

Quarterly 2009 VOLUME 1 ISSUE 4

The **CHALLENGER**

Global quality and service system of metal working industry

It must be Microcut!



Microcut *Into A New Era of High Speed*



Spin the World



Posa Machinery Company -
always on your side.



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Index

Taichung Park Since 1903

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From the publisher 2

- Fight Back Against A Tough Economy

About Microcut 3

-Newsroom

Global outlook 6

-Taichung County, The hometown of Taiwan Machine Industry

Distribution 8

- "Precise Machinery for Heavy-duty work"

Customer-FAMA

- YILMAZ REDUKTOR - the leader company for gearbox manufacturing in Turkey

Products 13

- Microcut Challenger Vertical Machining Center

R&D Zone 16

- Development in Thermal Growth Measurement of Intergraded Spindle

Application 19

- Quick Production

Key component 21

- Travelling Steady For Turning Machine

FAQ 23

- Trouble shooting

Event 27

- RIMA OPEN HOUSE

From the publisher

Fight Back Against A Tough Economy



After the global financial crisis in late 2008, the aftershocks still come with bankruptcies and belt-tightening or even shut down of some companies. Taking the upcoming EMO exhibition for example, some companies cancel their exhibiting to cut their expenses. But we believe, even under the most turbulence time, chances will still remain.

Even our benefit is close to zero, Microcut still believe and do our best to support our distributors for any selling opportunity. Therefore, we will still present our latest products in EMO, exhibiting our quality and sustained development, showing our strong vitality and the spirit of our brand.

In the latest two quarters of 2009, we have witnessed some international renowned manufacturers closed out their stocks at astonishing discount. As a manufacturer in this field, we don't think they can benefit much from these severe price cuttings. This is a battle of price. Meanwhile, some leasing companies have deteriorated the market by dumping some second-handed machinery with extremely low price.

To support our distributors, however, we have sold our products below its production cost in some cases. This is a miserable ordeal and leaves little room of benefit for all the distributors in the market. However, we have no choice but to pray for the

end of economic turmoil and the revival of the market.

Definitely, we have found the fast rebound in the emerging countries while the West still looks weak and grows slowly. As mentioned above, unfortunately, the market suffered steep price war from dumping competition.

At this time, an advanced conception of product, progressive marketing activities and full-understanding of market demand is the key to success. We hope all our distributors redouble your efforts to create growing sales.

A handwritten signature in black ink, appearing to read 'Paul Chang'.

Paul Chang
Sept. 2009



To ensure the highest customers' satisfaction, Microcut offers reliable quality products, efficient service, experienced response and innovated research & development. To continue our growth, we believe that it is essential for quality management in every department. Also we focus on our customers throughout the world and integrate them into our service system.

Quality system

Sales Dept.



Microcut sales strength lies in the perfect combination between product quality and selling expertise. Working closely with world-class distributor is the key to achieving our goal. Microcut's strong sales department works with spirits of efficiency and reliability.

Any inquiry will be answered within 24 hours. The sales are responsible for their customers and the manager (Sabina Chen) and leader of sales dept. (Sarah Chen) are in charge of central coordination. Distributors can reach any of them any time. Our products are promoted by sound distributors specially and appropriately pinpoint products best suited to individual customer request.

Global market information interchange with our distributors brings us the latest market demand and R&D innovation. We participate in regular international exhibitions – TIMTOS, EMO, BIMU, and support regional national exhibitions with machine presentations to work with distributors in creating higher market share.

To support sales function, Microcut established the marketing department, utilizing marketing techniques such as



advertising, sales promotion, magazine publication, and website exposure. Also working with distributors, the annual sales forecasts are made around the end of year, and quarterly ordering plans are discussed during the year. The sales department always works with our partners toward sustained efficiency, reliability and customer satisfaction.

Production Dept.

As the market environment shifts towards multi-items, small-lot production, or even variable-item, variable-lot production, Microcut has improved manufacturing methods to tackle the challenges of fast delivery and high quality. We utilized ERP(Enterprise Resource Planning) system in manufacturing by managing bills of material, capacity, workflow management, quality control, cost management, manufacturing process, manufacturing projects, manufacturing flow management, inventory, purchasing, product configurator,





supply chain planning, supplier scheduling and inspection of goods.

In the pursuit of high-precision and quality control, Microcut production department has conducted continuous professional training and implementation of SOP (Standard operation procedure) to standardize the assembly system. Microcut has improved production efficiency by carrying out a series of process of

producing, powder coating, and assembling in our own factories. For finished products, we conduct a detailed machining test to check the accuracy by laser, ballbar, noise, vibration and time of machining based on our original machining program.

In 2009, Buffalo No.8 Plant will be built specially to manufacture large-size CNC borer, CNC lathe, machining center and 5-axis vertical machining center. With 10,000 M² area, the mass-production capacity in the newly built plant will contribute to our productivity.

R&D Dept.

Technological innovations have been a driving force in the evolution of Microcut R&D department. By deriving the basic need from market perspective, we transform them into the best design concept, and deliver these to the customers in the form of high performance, high quality products.

To meet the increase requirement for integrated machining, multi-axis machining and simultaneous 5-axis machining, Microcut R&D department are promoting digital design using 3D for all new design development to reduce the number of test machines and their development times. We are now able to offer the optimum design technology, programmed paths and know-how for test machining on whole range and all multi-axis machines.

In order to increase quality, R&D department focus on constant internal



and external training of personnel to improve the skill & knowledge. The various classes include structural analysis of ANSYS Multiphysics, Inventor software of digital prototyping (CAD) and CAM system.



Management Dept.



The Quality stands at the center of a system designed to provide integrated quality control in all departments, from development and manufacturing to sales, service, purchasing and even administration and management. This is not just in-house, either. After delivery and installation, we have Service team deals with inquiries from customers all at once. Our skilled technicians can solve problems quickly,

or arrange for swift repairs and parts and repair machines as quickly as possible.

Seeking to improve the skills and knowledge of our employees, we provide employee education on a continual basis, except skills training, service engineer, Internal tutor training, we also got long-term training program supported by the government.

No matter how far technology may



evolve, the clients' number one concern is still quality and reliability.

Our management department developed our quality policy based on the ISO standard (ISO 9001:2008, ISO 14001:2004). All CE listed electrics components, safety protection, and PLC logical are all used on Microcut products.



ISO 14001:2004
EMS 546518



ISO 9001:2008
FM 538421

Microcut Powder Coating Plant

To strengthen our sheet metal machining, powder coating and liquid painting quality, Microcut coating plant performed the whole sequence of high quality coating by semi-automatic production line operation.

Utilizing advanced and environmental friendly equipment, we comply with ISO certification standard and provide best quality for our customers.

Our technical coating team members all with highly skills. Those skilled technicians with complete training and skill-certificate cater to the most diverse needs, tailor-making for customers' high quality requirement. Microcut introduced the Italian nova VERTA spray booth and Switzerland ITW Gema's powder electrostatic spray guns and USA GRACO high efficient fluid spray system with air spray gun for high quality finishing and productivity.



Spray booth

- **WALLS**, thickness 40 mm, in white/white galvanized sheet panels with polyurethane material in between.
- **INSULATED FILTERING PLENUM** wide 3200 mm and having the same length of the spray booth.
- **HEAT EXCHANGER** in stainless steel to raise the quality and efficiency of the product.
- **EACH SPRAYBOOTH** includes 2.5m OF GALVANIZED SMOKE CHIMNEY AND CAP
- **BY-PASS** which opens automatically
- **AUTOMATIC CONTROL PANEL** for improvement of productivity and product quality.



Taichung County- The hometown of Taiwan Machine Industry

Taichung County is situated in central Taiwan. To the east, with Central Mountains in between, is Hualien County. Taichung County is the third largest county in Taiwan. It has a population of around 1.55 million. Geographical terrain consists of four landforms- the western coastal plain, the western plateau, the Taichung Basin, and the hills. With moderate climate all year round, the natural environment has drawn people to set up their roots in the area. The rich cultural environment and the flourishing natural resources have made the county an ideal place to live. The geographical location and abundant resources provide the advantage of industrial development in Taichung County.

