

动柱式
加工中心
MOBILE COLUMN
MACHINING CENTER

N系列
N SERIES



C.B.Ferrari

ITALIAN EXCELLENCE SINCE 1966

公司历史 *OUR HISTORY*

- 1966** 1966年9月1日 C.B.Ferrari公司在位于意大利米兰北部50公里处的瓦雷泽省莫尔纳戈成立。三位创始人分别是负责技术的Renato Bianchi先生和Giuseppe Ferrari先生，以及负责财务的Augusto Caravati先生。成立之初的目标方向是生产适用于加工冲头、模具和复杂零件的小型铣床。
C.B.Ferrari is established September 1st in the northern Italian town of Mornago (VA), 50 km north from Milan, by Mr. Renato Bianchi and Mr. Giuseppe Ferrari as technical members and Mr. Augusto Caravati as the financial member and begin the production of small milling machines suited to build punches, moulds and complex workpieces.
- 1967** C.B.Ferrari 公司研发了自己的直流电机和驱动系统，并生产了第一台直流电机驱动的三轴机床。
C.B.Ferrari develops its own DC motors and drives, builds the first 3-Axis machine operated by DC motors.
- 1973** C.B.Ferrari 为生产的绝大多数机床配备了数控系统并且采用了绝对测量系统。
C.B.Ferrari equips the majority of its machines with CNC and adopts absolute measuring systems.
- 1974** C.B.Ferrari 发布了机床热补偿软件。
C.B.Ferrari releases the machines thermal compensation software.
- 1978** C.B.Ferrari 制造了自己的第一个双摆转台和第一台五轴加工中心。
C.B.Ferrari builds its own first 2-Axis rotary table and builds its first 5-Axis machine.
- 1984** C.B.Ferrari 创立了软件技术部以开发自己的CAM软件。
C.B.Ferrari founds Tecnosoft, its CAM software division.
- 1985** 软件技术部发布了第一版3D CAM软件。
C.B.Ferrari 和意大利领先的Elexa公司共同研发了第一套基于PC的数控系统。
*Tecnosoft releases its first 3D CAM software.
C.B.Ferrari develops the first PC-based CNC in Europe, in cooperation with the Italian CNC leading company Elexa.*
- 1987** C.B.Ferrari 在意大利摩德纳建立了新工厂。
C.B.Ferrari opens a new plant in Modena (Italy).
- 1992** C.B.Ferrari 自主研发并生产了第一根电主轴。
C.B.Ferrari builds its own first electro-spindle.
- 1993** 软件技术部发布了专门应用于透平叶片制造的CAM软件。
Tecnosoft releases the CAM software for turbine blades machining.
- 1994** C.B.Ferrari 售出了第一台用于发电机叶片加工的机床。
C.B.Ferrari sells the first machine for power-generation blades manufacturing.
- 1998** 软件技术部发布了用于模拟加工过程的数字仿真软件。
C.B.Ferrari 售出了第一台用于航空发动机叶片加工的机床。
*Tecnosoft releases the software for machining's graphical simulation.
C.B.Ferrari sells the first machine for aero-engine blades manufacturing.*
- 2003** C.B.Ferrari 生产了第一台配置直线电机和力矩电机的立式五轴加工中心。
C.B.Ferrari builds its first vertical 5-Axis Machine equipped with linear and torque motors.
- 2008** 软件技术部发布了用于分析和优化机床性能表现的软件。
Tecnosoft introduces Dynamic Analysis and Tuning software.
- 2009** C.B.Ferrari 成立了激光技术部。
C.B.Ferrari establish its own Laser Division.
- 2010** 软件技术部改进了CAM软件，使其能够适用于整体叶盘和叶轮的加工。
Tecnosoft develops the CAM software for IBR's (blisks) and Impellers machining.
- 2012** C.B.Ferrari 生产了第一台配有直线电机和力矩电机的卧式五轴加工中心。
C.B.Ferrari 和瑞士Rofin Lasag 公司在激光技术应用领域签署独家协议。
*C.B.Ferrari builds its first horizontal 5-Axis Machine equipped with linear and torque motors.
C.B.Ferrari and Rofin Lasag sign an exclusive agreement for laser application development.*
- 2013** C.B.Ferrari 开发了适用于分度凸轮加工的机床与配套软件。
C.B.Ferrari develop machine and software for the cam machining.
- 2015** C.B.Ferrari 发布了专为中型叶片加工而设计的N316机床。
C.B.Ferrari present the new N316 model for the medium size blades machining.
- 2016** C.B.Ferrari 发布了专为超大型叶片加工而设计的N530机床，同年售出6台。
C.B.Ferrari present and supply 6 machines of the new model N530, for the machining of the biggest blades in the world.



