



BELMAG

MACHINERY CORPORATION LTD.

August 10th, 1994

QUOTATION NO: 5592

D. H. Die-Tex Precision Tool & Die Ltd.,
2112 Front Street,
North Vancouver, B. C.
V7H 1A3

Dear to whom it may concern,

We are pleased to quote you as follows, subject to our General Conditions of Sale attached:

ONE AGIETRON C (CENTRE) CNC EDM SYSTEM MODEL 150C

1. GENERAL SYSTEM DESCRIPTION:

The AGIETRON CENTRE (C) Series EDM diesinking system is designed to provide the maximum in productivity and flexibility in a wide range of applications through its modular design concept and the following standard features:

AGIEMATIC T	Man/machine interface for simple operation and full multitasking.
AGIEPULS	Transistorized pulse generator representing 30 years of Research and Development.
DA 100C-P	Fully programmable electric unit using metering pumps to maintain consistent flow rate.
AGIESCAPE	Exclusive Agie strategies for exiting cutting area to avoid short circuits.
AGIESOFT	Easy to understand, menu based dialogue for simple man to machine interface.
RISE AND FALL TANK	Increased worktable access for easier setups and greater productivity.

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II. SPECIFICATIONS

TRAVELS AND CAPACITIES

Travel Distances	X Axis: 350 mm (13.77")
	Y Axis: 250 mm (9.84")
	Z Axis: 350 mm (13.77")
Mounting Surface (Table)	Length: 580 mm (22.83")
	Width: 475 mm (18.70")
Worktank Dimensions (Internal)	Width: 800 mm (31.49")
	Depth: 515 mm (20.27")
	Height: 320 mm (12.59")
Maximum Workpiece Weight	600 kg (1323 lbs)
Maximum Electrode Weight	200 kg (441 lbs)
Maximum Quill to Table Distance	480 mm (18.89")
Maximum Workpiece Dimensions	Length: 780 mm (30.70")
	Width: 500 mm (19.68")
	Height: 220 mm (8.66")
Rapid Traverse Speed	720 mm (28.34")/minute
Display Resolution X-Y-Z	0.001 mm (0.0001")
Drive Type	DC Servo Motors
Measuring System: Type/Resolution	Encoder/.125 μ m (.000005")
Dielectric Level (min/max)	Programmable (1.0=10.0")
Flushing Connections	8
Programmable Flushing Connections	6
Fume Extractor Connection (Outside Diameter)	178.5 mm (7.02")
Laser-Gauged Electronic Residual Error Correction	X-Y-Z Axes
Central Lubrication	Automatic
Approximate System Weight	3595 kg (7,909 lbs)
Standard Colours:	Machine Tool, Command Unit,
	Generator Dielectric System -
	Grey White NCS1500,
	Trim - Dark Grey NCS7500,
	Worktank - Teal Green NCS0040 B90G

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GENERAL SYSTEM REQUIREMENTS

- Compressed Air Supply:
 - 7 - 8 BAR (100-118 psi) Pressure
 - Free from interruptions
 - The air should be filtered and dried
 - Relative humidity: 80% or lower

- Environment:
 - Environment temperature: less than 28° C (83° F)
 - Recommended temperature: 20° C (68° F)
 - Temperature fluctuations:
 - less than 0.5° C/hour (1° F/hour)
 - Maximum fluctuations: 2°C/24 hours (4° F/24 hours)

- Electric power supply:
 - Nominal 220V (208-240V)/3Ph/60Hz; Approximately 20 KVA
 - Allowable deviation: +/-5% without interruptions 20 msec

Note: Inconsistent or unstable electrical power will adversely affect both machine performance and reliability, as well as having the potential to damage or shorten the life of electrical and electronic components. If the electrical power source is known to fluctuate in excess of specifications above, a power conditioner is recommended. Price upon request.

- Tooling:
 - The AGIETRON 150C is delivered with an air-activated quill chuck as **standard**. Your preference of 3R Macro, Mecatool, Erowa or Hirschmann tooling should be stipulated at time of order. Additional tooling is an option, and is available upon request.

