

ServoWorks™ S-140M™ & S-160M™:



Shape Cutting Capabilities and Features

Overview

ServoWorks™ S-140M™ and S-160M™ are innovative PC-based industrial CNC controllers that are ideal for many shape cutting applications: laser cutting, plasma cutting, diamond glass cutting, oxyfuel cutting and waterjet cutting machines.

ServoWorks™ S-140M controls 7 axes plus a spindle: 5 coordinated CNC axes and 2 axes that can be used for PLC axes or for synchronous control. ServoWorks S-160M controls 15 axes plus a spindle: 7 coordinated CNC axes and 8 axes that can be used for PLC axes or for synchronous control.

Product Features

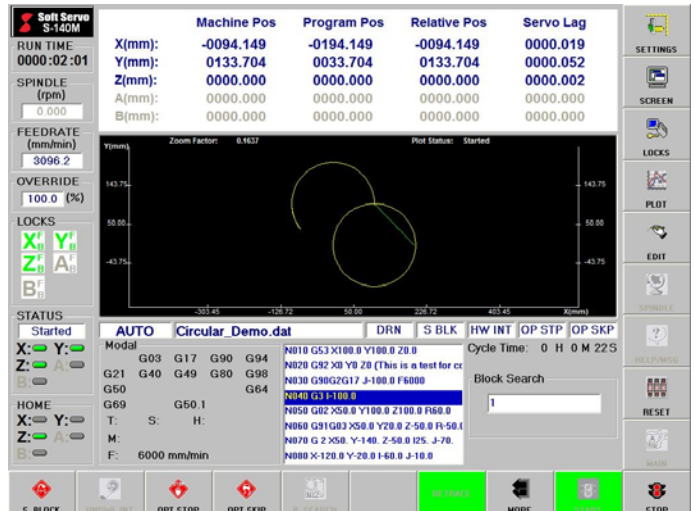
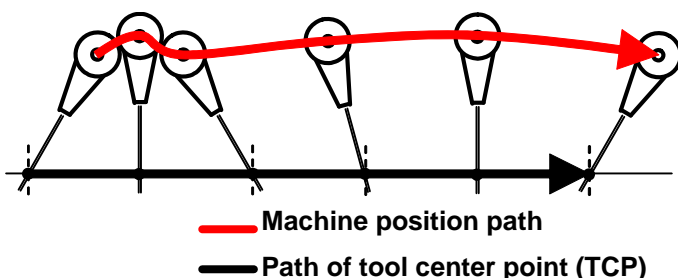
- 5 or 7 axes simultaneous control (S-140M or S-160M, respectively)
- Complete dual-axis synchronous control
- 1000 cycle three-dimensional dynamic look-ahead contour control (3D-DLACC) with pre-interpolation acceleration for high-speed, high-precision cutting
- Many shape cutting functions.

Velocity Control in Circular Interpolation

Automatically adjusts (reduces) circular interpolation speed according to the circle radius and the maximum allowable machine acceleration/ deceleration, to meet the specified trajectory accuracy.

Tool Center Point (TCP) Control

- Compensates for the distance between the actual tool position (i.e. the tip of the nozzle) and the tool center point (the theoretical tool position) – the program position is actually shifted to account for the tool center point, as opposed to compensating each actual movement command in the part program.
- The actual trajectory of G code is applied to the tool center point, and the tool center point acts independently from axis movement or angle movement. The tool center point moves at the feedrate specified by the part program, along the path specified by the part program.
- Simplifies the programming of complex workpieces.