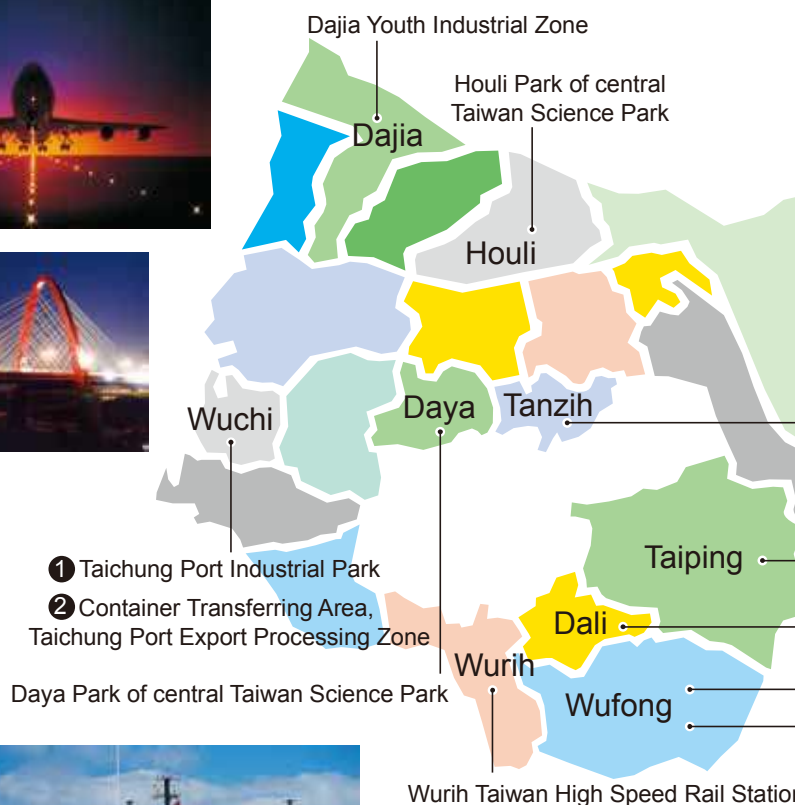
Taichung County has a sophisticated land, sea and air transportation system starting from its fully-equipped international port and a well-connected road system linking the central Taiwan

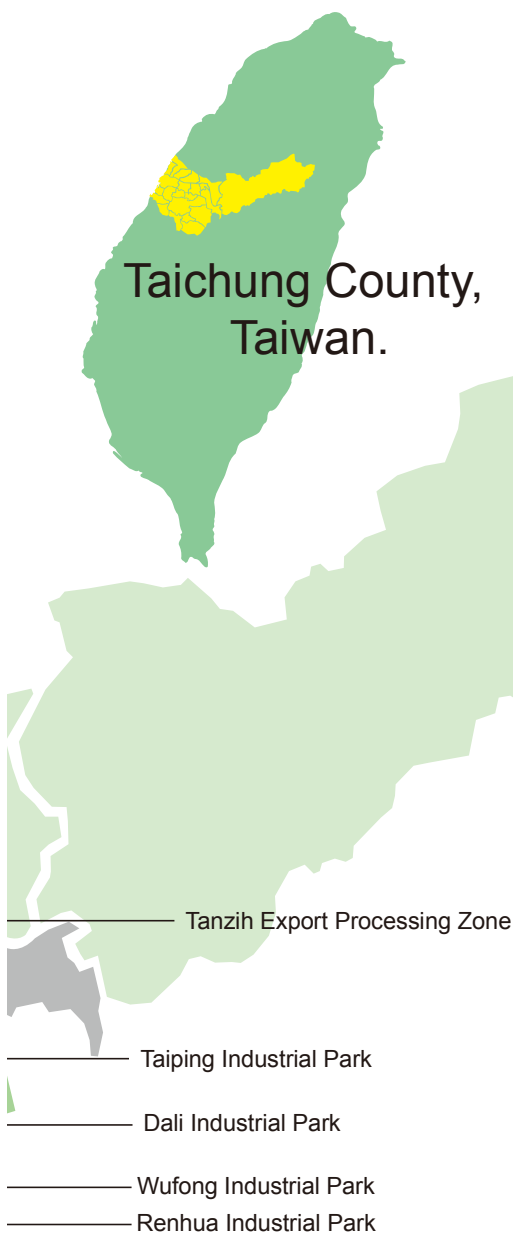


Science Park, Taiwan High Speed Rail and international airport.

It is also the second largest industrial county in Taiwan, including 3,652 precision machinery, machine equipment manufacturers. Especially, 90% of the metal working machine buildings can be found in this county. With the rich historical traditions and greatest advantage for industrial development, Taichung County is a stronghold of Taiwan's traditional industries.

With industrial revenue ranking





fourth overall in Taiwan, Taichung County has well developed industries, such as machinery, machinery tools, plastics, metal products, and bicycles. Besides, wood-working machinery manufacturers account for over 80% of the total number in Taiwan. Moreover, there are also 538 machine tool producers, placing Taichung County top five worldwide.



The 12,656 registered factories, led by machinery equipment manufacturers and metal product manufacturers, followed by plastics manufacturers. The establishment of the Daya Park and the Houli Park of Central Taiwan Science Park have brought numerous high-tech industries to invest in Taichung County. The goals of Central Taiwan Science Park are to balance living, ecology, and manufacturing.



Industrial Parks Introduction in Taichung County

Industrial Zones	Year of establishment	Industry type	Area (Hectares)
Daya Park Central Taiwan Science Park	2003	Nanotechnology	413
Houli Park Central Taiwan Science Park	2004	High-Tech Industrial Park	250
Tanzih Export Processing Zone	1972	Comprehensive	26
Taichung Port Industrial Park	1973	Comprehensive	143
Taiping Industrial Park	1990	Comprehensive	21
Dali Industrial Park	1991	Comprehensive	77
Container Transferring Area Taichung Port Exprocessing Zone	1998	Comprehensive	177
Wufong Industrial Park	2003	Comprehensive	20
Renhua Industrial Park	2000	Comprehensive	30
Dajia Youth Industrial Zone	1981	Newly Created Small & Medium Enterprises	219



Distribution



"Precise Machinery for Heavy-duty work"-FAMA



Lubomir Ondercin, CEO



Boris Ondercin, Director of Business Development



Lubos Ondercin, Director of Operations

FAMA has a long history on the Mexican market: Established as a subsidiary of TOS in 1964, it was one of the first companies to import European machine tools to Mexico. In the 1970s and 80s, it assembled conventional lathes and milling machines under the license from TOS. During those years, the company sold over 30,000 machines, making TOS the most successful machine tool brand on the Mexican market. FAMA became renown as the supplier of "Precise machinery for heavy-duty work", which later became its slogan. In the 1990s, the current owner Lubomir Ondercin

has acquired FAMA and restructured the company, slashing the unprofitable assembly of machines, focusing on sales and after-sales service, streamlining the operations and opening offices and sales presence in all major cities, including Mexico City, Monterrey, Querétaro and Puebla.

The second phase of growth came in the last five years when FAMA started working with Taiwanese machine tools suppliers. One of the most important suppliers is Buffalo. Buffalo's high quality, heavy duty machines fit perfectly in FAMA's product portfolio. **"Buffalo has perfect**

machine tools for Mexican market: Its BNC flat bed lathes are the best on the market. Compared to the competitors, the BNC lathes stand out for its heavy construction, extra wide carriage, very good accessory package at competitive prices. The MM-430s and MM-400s are also very popular and beat the competitors in its class hands down. The BNC oil field lathes are also very attractive offering for our customers." as stated by Boris Ondercin, Director of Business Development.



Mr. Lubomir Ondercin and Paul Chang



In FAMA exhibit area, you can see the equipment and conduct machining demos to help the customers make an informed decision before buying.

Buffalo has great potential for growth in Mexico. Prior to the recession, the CNC market in Mexico was growing at 25-30% annually, albeit from relatively low base, as the conventional machines are still predominant on the Mexican market. However a lot of customers are now switching from conventional machines to CNC machines. **"Buffalo machines with Fagor control have been particularly successful, because of the ease of use. Our technicians can train first time CNC users much faster than with any other control leading to high client satisfaction and lower training costs for FAMA."** said Lubomir Ondercin, CEO.

This year, the machine tools market

in Mexico is 30-40% down compared to last year (based on Mexico's customs data). However, this has not stopped FAMA from improving. "This year, we are actually quite happy. Last year's growth of 40% was almost unsustainable due to heavy burden on cash flow and operations. This year our sales are flat, which gave us an opportunity to stabilize the cash flow and invest more time and resources into training and hiring personnel. However, putting things into perspective, we are still outperforming the competitors by 30%, which is not so bad. We expect to resume growth later this year and next year, as there seems to be more activity on the market." stated Boris Ondercin.

