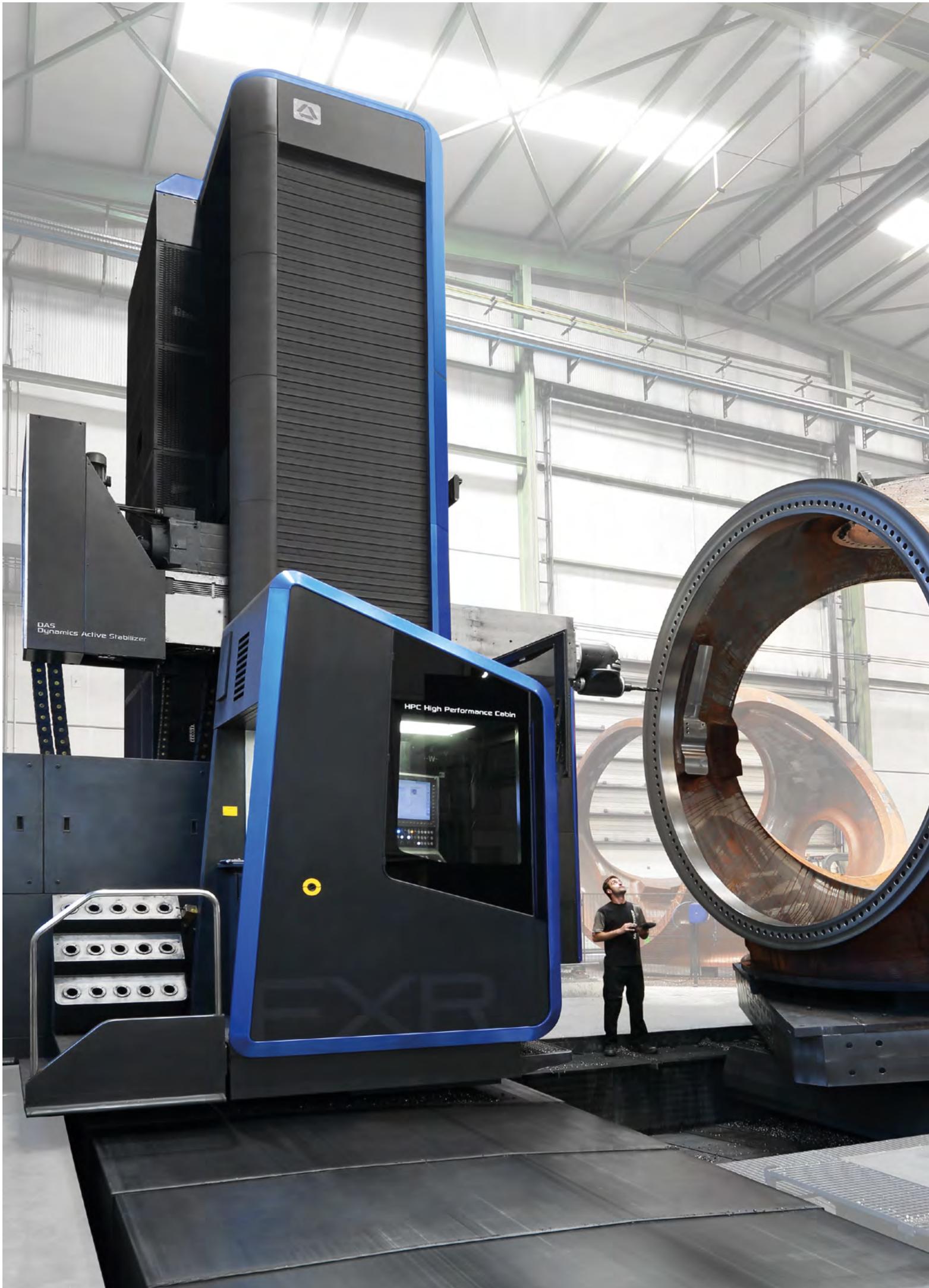




PRECISION IN THE BIG DIMENSIONS

**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.



BACKGROUND CONCEPTS

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



PRODUCTIVITY



QUALITY



FLEXIBILITY



