



ROKU-ROKU, the best solution for Super-Precision micro machining

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High-Speed
High-Precision
Dual Purpose Machining Center

HC
series

Hybrit Machine HC

Different machining performances are built into one machine.
The HC series, born from the Hybrid Concept,
will get out of crowds by investment efficiency.

ROKU-ROKU

SINCE 1903

High-Speed
High-Precision
Dual Purpose Machining Center

HC series

What should we look at Machining Centers of the next generation? ROKU-ROKU has found the answer in "realizing investment efficiency never had". As one of the ideal options, the HC series was developed with its new concept. While aiming at direct high speed machining of mold as a primary object, graphite machining is covered as "Hybrid Machines". Firstly, machine rigidity is thoroughly enhanced to correspond mold machining, then lifeline of graphite machining, dust collection and prevention, and high speed high precision machining, are sought. As a result, the HC series have enabled dry cut (air blow) for mold machining and graphite machining as standard function, as well as semi-dry cut (oil mist) for mold machining as optional function. By going one step forward from standard Machining Center and covering graphite machining, this Hybrid Machine promises high investment efficiency, which has never been achieved. This is the Ace of machines for the next generation.



HC-658
SUPER HYBRID MACHINE

HC-series 3 brothers are gathered



HC-548
SUPER HYBRID MACHINE

HC-878
SUPER HYBRID MACHINE



Dear Valued Customers,

It has been more than 20 years since our first development of graphite machine in 1988. At development, "Keep shop floor clean" was requested by customers as graphite machining represented typical "hard, dirty and danger" work at that time. We fulfilled this requirement by an idea of replacing entire air in the machining area, instead of ordinary dust collection.

After that, customers' requirements kept diversified. One example is "direct milling of cavity by the same machine". To meet this requirement, we continued improvements and completed development of Hybrid machine HC-series, for "incorporating different machining performance into one machine", and we started its delivery in 2000. Its spindle is a state of the art grease lubricated spindle as a vital element for graphite machining. Lately, there is a big stream from copper electrodes to graphite electrodes because of development of fine grain graphite. Furthermore, situation for mold making industry is getting tough, tight tolerance, short delivery and low cost.

We follow the founder's word "Provide solutions for customers" on the HC-series as well. We can't describe all in the limited space of catalog. If you need the latest machining data, or if there is any request, please feel free to contact our agent or our staff. And, if you can come to our factory to see and feel how we build every single machine by heart, it will be appreciated.

High rigidity structure for direct mold machining, and high grade dust protection for graphite.
Machine design for the HC is born from the Hybrid Concept.

● "High rigidity structure" for further high precision machining

Far surpassing high speed and high precision machining is enabled by high rigidity bridge type machine structure, mono-casting structure of column and cross rail as a single piece casting, head design for eliminating posture deformation by minimizing distance from guide surface to spindle center, high rigidity bed with ideal rib distribution by computer analysis, etc.

● "Dust collection and protection" for graphite machining

The full enclosure cover for preventing dust scattering is equipped, and dust protection is employed for key mechanical elements such as ball screws and linear motion guides.



In addition, 1.5 kW high power dust collector is equipped as standard. Dust collection and protection at graphite machining for both outside and inside of the machine are perfectly done.



For direct machining of mold and graphite electrode machining

Basic structure

Column and Cross-rail in single body

The key for this bridge structure, integrated column and cross-rail, is employed as basic structure. Realizing the highest level of rigidity and vibration dampening performance by employing the catenary which is used on our Super Precision Micro Machining Centers, integrated column and cross-rail with increased rigidity in center area, and lower center of gravity with square structure.

3-point supported box structure base

High-grade cast iron base has employed newly developed box type structure for maintaining high acceleration response. It promises stability with fundamental rigidity and high vibration dampening under hybrid machining environment.

Ideal feed structure for pursuing High-Precision

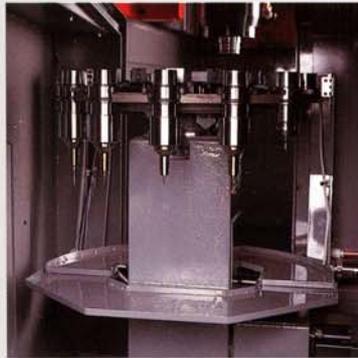
There is no over-hanging throughout full range of X and Y travels by employing bridge type structure suited for High-Precision machining. By separating each feed axis composition, unbalancing of center of gravity at machining is significantly suppressed.

Optimum axis guide for Hybrid machining

The world-wide standard, 4-direction equalized load type linear motion guides, are equipped as axis guide. Because of its rolling characteristics, difference between static friction and dynamic friction is minimum, high response machining without quadrant spikes can be done. Grease lubrication with minimum grease consumption is employed for Eco-friendly and no oil dripping on work pieces.

12 tools ATC

In the ATC magazine, 12 tools can be stored. Stable tool change is achieved with fixed address type tool index and magazine direct change.



