

# FNC 60-A20



**LEBLOND MAKINO**

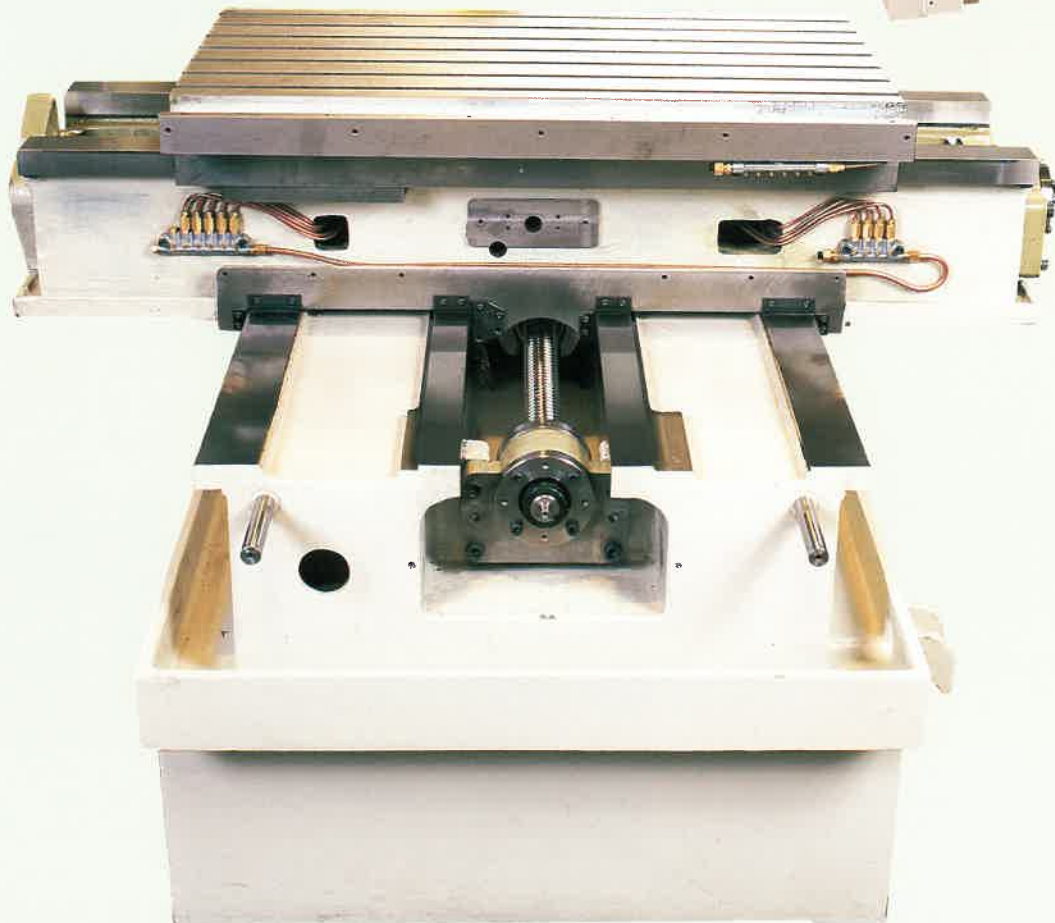
# HIGH PRECISION, HEAVY DUTY AND A WIDE RANGE OF MACHINING...

- FNC60 is a high performance - high speed - high precision - high power machine. It is an ideal installation for a wide range of part production.

## HIGH RIGID MACHINE STRUCTURE

The secret of High Precision Machining...

- The machine body is a monoblock box type design with ample rib reinforcements. It provides high damping qualities and improved thermal and mechanical rigidity.
- Superior positioning accuracy and stable cutting are realised with 4 large hardened and ground guideways in bed.
- All the slideways are incorporated with antifriction TURCITE-B to eliminate 'SLIP-STICK' effect and damping against vibration.
- Z axis Rectangular slideways are hardened and ground and they withstand large cutting thrust and moment.
- Z axis Slideways are protected against chips.