MAINTENANCE



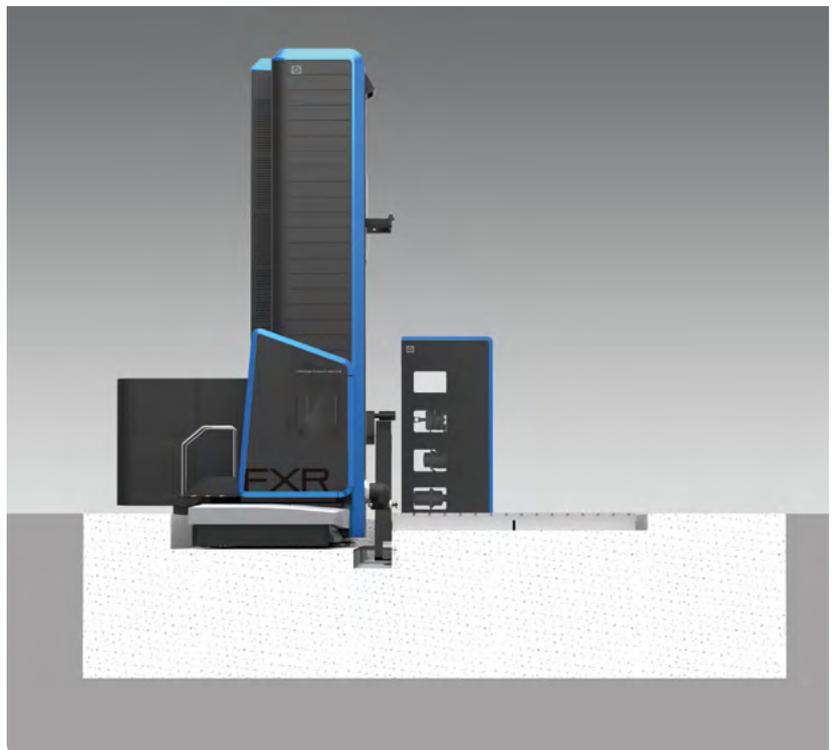
OWNERSHIP COSTS

LONG LASTING PRECISION

Full cast iron, enabling:

- › Accuracy: long lasting precision
- › Stiffness: proven physic 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.