12 tools ATC unit

Micro processor controlled high-performance dust collector.
Easy dust handling



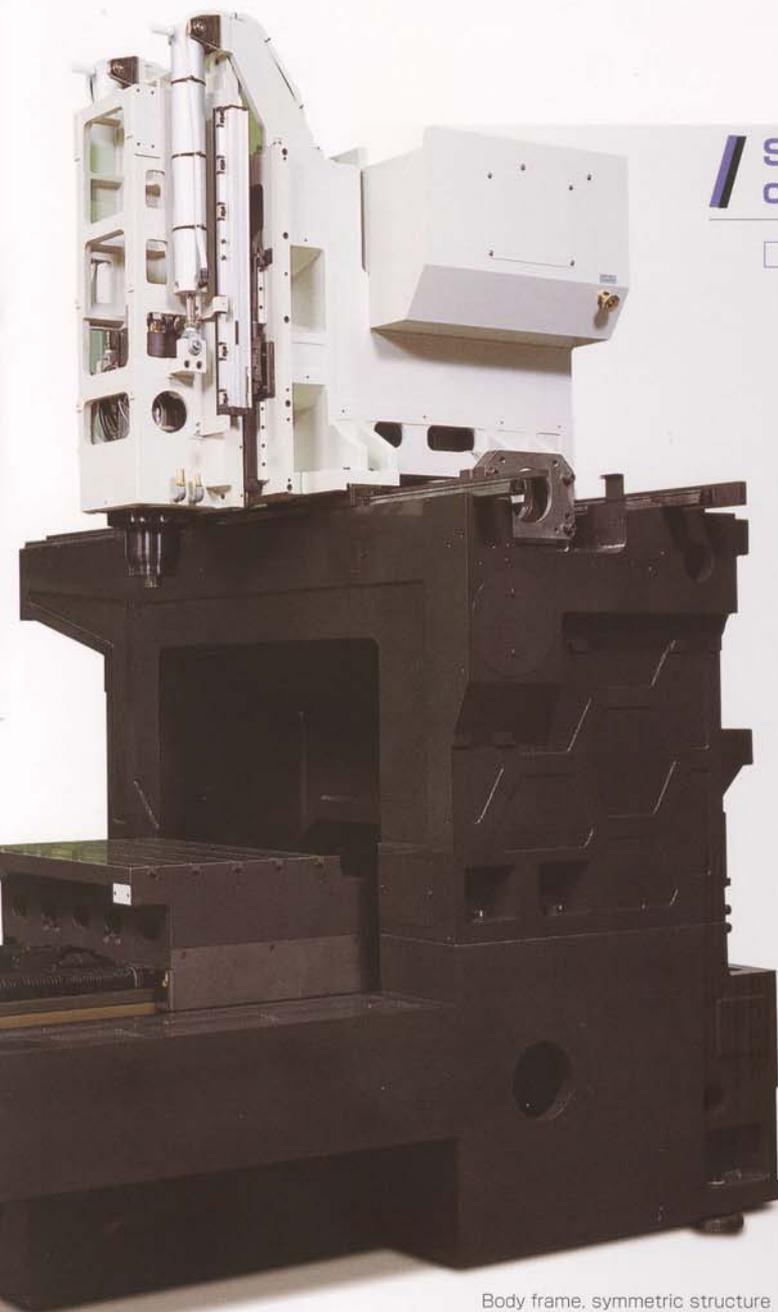
Superior operability

Workability

As dust collection is done in the back of the machine, there is no obstacle around operator's foot.

Chip process

Unique "Air exchanging dust collection system" is employed. Dust on the table and work piece is stirred by intermittent air blow, then, entire air with graphite dust in the machining area is exchanged 7 times in a minute. Intermittent air blow nozzles are also equipped at both side gutters for the same dust collection operation as the table.

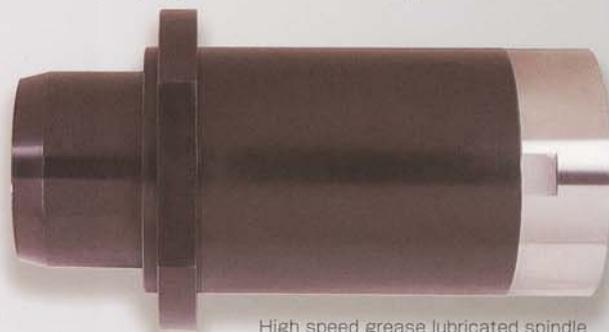


Body frame, symmetric structure

Spindle with new evolution and continued reliability

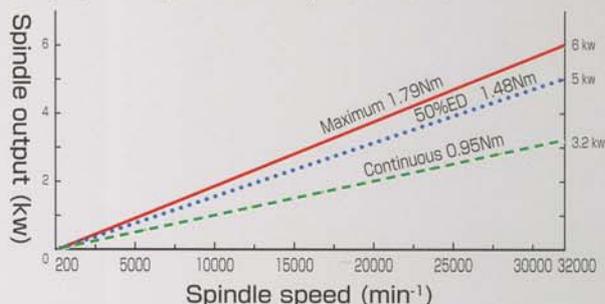
High performance spindle with grease lubricated ceramic ball bearings

The optimum built-in motor with low heat generation and low output for high-precision and high-speed machining is employed. By sealed special grease lubricated ceramic ball bearings, non-stop continuous operation at maximum speed is enabled with high reliability. Because of grease lubrication, not like oil lubrication, there is no oil contamination for work piece or machining area. The dedicated inspectors carry out static and dynamic inspections for long period without any compromising, to secure high-performance and high-reliability. As operation performance, its DmN value is 1.92 million, coping against oil lubrication type.