# HIGH PRECISION AND LONG-TERM STABILITY...

## PRECISION SPINDLE FOR HEAVY DUTY AND RELIABILITY

The cartridge type spindle features a large diameter spindle supported by Ultra precision bearings.

- Air jet stream through spindle collar provides cover for any micro particle to enter spindle area.
- Retention of cutting tool in the spindle is by bevelle disc springs with shock-free ejection by Pneumatic System.

## EFFICIENT CUTTING FLUID SUPPLY AND SMOOTH CHIP DISPOSAL

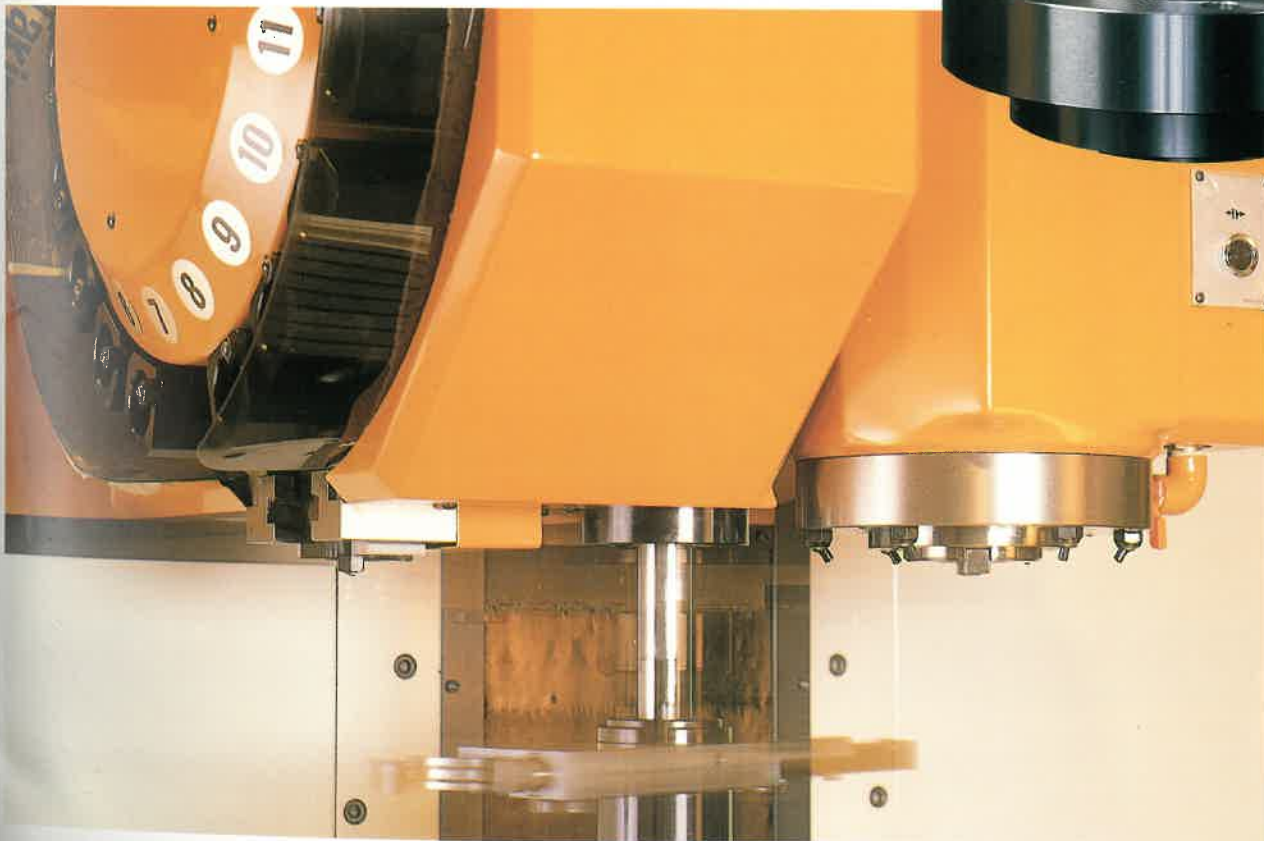
6 nozzles around the spindle allow ample supply of coolant.