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CNC CONTROL - AGIEMATIC-T

The CNC control is a centrally operated system and uses a menu based dialogue for programming. Inputs are made through soft keys in simple, conversational language. Simultaneous loading of geometric and erosion commands simplify the configuration of a program. Preprogrammed macros for planetary motion and technology assure simplified operation and dramatically shorten learning curves. Following are the standard features of the CNC:

- 14 inch Colour CRT
- Freely programmable, multi-tasking CNC control
- 768 K-Byte memory
- Program load through MDI or 3.5" micro-floppy disk
- Preprogrammed technology covering a wide variety of workpiece and electrode material combinations
- Planetary motion through simple combinations of form and strategy
- Programmable flushing
- Automatic and programmable cycle timer to control speed and length of axes retract which aids flushing
- Pulse flushing capability works in conjunction with cycle timer
- AGIESCAPE servo retract movement strategies (exit from programmed path under poor cutting conditions) are freely programmable
- ACC/ACO protection levels allow for operator determination of process control from the poorest (no flush) to ideal flushing conditions
- Complete program check
- Printer connection via interface RS232-C/V24-

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- AGIESOFT CATALOGS including software modules:

Reference: 20 Tool fixture, and/or workpiece locations on the table from the machine home position

Correction: 200 Workpiece and/or electrode offsets which allow the operator to "correct" for certain deviations and also allows for transformation of coordinates (program rotation)

- AGIESOFT EXPERTRON including software modules:

Measuring Cycles: Allows automatic pick-up for Angle, Corner, Edge, or Centre finding of the workpiece or electrode in any plane. Information on actual versus programmed location is automatically transferred to the AGIESOFT Catalogs which allows the operator to preprogram corrections for electrode offsets or workpiece location. (Does not include measuring sensor)

Electrode Magazines

(ELM) and Robot: Allows for addition of electrode magazine(s) (ELM) and a robot for longer unattended operation

Geometry (GEO): Simplified orbiting strategies for Spiral, Star, Equimode, Axial Helix and 3D Helix orbiting movements

Tectron: Enables the novice as well as the experienced operator to create programs automatically by answering simple questions at the control such as electrode/workpiece material combinations, desired surface finish, electrode undersize and surface area.

4-Axis Path Control:

Enables programming of erosion "paths" through linear and circular interpolation. The operator can program movement of any of the 4 axes of motion in any combination simultaneously.

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AGIEPULS 60 M1 GENERATOR

The AGIEPULS is a fully transistorized, square wave, static pulse generator which is completely programmable from the AGIEMATIC-T CNC control. This generator represents more than 30 years of Research and Development evolution. Final finishes in the 0.2 Ra (8RMS) range are achievable with both copper and graphite electrode materials. Standard features of the generator are:

- Microprocessor controlled
- Single channel operation
- Pulse parameters controlling:
 - Amperage
 - ON/OFF times to 7,500 microseconds
 - Voltage ranges to 250 open gap volts
 - Polarity reversal
- Up to 9,999 preprogrammed parameters soft loaded via floppy disk
- Up to 1,000 operator programmed parameters soft loaded via floppy disk
- Automatic on-screen monitoring of current erosion and efficiency
- In process optimization of the technology
- Input via MDI or by retrieval from technology which is stored on floppy disk
- Technology guideline table for material combinations of:
 - Graphite (2 Qualities)/Steel
 - Graphite/Titanium
 - Copper/Steel
 - Copper Tungsten/Carbide
 - Copper/Carbide
 - Copper/Aluminum
 - Steel/Steel
- All diagnosis is via the CRT with coded numbers and text

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- ACC/ACO Automatic Process Monitoring according to workpiece/electrode material combination and specific flushing condition through:
 - Current reduction
 - OFF Time increase
 - Voltage increase
 - Automatic implementation of Z-axis timer
 - Automatic adjustment of servo response

C-AXIS

Agie features a fully programmable C-Axis which is integrated directly into the quill. It is driven by a DC servo motor, and has a maximum programmable speed of 40 RPM. It is capable of carrying an electrode weight of 50 KG (110 lbs) and a working current of 60 amps throughout its full range of operation or 90 amps stationary.