High speed grease lubricated spindle

HC spindle output chart



Oil circulation forced cooling jacket and Super precision oil controller for $\pm 0.1^\circ\text{C}$ control

For controlling spindle head unit temperature more precisely, "Wide area jacket" is employed for the oil jacket to cover the spindle head nose. Temperature of cooling oil for forced circulation within oil jacket and housing is controlled within $\pm 0.1^\circ\text{C}$ by Gas-Bypass type oil controller unit. The temperature sensor has "Heat Capacitor" for eliminating excessive fluctuation of room temperature in short period.



High precision shrink fit tool holder (HSK-E40)

2-plane constraint spindle

HSK-E40, suited for high speed machining, is used for being compatible with stability and high precision balance. By high clamping rigidity, longer tool life and high machining surface quality are achieved. Tool mounting accuracy through ATC is also significantly improved. Spindle head contact surface is hand scraped for stable accuracy.

Priority issue is, harmony of efficiency, stability and environmental performance

SUPER PC III function

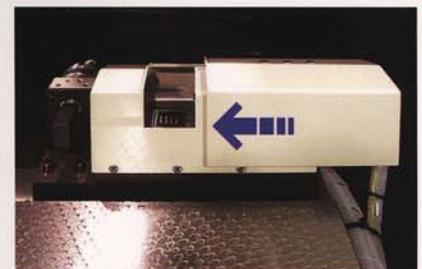
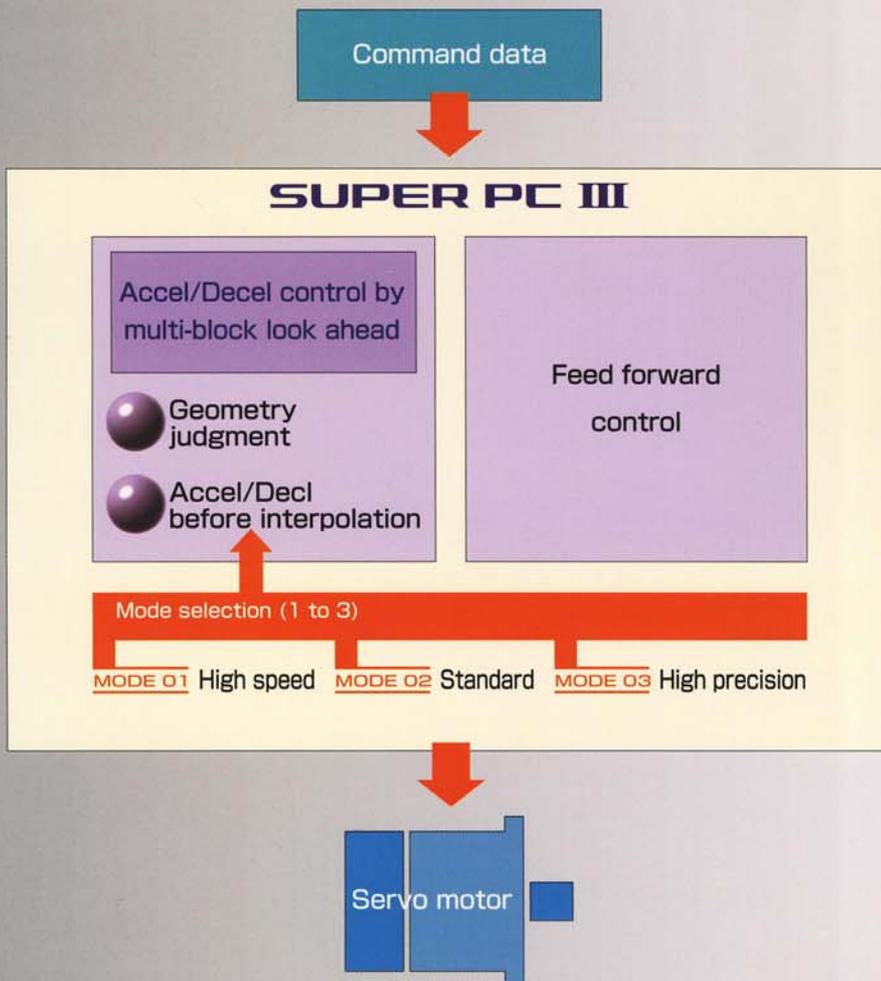
This is to follow fine 3-D point to point motion data produced by CAD/CAM in high precision and high speed. It includes AI Contour Control II, Data Server 1GB and NANO Smoothing for improving 3-D geometry accuracy and surface quality. High precision and high quality machining can be pursued by high efficiency process of 3-mode switching. High speed / Standard / High precision mode.

Spindle thermal growth compensation function

Displacement caused by spindle thermal growth during machining is detected by the sensor incorporated in the spindle, and real time compensation can be done. This can minimize spindle warm-up cycle before machining or after ATC.

Non-contact type tool measurement function

Tool length and diameter can be measured dynamically. Spindle runs at cutting speed, and, chips and oil on the tool are cleaned by special tool nose air blow, then, high precision measurement is done by the high resolution laser beam. Measurements are taken with considering tool elongation and run-out by high speed spindle rotation. Minimum measurable diameter is 0.05mm. Entering a radius offset value, breakage detection and allowance judgment can be done. Slide cover for protecting the device against graphite dust is available as an option.



ROKU-ROKU Tool life management

Non-contact tool measurement function and Tool life management function are combined as a ROKU-ROKU special function. When tool wear is detected at Non-contact tool measurement function, if there is a spare tool available in the same group, the tool is replaced with the spare automatically, and automatic operation can be continued with performing automatic tool length measurement for the new tool. By this unique function, tool life can be judged not only by cutting length or number of ATC, but also by measurement of actual tool wear.