公司简介 THE COMPANY

传统与创新

伴随着自1966年起的不断突破、创新以及坚持对性能与精度的不懈追求，C.B.Ferrari 在广泛的加工应用领域内皆游刃有余，获得了市场的肯定与信任，这奠定了其在世界上高精度五轴加工中心生产商中的领导地位。

意大利是欧洲第二大机床生产国，也是世界第五大机床生产国。目前C.B.Ferrari在意大利运营两家工厂，共有170余名积极的高技术员工，在生产高精度机床上具备丰富的经验与优秀的传统，同时自主生产包含电主轴和旋转工作台在内的绝大多数机床部件，这一切使得C.B.Ferrari能保证产品优异的质量和可靠性。

C.B.Ferrari在世界范围内安装超过4500台机床，并就近提供及时的销售和售后服务。C.B.Ferrari确保客户能够获得极高水平的技术支持，并享受业内顶尖水准的机床性能与精度。

TRADITION AND INNOVATION

Since 1966 constant innovation, performance based approach and market recognized and consolidated superior accuracy, achieved in a wide variety of manufacturing applications, have led C.B.Ferrari to a world leading position in high precision 5-Axes CNC machining centers solutions.

Currently C.B.Ferrari operates with two manufacturing facilities in Italy, the second major machine manufacturing country in Europe and the fifth in the World. 170 skilled and highly motivated employees, enjoying the homeland long-standing tradition in precision mechanics, design and manufacture all machines in house including electro-spindles and rotary tables, ensuring extraordinary quality and reliability over the time.

With more than 4500 machines successfully installed worldwide, supported by a complete and prompt sales and service network, C.B.Ferrari ensures its customers the ultimate manufacturing support, achieving state-of-the-art results in terms of accuracy and performances.

全面服务 *SERVICES*



服务内容 SERVICES



C.B.Ferrari 提供广泛的技术服务，包括：

- 全球范围的销售和服务网络
- 专有主轴、分度头的制造与维修
- 顶尖的专有CAM软件和仿真模拟软件
- 交钥匙解决方案
- 机床操作示范及加工效率优化
- 精度和重复定位精度测试
- 定制自动化解决方案
- 机床大修
- 全面的技术培训



C.B.Ferrari offers comprehensive consulting, including:

- *Worldwide Sales and Service Network*
- *Proprietary Spindles and Dividing Heads Manufacturing and Repair*
- ***Proprietary CAM and Simulation Software products***
- *Turnkey Projects*
- *Machine Demonstration and Time Studies*
- *Accuracy and Repeatability Tests*
- *Customized Automation Solutions*
- *Used machines Overhauls*
- *Training programs*

N系列 - N SERIES

N系列是立式高速5轴联动加工中心，专门用于航空航天叶片的精密加工和能源领域的蒸汽轮机叶片的精密加工，长度最大可达90英寸。

共有3个型号：N316、N516和N530，其主要区别是允许加工的工件最大尺寸（直径x长度）。N316：500x1000，N516：500x1400，N530：700x2300。

N系列机床结合了高刚性和较低的运动质量的特点，在复杂叶型的5轴高速加工中在保证高精度的基础上还有着优异的动态特性。

所有的型号都配备了一个连续摆动主轴头和两个同步的由力矩电机驱动的分度头。两个分度头之间的端面间距可调，可以加工不同长度和类型的叶片。

在N530机床上，可以安装一个选配的中心支撑，以提高关键叶片的加工效率，特别是在粗加工时的加工效率。

得益于以上特点，N系列机床可以在复杂叶片型面的5轴高速精密加工过程中保证高精度的同事实现高动态特性。

不论何种配置，自主生产的各式电主轴可以满足最先进的加工技术在粗加工和精加工各个方面的要求。

The N-Series includes a full range of high-speed 5-Axes machining centers, specifically designed for precision machining of turbine blades for the aerospace industry (airplanes motors) and energy industry.