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

**PATENT
PENDING**

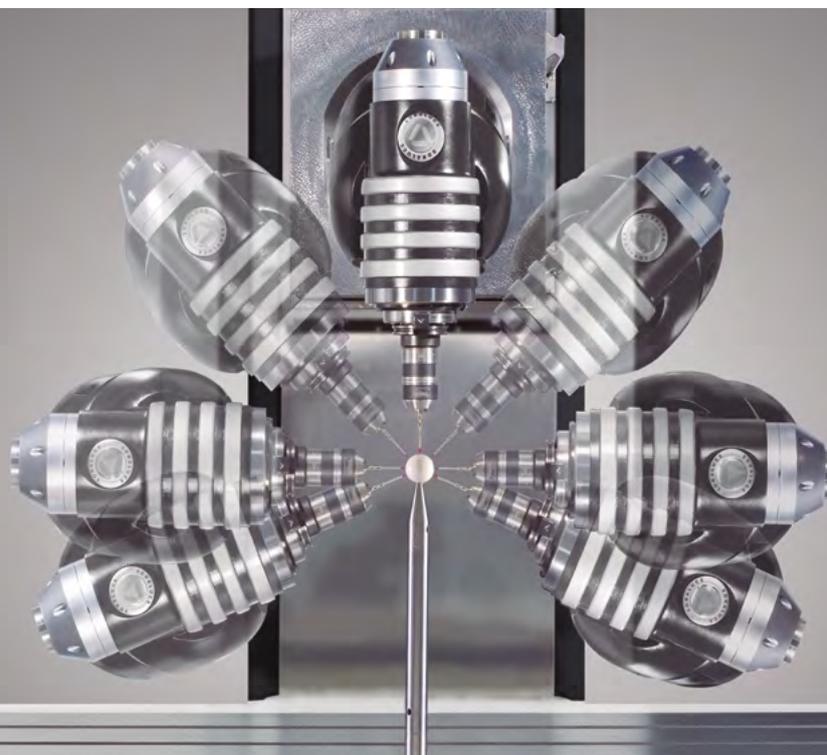


DYNAMIC HEAD CALIBRATION

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



PATENTED
W 10000514 ES W0

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

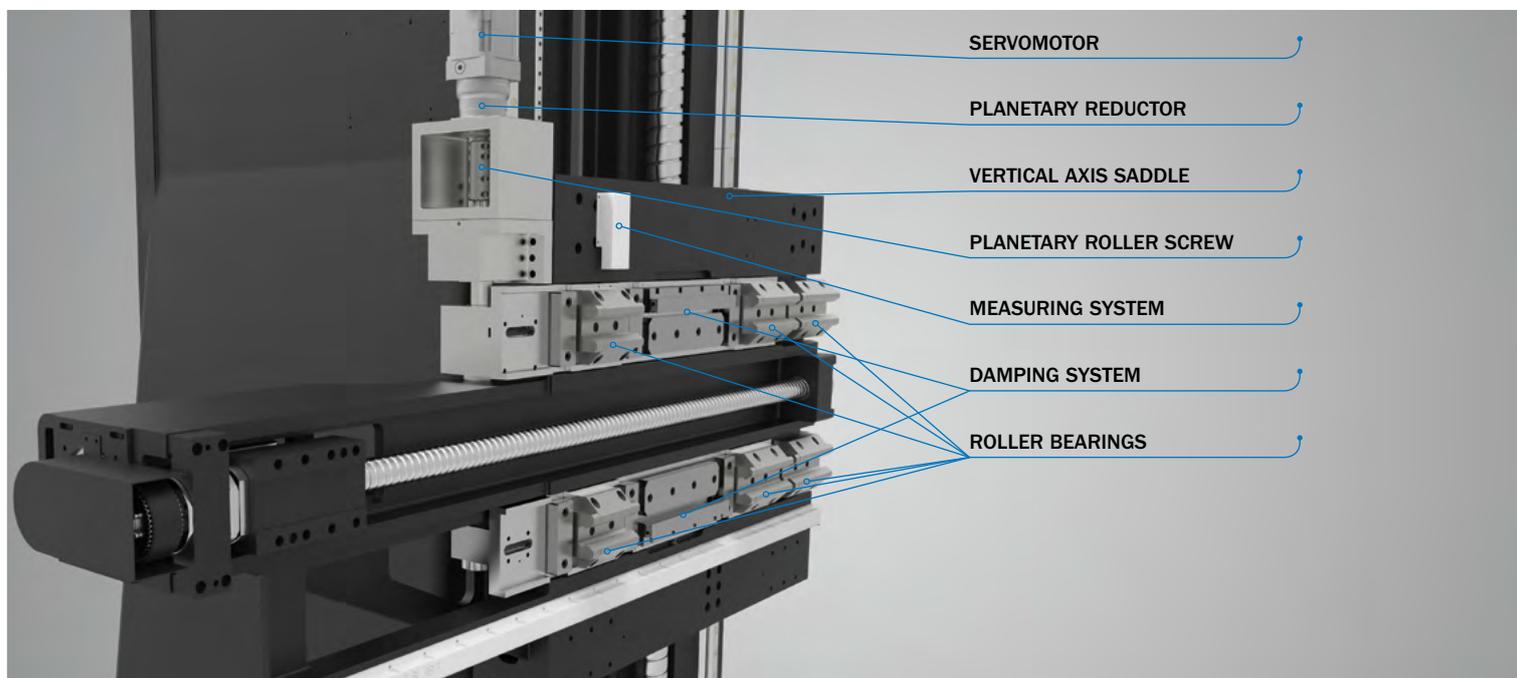
PATENTED
WO 2010/072856

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



SMART MANUFACTURING SOLUTIONS

INDUSTRY 4.0

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



1

Use management.



2

Management of alarms:
Real time, historical
and helpfile.



3

Remote access
to the control
of the machine.



4

Key machine information
displayed in real time
in a mobile device as a
smartphone or a tablet.