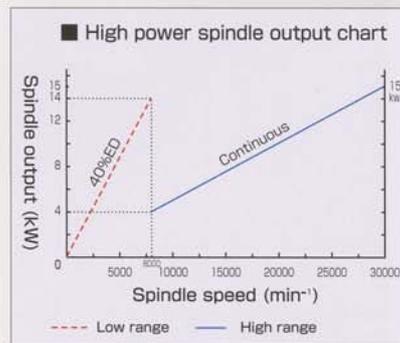
Semi-dry machining system

Semi-dry coolant, Mist collector and Simple chip buckets are equipped for direct mold machining. There is also a switch equipped for switching between graphite machining, for activating dust collector at dry machining and mist collector at semi-dry machining.



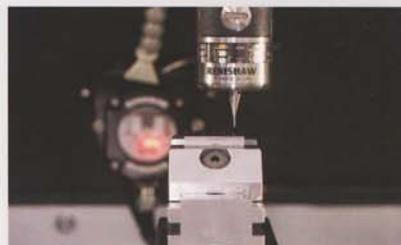
High power spindle

For achieving further high efficiency machining, 15kW high power spindle is available as option. By automatic coil switching, high torque can be obtained at low speed range, and high speed 30,000min⁻¹ can be obtained at high speed range.



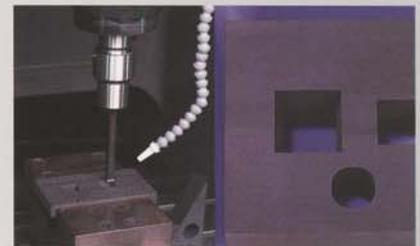
SUPER MAC II function

Coordinate system for work pieces or fixtures can be measured on the machine, and measured data can be automatically entered. The special touch probe stored in the ATC magazine is called, and various measurement operations can be automatically done accurately. Top surface, inner flange, outer flange and groove measurements are available as measurement software. "Automatic measurement data print out function" and "Coordinate system rotation centering function" for coordinate system rotation based on the measured data, are available as option. Standard stylus diameter is 2mm.



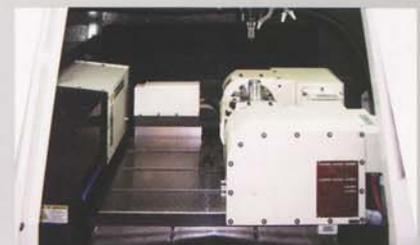
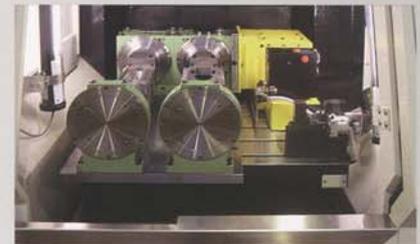
Super-J-Cut function (Patent pending)

At pocket machining by end mills, there is always material left at corner part due to cutter radius. Such corner part can be finished as sharp edge by using this function. Its program is just one block command, and tapered corner can also be machined. By this function, number of electrode can be reduced, and it contributes shortening of mold production process time and improving accuracy.



4-axis / 5-axis control

Various machining applications can be implemented by variety of additional axis control.



Various automated systems for pursuing and implementing new and high value addition

Electrode machining and EDM process are incorporated into a single cell

Graphite electrode Machining Center, EDM sinker for next process, and work and electrode stocker can be connected by a Robot as a special cell. This implementation is enabled by burr-free graphite electrode.



Machining cell dedicating to electrode machining

Machining cell dedicating to graphite electrode machining can be implemented. For this cell, the left-handed model is available. In addition, integrated machining cell for changing electrode holders by loader and stocker is also available. In this system, the special schedule management function developed by ROKU-ROKU is incorporated for enabling flexible management such as job interruption, program file control, etc.

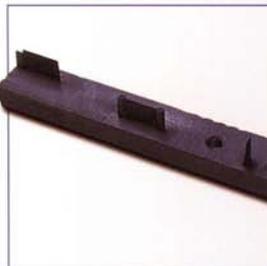
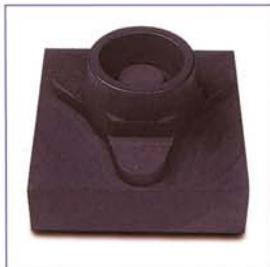


Optimum machining area and high-speed spindle for fine micro machining, it implements high-precision geometry finish.

HC-435

HC-435 is a dry cut model of High-Precision High-Speed Super Micro Fine Machining Center, MEGA. With maintaining performance of MEGA as Micro Fine Machining Center, it is developed for dry cut applications. Not only for high precision fine graphite electrode machining, but also it is suited for high precision carbon jig machining for semi-conductor and machining machine-able ceramics as a High-Precision Micro Fine Dry Machining Center.

Work Sample



- ◆ By the same machine structure as HC-658, a single piece casting for incorporated column and cross-rail, high rigidity is obtained.
- ◆ To fulfill the essential requirements as a graphite machine, dust collection systems, dust preventive structures and grease lubrication spindle are equipped.
- ◆ 130mm and 200mm high column options are available for the use of various electrode fixtures.
- ◆ Direct machining of mold materials can be done by air blow dry cut, or optional oil mist semi-dry cut.
- ◆ Various options as Automatic centering function, Non-contact tool measurement function, etc., are available. In addition, various automated systems can be implemented.