The range includes 3 models, N316, N516 and N530, whose main differences relate to the maximum size of workable pieces (chord x length). N316: 500x1000, N516: 500x1400, N530: 700x2500. The N530 machine is among the bigger machines in the World in its category.

The special design, that combines high stiffness and reduced mass movements, allows the N-Series machines to get high dynamic performances during the 5-Axes high speed machining of complex wings profiles, without affecting precision.

All the machines are equipped with a tilting head and two wide synchronized dividing heads with Direct Drive technology, powered by the latest generation torque motors, which directly support the piece to be machined.

The distance between the two dividing heads is adjustable and allows the machining of blades of different length and type. On the N530 machine it is possible to install an optional middle support to increase efficiency in the machining of critical blades, especially during the roughing phase.

For all configurations, a wide range of powerful electrospindles are available to meet the typical roughing and finishing needs of this application.



产品优势 *ADVANTAGES*

刚性铸铁结构

稳定的工艺贯穿整个铸造过程，使得机床的精度得以长久保持

纤细的主轴鼻端

与市面上其他产品相比，纤细的主轴鼻端减小了干涉区域大大减少了对刀柄长度的需求，即便在局促的加工空间里也确保了加工的灵活性。

配有力矩电机的分度头

直接驱动的分度头提高了动态性能，最大限度地提升了加工效率，尤其是叶片进、排气边。

用途广，柔性高

两侧分度头间较大的调整距离使N系列成为市面上同类产品中的应用面最广的机床之一。

斜床身

斜床身提高了结构刚度同时保证了极佳的排屑性能。

STIFF CAST-IRON STRUCTURE

The manufacturing process, together with the stabilization treatment, provides the machine with precision and over time stability.

ELECTROSPINDLES WITH TAPERED FRONT

They allow the use of tools and tool holders of a significantly reduced length compared with our competitors, thus ensuring perfect machining accessibility even near the two diving heads and optional central support area.

TORQUE MOTOR DIVIDING HEADS

The Direct Drive technology dividing heads achieve relevant dynamic performances, maximizing machining efficiency, especially at the leading and trailing edges.

ADJUSTABLE DISTANCE BETWEEN THE DIVIDING HEADS

The wide range of distance adjustment between the two dividing heads allows the N-Series to be one of the most versatile machines in its category.

LAYOUT WITH ANGLED X AXIS

The angled longitudinal axis design allows a perfect chips evacuation.

