FORCE ROBOTS LLC

TURBINE BLADE FINISHING • POLISHING • DIE LINE REMOVAL
DIMENSIONAL GRINDING • FINE ASSEMBLY

TOUCH ROBOT
Combining the precision of a machine with the finesse of the human hand.

Advanced Capabilities
• Learns part location and form by taking gentle contact measurements.
• Generates its own machining paths.
• Direct interface with the workpiece’s CAD model to reference desired results.
• Closed-loop task execution delivers consistent results despite work variation.

Naturally Responsive Dynamics
• Low friction, backdrivable joints
• Smooth actuation
• Light-weight and low inertia links
• Rigid tubular and box construction

Ergonomic and Easy to Use
• Velocity and force limited for safety
• Nearly silent operation.
• Positioned by direct manipulation. No teach pendant is required.
• Programmed and operated with a point-and-click, web browser interface.

Integrates with Existing Processes
• Uses familiar material removal tools.
• Preconfigured, table-top mounting for turnkey installation.
• Compact footprint
• Metal chip recovery option
• Open controller hardware and OS
• Uses standard motion control components

Low Maintenance
• No fragile force/torque sensor. Forces are felt at the motors.
• Brushless motors and sealed bearings.
• Long-lived cable transmissions need no lubrication and are resistant to the effects of dirt and grit.
• Convection cooling of drives and control mean no filters to replace or fans to fail.
• Motor control distributed to robot frame drastically reduces wire flex and abrasion. The only routed conductors are power and communications buses.
Specifications

<table>
<thead>
<tr>
<th>Axes</th>
<th>6 (4 arm, 2 positioner)</th>
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</thead>
<tbody>
<tr>
<td>Reach (mm)</td>
<td>500 mm</td>
</tr>
<tr>
<td>Positioning Repeatability (mm)</td>
<td>± .010</td>
</tr>
<tr>
<td>Measuring Repeatability (mm)</td>
<td>± .010</td>
</tr>
<tr>
<td>Continuous applied force (N)</td>
<td>30</td>
</tr>
</tbody>
</table>
| Maximum Speed (degrees/s) | J1 300  
J2 300  
J3 300  
J4 360  
J5 250  
J6 1500 |
| Inertia, center of workspace, from external perspective (Kg-m²) | J1 0.22  
J2 0.44  
J3 0.14 |
| Equivalent mass at end effector, center of workspace (Kg) | J1 1.30  
J2 1.61  
J3 0.80 |
| Power | 120VAC or 230 VAC  
400 Watts |
| Mass | 100 Kg |