HC-548/658/878 · HC-435 Standard specifications

Machine specifications	(mm)			ROKU-ROKU SYSTEM α -3
Model	HC-548	HC-658	HC-878	HC-435
X axis travel (spindle head left/right)	460	600	850	410
Y axis travel (table forward/backward)	360	500	750	330
Z axis travel (spindle head up/down)	260	400	←	200
Distance from table surface to spindle nose	150~410	200~600	225~625	50~250
Table work area (width×length)	600×360	750×500	950×750	600×330
Maximum table load	200 kg	←	←	100 kg
Table surface	14mm T-slot×3, 100 pitch	14mm T-slot×5, 100 pitch	14mm T-slot×5, 160 pitch	14mm T-slot×3, 100 pitch
Table height from floor	800	←	850	750
Spindle speed	200~32,000min ⁻¹	←	←	3,000~25,000min ⁻¹
Spindle taper	1/10 taper (2-plane constraint)	←	←	←
Spindle air purge	Equipped	←	←	←
Distance from machine front to spindle center line	650	780 (With door open)	1,050	600
Spindle air through	Equipped	←	←	←
Rapid feedrate	30,000mm/min	20,000mm/min	←	15,000mm/min
Cutting feedrate Normal mode	8,000mm/min	←	←	10,000mm/min
Super PC III mode	30,000mm/min	20,000mm/min	←	10,000mm/min
Tool shank type	HSK-E40	←	←	HSK-E25
Tool storage capacity	12	←	←	11
Maximum tool diameter	φ38	φ60 for continuous loading, φ76.2 for without adjacent tools	←	φ6
Maximum tool length	150	250	←	80
Maximum tool weight	3kg	←	←	0.6kg
Tool selection type	Fixed address type	←	←	Fixed address type
Tool change type	Pop-up type	Magazine direct type (arm-less)	←	Pop-up type
Spindle motor	6kW(32,000min ⁻¹)	←	←	2.5kW(25,000min ⁻¹)
Dust collector motor	1.5kW	←	2.2kW	0.75kW
Power supply	AC200V±10% 50/60Hz±1Hz 22kVA	←	←	←
Air supply※	0.5MPa 600NL/min	0.55MPa 750NL/min	←	0.5MPa 400NL/min
Floor space required (width×length)	2,000×2,760	2,860×3,300	3,300×3,325	1,300×1,870
Machine height	2,500	2,860	2,935	2,070
Machine weight	4,000kg	5,500kg	7,000kg	2,500kg

Numerical Control unit specifications

- Control axis : 3 axes, Simultaneous control axis : 3 axes ●Least input increment : 0.0001 mm ●Program storage capacity : 64kB (160m)
- Custom macro B ●Input/Output interface : RS232C ●Canned cycle ●Tool length offset ●Cutter compensation C ●Tool offset memory A
- Work coordinate system selection ●Registerable number of program : 63 ●Programmable data input ●Color LCD ●Extended program editing

Additional option for Numerical Control unit

- Helical interpolation ●NURBS interpolation ●Program storage capacity : 128/256/512kByte, 1/2/4/8MB
- Registerable number of program expansion 1, 2 ●Number of tool offset : 64/99 total ●Tool offset memory B/C ●Tool life management
- Scaling ●Coordinate system rotation ●Background editing ●Work coordinate system 48 sets ●F15 program format ●Program restart
- Smooth interpolation ●Graphic display ●Dynamic graphic display

Optional functions and accessories

HC-548 / 658 / 878

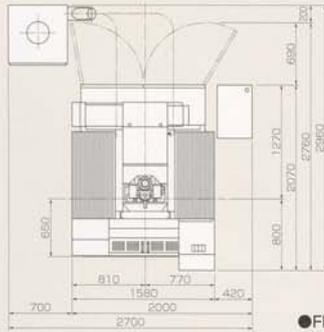
- B kit ●2nd machine light ●Patrol light, 2 colors ●Short circuit breaker
- Automatic power shut down ●Air gun ●Table surface hand scraping finish
- Super PC III function (AI Nano High precision contour control, 3-mode switching, Data server, Others)
- Tool length measurement ●Background editing ●Run hour / Parts count display
- V kit ●Spindle load meter ●Maintenance kit
- Machine color paint for dust collector and spindle oil controller ●Air source valve
- Inch/Metric switching
- Semi-dry machining system ●Nozzle type oil mist coolant ●Mist collector
- Chip bucket ●Linear scales ●30 tools ATC
- Non-contact type tool measurement function (Tool length, Tool diameter, Breakage detection)
- Automatic tool height setting (Tool length, Breakage detection)
- Super MAC II function (Automatic centering function) ●Super-J-Cut function
- High power spindle ●Spindle thermal growth compensation function
- Rigid tapping ●Additional axis control (1-axis / 2-axis) ●Automatic side door
- Remote type handle unit ●Weekly timer and automatic program start function
- Additional M code ●Tool tightening stand ●Special filter for dust collector
- High column 200mm