Providing financing has also contributed to FAMA's growth. Because equipment financing is hard to obtain and the bank approval process takes 4-6 months, FAMA has been supporting their customers by offering direct financing. FAMA's customers can nowadays buy Buffalo machines with 30% deposit and up to 24 months "Interest free" financing. If the customer has a sound business plan and prior track record, he can have Buffalo machine installed and running in less than a week.

FAMA is very meticulous about tracking customer information to deliver superior service. Last year, FAMA launched a new online version of CRM system, which is used by all the

field sales people. Additionally, FAMA's customer support service, pre-qualifies all the leads, so that when the sales person actually visits the client, he'll already have a solution tailored to the customer need. The customer support also tracks the service tickets in the CRM, so FAMA now has very good data about the performance of the service department. This allows not only documenting the solutions to technical problems, but also measuring the speed and quality of problem resolution: "Through our CRM system we have very good visibility of the technical problems and our response times. Through post-service surveys we also track the customer satisfaction. We are very happy with Buffalo, for the machines are very reliable, keeping our support costs down. Also in cases we required Buffalo's tech support, they have been very quick to respond with detailed and precise information that help us resolve customer problems very quickly." – commented Lubos

Ondercin, Director of Operations.

The high quality products combined with constant strive to deliver superior customer satisfaction have enabled FAMA to continue outperforming its competitors. "We constantly look for opportunities to deliver better products, better service and reduce the cost of ownership for our customers. Buffalo has been our critical partner in

achieving this goal." said Boris Ondercin.



Customer support team of FAMA



Mr. Lubomir Ondercin, CEO and Mr. Boris Ondercin, Director of Business Development





YILMAZ REDUKTOR, the largest gearbox manufacturer in Turkey and the Middle East zone, was founded in 1958 by **Mesut Yilmaz**. The company concentrated on gearbox manufacturing since 1963 and by then became an expert for serial, standard and economical high quality gearboxes.

Until 1986, the gearboxes were manufactured in a small 1,000 m² factory in Istanbul (Turkey), which serves today as Yilmaz worldwide headquarters. To accommodate extremely high growth, YILMAZ REDUKTOR established the largest gearbox factory in Turkey with modern facilities of over 30,000 m² in 1986.

In its 30,000 m² production facility, high technological equipment including CNC machining and transfer lines leads the sector and dominates with the continuous improvements and product range, increasing its reputation in Europe and the rest of the globe market.

The products YILMAZ REDUKTOR supplies are running in many different industries, also in heavy industries with

high reliability. Exporting to countries in Europe, America, Middle East and Africa. YILMAZ REDUKTOR offers its products via business partners in Turkey and abroad, providing also the before and after sales support.

YILMAZ REDUKTOR has bought the first two the Challenger HBM-4 machines in 2006 and the next 2 machines in 2007. With the machines Yilmaz first procured some moulds of their gearboxes for their foundry. Using the latest technologies for CNC Machining and transfer lines, YILMAZ REDUKTOR produces low vibrating, silent and efficient gearboxes.

They implemented a second rotary table system on the machine rotary table to increase production and shorten setup times. **Their all production of Mono block Horizontal Type. Gear boxes are on the Challenger HBM-4 machines now.**

Mr. Mustafa Yilmaz, board of YILMAZ REDUKTOR, who is responsible for the production said that at decision time he hesitated to buy a Taiwanese Machine, but now he is very satisfied with the output. "The Challenger HBM-4



machines have been able to refine the machining process and significantly improved the cycle time and output," he said.



Using the latest technologies for CNC Machining and transfer lines, YILMAZ REDUKTOR produces low vibrating, silent and efficient gearboxes.



Products

Microcut Challenger Vertical Machining Center

F-Line

Vertical
Machining
Center



RH



MM-400



MM-430



MM-800



MM-1000

Box way 40 taper

Vertical
Machining
Center



VM-1000/40



VMC-1100/40



VMC-1300/40



VMC-1600F/40



VMC-1600/40

Box way 50 taper

Vertical
Machining
Center



VMC-1100/50



VMC-1300/50



VMC-1600F/50



VMC-1600/50

5-Axis

Vertical
Machining
Center



MCG-5X

HSM

Vertical
Machining
Center



V-20



V-26



V-30

Travel column

Vertical
Machining
Center



TC-1850



TC-2100



TC-3200



TC-4200



TC-5200

Gantry

Vertical
Machining
Center



TT-40

Large

Vertical
Machining
Center



VMC-2100



VMC-3100

HBM

T-type

Milling Machine



HBM-5T



HBM-5TE

HBM

Table-type

Milling Machine



HBM-4

Whatever your requirements, there is a Microcut / Challenger's VMC to meet your demand. Travel range from 450x400x400mm (17.7x15.7x15.7") (xyz) mini MM-400 up to 5200x850x850mm (205x33.5x33.5") (xyz) the massive travel column TC-5200 covers various working capacities in between. The various capacities of Microcut Challenger VMC are with many configurations available, including ISO40 taper, ISO50 taper, geared-head, direct-driving, built-in spindle, mold making machines, 5-axis simultaneous machining and more. Inside this article, you will find all the latest technological advancements and features on Microcut / Challenger's VMC.

Rigid construction

Meehanite licensed castings with dynamically stress released treatment are used for all machine construction components. Inside the castings, there are internal reinforce with heavy ribs (see Fig. 1) to resist flex and damp vibrations, and each casting is thoroughly inspected before and after machining to ensure it is free of flaws. All structural components are optimized using finite element analysis to ensure the most rigid design.



Fig. 1 Casting with heavy ribs (sample from model V26)

Durable box-guide ways and Fast traverse Linear guide ways

Wide column and base with vibration-absorbing ribs offer superior rigidity for cutting areas. On the box-way types, wide guideways (see Fig. 2) with Turcite B applied to decrease friction on bearing surfaces.

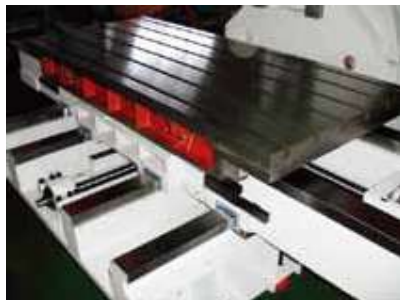
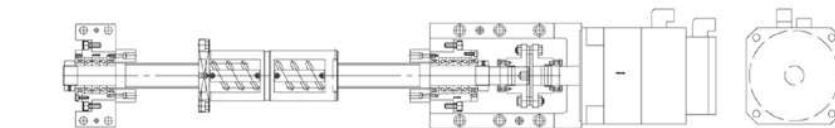


Fig. 2 Box way guide ways

On the Linear-way types, ball guideways used for the MM series and Roller guideways (see Fig. 3) used on the V series. These guideways are preloaded to reach zero clearance, and provide full load-carrying capacity in all directions. Each guideway is automatically lubricated to guarantee long life. Different design of guideways are used for different applications. The box guideways offers durable loading capacity for heavy cutting and the linear guideways have



a very low coefficient of friction, which allows faster movement without any sacrifice of repeatability or positioning accuracy. Microcut / Challenger produces both Box-way type and Linear-type VMC.



Fig. 3 Roller linear guideways



High precision ballscrews

C3 class ballscrews with double nut (Fig. 4) are applied on X/Y/Z axes which offer high axis accuracy and less deforming under axial force. All the ballscrew nuts are preloaded to ensure less tension deforming. Ballscrews are anchored at both ends and inspected to meet 100% parallelism to the axis guides. Except the V series HSM, the ballscrews fitted are pre-tensioned and chilled (shown as Fig. 5). On the V series HSM, hollow-shaft ballscrews with coolant through ballscrews are applied for retaining ballscrew temperature to ensure axis accuracy.

Fig. 4 ballscrews with double nut



Fig. 5 ballscrew pretension

Powerful AC servo motor driving on spindle

Pre-loaded angular contact bearings are used throughout the spindle provides high axial thrust capability. Spindle air purge is designed to prevent coolant contamination to ensure long life. Moreover, cartridge designed spindle (Fig. 6) is easy for maintenance by allowing quick change of the entire spindle.

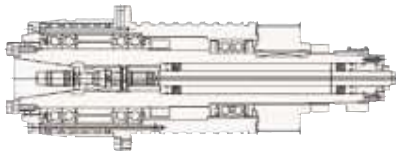


Fig. 6 cartridge designed spindle

Various selections of spindles

Four types of spindles are available for different of models for various applications.