DIELECTRIC SYSTEM - MODEL DA 100C-P

The DA 100C-P is designed for the maximum in performance with the minimum of maintenance. General specifications of the system are:

- Four (4) paper filter cartridges
- Programmable regulation of dielectric flow for pressure, suction and pulse flushing
- Manually adjustable pressure and vacuum flushing
- Dielectric temperature regulated to ambient or pre-selected level by built-in water/water heat exchanger thermostatically regulated to be connected with the tap water or with a cooling water system
- Capacity: 700 litres (185 gals)

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ADDITIONAL 30 AMP UPGRADE

Increased working current from 60 to 90 amps
(We recommend Option 397.704.8 - DA100C-P with 8 cartridge filters)

DIELECTRIC UNIT DA 200C-AF

The DA200C-AF is designed for longer periods of unattended operation with a minimum of maintenance. General specifications of the system are:

- Long period of autonomy (75 hours at 60 amps)
- Precoated filter for automatic filter regeneration, ejection of the filter cake and recoating with filter medium
- Programmable regulation of dielectric flow for pressure, suction and pulse flushing
- Dielectric temperature regulated to ambient or pre-selected level by built-in water/water heat exchanger thermostatically regulated to be connected with the tap-water or with a cooling water system
- Special compartment for filter aid (Diatomaceous Earth)
- Castor mounted dry sludge container
- Separate clean and dirty tanks
- Capacity: 1200 litres (317 gal)

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CENTRAL DIELECTRIC (DA) INTERFACE

When ordered, this system would be delivered in lieu of the standard dielectric system. It serves as the interface mechanism between the machine tool and an existing Central Dielectric System. Please contact us for specific details.

AGIE ELECTRODE CHANGER

- Electrode changer with integrated clamping mechanism, number electrodes in changer: 28 places
- Maximum weight of one electrode: 15 kg (33 lbs)
- Total weight of all electrodes in changer: 90 kg (198 lbs)
- Maximum electrode dimensions: 55mm x 55mm x 185 mm (2.16" x 2.16" x 7.28") or 105 mm (4.13") with work tank at fully extended position

Note: By altering stations an electrode size of 100 mm x 100 mm x 185 mm (3.93" x 3.93" x 7.28") can be accommodated

- Pneumatic release function
- Electromechanical chain magazine and loading arm drive

ELECTRODE MAGAZINE LEFT

- Electrode magazine with integrated clamping mechanism, number of electrodes in magazine: 4 places
- Maximum weight of one electrode: 5 kg (11 lbs)
- Total weight of all electrodes in magazine: 20 kg (44 lbs)
- Maximum dimensions: 75 mm x 75 mm x 100 mm (2.95" x 2.95" x 3.93")

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- Pneumatic release function
- Electropneumatic linear electrode shuttle

Important note: The optional air pressure intensifier (151.840.6) is recommended for proper operation of either the AGIE tool changer, or AGIE tool magazines when an air pressure of 8 bar (116 Psi) cannot be supplied.

MACHINE TOOL:

T14.500.00	AGIETRON 150C with C-Axis, 60 amp generator and Dielectric System DA100C-P	U.S. \$ 195,300.00
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OPTIONS:

639.329.2	28 Position AGIE Electrode Changer	U.S. \$ 32,700.00
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TOTAL U. S. \$ 228,000.00

**SPECIAL PRICE FOR DEMO M/C AT
AGIE N.C. U.S. \$ 170,000.00**

IMPORTANT NOTES:

OPTIONS Option prices apply only if specified at the time of machine order. If ordered later, field installed prices may apply. Consult your Agie USA Ltd. representative for field installed option prices, delivery and applicability.

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