TOTAL MACHINE

THE COMPLETE WORKING AREA ANALYSED FOR AN OPTIMAL RESULT

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					
Cross traverse "Z" axis	mm	1600 / 1900					
Heads		Universal / Orthogonal / Quill Spindle / Special heads					
Spindle power	kW	46 / 70					
Spindle nose taper		ISO-50 / HSK-100					
Spindle speed range	min ⁻¹	2500 ÷ 6000 / 30000 / 40000					
CNC system*		HEIDENHAIN TNC 640 / SIEMENS 840 D SL					
Coolant system		External coolant system over a ring / Internal coolant system up to 70 bar					
		Machine version with Modular Quill (FR / FX / FXR - W)					
Quill Diameter	mm	130	150	180			
Quill cross traverse, "W" axis	mm	700	1000				
Ram traverse	mm	1600 / 1900	1900				
Spindle power	kW	53 / 74 / 101					
Spindle speed range	min ⁻¹	2500 - 3000					
		FR - 4000	FR - 6000	FR - 8000	FR - n X 2000		
Longitudinal traverse, "X" axis	mm	4000	6000	8000	n x 2000		
Cross traverse, "Y" axis	mm	3600 / 4000 / 4500					
Rapid traverse	mm/min	25000					
Tool magazine	No. tools	60 / 80 / 100 / 120 / 150 / 200					
Machine weight	Kg	61000	67400	73800	61000+n x 3200		
		FX - 4000	FX - 6000	FX - 8000	FX-10000	FX-12000	FX- n X 2000
Longitudinal traverse, "X" axis	mm	4000	6000	8000	10000	12000	n x 2000
Vertical traverse "Y" axis	mm	4300 / 4800 / 5300					
Rapid traverse	mm/min	25000					
Tool magazine	No. tools	80 / 100 / 120 / 150 / 200 / 250					
Machine weight	Kg	64800	72000	79200	86400	93600	72000+n x 3600
		FXR - 6000	FXR - 8000	FXR - 10000	FXR - 12000	FXR - n X 2000	
Longitudinal traverse, "X" axis	mm	6000	8000	10000	12000	n x 2000	
Vertical traverse "Y" axis	mm	6000 / 6500 / 7000 / 8000					
Rapid traverse	mm/min	25000					
Tool magazine	No. tools	80 / 100 / 120 / 150 / 200 / 250					
Machine weight	Kg	78000	85200	92400	99600	72000+n x 3600	