Well-designed spindle head temperature control

The oil cooling system shown on Fig. 7 red lines provides spindle head stay at constant temperature and ensure spindle accuracy permanently and extends service life of spindle. The air purge shown Fig 7 blue lines on spindle to prevent high pressure air bringing small chips into spindle and damage the bearings.

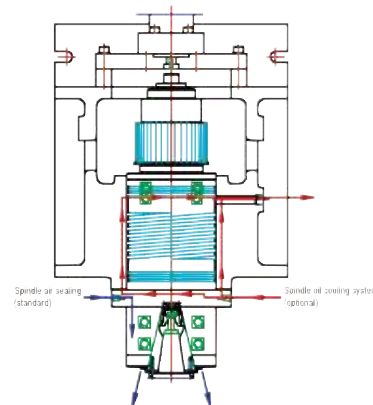


Fig. 7 Spindle cooling system

Automatic Tool Changer

Various designs of automatic tool changer and more tool capacity is always possible on request. On the VMC, TT, and V series machines, arm type tool changers (Fig. 8) controlled by precision cams are provided as standard. This rugged, dependable designed ATC offer fast tool changing time to reduce cycle time. On the MCV and VM series, the arm type ATC is provided which offers big capability of tool stations of 16, 24, and 32 tools. On the MM series, a carousel type tool changer is an economical choice for cost consideration. On the 5-axis gantry VMC, a pick-up design ATC (Fig. 9) offers massive tool stations up to 96 tools.

Spindle type	Belt-Drive	Gear-Drive	Inline Drive	Built-in Drive
Image				
Advantage	The spindle is driven by the motor via belt. It provides a good combination of torque and rpm for a wide selection of machining operations.	A gear box is fit between motor and spindle. It Increases low-end torque for heavy cutting.	The spindle is coupled directly to the motor and driven directly. This provides smooth operation for excellent surface finishes and reduces operating heat.	The spindle is built between the rotor and stator of the spindle motor to create high speed rpm up to 30000rpm or more. This supplies fast speed for perfect finishing on hard material.
Application	General machining, heavy duty cutting. Standard on ISO40 taper spindle.	Heavy cutting and heavy loading. Standard on ISO50 taper spindle.	High speed machining, Die & Mold	Steel mold machining, aero space, medical industry, 5-axis machining
Models	RH, MM, VM, MCV, VMC	VMC	TT, V, VMC, TC, MCG	V, MCG



Fig. 8 Cam type ATC



Fig. 9 Pick-up ATC

Operator-orientation-designed guarding

Machine guarding is fully enclosure with top full covered and safety circuit-controlled interlock. To make machine color lasted long guarding is power coated. Powder material is computerized mixed up to ensure each lot of powder is at the same color, so the color of each shipment is dential. Machine guarding is designed totally from the need of operators for easy operation, including below advantages:

- (1) Safety protection of bright windows with polycarbonate and safety glass
- (2) Built-in sliding way for front door to keep clean environment
- (3) Removable side doors for long piece
- (4) Large outlet for chip and coolant for efficient chip removal

Efficient Chip Removal

CNC machines make parts faster, it is also important not taking time waste on removing chips. The guarding design is with no hidden areas and easy for chip flows, especially while assistant with rear wash down system or top wash down system (on request).

Chip drawers as standard on economic models for cost-conscious shops. Yet, the coolant tank is designed to be ready for fitting the chip auger or chip conveyor. Chip augers and chip conveyor are available for selection without extra modification even after machines are installed. On the V series, TT series, TC series, and MCG series, the chip conveyor is already included in standard configuration since those models are for high removing rate – produce big volume of chips.

20 bar or 70 bar high pressure coolant through spindle

Through-spindle coolant supplies coolant through the tool, directly to the cutting edge. This will increase tool life, allow higher cutting speeds, and clearing chips during deep-hole drilling and blind-pocket milling.

Safety is the first priority - all machines are produced according to CE regulations

Machines are produced according to CE regulations, such as CE licensed electrics components, electric diagrams, safety protection, and PLC logical to meet CE regulations. Inside the electric cabinet, control circuit voltage is 24Vac. On the switchboard, power cable and signal cables are separately isolated. Machine is well ground wired. The machine is fully designed according to CE regulations, CE Declaration of Conformity is provided for each machine.

High performance and convenient programming system

Machine is available to fit various controllers – FANUC, FAGOR, MITSUBISHI, SIEMENS or HEIDENHAIN. Most controllers are provided conversational programming system that uses a graphical interface and soft keys on screen to create simple G-code programs.

On the high speed machining and multi-axis machining, the latest high end controller are used, i.e. Heidenhain ITNC530, SIEMENS 840DE (840 SL), FANUC 18i or 31i or FAGOR 8070XP series. With those controllers, bigger memory, faster processing time and more look ahead blocks, etc. are supplied as standard configuration of machine functions. Moreover, Ethernet and USB are supplied for easy data transfer.

High-Speed Machining and Multi-Axis Machining

High speed machining is Microcut / Challenger's development direction on VMC. High speed spindle, large power spindle motor, fast processing speed CNC unit, and rigid machine construction are essential factors for high speed machining. The Microcut / Challenger's VMCs are designed with these conditions and more modern technological developments on thermal compensation on spindle and axes, spindle vibration detection and compensation. Those will bring more benefits to customers.

Development in Thermal Growth Measurement

Chang, Ching- Feng, Chen, Jin-Jia, Chen, Tsair-Rong



Abstract

The use of a second displacement measurement meter as a compensatory device greatly increases accuracy, which matches a laser inspection report. However, despite being much more accurate than the traditional thermal coupler design, when the displacement measurement meter is applied, the non-flat surface of motion and fluctuating measurement distance create a certain percentage of error. Moreover, a differential amplifier greatly enhances the linear output voltage that is fed back to the CPU, which provides a highly sensitive level of compensation. The application reduces the compensated error by 6% down to 2%, which is based on a single displacement measurement meter application. This will greatly improve machine quality and its overall cutting performance.

I. Introduction

1.1 Background

Spindle is the heart of machine tools, especially in the field of high-speed machining (HSM) technology, which has been broadly used in a range of applications. Rigid designs combined with spindles capable of delivering high torque value at high spindle speeds enables occurrence on the same machine in one setup. Also, repair time and cost are important issues that need to be considered. To achieve all these targets, a compact intergraded spindle is the best choice.

As the high spindle speed and torque are within a compact design, remaining within a limited temperature increase can be accepted, and to develop one more effective spindle at low heat increase is one of the biggest challenges. The thermal growth reaction is one of the most important factors to be considered in HSM

1.2 Thermo coupler

PT-100 has been used traditionally and it gives good feedback. Fig. 1 shows a thermo response of PT-100 with a linear output to set compensation value relative to PLC parameters. Normally, the thermo coupler is placed very close to the front bearing of the spindle, as shown in Fig. 2, which allows the temperature to be measured within less tolerance.

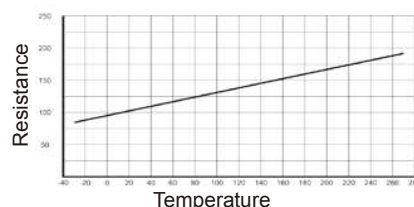


fig 1 PT-100 Thermo response

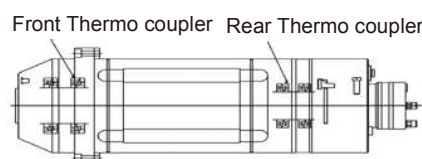


fig 2 Spindle with thremo coupler

But the limitation is the distance between the thermo coupler and the bearings, because of which heat is generated, and the timing delay of feedback owing to the thermo coupler's characteristic. Also, the compensation value is normally set under no load condition. Thus, the performance will never be a perfect one. Fig. 3 shows the difference between the spindle growth proved by laser unit and the measured value of thermo coupler.

Spindle growth v.s.PT-100 measured value

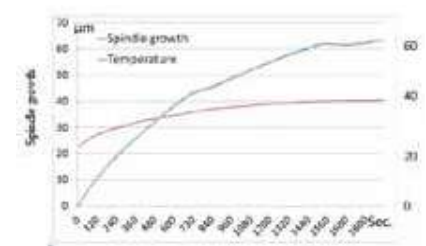


fig 3 Spindle growth vs PT-100 thermo measured value

1.3 Displacement measurement meter

Based on the law of Foucault current (eddy current) and Faraday current, a displacement measurement meter is found, see Fig. 4. It gives a much precise result of spindle thermal growth, without any timing delay and the output is perfectly linear as well. It is much better than PT-100 to set the compensation value of PLC parameter. The drawback is that the displacement measurement meter is very hard to be placed upright on the spindle surface. The feedback will be hard to be an exact linear output; in fact, it is an rms value. Fig. 5 shows a report from a laser test and its displacement measuring meter. Only when spindle warms up, both curves become closer.

