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COLGAR

Colgar SpA
Costruzione macchine utensili
Fondata nel 1945

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San Pietro all'Olmo, 04-03-2008

Exp/gg

PACKING LIST

**RE: ORDER CONFIRMATION NO. 06/04 DATED 19.04.2007
CNC "T" SQUARE BORING MILLING MACHINE TYPE PROG 213 TR 12**

1st TRUCK (26.03.08)

N.1 Machine bed complete	L=5000X1500X800	KG 6500
N.1 column	L=4300X1100X1100	KG 6300
N.1 headstock		KG 3500
		16300

2nd TRUCK(26 or 27.03.08)

N.1 Accumulator	L=2200X800X300	KG 200
N.1 Hydraulic unit	L=1900X1400X1500	KG 400
N.1 coolant unit	L=800X800X1200	KG 100
N.1 paper filtering plant tank	L=2400X1400X1200	KG 450
N.1 Energy cable complete	L=4000X800X1000	KG 250
N.1 Electric cabinet	L=4300X800X220	KG 1300
N.1 Control pendant complete with column	L=	
N.1 Column with tool chain	L=4300X1600X1500	KG 3500
N.4 Colum pillars	L=5000X200X200	KG 40 cad.
		6300

3rd TRUCK (27.03.08)

N.1 Complete table	L=7400X2000X900	KG 13500
N.1 Remote control	L= 700x600x350	KG 100
N.1 Accessory head TA 1003	L=1200x900x600	KG 650
N. protections - Pallets		
		14250
		6200
		16300
		36750

COLGAR SPA
Export dept.


COLGAR SpA
S. PIETRO ALL'OLMO

Capitale Sociale € 2.080.000,00 int. vers.
CCIAA Milano 475674 - Export MI 006128
Iscritta al Tribunale di Milano n. 94353 Registro Società
C.F. e P.IVA n. 00765590153



FINAL QUOTATION No. 07-29-F rev.3 - AV/av - Sheet no. 1 - date: 16/04/2007:

MACHINE no° 1**PRICE SUMMARY EURO**

		BASE	
A118	"T" SQUARE BORING MILLING MACHINE PROG 213TR 12 X-AXIS MM 4000 - Y-AXIS MM 3000 W-AXIS MM 2000 - Z-AXIS MM 700 SPINDLE DIAMETER MM 130 TABLE DIMENSIONS MM 1800 X 2300 COMPLETE WITH :		
B045	CNC HEIDENHAIN MODEL Itnc 530 AFC HEIDENHAIN ADAPTATIVE TOOL CONTROL TOP TELESERVICE		
G001	INTERNAL COOLING DIN 69871		
H002	PAPER CLEANING AND FILTERING PLANT		
P025	AUTOMATIC UNIVERSAL HEAD TA100/3 (1°)		
P051	SPINDLE STIFFENER FOR MACHINE MAIN SPINDLE IR13.R		
N002	AUTOMATIC TOOL CHANGER MC-OV-13-6 60 PLACES		
S010	SAFETY PROTECTION AROUND THE OPERATOR AREA SUPPLY BY COLGAR (WITH METAL PLATE AND GLASSES) AROUND THE TABLE METAL BARRIER H= 1400 MM (COLGAR SUPPLY ONLY THE PROJECT)		
X001	LASER TEST		
X002	NAS TEST		
X004	TRAINING COURSE		
X006	ASSEMBLING AND START UP		

**A118 CNC "T" SQUARE BORING-MILLING MACHINE TYPE
PROG 213 TR 12**

MOTOR RATED POWER :

- DUTY CYCLE S1 (100%) – KW 41
- DUTY CYCLE S2 (30 Min.) – KW 56

- Siemens Motors

- **Hydrostatic bearing system** on X-Y-W – B axes
- Automatic hydraulic clamping on X – Y – W – B axes
- Spindle axis equipped with brake installed on motor
- Recirculation ball screws on X, Y, W and Z axes; double pinion with backlash elimination and rack on B axis.
- Axes feed motors Brushless-Siemens

TRAVELS

X-Axis	Longitudinal travel of table	mm	4000
Y-Axis	Vertical travel of headstock	mm	3000
W-Axis	Axial travel of column	mm	2000
Z-Axis	Axial travel of spindle	mm	700
B-Axis	Rotation of table		continuous
	Positioning angle for 360.000 pos.		0,001°
B-Axis	with automatic indexing on	pos.	4 x 90°
B-Axis	diameter of hydrostatic surface	mm	1200