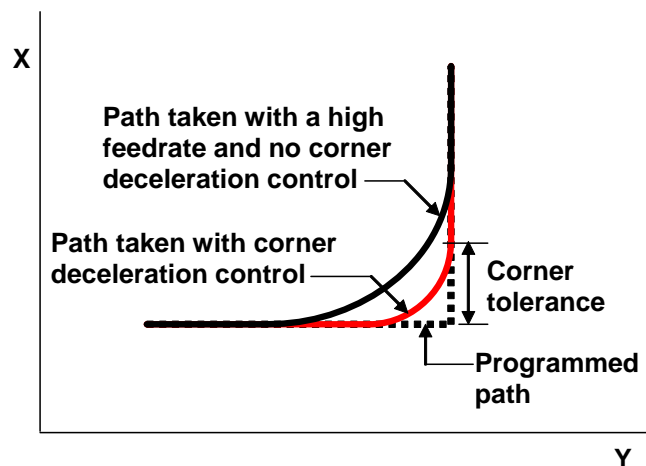


Quadrant Protrusion Compensation

- Optimizes cutting precision by preventing protrusions and unevenness due to lost motion when an axis reverses motion
- Applies to circular compensation and “V” shape cutting

Corner Deceleration and Velocity Control

- Creates sharper corners while maintaining high feedrates away from corners
- For a each “corner” (specified by a user-defined angle), the cutting feedrate near the corner is automatically decelerated to a user-specified corner feedrate to increase the working accuracy to that of low feedrate processing. The user can specify whether or not to perform an in-position check at each corner, to further increase accuracy.



Block Search

During part program execution, you can use the “block search” function to search for a specific block based on a sequence number (N), a tool number (T) or an M code (M), and then restart execution from that block.

This block search is not a simple text search; rather it is a more useful “search with calculation” that extracts data from each previous block before checking to see if the current block is the target block. While searching the part program line by line for the target block containing the specified N, T or M number, ServoWorks S-140M/S-160M also runs the part program line by line, and tracks the location of each axis. In this way, for each line of code in the part program, the current modal information for each G code group, the current T code, feedrate, macro parameters, etc. are maintained.

This is comparable to running ServoWorks S-140M/S-160M in Simulation Mode, except that no tool movement is simulated on the screen. No tool movement occurs while this “search with calculation” continues.

Upon reaching the target block, ServoWorks S-140M/S-160M moves each axis to a reentry position – its programmed position just prior to this block (the programmed position has been continuously updated during the block search), and then continues execution of the part program beginning with the target block.

This complicated algorithm allows you to start execution at the target block, with all the “knowledge” (data) of what transpired in all of the previous blocks.

Retrace Function

There are many reasons that the CNC may continue to move even if cutting is no longer taken place: a piece may be left uncut due to an unstable plasma emission process or an uncertain workpiece thickness, or the garnet running out on the waterjet or your gas going off. With a complicated shape, it's difficult to manually reverse and move backwards along the cutting path to fix this problem. With the retrace function, though, you can stop the cycle, move the tool in the reverse direction with the “RETRACE” button, retrace the programmed path up to the last 200 blocks, and then move the tool forward again along the retraced path.



1. CNC cutting begins. The dashed path indicates that the CNC still moves, but no cutting occurs; the operator notices, and presses the “RETRACE” button.



2. The CNC reverses direction and follows the reverse path until the operator presses the “RETRACE” button again.



3. CNC cutting continues along the original path and executes the remainder of the part program.

Straightness Compensation

- Compensates for a lack of straightness along the total length of an axis
- Compensates for the lack of squareness between axes

Macro Variable Display

- View up to 20 macro variable values at one time (global, permanent or system variables)
- Useful for tracking tool length or radius compensation values (either wear or geometry)

Normal Direction Control and Bevel Cutting

- A tool with a rotation axis can be controlled so that it is kept constantly perpendicular to the tool path, as the tool moves in the X-Y plane.
- ServoWorks S-140M calculates the required geometry modifications to apply to tool movement, to keep the tool normal to its path at all times.
- Ideal for clean and functional bevel cutting and chamfering, particularly rotary bevel cutting.
- Greatly simplifies the programming of the beveled shapes and chamfers that are common in plasma cutting and fuel cutting applications.