- Chip discharge chute with the chip-guard at the rear of the table and wipers are fitted to clear chips.
- The cutting fluid and coolant are separated to prevent contamination. The coolant tank has two partitions.

## OUTSTANDING OPERABILITY

Ergonomically designed Pendant - type control unit provides excellent operating ease.

- Fully enclosed splash guard (optional) provided with large window to permit monitoring of machine and allows easy approachability.



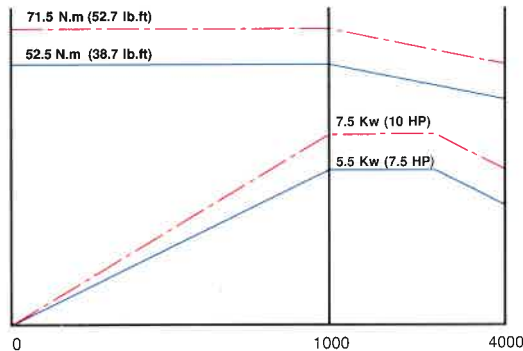


# DESIGNED FOR PRECISION, HEAVY DUTY AND RELIABILITY...

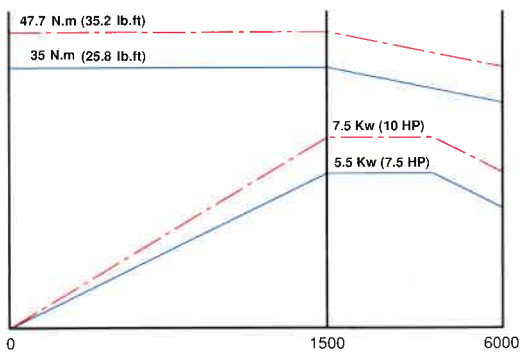
## HIGH SPEED A.T.C.

- The standard ATC configuration stores 20 tools (30 tools option).
- Independent ATC magazine does not affect machining accuracy and it employs mechanical structure to realise lasting performance and reliability.
- High precision positioning - smooth, fast and low noise operation is achieved by A.C. Servo motor with 2500 pulses.
- The random pocket assignment selects the shortest path and time for the next tool. The tool change time is 3 secs.

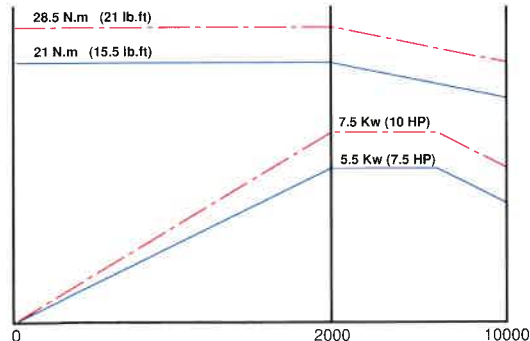
OPTIONAL 40-4000 (Spindle RPM)



STANDARD 60-6000 rpm (Spindle RPM)



OPTIONAL 100-100,000 rpm (Spindle RPM)



30 min. Duty Rate  
Continuous Operating Zone

--- 30 min. Duty Rate  
— Continuous Operating Zone



← OILMATIC  
← TWIN LUBE OIL DISTRIBUTION FOR X, Y & Z AXIS

## HIGH SPEED - HIGH PRECISION POSITIONING

- Large dia (40mm) pretensioned ball screws, supported with double anchors minimize, thermal expansion and ensures good positioning accuracy.
- The rapid traverse rate is 15m/min for X,Y,Z axes. Machining efficiency is further improved by high acceleration/deceleration characteristics.