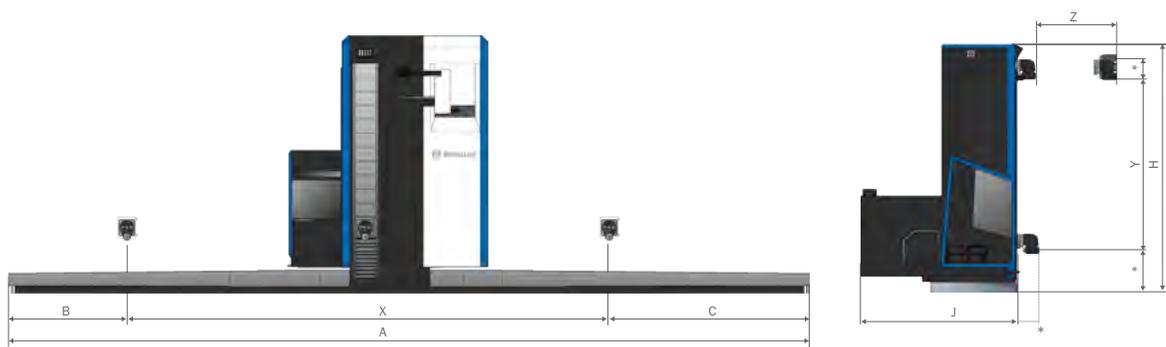
*Other CNC systems under request

FLOOR TYPE
MILLING-BORING
MACHINES › **FR | FX | FXR**

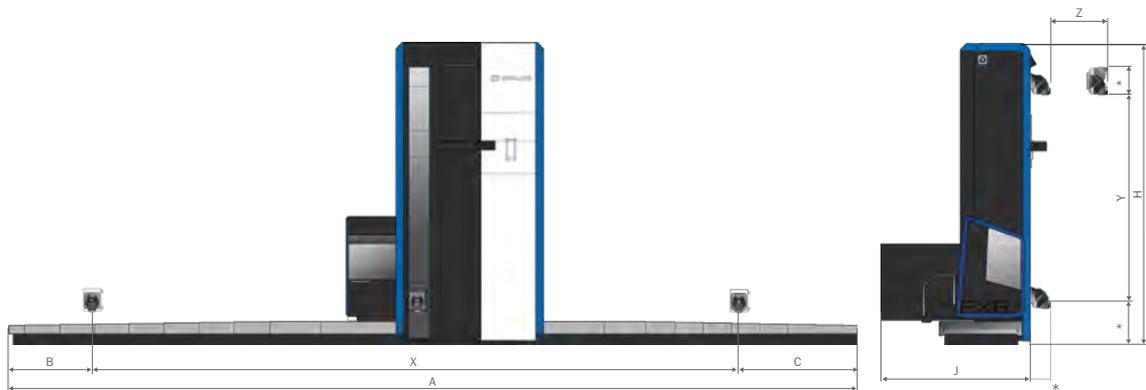


 SORALUCE



LAYOUT **FR**

	X	Y	Z	A	B	C	H	J
FR-4000	4000	3600 / 4000 / 4500	1600 / 1900	9340	1860	3480	6900 / 7300 / 7800	3950 / 4300
FR-6000	6000	3600 / 4000 / 4500	1600 / 1900	11595	2025	3570	6900 / 7300 / 7800	3950 / 4300
FR-8000	8000	3600 / 4000 / 4500	1600 / 1900	13835	2145	3690	6900 / 7300 / 7800	3950 / 4300
FR-10000	10000	3600 / 4000 / 4500	1600 / 1900	15965	2210	3755	6900 / 7300 / 7800	3950 / 4300
FR-12000	12000	3600 / 4000 / 4500	1600 / 1900	17965	2210	3755	6900 / 7300 / 7800	3950 / 4300

LAYOUT **FX | FXR**

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

Dimensions in mm.

*Dimensions depending on the head

MILLING AND TURNING HEADS

IN-HOUSE MANUFACTURED
HIGH RELIABILITY
BROAD RANGE

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.

UNIVERSAL HEAD



46 kW
2,5° X 2,5° / 0,001° X 0,001°
4000 / 5000 / 6000 min⁻¹

ORTHOGONAL HEAD



46 kW
1° X 1°
4000 / 5000 min⁻¹

FIXED HORIZONTAL BORING HEAD



46 kW
3000 / 4000 / 5000 min⁻¹

MODULAR QUILL SPINDLE

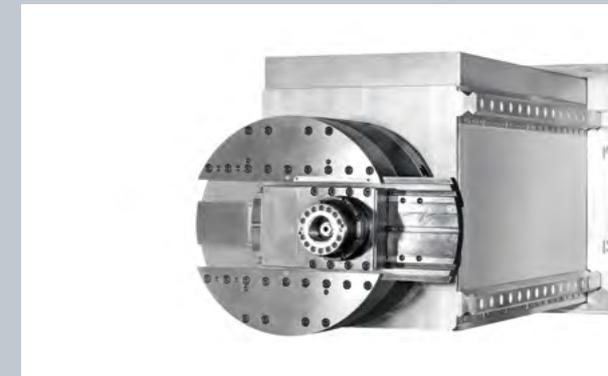


- Ø130 mm, W=700 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø150 mm, W=1000 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø180 mm, W=1000 mm, 53-101 kW / 2500÷3000 min⁻¹
- Ø200 mm, W=1200 mm, 53-101 kW / 2500÷3000 min⁻¹