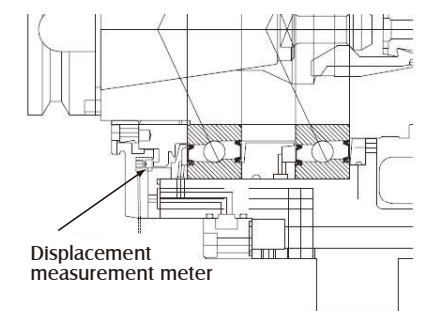


Fig 4 Spindle with a displacement meter

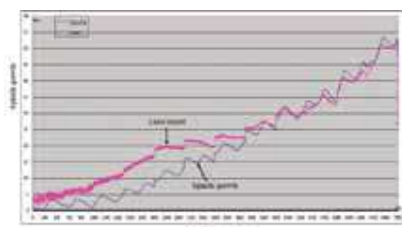


Fig 5 Spindle growth comparison of PT-100 vs laser report

II. An Advanced Measurement Model Development

2.1 Mechanical design

This new model consists of two pieces of measurement meters, which is placed in front of the spindle, one used as a reference and the other one used to measure from 3 to 5mm, depending on the room and the rigidity of the spindle end cover. Both meters should be fitted under very closed position and exactly same geometrical condition, upright to the spindle end, and all geometrical conditions should be as close as they can. And a differential amplifier is applied. Fig. 6 shows the sensors that have been placed on the bottom cover.

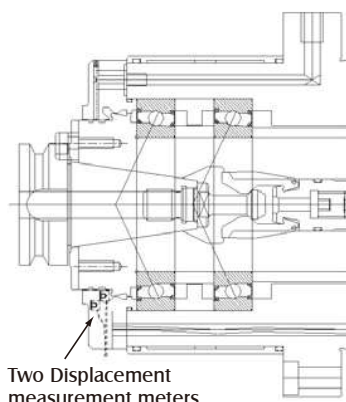


Fig 6 Double displacement measurement sensor

2.2 Logic concept

To obtain perfect performance of the cutting result, the compensation logic has been set to allow the spindle axis compensation every 1μm when the output voltage changes per ±0.02V, and the logic chart is shown in Fig. 7.

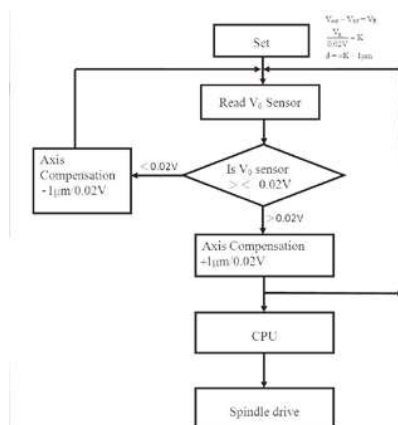


Fig 7 Logic chart

A differential amplifier is shown in Fig. 8, which meets the requirements of the above logic concept.

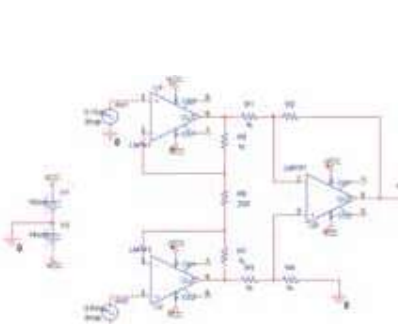


Fig 8 Differential amplifier diagram

where

Vin1 is the compensation (reference) displacement meter

Vin2 is the measuring displacement meter

R6 is a ratio resistor

R1, R3 are input circuit insulation resistors

R2 is the time control resistor.

And the equation is given as follows:

$$i = \frac{Vin_2 - Vin_1}{R_1} = \frac{Vdif}{R \cdot \sin \omega t} \dots (1)$$

where

ωt is the phase angle at time t .

The output of this measurement meter is shown in Fig. 9, which meets the requirements of compensation parameter, as it is linear.

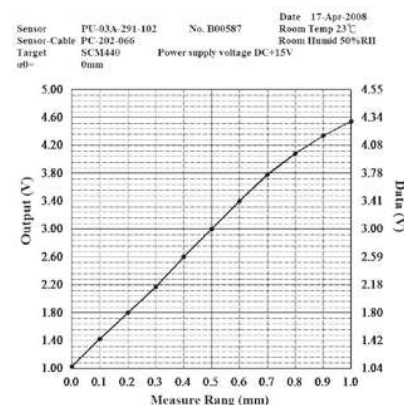


Fig 9 Output of displacement sensor

Fig. 10 shows the output responses, both current and voltage, the output response is stable, also highly precise and sensitive when it is fed back to the CPU for axis compensation.

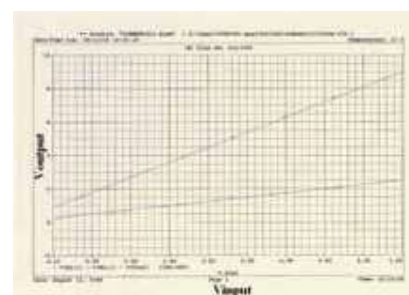


Fig 10 Simulation

Fig. 11 shows the output responses of both current and voltage. The output response is stable. The amplifier meets the requirement.

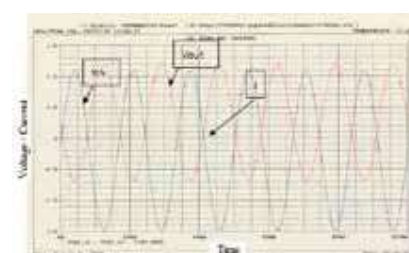


Fig 11 Voltage and current response

III. Experimental result

The testing is performed on a Challenger high-speed vertical machining center, which is equipped with a 24000rpm high-speed electronics intergraded spindle. A laser checking unit is placed on the surface of the working table, as shown in Fig. 12.



Fig.12 Laser measurement setup

A comparison of new design to the spindle equipped with only one displacement meter with the proposed new model is shown in Fig. 13. A report is also provided to approve the test results. This figure shows that there exists some discrepancy between the measure 1 (only single displacement meter used) and the laser curve, while the measure 2 with this new model is nearly matching the laser curve.

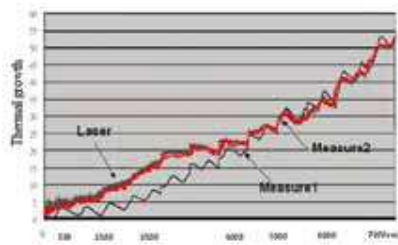


Fig.13 Comparison curve of lasers and two models

As a result of this, in comparing the difference in thermal growth error between two different models, it is clear from Fig. 14 that the new model gives only a maximum of 2% temperature error and the simple displacement meter will give error up to 6%. Consequently, the new model shows great improvement

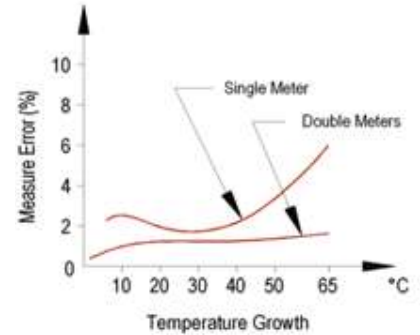
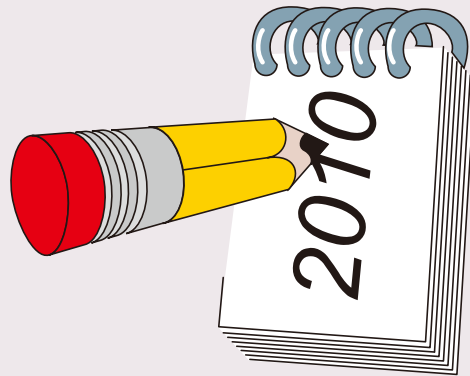


Fig 13 Measurement error comparison

IV. Conclusion

The proposed new model approved that the thermal error is three times better than in the old design. It will bring a big quality improvement in the accuracy performance of machine cutting. This will greatly improve machine equality and meet the requirements of HSM technology.



Welcome user's submission

of company profile, sharing Challengers' Products experience and pictures of people, products. Please send your story and pictures (images in high-resolution higher than 300 dpi) to your Challenger Factory Outlet. Only English version is acceptable.