## THERMAL DISPLACEMENT

- Hydraulic Unit - one of the heat sources has not been used.
- Fins and fans have been incorporated inside spindle head to evacuate heat from Headstock.
- Spindle oil cooler (option) adjusts head to body temperature, reduces thermal displacement and improves precision and accuracy.

CUTTING TOOL	ø 63 & 45° 5 INSERTS	ø 25 DRILL E.M. CARBIDE	ø 20 E.M. H.S.S. co
CUTTING CONDITION			
Speed RPM	700	1300	500
Cutting speed m/min (ft/min)	138 (460)	102 (344)	31 (104)
Feed mm/min (IPM)	600 (23.6)	250 (9.8)	120 (4.7)
Depth of cut - mm (in)	5 (0.2)	-	20 (0.8)
Width of cut - mm (in)	50 (2)	-	20 (0.8)
Depth with Pecking - mm (in)	-	15 (0.59)	-
Volume of metal removal - cm <sup>3</sup> /min (in <sup>3</sup> /min)	150 (9.1)	122 (7.4)	38 (2.3)

# FANUC OM CONTROL

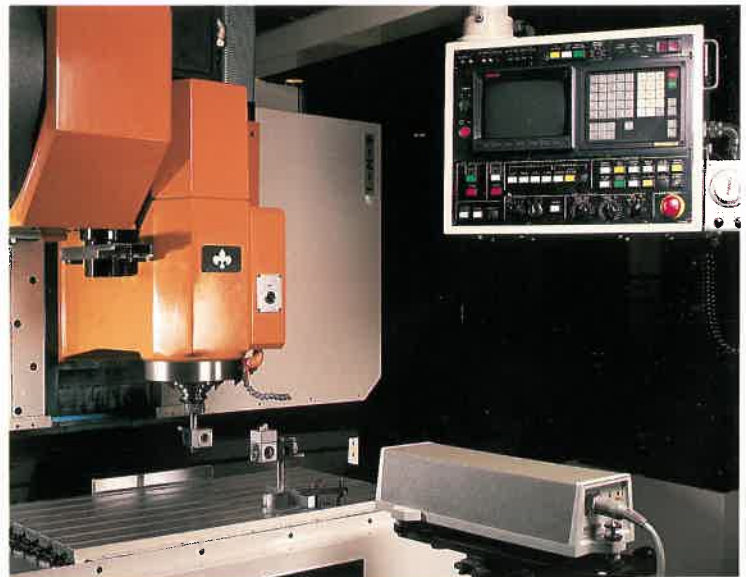
## STANDARD CONTROL SPECIFICATIONS

ITEM	FANUC OM
Controlled axes	3 axes (X,Y,Z)
Simultaneous controlled axes	3 axes for positioning and linear interpolation 2 axes for circular interposition
Increment system	0.001 mm
Interpolation unit	0.001 mm
Max. programmable dimension	± 9999.999 mm
Positioning	G00
Linear interpolation	G01
Multi-quadrant circular interpolation	G02, G03
Feedrate override	0.150% (10% increments)
Rapid traverse override	F0, 25%, 50%, 100%
Automatic acceleration/deceleration	Two stage linear acc/dec for positioning and manual feed. Exponential for feed
Feedrate command	Direct programming of mm/min or inch/min
Exact stop check	G04, G09, G61
Dwell	G04
Reference point return	Manual, Automatic (G27, G28, G29)
Coordinate system setting	G92
Work Coordinate	G54-G59
Spindle speed function	S5 digits direct command
Tool length compensation	G43, G44, G49
Tool Offset	G45, G46, G47, G48
Tool radius compensation C	G40, G41, G42
Tool offset memory	64 offsets
Absolute/Incremental command	G90/G91
Offset Data Input	G10
Canned cycle	G73, G74, G76, G80-G89