Rotation of the pieces in the middle of the X axis travel

**Max diameter mm 4000 high mm 1000 or
max diameter mm 3000 high mm 3000**

**In every position of the X axis is possible rotate a pieces diameter
mm 2774 high mm 3000**

Table dimensions	mm	1800 x 2300
Table plate thickness	mm	200
Dimension of T slots on table plate (standard)	mm	28
T-slots pitch	mm	180
Max. admissible load evenly distributed on the table surface	kg	15000

HEADSTOCK SECTION	mm	410 X 505
Headstock projection	mm	500

22
160

FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 3 – date: 16/04/2007:**HEADSTOCK**

Boring spindle diameter	Ø	130
Internal diameter of milling spindle front bearings	Ø	170
Spindle taper	ISO	50
Spindle 2 speed :	r.p.m.	4 ÷ 3000
- at constant torque		
- at constant power		
Max.torque	Nm	2300

FEEED RATES

B Axis rotation	r.p.m.	0,002 ÷ 2
Rapid traverses X,Y,W Axes	mm/Min	20000
Rapid Z Axis	mm/Min	15000
Rapid B Axis	r.p.m.	0.002 ÷ 2
Working thrust	N	20000
Max torque with clamped table	Nm	30000
Max torque in contouring	Nm	20000

MOTOR POWER

A.C. Spindle motor duty cycle S1 (100%)	kW	41
A.C. Spindle motor duty cycle S2 (30 min.)	kW	56
A.C. linear axes feed motor	Nm	15
A.C. circular axes feed motor	Nm	15
Total installed power	Kva	90
Approximate net weight	Kg	34.500

COMPLETE WITH:

- Tool cooling system
(With tank and pump to be built-in into foundation)
- Fixing and levelling screws
- Control panel near to the machine with independent totem and possibility to orient and to rotate it.



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FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 4 – date: 16/04/2007:

- Heat exchanger unit
- Measuring systems - direct type :
 - Heidenhain optical scales LB 382 C • Encoder ROD 780 C
- 24 Volt connection near the machine headstock for customer light
- Colgar will supply only roject of the interfacing plate for installation of manual existing customer accessory head
- Machine ready for next installation of radio probe by M&H, excluded all the M&H components and the installation
- Rear single plastic cable chain
- Double telescopic protections for X axis and front side of machine bed
- Plate protection between telescopic protection and foundation, to avoid chips going under the beds *Bed*
- Possibility to load/download the tools from the tool-changer chain even the machine is in RUN mode, with the priority of the tool changer chain to save the operator work

THE MACHINE IS MANUFACTURED IN COMPLIANCE WITH CE REGULATIONS AND SAFETY NORMS.

Colgar supply the project of the safety protection around the machine and the operator area safety protection including all the electric component and electrical installation, Customer make all the mechanical protection around the table including the installation.

**B045 CNC NUMERICAL CONTROL HEIDENHAIN
MODEL iTNC 530 - 5 AXES + SPINDLE**

complete with:

- Colour screen BF120 TFT 15" (complete with cables)
- Keyboard TE 420
- Spindle orientation
- Basic software
- Logic
- Memory for pieces programmms
- Hard disk memory 6 Giga Byte
- Interface card for drivers
- Input/output cards
- Lines V.24/RS232-C
- Lines V11/RS422
- Measuring systems
- Cables and connections
- Start-up and guarantee through Heidenhain
- Use and maintenance handbooks *Handbook*

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INCLUDED:-

- **B016 ELECTRONIC REMOTE PORTABLE control HR 410**
(complet with cables and connection)
- **SOFTWARE FOR THE COMPENSATION OF AUTOMATIC HEADS GEOMETRY ON ORTHOGONAL POSITIONS IS INCLUDED**
- **AFC Heidenhain adaptive control**, allows optimization of the cutting speed on the profile as a function of machine tool and spindle performances, after precise sampling performed directly on the machine. Allows control of tool wear, breakage, adaptation and lifespan.
- **COLGAR TOP TELESERVICE**
Telediagnostic operator Program complete with :
 - Help on CNC*
By pushing the button HELP on the CNC, the operator can have an immediate textual multi-line diagnostic corresponding to the visualized error message.
 - Problem solving CD*
 - Documentation on CD*
 - Preventive maintenance management***Teleservice complete with :**
 - HEIDENHAIN Software Teleservice**
 - Router*
 - Cables from router to CNC*
 - Card Ethernet TCP/IP*