An inventive example of how to use ShopTurn

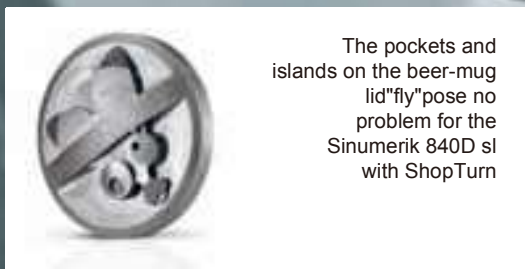
Quick Production

The machining systems offered by today's machine-tool manufacturers place high demands on the programming process. Using the lid of a beer mug as an example, we can demonstrate how convenient and easy it is to implement the necessary steps using the ShopTurn technology package.

> The procedure for manufacturing a lid to fit any standard beer mug is an ideal demonstration of the wealth of options available by the correct combination of CNC system and technology package. To make the machining process more interesting and provide a better illustration of the various work steps, the lid used in our example will feature a "flies keep out" emblem. This means that the workpiece will require a series of islands and pockets, so a certain amount of skill is required on the operator's part during programming. Users who do not like the fly can decorate their workpiece with another design; the procedure is described below.

Conversion into G-code

First of all, the design is drawn using a CAD system. In this example, we used Autodesk Inventor 2009. The software's core component is its 3D modeling package. This enables 2D drawings to be derived from the 3D models and components created. The next step is to use the 2-D drawing in DXF format to generate a CNC program that is compatible with the machine; this is done via the CAD Reader that is either part of the SinuTrain software or can be ordered separately as a PC version. The DXF (Drawing eXchange Format) file generated by Inventor is imported into the CAD Reader. Contours and drilling points are then filtered out, and any parts that are not required for machining (dimensions, hatching, labels,



The pockets and islands on the beer-mug lid "fly" pose no problem for the Sinumerik 840D sl with ShopTurn

Pictures: Siemens AG

borders, etc.) are removed.

Each individual contour, e.g. the fly's abdomen or one of its wings, is assigned a name, a start and an end point, and is saved. CAD Reader then converts the contours into G-code or into the ShopTurn format, which can be processed directly in the Sinumerik CNC. ShopTurn can be used to produce contour pockets with islands. The operator can specify whether the entry point for the cycle should be helical, oscillating or central, or whether the entry point should be determined using a drill hole. If it becomes apparent during the machining process that a milling tool is too large to clear out the entire contour pocket, it is replaced with a smaller one to remove the residual material.

CAD reader reduces workload

In this example, the machining process for the beer mug lid is carried out over several work steps on a Spinner TC-600 CNC universal lathe. This lathe is fitted with a Sinumerik 840D sl control system and ShopTurn. The lid is turned in two mountings: the first step turns out the concave inner/lower side and turns on a recess. After the second mounting, the convex outer/upper side is turned, and the contours of the fly and the diagonal bar are milled. The blank for this job is a round piece of material measuring 100mm in diameter and cut to a thickness of approx. 30mm. We used an AlCuMgpb alloy.

As the example shows, ShopTurn makes it easy to get ahead with CNC technology. One reason for this is that the programming interface is geared toward the machine operator's way of thinking. The user also has far less work to do when using the Sinumerik control system together with ShopTurn and the CAD Reader because he does not have to input all the coordinates for each contour manually. If he wants to make sure that



The technological details

CAD Reader

The CAD Reader program makes it possible to process CAD drawings using Sinumerik control systems. The transferred NC programs can be saved as MPF, SPF or ARC files. During the saving process, CAD Reader generates G-codes (NC blocks) from the selected contour. These codes can be processed directly using Sinumerik. Comment blocks that can be processed by the geometry processor or the cycle support are also saved. Imported contours can be recompiled or modified using the geometry processor. Drill holes are usually generated in cycle format and can therefore be recompiled on the control unit.

To output a contour as an NC program, a zero point for the drawing must first be specified in CAD Reader. This is because, in most cases, this zero point deviates from the zero point in the DXF file. To determine a contour to be generated, its start and end points are then selected. The program attempts, wherever possible, to select the contour automatically. If a subsequent element is not obvious, the software switches to interactive mode and prompts the user to select the next element. Selection then proceeds in stages until the end point of the contour is reached.

the process steps he has planned will be performed without a hitch, he can run a simulation before he starts. What's more, anyone using ShopTurn does not require extensive knowledge of a DIN/ISO programming language. However, it is still possible to enter DIN/ISO blocks directly into a ShopTurn program.

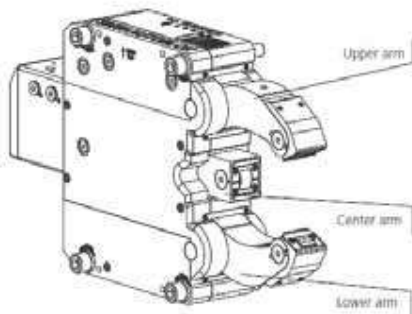
Information contributed by SIEMENS

Key Component Travelling Steady For Turning Machine

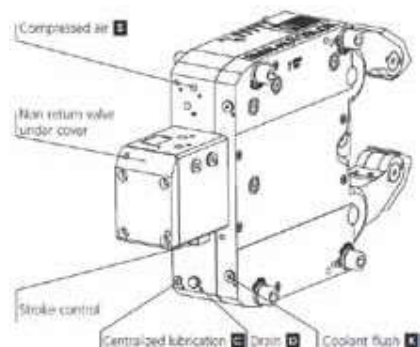
FUNCTION

The SMW-AUTOBLOK steady rest is applied axially direct on to workpiece whereas the two outer pivoting roller arms rotate around their pivots along two harden cam surfaces which, in turn are arranged on the center roller.

The outer arms are provided with inner rollers, which run along the cam surface to move the outer rollers concentrically, with constant stroke, towards the center throughout the complete clamping range.

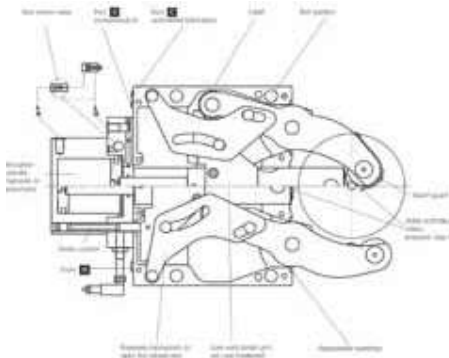


As the function of the level arms selected and the cam surfaces employed, the force exerted by three rollers is equal to the axial force generated by the actuating cylinder.



Standard model steady rests are designed for manual or center lubrication. Due to the increased roller loaded involved, SMW-AUTOBLOK strongly recommends that the centrally-lubricated version be specified for travelling steady rest applications.

SMW-AUTOBLOK steady rests are designed to be used on high performance CNC-Lathe and CNC-multipurpose machines. Based on the cam level design developed by SMW-AUTOBLOK a patented system is used, to open the steady rest arm without springs. It is used for precise centering of shafts independent of their diameter.



The compact and rigid design with a large clamping range as well as with case hardened and ground internal parts guarantee high precision, rigidity and long service life.

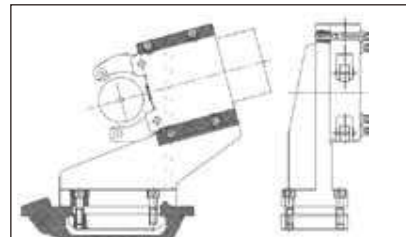
The actuation is done via built-in cylinder with stroke control and hydraulic or pneumatic non return valve.

STEADY REST MOUNTING

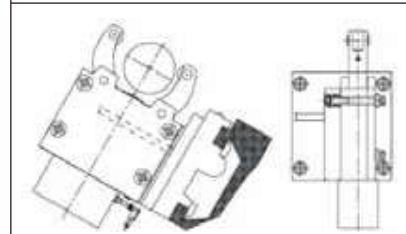
The trouble free operation of a SMW-AUTOBLOK steady rest also depends on it being rigidly and accurately mounted to the machine tool.

Some basic designs of the steady rest are shown in the following drawings. The brackets should have a wall with enough thickness and have supporting webs for the upright section to help prevent vibration.

The contact face for mounting the steady rest must be ground precisely at right angle to the truing axis.