ITEM	FANUC OM
Miscellaneous function	M2 digits
Mirror image	M21, M22, M23
Program stop/Program end	M00, M01, M02, M30
Background Editing	
Number of programs	63
Main program/Sub program	Sub program 2 Folds nested
Tape Code	EIA RS-244 ISO 840 Automatic Recognition
Tape Reader without reels	
Tape storage length	80m (262 ft)
Control in/out	
Input/output interface	20mA current loop RS232C
Optional block skip	
Manual absolute on/off	
Machine lock	
Z-axis command cancel	
Auxiliary functions lock	
Dry run	
Autopower out	
External power on/off	
Manual pulse generator	1set
Data protect key	1
Spindle speed override	
Spindle load meter	
Blacklash compensation	
Program Restart	
CRT & MDI	9" high Resolution Screen
Self-diagnosis function	
Stored stroke limit 1	
Stored pitch error compensation	

## OPTIONAL SPECIFICATIONS

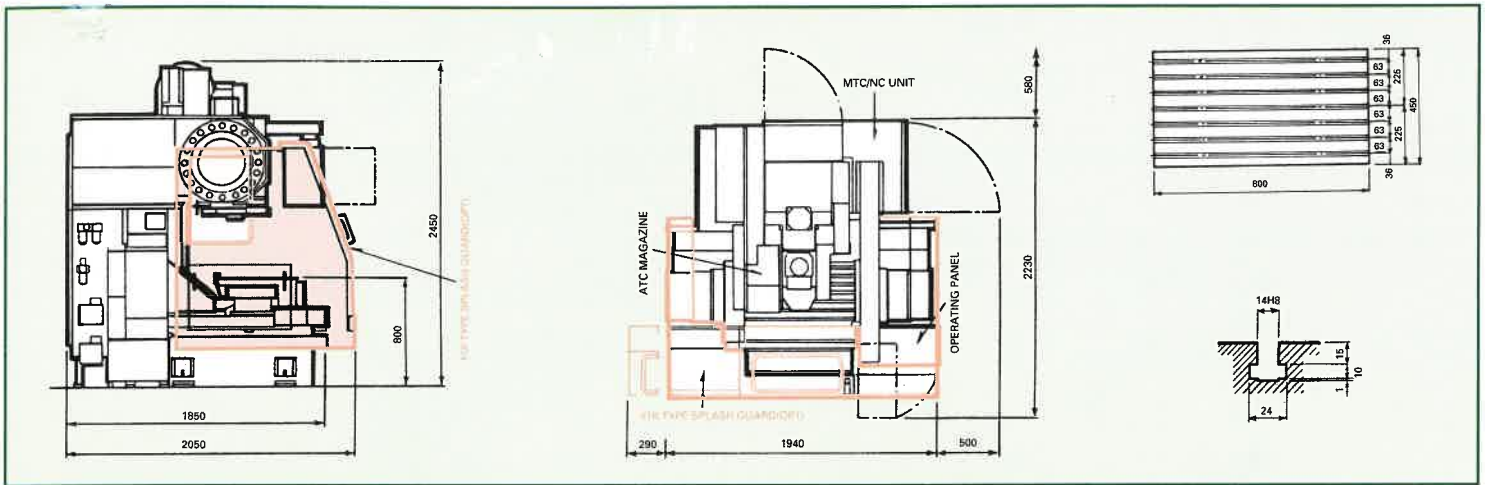
ITEMS	FANUC OM
Additional axis control	4th axis control
Additional offset memory	99-200 Nos
Auto Tool Lg measurement	
Remote Buffer Unit	
High speed skip function	
Playback	
Enhanced part program editing	
MEM-storage length	Max 120m, 320m
Conversational programming with graphic function	
Menu programming	
Pattern data input	
Custom macro A-type	
Order made macro	
Run hour display	
Graphic display	
Coordinate System Rotation	G68, G69
Helical Cutting	
Polar Coordinate	G15, G16
Automatic Corner Override	G62
Scaling	G50, G51
Optional angle chamfering corner rounding	



