Soft Servo Systems' 3D-DLACC:

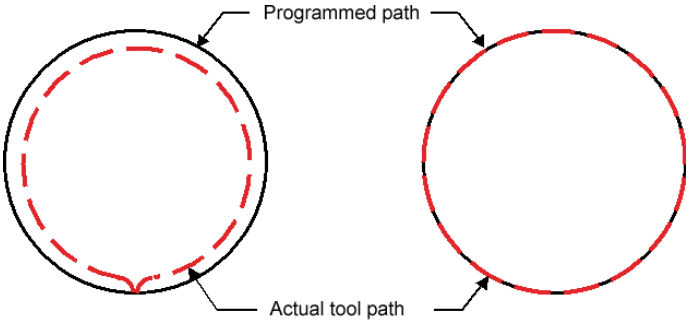
Advanced 3D Contour Control for High-Speed Machining

Soft Servo SYSTEMS, INC

Overview

Soft Servo Systems has re-engineered and improved their highly advanced, highly specialized look-ahead function for high-speed machining: three-dimensional dynamic look-ahead contour control (3D-DLACC) with pre-interpolation acceleration for high-speed, high-precision machining.

Soft Servo Systems' 3D-DLACC, soon to be the gold standard of high-speed precision machining, is available for ServoWorks MC-Quad, ServoWorks S-100M, ServoWorks S-120M, ServoWorks S-140M and SMP products.



Conventional Control

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PC Requirements

Due to the significant amount of computation required by the DLACC, we suggest the following computer configuration for 3D-DLACC:

- CPU: Intel Pentium IV 2 GHz or faster
- Memory: 128 MB or more

3D-DLACC: faster feedrates, higher precision.

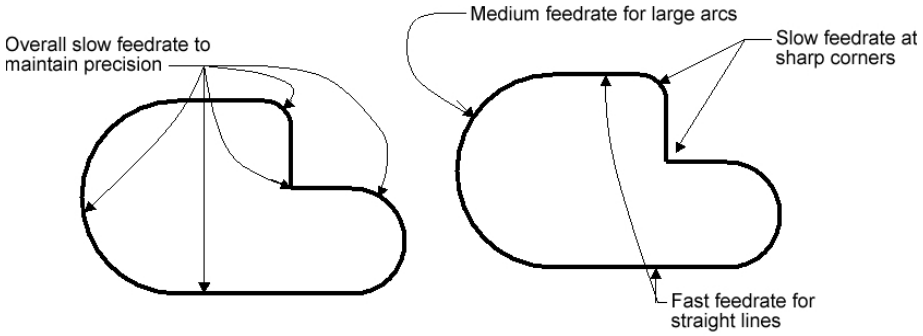
Look-Ahead Functions Vs. Conventional CNC

Look-ahead functions are becoming common in the CNC marketplace, because they provide better performance than conventional controls without look-ahead. Soft Servo Systems' 3D-DLACC is no exception: it solves problems with close points, corner rounding, gouging and overshooting:

Three-dimensional surfaces and complex, free-form shapes can be designed with CAD/CAM that produces part program output consisting of many, many linear movements over a fine mesh of very closely spaced points to produce a highly finished surface. With such tiny movements, and closely bunched points, there are constant slight direction changes that must be made in rapid succession. These small linear movements can be optimized with 3D-DLACC to move the tool over the milling surface as quickly as possible while not sacrificing accuracy.

For part program commands using circular, helical or exponential interpolation, or milling long linear segments, 3D-DLACC provides calculated deceleration at corners and other changes in direction, to eliminate corner rounding and to get the most accurate possible tool path. Without look-ahead, there is the potential for a tool that is moving at a high feedrate to overshoot the tool path when changing direction, leading to gouging of the part – one block of data is executed before the previous block of data is quite complete because the tool is moving too quickly.

Look ahead produces sharp corners by preventing overshooting of the tool path with deceleration as necessary for changes in direction (while still maximizing feedrates on long segments), so the tool isn't moving too quickly to "make the corner." If the control looks ahead and sees no deviation in the upcoming tool path, no deceleration is required. If the control looks ahead and sees a 90° deviation in the upcoming tool path, it may decelerate the tool to a total or near total stop to produce an accurate corner.



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3D-DLACC's Advantages Over Competing Look-Ahead Functions

Soft Servo Sysems' technologically superior and flexible 3D-DLACC is unique among the many different look-ahead functions offered by CNC vendors for 3D contours, milling or molding:

1) 3D-DLACC has a more advanced and complex algorithm for acceleration/ deceleration before interpolation, maximizing speed and making the best use of the machine's maximum acceleration/deceleration rate, resulting in higher performance.

2) 3D-DLACC looks ahead a constant 1000 cycles, resulting in greater efficiency and more consistent performance. Most other look-ahead functions look ahead a certain number of blocks: depending on the length of time necessary to complete these blocks, the control could be looking ahead too far (wasting computing power), or may not be looking ahead long enough to decelerate enough when needed. [For the VersioBus II interface system, 1000 block look-ahead results in one-second look-ahead, due to the 1 ms position feedback rate.]

3) 3D-DLACC provides flexibility, allowing a choice among prioritizing accuracy, prioritizing speed, or finding a balance between accuracy and speed that optimizes cutting efficiency.

   To reach the highest possible accuracy while still maximizing feedrates whenever possible, 3D-DLACC works without any smoothing filter. (Smoothing filters, necessary in the absence of look-ahead, deteriorate the precision of multi-axis interpolation.)

   To increase speed by sacrificing some accuracy within an allowable tolerance, 3D-DLACC works with an adjustable smoothing filter. A long look-ahead smoothing filter results in smoother motion and faster feedrates, with a less accurate tool path; a shorter look-ahead smoothing filter results in a more accurate tool path, with slower feedrates.