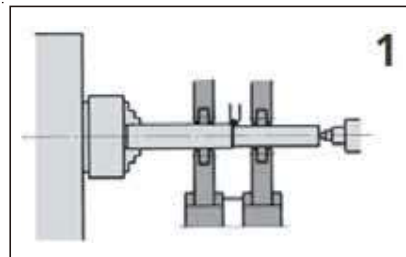


For flat bed machine

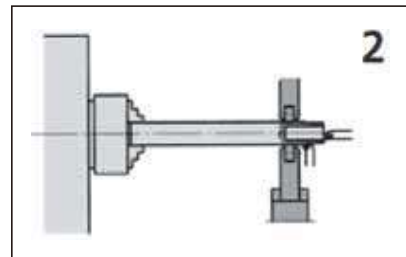


For slant bed machine

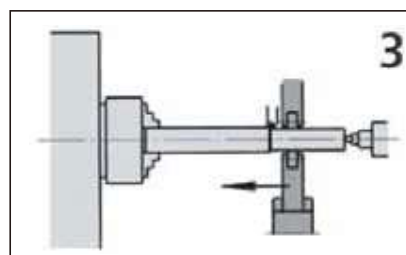
FIXED OR TRAVELING APPLICATION



1. Tandem steady rest fixed



2. Steady rest fixed for end machining



3. Steady rest traveling

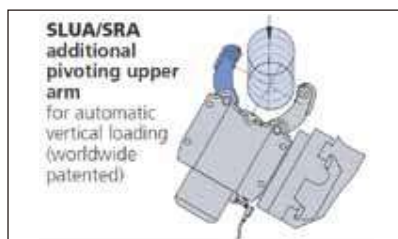
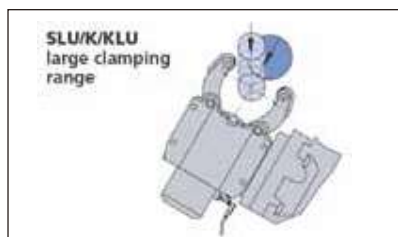
Key Component

TYPE OF STANDARD STEADY REST

The First steady rest were developed by SMW-AUTOBLOK in 1967. Over 40 years of experience SMW-AUTOBLOK have developed Series SLU, Series SR, Series K and Serial KLU In order to meet the different request and application.



Serial **SLU** and **SR** steady rests have large clamping range. SLUA or SRA, belong to Serial SLU or SR, are for automatic vertical loading through the additional pivoting upper arm



Type	SLU	SLU	SLU	SLU	SLU	SLU	SLU	SLU	SLU	SLU
	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Centering range	1	2	3	3.1	3.2	4	5	5.1	6	6
U1 (mm)	4	8	12	20	50	60	45	85	125	125
U2 (mm)	64	101	152	165	200	245	310	350	460	460



proofline® series
fully sealed-low maintenance

Series **K** steady rests have compact design and sealed body. It normally be used when the machine has not enough space or need bigger clamping range.

Centering range	K3	K4	K5	K5.1	K6	K6.1
U1 (mm)	65	60	80	100	135	215
U2 (mm)	235	280	390	410	460	510



Serial **KLU** has Narrow arms for crankshaft. Due to the interference circle of the crankshaft throws these applications demand a thing housing and extremely thin but long roller level.

Centering range	KLU	KLU	KLU	KLU	KLU	KLU	KLU	KLU	KLU	KLU
	215	218	222	318	322	419	422	429	530	540
U1 (mm)	4	8	12	12	12	50	60	45	85	125
U2 (mm)	64	101	152	152	152	200	245	310	350	460

Of course, apart from wide range of standard sizes, SMW-AUTOBLOK has collaborated closely, for many years, with OEMs and end users to produce a large variety of special sizes and designs to meet specific application requirements.



From small to Large



Information contributed by SMW-AUTOBLOK

Q: On my Microcut BNC/LT/HT machine with FANUC OiTC controller, I am having an alarm shown 9084, what is the problem? How can I solve the problem?

A: Please refer to this alarm meanings below, it's an alarm from external encoder error and you need to check if there is any mechanical problem of encoder and also check the encoder function.

9084	SPN_n_ : SPNDL SENSOR DISCONNECTED	84	1 Replace the feedback cable. 2 Check the shield processing. 3 Check and correct the connection. 4 Check and correct the parameter. 5 Adjust the sensor.	The spindle sensor feedback signal is not present.
------	------------------------------------	----	----------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------

Then you should check in the following steps.

- Step1. Please check if there is any mechanical problem of encoder : Check if encoder screws were loose or not; check if encoder shaft was bent or broken.
- Step2. Please check encoder function by procedures below to see if the inside mirror is ok. Please prepare tool as below firstly.
- a. Hexagon Wrench for M5 X 1pc
 - b. Phillips Screwdriver X 1 pc
- Step3. Turn off the main power of machine.
- Step4. Disassemble the cable on encode by hand (see A in Fig. 1).

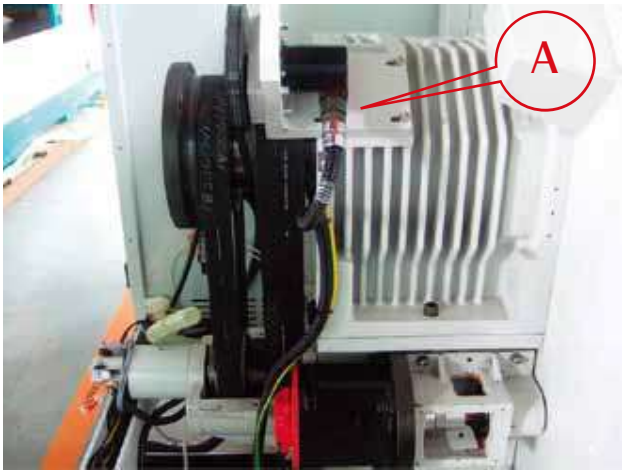


Fig. 1

- Step5. Use Hexagon Wrench M5 to disassemble the 4 screws of encoder and remove the encoder from machine carefully (see A/B/C/D in Fig. 2).

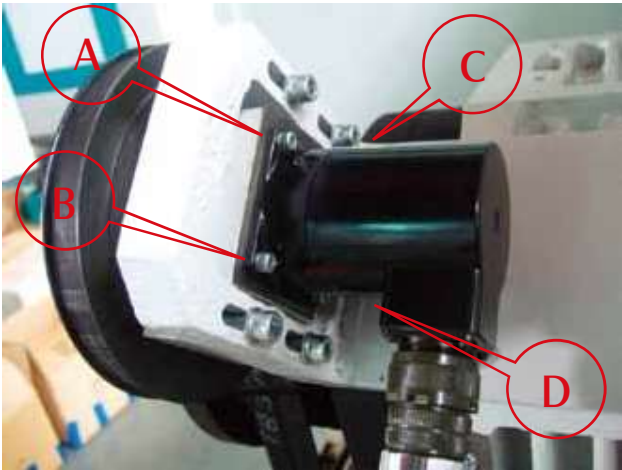


Fig. 2

- Step6. Use Phillips Screwdriver to loosen 3 screws of encoder shell (see Fig. 3).



Fig. 3

FAQ Trouble shooting

Step7. Open the shell of encoder by hand (see Fig. 4)



Fig. 4

Step8. Use Philips Screwdriver to loosen the 3 screws on IC board. (see A/B/C of Fig. 5)



Fig. 5

Step9. Take away the IC board and check the encoder mirror if it's ok or damaged. If the mirror looks like Fig. 6, it shows the encoder is ok.



Fig. 6

Step10. If there are scratches on the mirror such as A/B/C of Fig. 7, it means the mirror is damaged. Please contact us and send those pictures for judgment.

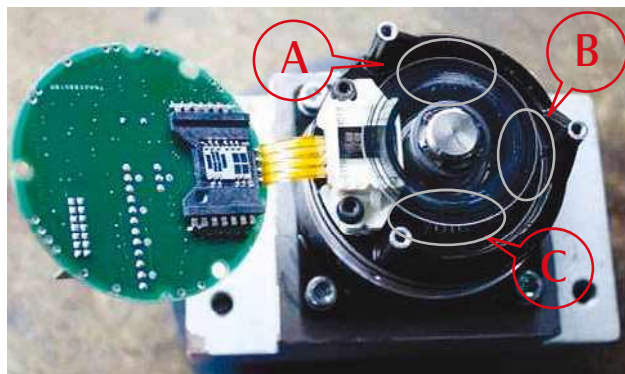


Fig. 7

Q: On my Microcut lathe/machining center/boring machine with FANUC controller 0iTC/0iMC/18iMB/21iMB, I need to change the language, How to deal with that?