应用一览

APPLICATION SECTOR



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航空航天
透平叶片
能源发电

AEROSPACE
TURBINE BLADES
POWER GENERATION

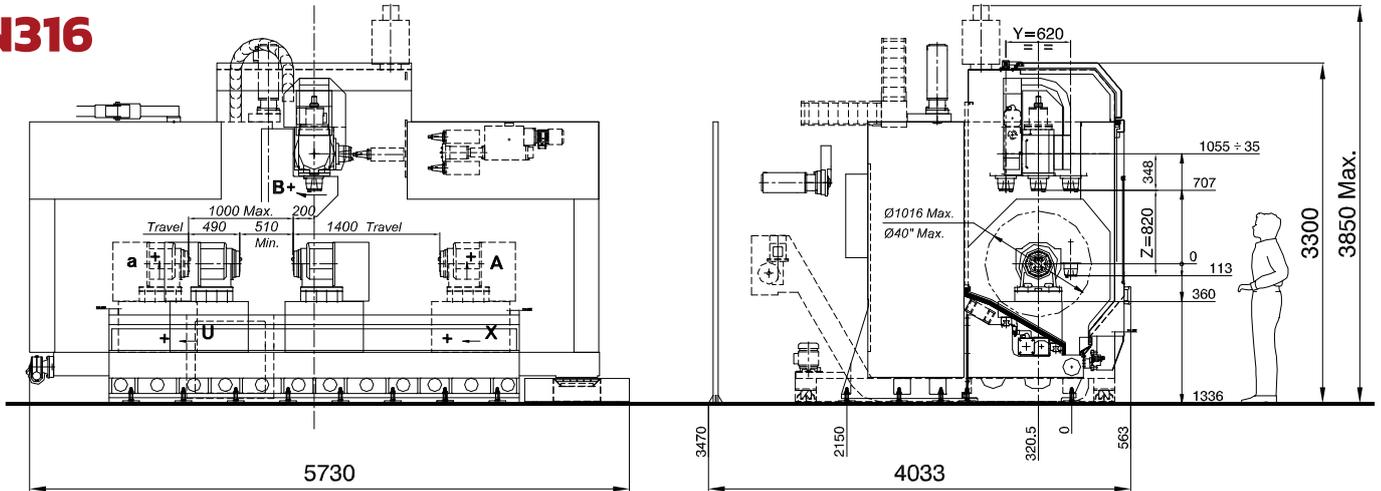


产品特点 FEATURES

	N316	N516	N530
行程 • SLIDE TRAVELS			
X - 轴 Longitudinal (mm)	1400	2580	3000
Y - 轴 Cross (mm)	620	620	820
Z - 轴 Vertical (mm)	820	820	820
U - 轴 Longitudinal (mm)	1400	2580	3000
工作范围 • WORKING RANGE			
中心距 Centres distance (mm)	510÷1000	545÷1460	1100÷3000
旋转直径 Swing diameter (mm)	1016 (40")	1016 (40")	1016 (40")
工件最大重量 Max workpice mass (kg)	500	500	1000
工件最大尺寸 Max workpice dimension (mm)	∅ 500 L=900	∅ 500 L=1400	∅ 700 L=2500
轴 • AXES			
XU - 进给速度 Linear Feed rates (m/min)	40	40	40
YZ - 进给速度 Linear Feed rates (m/min)	25	25	25
A - 转速 Rotary Feed rates (rpm)	160	160	160
C - 转速 Rotary Feed rates (rpm)	11	11	11
轴加速度 • AXES ACCELERATION			
XYZ - 直线加速度 Linear (m/s ²)	5	5	5
A-A11 - 转动加速度 Rotary (°/s ²)	800	800	700
C - 转动加速度 Rotary (°/s ²)	140	140	140
测量系统 • MEASURING SYSTEM			
绝对光栅尺 Absolute optical linear scales	Heidenhain		
数控系统 • CNC CONTROL			
海德汉 Heidenhain	TNC 640		
西门子 Siemens	840D sl		
刀库 • TOOLS MAGAZINE			
带机械手的链式刀库 Chain type with exchanging arm			
刀位 Positions (V45/V50/A63-V40)	36	36	36
换刀时间 Changing time chips/chips (s)	10	10	10
最大刀具长度 Max. tool length (mm)	400	400	400
最大刀具直径 Max. Tool diameter (mm)	100	100	100
最大道具重量 Max tool weight (kg)	5	5	5
尺寸与重量 • WEIGHT AND DIMENSIONS			
整机尺寸 Dimensions (m)	5,6x4,1	6,7x4,1	9,8x4,5
高度 Height (m)	3,85	3,85	3,85
重量 Weight (kg)	18000	20000	29000
装机功率 Rating power (kW)	65	65	65