From customer's side must be available N.1 internet access coded and dedicated close to the electrical board

G001 TOOL INTERNAL COOLING THROUGH SPINDLE TAPER

Standard solution

DIN 69871 AD - coolant and/or air passing through the centre of the machine main taper and accessory heads taper

H002 PAPER FILTERING PLANT

For cutting fluid with double delivery pressure, suitable for steel, cast-iron, aluminium and other kind of metal workings.

FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 6 – date: 16/04/2007:

Filtering procedure:

The “dirty” fluid to be filtered is collected or in the cheap conveyor tank or in an additional tank located in the foundations throughout a metallic mesh filtration (the choice between the two alternatives is taken by Colgar’s technical dept. depending on the machine configuration, and it will be shown on the final lay-out drawings which shall be approved by the customer).

From this tank, the “dirty” liquid is pumped throughout a pump into a paper filtering plant, DTE 150 delivery 160 lt/min., complete with electric gauge for end-reel, and then it is collected in a tank having a total filtered fluid capacity of 1000 liters and a filtering degree of 30 microns.

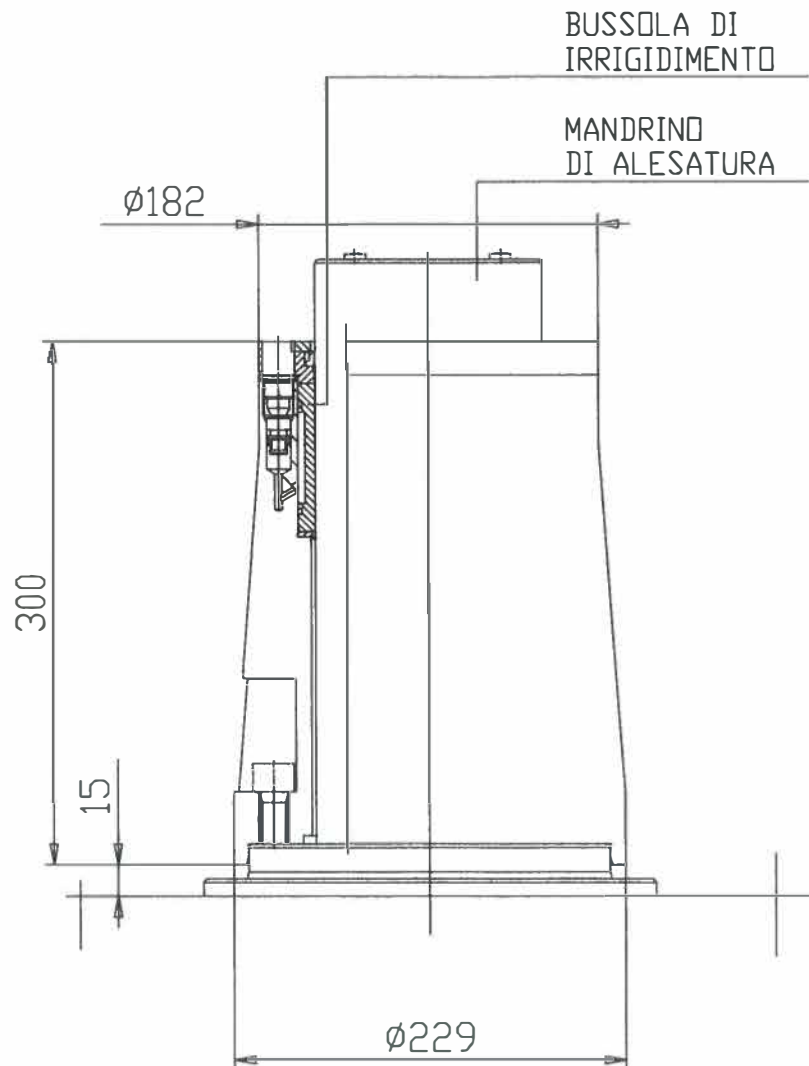
The tank is provided with:

- an electropump with low pressure delivery (Q=100 lt/min. P=4 bars) for the external cooling, and with
- an electropump with high pressure delivery (Q=30 lt/min. P=15 bars) for the internal cooling.

FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 7 – date: 16/04/2007:

P051 SPINDLE STIFFENER FOR MACHINE MAIN SPINDLE IR13.R

Has to be installed manually on the main spindle and screwed on milling spindle flange. After that with other screw the stiffener has to be fixed with the main spindle in order to rotate together. The automatic tool changer is not allow if the operator do not release some screw.



**N002 AUTOMATIC TOOL CHANGER MODEL MC-OV-13-6
CHAIN MAGAZINE ON FLOOR**

With n° 60 tools - Pitch 130 mm -

Spindle taper

ISO 50 DIN 69871 – DIN 69872

ISO 50 UNI 8487/1 – UNI 8487/2/A

Magazine chain N° 60

Chain pitch mm 130

Max.tool diameter mm 125

Max tool length mm 300 ?

Max tool diameter

(when adjacent pocket is empty) mm 250

Max tool weight kg 30

D.C. Motor for chain rotation kW 3,3

Tool changing time

(on horizontal spindle) sec. 20

Tool changing time

(on vertical spindle) sec. 30

The changing times of the toolings are calculated with the head in changing position following to ISO Norms 10791

The tool is changed in the
HORIZONTAL SPINDLE

Complete with:

- Motors for chain rotation and for carriage movement with exchange arm to deliver, pick up and change the tools
- Feeders and electrics located in proper cabinets
- Central unit for the hydraulic controls
- Control panel for the manual control step-by step of all change functions.
- N.2 CNC AXES
- Tool Management Package

Technical description as per sheet FDT 7.3-1

**SHANKS AND RETENTION
KNOBS EXCLUDED**

S010 CE PROTECTIONS FOR “T” MACHINES :

The perimetric safety barriers are component of the boring milling machine simple only by appearance, but to be personalized for every machine and for every working environment in which the machine is placed. The safety norms for the operators are very restrictive, and for this reason the whole area around the machine is interested.:

High protections,

with metallic panels and inspection windows only for the operator area. The opening of the doors can take place only when the machine is stopped to avoid any sudden interruption of the program and to guarantee safety to the operators.

Low protections around the table at customer charge including mechanical and electrical installation following Colgar project, with metallic barriers and provided with doors with security lock for the loading/unloading of the piece in the machining area and for the operator's access.

The opening of the door can take place only when the machine is stopped to avoid any sudden interruption of the program and to guarantee security to the operators.

The height of the protections in relation to the norms depends on the distance they have from the more exposed working area; the min. height allowed is 1400 mm. because it does not allow their climbing. In case the protection is brought nearer to the working zone, the height of the protection must be increased and its metallic meshes must become closer or, in alternative, the protection must be completely closed and manufactured with metallic panels and inspection windows.

A door to load the part on the machine is in front the table.

Complete PLC program and logic function at Colgar charge



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**FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 10 – date:
16/04/2007:**

X001 LASER TEST

Test according to Norms VDI-DGQ 3441 by means of Laser-Interferometer to align the measuring system and for repeatability of linear axes positioning.
To be carried out at Nordmark Maskinfabrik A/S works.

X002 NAS TEST

Test according to Norms NAS with machining of one workpiece positioned on XY plans and its following measurement.
To be carried out at Nordmark Maskinfabrik A/S works.

X004 TRAINING COURSE

Training course how to operate the machine lasting 5 working days, held by one of our specialized technicians at customer's plant.
Travel, board and lodging included.
CNC programming not included

X006 ASSEMBLING

Assembling , start-up and geometric test of machine by our technician on the spot, with the help of your personnel for the use of your lifting means (cranes etc.), for service operations and connections.
Included travel of Colgar Engineers during assembling, set-up, test and training.

Not included into supply :

- Necessary and appropriate cranes and tools for unloading and assembling
- Materials and relevant installation for :
 - Covers and protection plates around the machine
 - Chips and fluids conveyor sheets
 - Pipes and cables raceways into foundations
- Board and lodging expenses of our technicians.

**FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 11 – date:
16/04/2007:**

**OUR MACHINES ARE PAINTED WITH FOLLOWING
STANDARD COLOURS :**

Machine	BLUE	RAL 5005
Safety barriers and control panel	WHITE	RAL 9003
Electrical boxes	BEIGE	RAL 7032
Automatic tool changer	BLACK	RAL 9005
Accessory heads	RED	RAL 3001
Machine's covering with walls	WHITE	RAL 9003

For any special paints a price difference will be quoted.

**TECHNICAL DOCUMENTATION SUPPLIED WITH THE MACHINE
(one paper copy and one copy on CD)**

MECHANICAL:

- 1) User and maintenance manual
- 2) General hydraulic diagram
- 3) Preventive maintenance sheet
- 4) List of materials subject to wear (filter cartridges)
- 5) List of recommended spare parts
- 6) Mechanical/hydraulic drawings for troubleshooting
- 7) Complete machine list including all components installed with: code-location-quantity-manufacture (only on request and only in Italian).

ELECTRICAL:

- 1) Functional electrical diagram
- 2) Wiring diagram
- 3) Electrical service manual
- 4) CNC Manual
- 5) User and programming manual
- 6) Drives manual
- 7) Measurements systems manual

**FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 12 – date:
16/04/2007:**

V02 - SALES CONDITIONS

- PACKING:** Included
- DELIVERY TIME:** 1st February 2008 except sold except causes of force major.
The delivery time refers to the time when machine is ready to be tested at our workshop.
- PAYMENT:** 30% at the order
60% at machine testing in our Works before shipment
10% with confirmed and irrevocable letter of credit payable against presentation of testing report and in any case within 60 days from shipment date
- TESTING:** Machine testing is performed according to ISO standards and the following:
- Test booklet ISO 3070/II for boring and milling machines with movable column
 - Test booklet ISO 3070/III for boring and milling machines T-type with suitable integrations
 - Specific notebook for rotary traverse tables
 - Specific “Colgar” standards for accessories
- Preliminary test* performed at Colgar’s works in the presence of the purchaser’s technicians involves checking the complete supply, its functionality and control of geometric accuracy (excluding those which cannot be implemented with the final foundations missing).
- Final test and inspection* will be performed after installation at the purchaser’s works and will involve final acceptance of the supply and starting date of the warranty.
- If the purchaser uses the system before the final test and inspection has been endorsed, it shall be deemed as accepted with starting date of the warranty and contractual payment terms commencing immediately.
- LAY-OUT:** Within 3 months of contract signature , Colgar shall submit an installation lay-out proposal which must be verified by the Purchaser and accepted or modified within 20 days of receipt. Upon expiry of this period without receiving a reply, Colgar

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**FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 13 – date:
16/04/2007:**

shall consider the proposed lay-out to be tacitly approved and shall start to produce the machine according to this project.

In the event of modifications, received within the established terms, Colgar shall return the new lay-out modified within 20 days and shall wait acceptance for the following 20 days.

Modifications shall be limited solely to positioning of the machine and relative systems and shall not include variations in structure and dimensions.

- FOUNDATIONS:** Machine foundations shall be implemented by the Purchaser according to the following diagrams drawn up by Colgar:-
- lay-out with overall dimensions of all supply components
 - lay-out corresponding to the foundation plan with spacing of jacks, implementation of formworks to house the tie-rods, slopes and levels
 - technical specifications with admissible loads and deformations to submit to the civil engineering office appointed by the Purchaser for implementation.

The Colgar supply excludes:

- the necessary geological checks
- calculation and implementation of the foundations
- waterproofing of the foundations
- supply and laying of quick setting cement to anchor the jacks and foundation tie-rods.

- ERECTION AND START-UP:** During assembly and setting at work performed by Colgar, the Purchaser must provide Colgar technicians with the assistance of its skilled personnel to use handling means and cranes.

If the lifting means available are unsuitable for appropriate handling, the Purchaser shall hire suitable means at his expense.

The following are excluded from the supply and assembly by Colgar:

- implementation and positioning the coverings of the ducts to house cables and pipes,
- implementation and positioning of the metal plates to convey chips and protective gratings,
- supply of oil (the machine will be delivered without oil) which must be provided by the Purchaser in compliance with Colgar's indications,
- everything else not specified in the offer.

