



Aerospace Solutions From Flow International Corporation

Special duty machine tools  
for waterjet, routing,  
drilling and inspection.



### Three Dimensional Abrasive Waterjet Cutting

- Excellent finish • No secondary operations required
- No material delamination • No heat generated
- No airborne dust or chips • Long tool life • Higher feed rates
- Little or no cutting forces or vibrations • Simple fixturing



Here are just a  
of the more than  
solutions Flow  
has provided

### Large Volume, High Precision Abrasive Waterjet Machines

- Custom size machines
- Work envelopes to 100 feet



### Flexible Contouring Capability

- Two-axis wrist with abrasive waterjet catcher
- Patented focal point design • Automatic jet monitor
- Vacuum assist for piercing composites



### Custom Control Systems

- CNC/DNC
- PC controls
- CAD-CAM



### From Autoclave to Assembly

- Complete part processing • Five-axis heavy duty routing
- Precision drilling and countersinking • Flexible tooling
- Abrasive waterjet cutting • Marking • Inspection



few examples  
n 2,000 system  
v International  
d worldwide.

### Optical Inspection Systems

- High speed surface measurement • SPC reporting
- Non-contact laser sensor • 3-D graphical output
- Direct cloud to CAD comparator • Reverse engineering



### Large Volume, High Precision Machine Tools

- High stiffness bridge structure • Sealed bearings and ways
- Zero backlash patented "Accu-Drive" linear gearboxes
- Machined in geometry, no shims or software corrections



### High Speed Routers

- Trimming • Drilling • Core profiling
- Servo cut off saws • Three to five-axis



### Precision Drilling and Routing

- Spindles to 40 hp and 25,000 rpm • Dust extraction systems
- Direct feedback on rotaries • Zero backlash design
- "W" axis for drill for assembly • Auto tool change • Probe-ready



### Special Tooling Systems

- Precision machine beds • Vacuum fixtures
- Mechanical fixtures • Cutting tools
- Universal holding fixtures



## Total Solutions From A Single Source

Flow Robotics, a subsidiary of Flow International Corporation, is a leading U.S. manufacturer of machine tool and inspection systems for the aerospace industry. Abrasive waterjets from Flow International Corporation have become the global machine tool of choice because, for many applications, they're the most productive method for cutting material. From the time FLOW invented ultrahigh-pressure (UHP) abrasive waterjets in 1982 the company has installed more abrasivejet systems, around the world, than all other UHP manufacturers combined. FLOW's total system solutions design team—more than 200 strong from sales, technical service, project engineering, and manufacturing engineering departments as well as specific industry experts—has expertise in virtually every aerospace machining application. FLOW's regional training and applications laboratories in Seattle, Detroit, Louisville and Burlington, Ontario test customer applications every day to assure the highest possible quality and productivity.

No other company in the world offers the comprehensive solutions that FLOW provides, with manufacturing and sales facilities in the U.S., Canada, Europe, South America and Asia. Flow Robotics has dedicated resources in engineering and development to the precision machining of aerostructures. From simple three-axis waterjets and routers to the large multi-process, fourteen-axis trim and drill cells, FLOW has provided more composite machining systems than any other machine tool manufacturer. FLOW has developed systems for the proof and implementation of "fixture-less" or "determinate assembly". This required the design of structures, drives, rotary axis, and spindles of much higher accuracy than had been achieved in previous machine tools of this size. These trim and drill cells have now become the industry standard for determinate assembly systems. Many of these machines have multiple-process capability. A part out of the autoclave may be loaded on the system, trimmed with abrasive waterjet, routed, drilled and inspected, and be ready for assembly, all on one setup.

FLOW uses the latest state-of-the-art engineering tools to design its systems. FLOW's mechanical engineering department utilizes solid modeling, real time kinematic simulation, and dynamic finite element analysis in machine design. The electrical engineering department designs its own PC-based controls and also integrates commercial CNC and robot controls. In electrical design, the newest high level language compilers and computers are used for software development. All of FLOW's servo systems are designed utilizing servo sizing and analysis software. Any new design is thoroughly tested and simulated for range/interference, stiffness/deflections, fatigue, servo performance, and software functionally, before being built. This method of engineering has been proven hundreds of times by the performance and reliability of the many special machines FLOW has supplied.

### Flow International Corporation

is the world's leading developer and manufacturer of ultrahigh-pressure (UHP) waterjet technology for cutting, cleaning and food safety applications. FLOW provides total system solutions for industries including automotive, aerospace, paper, surface preparation, and food production.

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