HC-435

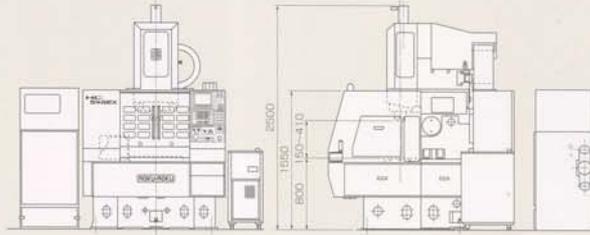
- G kit ●2nd machine light ●Patrol light, 2 colors
- Short circuit breaker ●Automatic power shut down
- High precision oil controller ●Manual handle feed
- Tool length measurement
- Run hour / Parts count display ●Table surface hand scraping finish
- Super PC III function ●AI Nano High precision contour control
- 3-mode switching ●Data server, Others
- Semi-dry machining system ●Nozzle type oil mist coolant
- Mist collector ●Chip bucket ●Linear scales ●Air gun
- 30 / 60 tools ATC
- Non-contact type tool measurement function
- Automatic tool height setting (Tool length, Breakage detection)
- Super MAC II function (Automatic centering function)
- High column, 130 / 200mm ●Additional axis control (1-axis / 2-axis)
- Automatic side door ●Weekly timer and automatic program start function
- Maintenance kit ●Additional M code ●Tool tightening stand

HC-548

Machine width / 1,580mm Length / 2,070mm



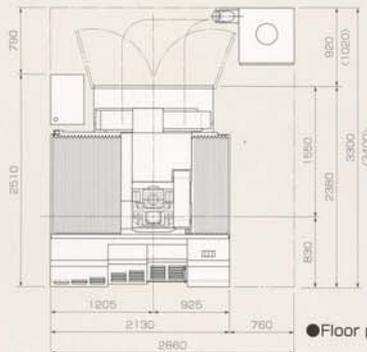
Floor plan



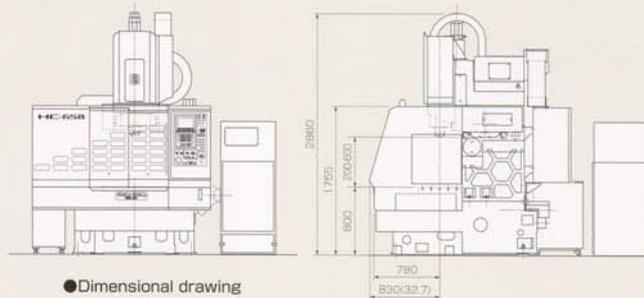
Dimensional drawing

HC-658

Machine width / 2,130mm Length / 2,380mm



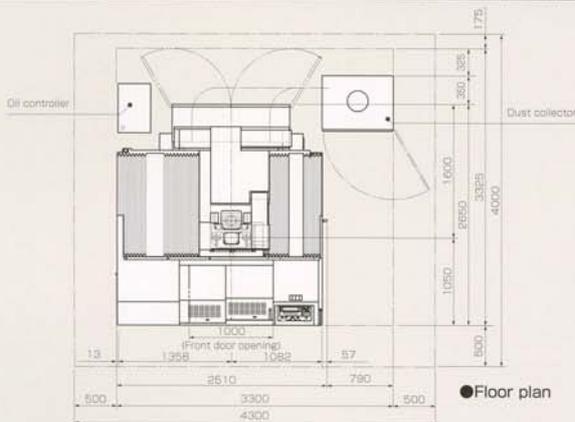
Floor plan



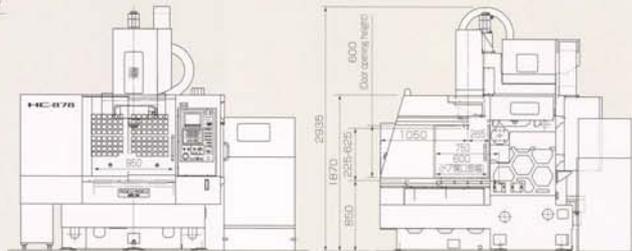
Dimensional drawing

HC-878

Machine width / 2,510mm Length / 2,650mm



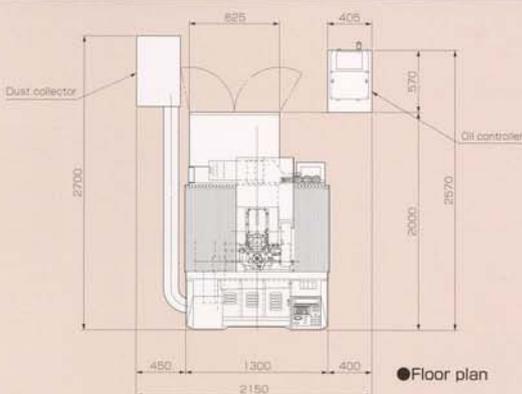
Floor plan



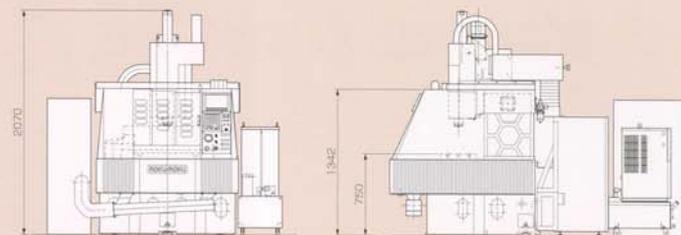
Dimensional drawing

HC-435

Machine width / 1,300mm Length / 2,000mm



Floor plan



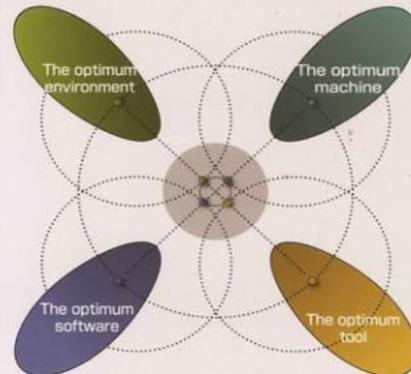
Dimensional drawing

* This drawing includes some options. * Ask Roku-Roku sales staff for details of machine specifications.