**FINAL QUOTATION No. 07-29-F rev.3 - AV/av – Sheet no. 14 – date:
16/04/2007:**

To allow installation of the machine it is essential that the foundations are fully completed and the plant layout works have been terminated (electricity, compressed air, water, dedicated telephone line if needed) and brought close to the machine, on pain of our technicians returning to us with all costs charged to the Purchaser (should these be chargeable to Colgar) and reprogramming of installation according to Colgar's availability.

Costs for travel, stay and transfer of our technicians not included in the contract shall be charged according to the tariffs in force at the time in which they occur.

- GUARANTEE:** Machine is guaranteed for a period of 12 months from installation, max 15 months from shipment, according to UCIMU conditions.
Accessories acceptance and guarantee is separated from machine guarantee.
Guarantee covers replacement of defectuous parts in our workshop and manpower for eventual necessary replacement on machine.
Travel and accommodation of our technician at Customer's charge.
- SAFETY:** Machine manufactured in compliance with the existing European norms
"Machine Directive 98/37/CEE"
- VALIDITY:** 60 days

For all terms that are not covered by the present conditions please refer to the UCIMU general sales conditions for machine tools.

TECHNICAL DESCRIPTION OF THE MACHINE

A118 TECHNICAL DESCRIPTION "T" TYPE CNC BORING-MILLING MACHINE MODEL PROG 213 TR 12
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- **FOUNDATION**

The foundation has to be a single block made of homogeneous compact and not capable of being deformed ferro-concrete, which calculation is not included into COLGAR supply. The composition and reinforcement of foundation plinth have to be studied by skilful and specialized personnel, who must take into consideration, the nature of the ground where the system will be installed.

Rigidity and stability of foundation are very important elements to guarantee steadiness of machine in the time: friability of beton might compromise anchoering and support of jacks and consequently the good order of the system.

The foundation shall be isolated from vibrations rising from other sources.

Before the machine installation, foundation has to be impermeabilized for respecting the in force ecology norms.

- **STRUCTURES :**

BEDS are a welded cellular steel construction, head treated after welding and rough-machining for stabilizing purposes.

The two alloy steel slideways are so dimensioned to guarantee a low specific load on themselves, they are welded to the structure.

Beds lay on rows of jacks and makes a single unit with foundation.

COLUMN SADDLES The column saddle and the table basis are made of electrowelded cellular steel to counterbalance the variations of load due to the headstock outcoming.

They are heat treated after welding and rough-machining for stabilizing purposes.

Saddles move along the slideways of the bed by means of a hydrostatic gibs system, differently preloaded, according to the load working in the various positions.

The **COLUMN** is made of electrowelded steel.

A peculiar system of inner stiffening ribs, makes this unit a high sturdy structure; in fact the external cover and the inside wall are connected inbetween by an intermediate cellular structure.

Besides, in correspondence to every inner angle a reinforcement bent plate is welded to the cover forming four columns.

The front reinforcements (guides side) are so positioned that the front inside bent plates (forming two front columns) are linked to the guides, connecting the above guides to the inner and external structure of the column.

The structure is heat treated after welding and rough machining for stabilizing purposes.

The guides are made of hardened alloy steel and are welded to the structure.

Column guides are induction-hardened and ground (medium hardness of guides 53-55 HRC depth 1-1,5 mm).

The column is screwed to the saddle and the coupling plates are ground.

The X axis is easily and precisely adjusted, operating on a system of opposite gauges (one gauge on the basis, the other one on the column) preventing any shift of the upright during heavy machining operations, while allowing rapid restoration of the setting in case of accidental shock.

TABLE BASIS on G300 cast iron

The **HEADSTOCK** moves along column slideways by means of a hydrostatic gibs system differently preloaded.

It is made of electrowelded steel, head treated after welding and rough-machining for stabilizing purposes.

On the front part of the head (set to receive the protection plate and attachment heads) the following are located :

- the electrical connectors
- the hydraulic connector for attachment heads
- the connectors for the tool coolant

The connection between head and attachments are made automatically on fitting the attachment on the head. Optionally the attachment is locked by means of four hydromechanical (irreversible) locking devices.