A: You can change the language by the following steps:

1. Press function key "OFS/SET" button. (see Fig. 1)



Fig. 1

2. Press chapter selection soft key "SETTING" button. (see Fig. 2)



Fig. 2

3. Select "PARAMETER WRITE=" and change to "1". (see Fig. 3)



Fig. 3

4. Press function key "SYSTEM" button. (see Fig. 4)



Fig. 4

5. Press chapter selection soft key "PARAM" button. (see Fig. 5)

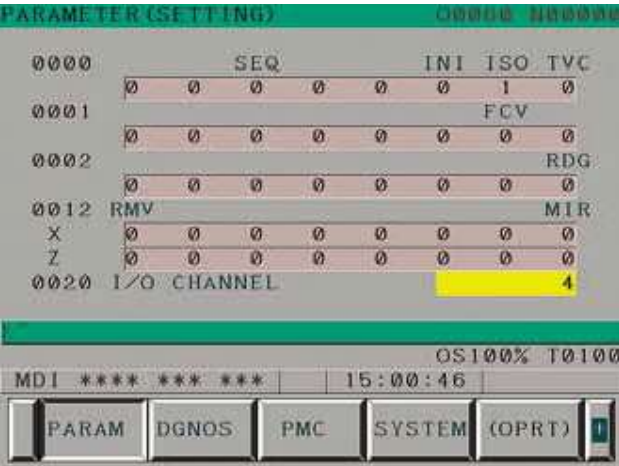


Fig. 5

6. Standard language for choosing.

- 6.1 For 0IMC- 8.4"LCD 2 SLOT/ 0IMC-10.4"LCD 2 SLOT
You can choose 16 languages, please refer to Fig. 6
 - 6.2 For 0ITC- 8.4"LCD/ 0ITC-10.4"LCD 2 SLOT
You can choose 16 languages, please refer to Fig. 6
 - 6.3 For 21IMB-10.4"LCD/ 18IMB-10.4"LCD
The standard language is English/German/French/Italian/Spanish.
The others are optional.
 - 6.4 For 18ITB-10.4"LCD
The standard language is English/German/French/Italian/Spanish.
The others are optional.
7. Please refer to the language list (see Table 1) to know the acronym of the language you needed.



FAQ Trouble shooting

Table 1

RUS	CHZ	CZE	SWE	HUN	POL	POR	DTH	SPN	HNG	ITA	CHI	FRN	GRM	JPN	Language
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	English
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Japanese
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	German
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	French
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Chinese (traditional character)
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	Italian
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	Corean
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	Spanish
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	Dutch
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	Portuguese
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	Polish
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	Hungarian
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	Swedish
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	Czech
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	Chinese (simplified character)
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Russian

8. Please refer to the table 1 and check "3102"; "3119" and "3190" setting to enable the language you need. For example:
If you need to enable Portuguese, please set the 3 parameters here as below.

a. 3102=00000000 b. 3119=00000010 c. 3190=00000000

Table 2

	#7	#6	#5	#4	#3	#2	#1	#0
3102	DTH	SPN	HNG	ITA	CHI	FRN	GRM	JPN
3119							POR	
3190	RUS	CHZ	CZE	SWE	HUN	POL		

9. Press chapter selection soft key "NO.SRH" button. Then you will see 3102 as Fig. 7; 3119 as Fig. 8; 3190 as Fig. 9

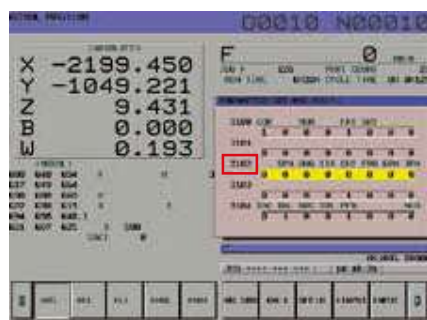


Fig. 7

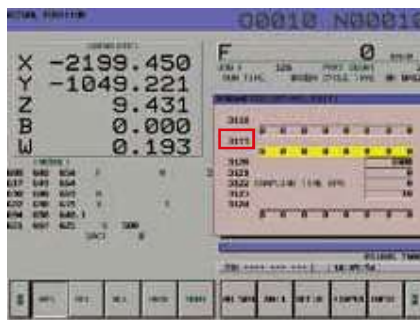


Fig. 8

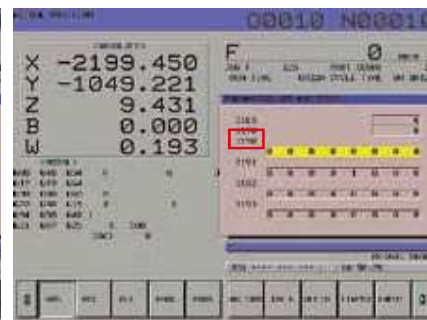


Fig. 9

10. Turn on/off main power again for enabling this new language setting.

RIMA OPEN HOUSE JUNE 4~5, 2009



Mr. Bruno Rieser, director of RIMA and his guests.

Over 280 customers come from everywhere of Switzerland joined the open house and celebration of new building established party of RIMA CNC-Maschinen AG. In this new 2800 M² RIMA Building, warehouse and office is combined for easy operation.

RIMA Company is located in Widnau, North East of Switzerland, its strong, experienced sales and service team are giving the market very fast and quality service from corner. The strong team including Mr. Bruno Rieser, Mr. Fredy Utzinger, Mr. Engelbert Baumgartner and other sales representative has been working together for more than 10~20 years. Customers who have cooperated with the team for a long time, are just like good friends.





Open house of RIMA

Besides RIMA Mill (Microcut range), the other brands such as Takisawa, Quaser, Renishaw all involved in the fair. Machines shown includes Turning Centers with B-axis, 5-axes machining center, Box way machining center, and CNC lathe includes 2-axes standard CNC lathes and twin-spindle, twin-turret CNC lathes. Those products are suitable for application in the automobile industry, energy industry and also medical industry. While the automobile industry worldwide suffered most in the financial crisis, energy and medical industry will be the star market momentarily.

Buffalo has been working with Mr. Rieser and Mr. Utzinger since 2002. Microcut Teach-In lathe and box way machining centers have very good reputation. Just before the open house, one more BNC-2680X was bought and the other BNC-26120X is under discussion with customer.



Mr. Jurg Brunner from LfW has 4 RIMA-MILL, Microcut box way VMCs. His company is not only a training institution for private enterprises and government organizations, but also works as a general work shops. The company is considering investing the other RM-1600 machining center to expand its production line.



Mr. Jurg Brunner, one of their clients, photo together with Microcut Sales manager Sabina and Fredy Utzinger of RIMA

Cutting-edge technology: SINUMERIK CNC

2009



The world's first
numerical control



Gear hobbing
for the first time with CNC



The first CNC-integrated
safety solution



SINUMERIK® 828D
for the shopfloor

SINUMERIK

Compact, strong and simple – in the class of the compact CNC systems, the SINUMERIK 828D sets new standards with regard to ruggedness, performance and ease of operation. It is therefore ideally suitable for the use in the shopfloor environment, where it opens up unique options for higher productivity in the machining of turned and milled workpieces. www.siemens.com/sinumerik

Answers for industry.

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NCT
CNC Rotary Table



HC-HB
Hydraulic Horizontal Coupling Gear Index Table



HC
Hydraulic Coupling Gear Index Table



CT
Horizontal Hydraulic Coupling Gear Index Table



NCT-125-T2,T3,T4
CNC Multi-Spindle Rotary Table



TRT
CNC Tilting Rotary Table



MBT
Manual Coupling Gear Index Table with
Pneumatic Clamping



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LT-HT-SPT series
CNC Slant-bed Lathe



DUAL series
Dual spindle
CNC Lathe



MCG-5X
5-axes Gantry
type VMC



TC Series
Travel Column VMC



V-Series
HSM VMC



MM-Series
Linear
guideway
VMC



MCV-Series
Box way VMC



VM/VMC Series
Medium/Large
Box way VMC



RH Series
Economic type
box way VMC



TT-40
Bridge type Twin-table VMC



HBM-5T/5TE
Travel-column
Horizontal Borer



HBM-4
Table-moving
Horizontal Borer



BNC-3000/3500/4000
Large bore CNC
Flat-bed Lathe



BNC series
Teach-in Flat bed Lathe



BNC-5000/6500
4-Guideway Heavy
Duty Lathe



ISO 14001:2004
EMS 546518



ISO 9001:2008
FM 538421