AUTOMATIC ANGULAR ROTARY HEAD WITH MANUAL TOOL CHANGE



NC FACING AND BORING HEAD



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

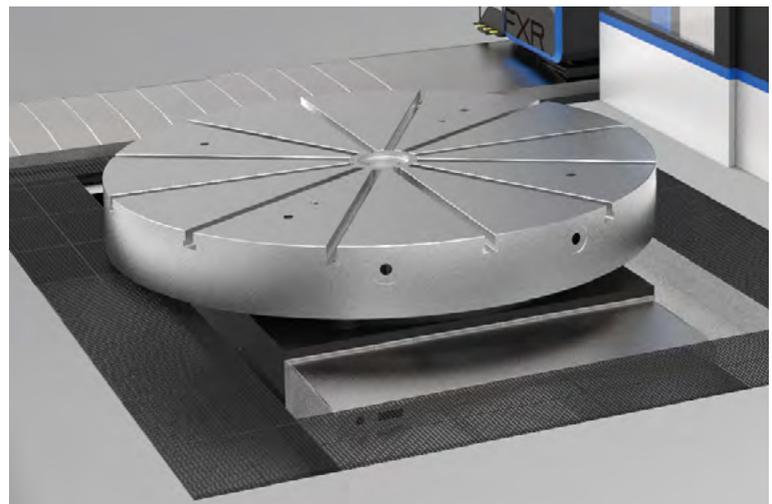
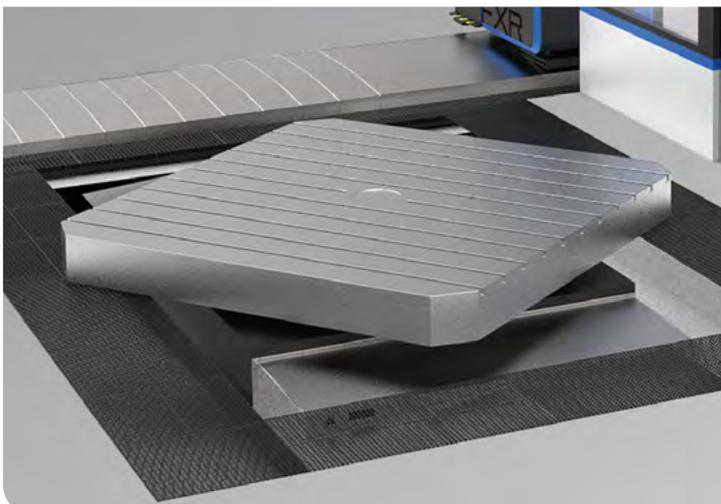


VERSATILITY HIGHLY CONFIGURABLE

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.

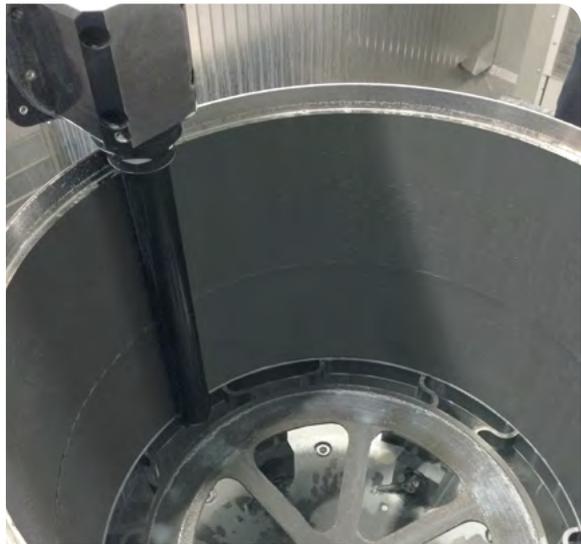
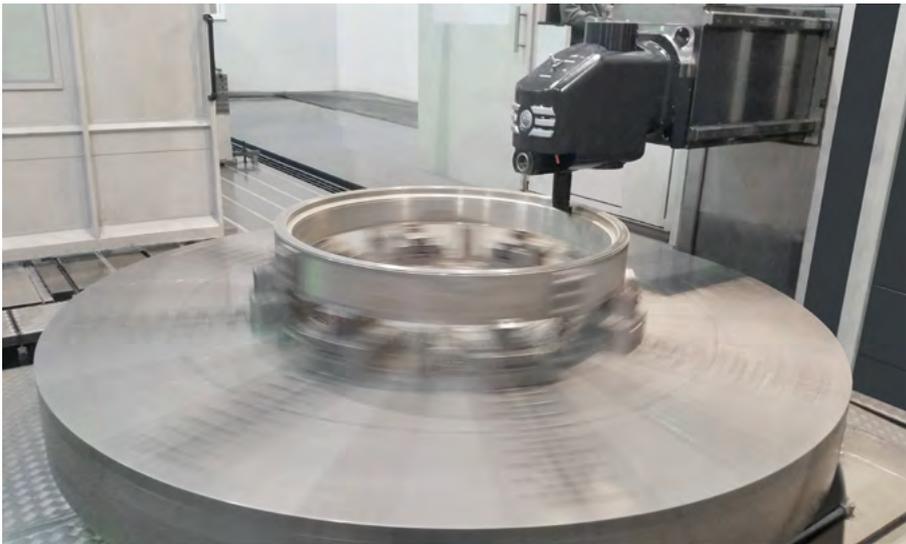