The *SPINDLE LINE*

The nitrided and precision-finished alloy steel spindle line consists of :

- milling spindle rotating on very high precision ball bearings specially made for machine tool spindles. Lubrication is obtained by means of a special minimal (air-oil) system.
- boring spindle, coaxial with the milling spindle, by which it is supported and rotated

The spindle is fitted with :

- ISO 50 tool fitting with rapid tool clamping/unclamping device (mechanical clamping and hydraulic unclamping), the clamping system is irreversible
- The internal cone of the boring spindle is inserted and can be changed without dismantling the whole spindle
- Rotary coolant distributor to feed coolant through the spindle (option)

● **LUBRICATION OF HYDROSTATIC SLIDEWAYS**

The slideways ("X" – "Y" – "W" axis) are equipped with the hydrostatic bearing system actuated on top, bottom and side surfaces.

The system ensures the maximum stability and minimum wear; eliminates eventual vibrations assuring a better superficial finishing of the working pieces.

The advantages of this lubrication system can be sum up as follows :

- no metal to metal contact and therefore no sliding friction between the ways (no stick-slip)
- elimination of wear in sliding surfaces
- high load carrying capacity and rigidity at all speeds when static
- smooth, stable and easy positioning
- no backlash in the guideways with consequent high positioning precision
- minimum reverse floating value

The circuit has safety devices which stop axes drive in case of insufficient pressure.

Table center pin combined with conical roller bearing and hydrostatic thrust bearing on B Axis

Rotation axis is equipped with oleodynamic pincer clamps producing two equal and opposed clamping forces on the slideways without altering the oil film of the hydrostatic lubrication and the machine trim

Automatic machine stop device in case of oil pressure drop below the rated value

All moving parts are force-lubricated; any change in rated values is monitored to the logic of the machine to cause standstill

- ***AXES FEED***

COLUMN TRAVERSE

The column traversing movement is controlled by an alternating current (Brushless) motor driving a preloaded double worm screw recycling the balls.

The drive is by rotary screw and fixed worm anchored to the column basis

HEAD CARRIAGE TRAVERSE

The head carriage traversing movement is controlled by an alternating current (Brushless) motor driving a preloaded double worm screw recycling the balls.

The drive is by rotary screw and fixed worm anchored to the head carriage.

BORING SPINDLE TRAVERSE

The spindle traversing movement is controlled by an alternating current (Brushless) motor driving

a preloaded double worm screw recycling the balls. The drive is by rotary screw and fixed worm anchored to the head.

TABLE BASIS TRAVERSE

The head traversing movement is controlled by an alternating current (Brushless) motor driving a preloaded double worm screw recycling the balls.

TABLE ROTATION

Table rotation (B axis) by means of a rack- double pinion system with automatic backlash elimination

- ***SPINDLE ROTATION***

The a.c. (Brushless) spindle motor provided with a two speed gear, is connected to the spindle by means of a specially profiled belt.

The spindle has a transducer regulating its angular position and the angular positions of the spindles of all the accessories.

- ***BALANCE OF HEADSTOCK***

A mechanical counterbalance inside the column, balances the translating part of the Y axis. It is linked to the headstock by a metallic rod.

- ***ELECTRICAL SYSTEM***

The electrical system has been studied according to the international standards.

The interfacing is made using the programmable logic; in case of installation of CNC with programmable interface, the interface is located in the CNC itself.

The electric cabinets are provided with refrigerator conditioner.

Power is 400 V – 50 Hz

- ***CONTROL PANEL***

All machine and CNC controls are removed on a control panel near to the machine

- ***STEEL WAY COVERS***

X-Y and W axis guides are protected by telescopic steel way covers.

- ***MEASURING INSTRUMENTS***

On the X-Y-W axes the control unit (of direct type) consists of a transducer with infrared ray reader and optical scales; on Z Axis and on rotation Axis (B) control is made by a rotating encoder.

Optical scales of X-Y and W axes are provided with pressurization.

**TECHNICAL DESCRIPTION
AUTOMATIC TOOL CHANGER****FDT 7.3-1**

The machine-tool spindle is equipped with orientated spindle stop for the change positioning of the tools.

The device for the automatic change of the tools on the spindle is composed of two units :

Chain tool magazin : fixed to the machine-tool column.

The rotary chain motion is driven by a permanent magnetic, self-breaking D.C. gear reducer and relevant controlled feeder.

The distance between the tools locations is 130 mm, therefore the chain can be used for tools having a diameter of about 250 mm, leaving the adjacent locations free.

The locations hold ISO 50 tools.

Carriage for tool transfer from magazin to spindle with arm sliding horizontally on prismatic guides.