机床布局 LAYOUT MACHINE

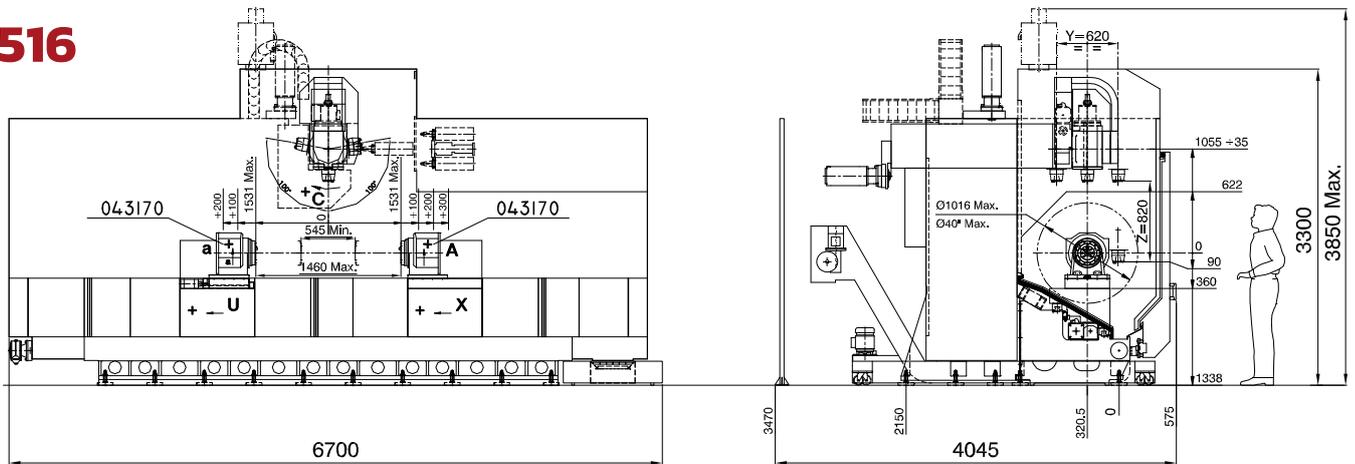
N316



工件最大尺寸 (直径x长度) Max working piece dimensions (chord x length): $\varnothing 500 \times 1000$ mm

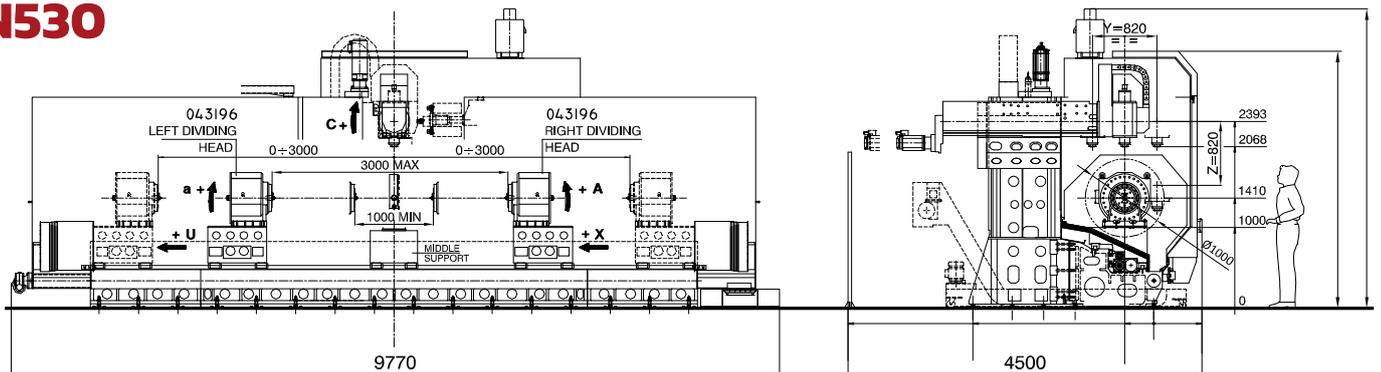
10

N516



工件最大尺寸 (直径x长度) Max working piece dimensions (chord x length): $\varnothing 500 \times 1400$ mm

N530



工件最大尺寸 (直径x长度) Max working piece dimensions (chord x length): $\varnothing 500 \times 2500$ mm

数控系统选项 AVAILABLE CONTROLS



西门子 840D SL



海德汉 TNC 640

绝对测量系统 ABSOLUTE MEASURING SYSTEM



所有回转轴标配海德汉绝对编码器
分辨率达到0.0001°

All rotary axes are equipped with Heidenhain absolute encoders. Resolution 0,0001°



所有机床标配海德汉绝对光栅尺

All machines are equipped with Heidenhain absolute linear scales.