Proposal for implementing High-Precision Micro Fine machining, "Integrated Four"

In the high precision micro fine machining applications, its requirement is getting tight day by day, and high value addition field is growing rapidly. Such higher level micro fine machining cannot be achieved just by machine itself, and ROKU-ROKU is proposing the "Integrated Four" concept to customers. The "Four" addresses following four factors, and it is required to maintain them with balance for drawing the maximum machine performance.

- ① The optimum machine : ROKU-ROKU High precision Micro Fine Machine
- ② The optimum software : CAD/CAM software suited for the machining
- ③ The optimum tool : Tools suited for the machining
- ④ The optimum environment : Stably controlled temperature



High precision assembly factory with complete temperature control *Area23*

The Area 23 at Roku-Roku Shizuoka factory is the "Artisan's Workshop" implementing "the optimum environment" in the Integrated-Four concept. By complete heat isolation and precise temperature control throughout the four seasons, its room temperature is controlled at 23 +/-0.5 degrees C. Its solid foundation eliminates external vibration to affect machines or precision instruments in the Workshop. The ROKU-ROKU Micro Fine Machines are built by Artisans in this Workshop.



Inheritance of assembly skills of Artisans

ROKU-ROKU devotes improvement of assembly skills and inheritance of skills to young generation. Besides National manufacturing skills License, various production skills, including the traditional hand scraping, are set as internal qualifications, and obtaining those Licenses or qualifications are encouraged.



Introduction of ROKU-ROKU Friends Association

The concept of ROKU-ROKU Friends Association is to insure that users and ROKU-ROKU join together to create new technical innovations for developing our industries, and to develop further relations and cooperation. It was established with a number of ROKU-ROKU users as promoters. Major activities include ; issuing bulletins, holding maintenance training session by separating MC group and PWB group, holding machining know-how seminars by instructors from third parties, a general meeting once a year followed by a special lecture by a well-known person in various fields and a party, and study tours for overseas. As of summer 2008, there are more than 280 members joined this Association. The ROKU-ROKU Friends Association, consists of users and a maker, has been attracting attention as an unique approach in the industry today.



Maintenance training session at Shizuoka factory



グラファイト材を、時には 高硬度焼入れ鋼材を
いかに高速で滑らかに、そして高品位に加工するか？
確かな階段を踏み重ねた専用設計
機械と制御のダイナミック・バランス・テクノロジーで今
高速加工の概念を変革する [HC-658 II]

Here is how to mill graphite, or sometimes high hardness hardened steel,
with high-speed and high-quality.
Exclusive design which accumulated proven track records.
With the dynamic balance technologies of machine and control,
the concept of high-speed machining is evolved now [HC-658 II]

高速高精度三次元加工機

HC II

High-Speed High-Precision Multi-Purpose Machining Center

- 輪郭制御10モード*1を新開発
最適な加工品質と生産性の両立を目指し、加工モード
を10段階に切り替え制御可能
軸移動中の加減速を最適化し、滑らか且つ高速な輪郭
加工を実現（加工時間 約30%短縮*2）
- 従来実績「Super PC III」のバージョンアップを実施
高速加工モードでの加工時間を従来より約20%短縮*2
- ナット冷却ボールネジ（X軸）の採用で、長時間加工
での更なる精度安定を実現

*1: 10段階で加工モードを選択可能な機能（op）

*2: 弊社指定条件の場合

- The contour control 10-mode*1 was newly developed.
With optimized accel / decel control, smooth and high-speed contour machining
is achieved with 30% cycle time reduction*2.

- SUPER PC III has been improved.
The machining time for High-speed mode is shortened about 20%*2

- Further accuracy stability in long machining time is realized by the oil cooled ball screw nut (X-axis).

*1: The function for selecting machining mode in ten steps (option).

*2: Under the conditions set by Roku-Roku.



写真は一部特別付属品を含みます
The photo contains some optional accessories

HC-658 II SPECIFICATION

軸移動量 (X・Y・Z)	Axis travel (X・Y・Z)	● 600・500・400 mm	● 23.6・19.7・15.7 inch
主軸端形式	Spindle taper	● 1/10 ショートテーパ 2面拘束	● 1/10 short taper 2-plane constraint
ツールシャンク形式	Tool shank type	● HSK-E40	● HSK-E40
主軸回転速度	Spindle speed	● 200 ~ 32,000 min ⁻¹	● 200 ~ 32,000 min ⁻¹
A T C 工具収容本数	Tool storage capacity	● 12本 (30・60本)	● 12 tools (30・60tools)
機械質量	Machine weight	● 5,500 kg	● 5,500 kg

