integrating automated systems such as:

- Automated machining lines
- Palletised workpiece loading/unloading system
- Automatic head changing system
- Automatic tool changing system
- Centralised tool management system
- Centralised production management system
- Robot based tool changer

DUPLEX MACHINING

- Machine can work separately or as a single machine
- Production increase of up to 50%
- Workpiece precision improvement (machining in a single setup)
- One sole operator for both machines
- Reduced space requirement
- Specific cycles by SORALUCE

PENDULUM WORKING PROCESS

- Several working stations
- Nonstop machining
- No downtime (parts are loaded / unloaded while machine continues working)
- Customised working area
- Increased productivity
- Highly flexible

PALLETISED SYSTEMS AND FLEXIBLE MANUFACTURING SYSTEMS

- Maximum efficiency
- Reduction of set-up times
- Downtime are minimised
- Avoid human errors
COMFORT, SAFE AND ERGONOMIC

SORALUCE has created a new range of machines that will revolutionise the market thanks to the creation of a more human and ergonomic environment, while also significantly increasing the safety and ergonomics parameters.

OPERATOR’S PLATFORM

- Operator platform with electric motor drives for vertical and cross movements
- Complete workbench with a panel to hang drawings and documents
- Folding seat
- Soundproofed cabinet
- Sound system (option)
- Generous interior lighting by two led spotlights integrated in the ceiling
- Air conditioning (option)
- Sliding door with a window that gives the possibility of manually unfold a balcony to approach to the head in any position
- Enhanced visibility, ample glass surface
- Support for special tools in the external platform
- Uncontrolled descent prevention system
- Floor with special anti-slip paint that minimizes wear and tear
TOOL MAGAZINE

- Full visibility of tool magazine
- Storage area’s closure protecting sensitive items inside it from chips and coolant
- Sliding shutter to ease tool loading / unloading

MAINTENANCE

- The intervention areas are now more accessible
- Sliding shutters and doors to avoid the disassembly of panels
- Improved protection of the critical areas of the equipment
- Gauges and levels visible from the outside the machine without removing panels
- Ample areas to ease the maintenance tasks
- Specific signals to indicate maintenance and service points
With excellent versatility and precise and efficient customization, SORALUCE FR - FX - FXR milling-boring machines meet the specific needs of any customer of large components thanks to the wide variety of heads, options and levels of automation available.
The combination of high performance SORALUCE head and rotary-travelling table enables full machining of press frames in one set-up.

Improved production rate guaranteed by pendulum machining of wind power nacelles using two workstations equipped with rotary-travelling tables.

Complete machining of energy components, by combining the broad range of available top quality machining heads.

Pendulum machining of press heads and frames with minimum number of set-ups, improving the cycle time. High precision boring operations.

Machining of extremely complex gas turbine components minimising the number of workpiece set-ups so as cycle times and possible errors.

Rotary-travelling tilting table enables machining of wind power components in 1 or 2 set-ups.

High technological solution for both the machinery and other technical aspects such as fixturing, tooling, production assistance, etc.