电主轴 *ELECTROSPINDLES*

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C.B.Ferrari 所有机床配备自主设计并制造的电主轴，
可以为其用户提供以下卓越的优势：

- 库存有充足的备用电主轴
- 响应时间短且主轴易于更换
- 低廉的维修费用
- 减少机床停机时间

陶瓷球轴承

集成同步电机

温度控制功能

液体冷却系统

刀具轴向热变形自动补偿

*C.B.Ferrari design and manufactures in house all the electrospindles its machines
are equipped with, offering remarkable advantages to its customers:*

- *Spare spindles always available*
- *Easy replacement with minimum intervention time*
- *Low repair cost*
- *Reduced machine downtime*

Ceramic ball bearings

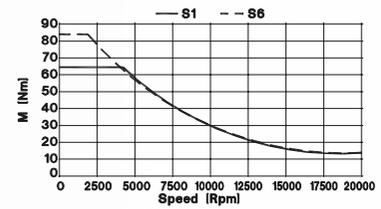
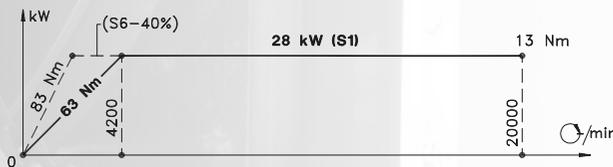
Integrated synchronous motor

Temperature controlled operation

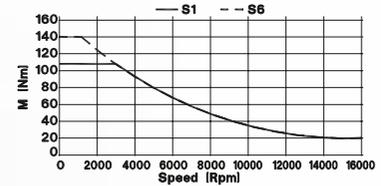
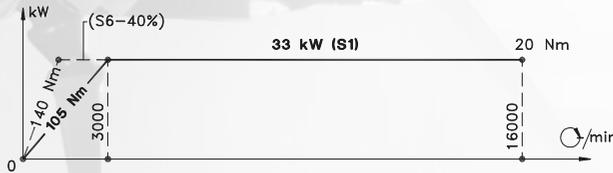
Liquid cooling system

Automatic compensation of thermal expansion along the tool axis

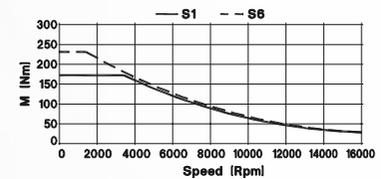
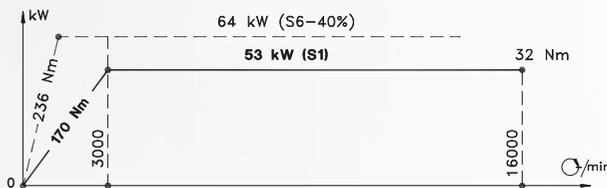
20000 rpm
28 kW
63/83 Nm



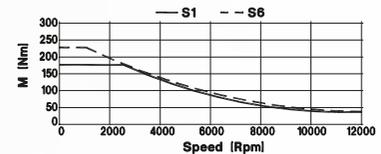
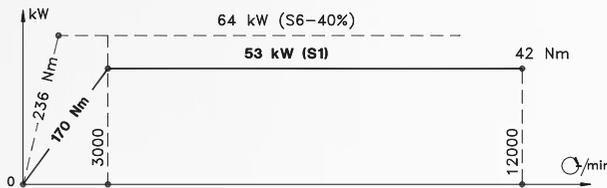
16000 rpm
33 kW
105/140 Nm



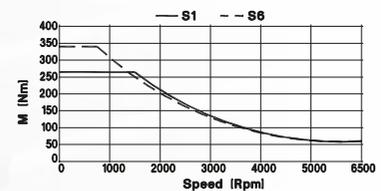
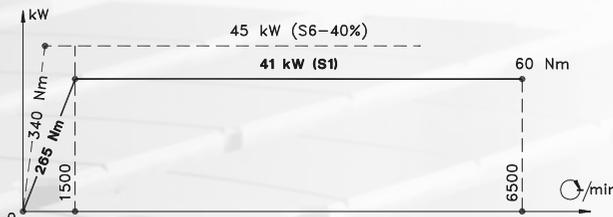
16000 rpm
53/64 kW
170/236 Nm