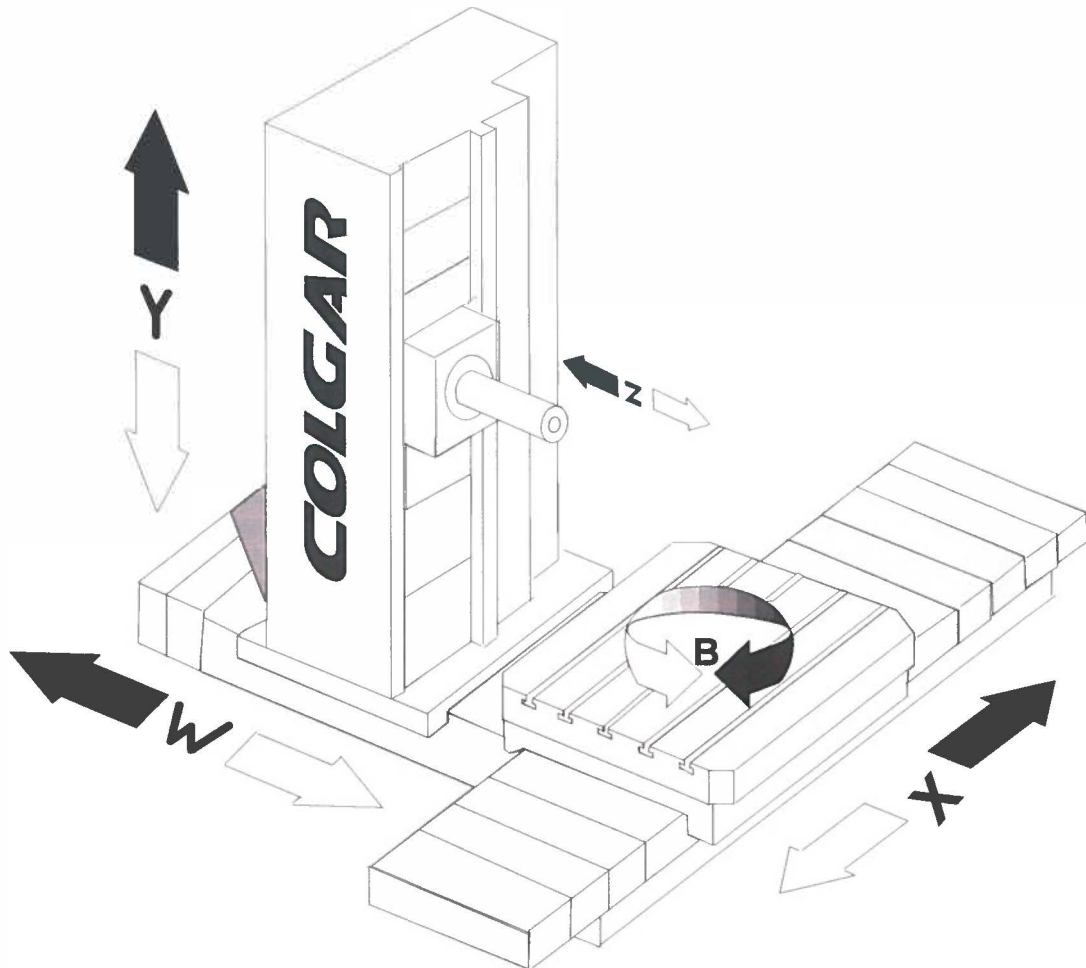
The carriage is driven by a permanent magnetic self-breaking D.C. motor, with controlled feeder, gear reducer, chain pinion.

The stand-by position of the carriage is located behind the machine-tool column to prevent from hampering the work processing with the swivel arm.

The tool search takes place on the chain by means of a bidirectional operation with count, CNC Random control.

For tools having a diameter over 125 mm, the storage occurs always in the same position.

On demand even the storage of the tools having a diameter less than 125 can occur always in the same position (fix.Random)

A118**PROG 213 TR 12****“T” SQUARE TYPE WITHOUT RAM WITH SPINDLE**

X-Axis	:	longitudinal travel of table
Y-Axis	:	vertical travel of headstock
Z-Axis	:	axial travel of spindle
B-Axis	:	continuous rotation of table
W-Axis	:	axial travel of column