MULTITASKING

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



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



AUTOMATED SYSTEMS, UNATTENDED MACHINING

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



HUMAN MACHINE

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

Workbench
with a panel

Enhanced
visibility

Folding
seat



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

Sliding shutters



Full visibility of tool magazine

Electrically driven tool magazine



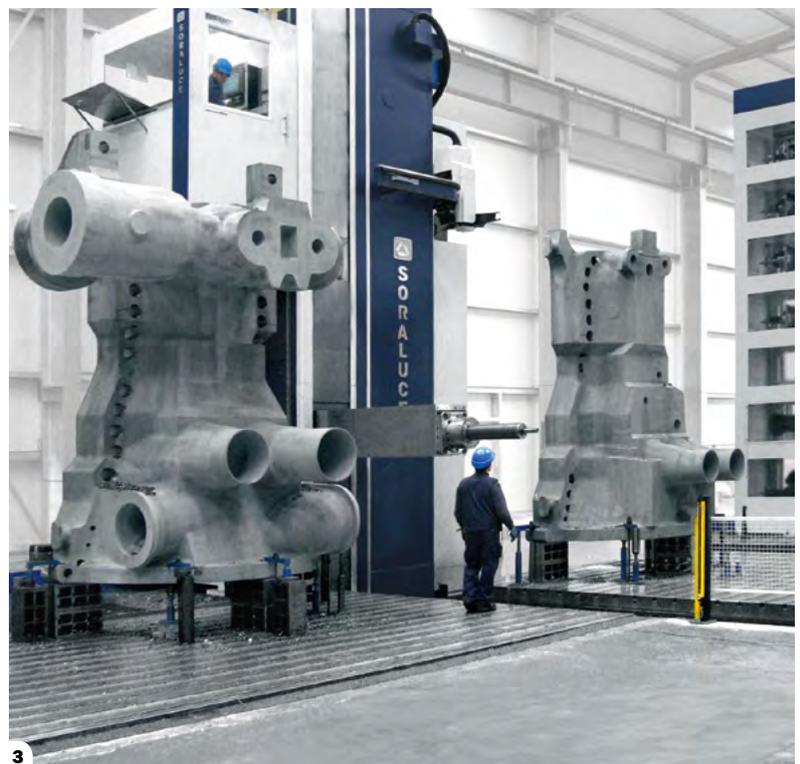
Complete closure

Critic zones protection



LEADING THE MOST DEMANDING INDUSTRIES

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.



[1] The combination of high performance SORALUCE head and rotary-travelling table enables full machining of press frames in one set-up

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

[3] Complete machining of energy components, by combining the broad range of available top quality machining heads

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

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

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

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



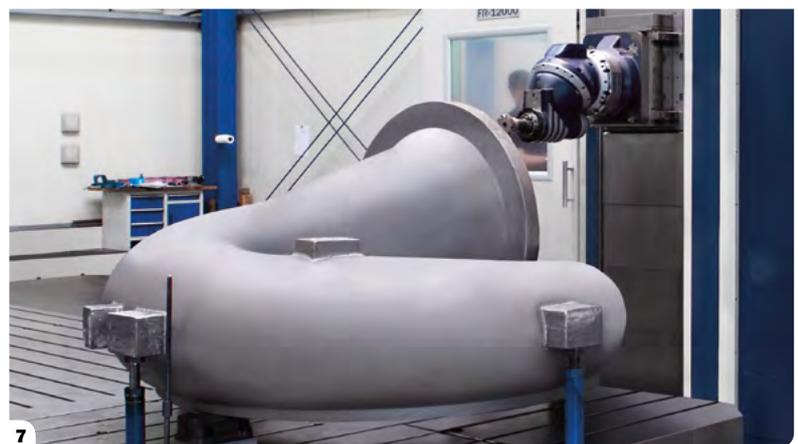
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7

DANOBATGROUP

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