12000 rpm
53/64 kW
170/236 Nm



6500 rpm
41/45 kW
265/340 Nm



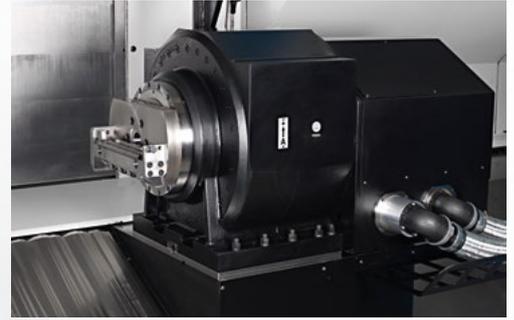
连续摆动主轴头 C轴 = $\pm 91^\circ - 3900^\circ/\text{Min}$.
CONTINUOUS TILTING HEADS Axis: C = $\pm 91^\circ - 3900^\circ/\text{Min}$.

20.000 RPM	ISO V40	28 Kw	63/83 Nm	Type 051556
20.000 RPM	HSK A63	28 Kw	63/83 Nm	Type 051557
16.000 RPM	ISO V40	33 Kw	105/140 Nm	Type 050477
16.000 RPM	HSK A63	33 Kw	105/140 Nm	Type 050478
16.000 RPM	HSK A63	53/64 Kw	170/236 Nm	Type 051558
12.000 RPM	ISO V50	53/64 kW	170/236 Nm	Type 051551
6.500 RPM	ISO V50	41/45 kW	265/340 Nm	Type 050489

选配件 ACCESSORIES

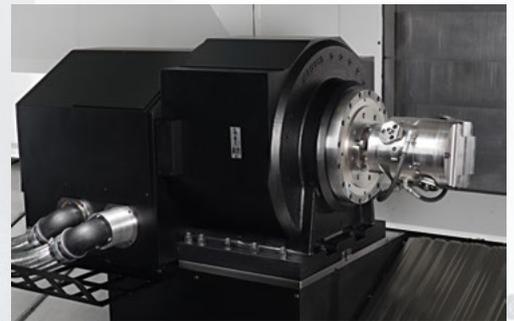
1轴分度头 (右) 安装于滑枕上
1 AXIS DIVIDING HEAD (right) Mounted on mobile slide

TYPE	
043170	A = 160 RPM - 1000 Nm
043196	A = 160 RPM - 2900 Nm (N530)



1轴分度头 (左) 安装于滑枕上
1 AXIS DIVIDING HEAD (left) Mounted on mobile slide

TYPE	
043170	A = 160 RPM - 1000 Nm
043196	A = 160 RPM - 2900 Nm (N530)



14 中心支撑
VLADE MIDDLE SUPPORT (REST)

该中心支撑随着叶片一起旋转，位于两个分度头之间，用于支撑较重较长或者易折的叶片。

The middle support rotate with the blade and is located between the two opposite diving head. Support heavy blades or long and easy to bend blades.



配件一览 ACCESSORIES

机床可安装以下标准配件：

- 适用于钢件加工的排屑器
- 用于铝合金钛合金加工的排屑器
- 废气过滤器
- 75bar主轴中心出水
- 刀具气冷系统
- 刀具油气冷却系统
- 2D或3D接触式测头
- 接触式对刀仪
- 激光对刀仪
- 旋转视窗
- 根据要求可安装其他配件

The machine can be equipped with the following STANDARD accessories:

- Chips conveyor for Steel
- Chips conveyor for Aluminium/Titanium
- Exhaust filter
- Through spindle coolant system 75 bar
- Tool blower air system (standard)
- Tool blower air/oil system
- 2D or 3D Touch probe
- Touch tool setting device
- Laser tool setting device
- Spin window on door (rotoclear)
- Other options available on request



中心出水冷却单元 - 75 BAR
500升水箱 - 鼓式过滤器

THROUGH SPINDLE COOLANT GROUP - 75 BAR
500 lts tank - Drum filter



2D-3D 工件测量系统
2D-3D control piece group



激光对刀仪
Laser tools setting device



接触式对刀仪
Contact tools setting device

可对旧机床的工作台、分度头
以及电主轴进行升级。

Possibility to update
C.B.Ferrari used machines, with
new tables, dividing heads
and electrospindles.



C.B.Ferrari

C.B. FERRARI S.r.l. a socio unico
*Società soggetta a direzione
e coordinamento di*
Jingcheng Holding Europe GmbH
Coburg, Germany

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