*Laser check for positioning accuracy*



## MACHINE LAYOUT



## MACHINE SPECIFICATIONS STANDARD

TABLE	SPECIFICATIONS			
	METRIC	IMPERIAL		
Table Working Surface	800 x 450 mm	31.5 x 17.7 in		
Axes Travel (X,Y,Z)	600 x 400 x 400 mm	23.6 x 15.7 x 15.7 in		
T-slot(Size x No)	14mm x 7	.563 in x 7		
Load Capacity	400kg	880 lbs		
Feed Rate	1 - 5000 mm/min	0.04 - 197 in/min		
Rapid Traverse (X,Y,Z)	15 m/min	600 in/min		
<b>SPINDLE HEAD (Z AXIS)</b>				
Spindle Nose	ISO 40			
Counter Balance	Mechanical			
Rapid Traverse	15 m/min	600 in/min		
Feed Rate	1 - 5000 mm/min	0.04 - 197 in/min		
Spindle Nose To Table	150 - 550 mm	5.9 - 21.65 in		
Spindle Centre To Column	460 mm	18 in		
Speed Range (Direct Drive)	40 - 4000 rpm			
*Oilmatic Required (OPT)	*60 - 6000 rpm			
	*100 - 10000 rpm			
Tool Clamp Force	750 kg.f	1650 lb.f.		
<b>BALL SCREW X,Y,Z AXES (DIA)</b>	40 mm	1.57 in		
<b>MOTORS</b>				
Spindle Drive (Cont./30 mins)	A.C. 5.5/7.5kW	7/10hp		
Axes Drive X,Y,Z	A.C. 1.8kW	2.5hp		
Coolant Pump	A.C. 0.18kW	0.24 hp		
Oilmatic Unit	A.C. 0.82kW	1 hp		
Power (STD)	20 kVA			
<b>COOLANT SYSTEM</b>				
Distribution	External			
Operating Pressure	6.3 kg/cm <sup>2</sup>	89 lb/in <sup>2</sup>		
Tank Capacity	40 l	10.6 gals		
<b>MACHINE ACCURACIES</b>				
Positioning (without scale)	± 0.003	} Full stroke	± 0.00012	} Full stroke
(with scale)	± 0.0015		± 0.00006	
Repeatability (without scale)	± 0.002	} Full stroke	± 0.00008	} Full stroke
with scale	± 0.001		± 0.00004	
<b>ATC</b>				
Number of Tools	20 Tools			
Tool Selection	Random			
Max Tool Diameter x Length	76.2 x 300 mm	3 x 12 in		
Max weight (Incl Tool Weight)	7 kg	15.4 lbs		
<b>AIR SUPPLY</b>				
Pressure	Min 5kg.f/cm <sup>2</sup>	71 lbs/in <sup>2</sup>		
Consumption	0.2 Nm <sup>3</sup> /min	53 Ngal/min		
<b>CNC CONTROL</b>	FANUC OM			
<b>STANDARD ACCESSORIES</b>	Manuals, Service Kit, Levelling Bolts, Plates, Coolant Tank			
<b>TOOL SHANK/PULL STUD</b>	MAS 403-BT40/MAS P40T-1	#40 V - Flange		
<b>MACHINE WEIGHT</b>	4500 kg	9900 lbs		

Imperial conversions are approximated

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## OPTIONAL ACCESSORIES

- ATC 30 Tool
- Special Color
- Oilmatic
- Scale Feedback
- Air Blower
- Oil Mist
- Spindle Speed Override Meter
- Rotary Workhead (With Mechanical Clamp)  
Dia 150, Dia 180mm
- Tailstock For NC Rotary Workhead
- Tool Presetter
- Pilot Light
- Halogen Light
- Run Hour Display
- Splash Guard - C Type
- Splash Guard For Pallet Changer
- Work Cleaning Device
- Through Tool Coolant

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