標準仕様

本体仕様 (mm)	NC仕様	ROKU-ROKU SYSTEM α-3
移動量 X・Y・Z	制御軸数	3軸
テーブル上面から主軸端面までの距離	最小設定単位	0.0001 mm (0.1 μm)
テーブル作業面の大きさ (左右 x 前後)	送り速度オーバーライド	0 ~ 200 % (10 % 毎)
最大積載質量	プログラム記憶容量	64 kByte (1-ザ-17 30 kByte)
テーブル上面の形状	登録プログラム個数	63 個
主軸回転速度 (電動機)	工具補正個数	32 個
主軸端形式	オプションブロックスキップ	
早送り速度	ミラーイメージ	X・Y軸 M71・M72 / M70
切削送り速度 (通常モード)	固定サイクル	G73 ~ G89
(Super PCIIIモード)	記憶形ピッチ誤差補正	
ATC方式	バックラッシュ補正	早送り・切削送り別
ツールシャンク形式	アラーム履歴表示	25 個
工具収納本数	工具長測定	
工具最大径 (隣接時 / 非隣接時)	10.4インチLCD	カラー
工具最大長さ	拡張プログラム編集	
工具最大質量	プログラマブルデータ入力	G10
電源	メインプログラム / サブプログラム	10 重
空気圧源	早送りベル形加減速	
機械の高さ		
所要床面の大きさ (幅 x 奥行)		
機械質量		

機械系標準付属品

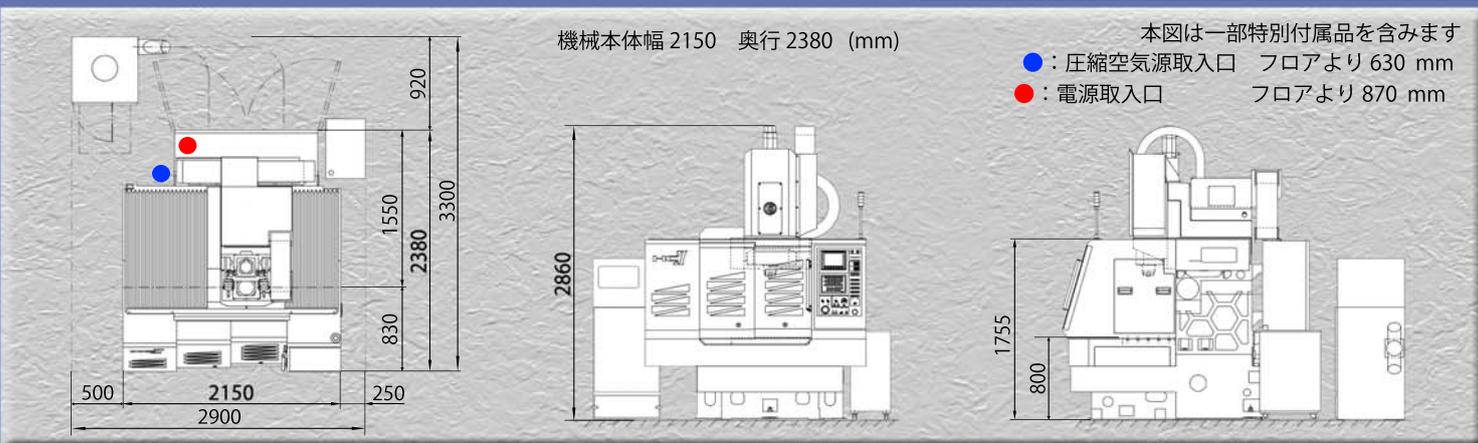
超高精度主軸オイルコントローラ	±0.1°C制御	集塵機 (1.5 kW)	全閉カバー 及び 背面排気式
マシンランプ	1灯目	主軸エアページ 及び エアスルー	

特別付属品仕様

本体仕様 ●は推奨品	*B-KIT	NC仕様
●B-KIT *詳細右記	●マシンランプ (2灯目)	●輪郭制御10モード
●リニアスケール (X・Y・Z)	●タワ式ノットライト (2連:黄/赤)	●データサーバフラッシュATA仕様 2・4 GB
●非接触式高設定及び径測定機能	●漏電ブレーカ	●ヘリカル補間
●ATC本数 30・60本	●自動電源遮断装置	●プログラム記憶容量 128・256・512 KB、1・2・4・8 MB
●Super MAC II 機能	●エアガン	●登録プログラム個数拡張 1・2
●自動計測機能 (Super MAC II 機能への付加仕様)	●テーブル上面キサゲ模様	●工具補正個数追加合計 64・99・200・400 個
●スーパーJカット機能	●稼動時間・部品数表示	●カスタムマクロ
●セミドライ加工システム	●バックグラウンド編集	●カスタムマクロコモン変数追加
ノズル式セミドライクーラント・ミストコレクタ	●Super PCIII 機能	●自動コーナオーバーライド
簡易チップバケット・専用ノズル2本	AI輪郭制御II	●スケーリング
●V-KIT	高速プロセッシング	●任意角度面取り・コーナR
主軸ロードメータ・入出力インタフェース (RS-232C)	先読みブロック数拡張	●座標回転
集塵機の機械色塗装・エア元バルブ	3モード切替	●ワーク座標系組数追加 48・300 組
インチ/メトリック切替え・機械固定具	ナノスムージング	●工具寿命管理
●J-KIT	データサーバ2GB	
100V (1A) コンセント・集塵機の機械色塗装		
●リジッドタイプ機能		
●高出力主軸 (最高回転速度 30,000min ⁻¹ (15.0 kW))		
●主軸熱変位補正機能		

設置環境調査

室温・湿度・外部振動等の適正調査を実施し、必要に応じて改善提案を行います



碌々産業株式会社



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