



---

## Advanced Controller Functionality

# AeroScriptPlus

---

### Plus Means More Capabilities

With the AeroScriptPlus feature, available in your Automation1-iSMC controller configuration, you can run any AeroScriptPlus program—including Optical Alignment Algorithms and Tool Center Point programming system configuration—on your controller.

AeroScriptPlus programs are specially designed AeroScript library files that you can purchase via the AeroScriptPlus product configurator. Each AeroScriptPlus program supplies special canned functionality for specific systems and applications. These files are encrypted and can only be run on Automation1 controllers that have AeroScriptPlus configured.

More AeroScriptPlus programs are coming soon to Automation1, and capabilities will continuously improve.

### Automation1

The Automation1 AeroScriptPlus feature is part of the user-friendly Automation1 motion control platform, which includes the following:

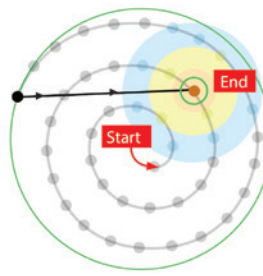
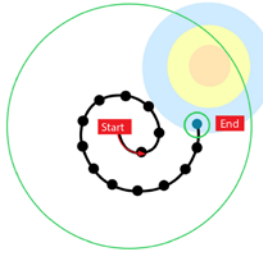
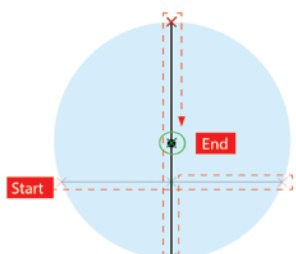
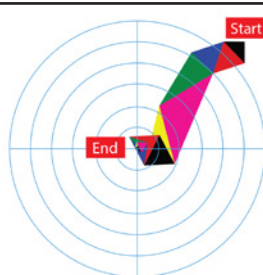
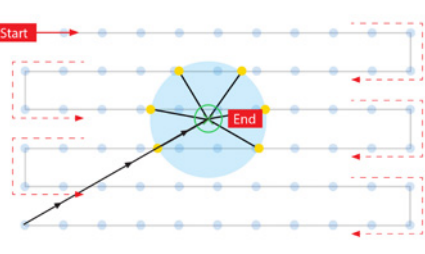
- ◆ **Development Software**
- ◆ **Controls**
- ◆ **Motor Drives**
- ◆ **Fiber-Optic HyperWire® Communication Bus**



### KEY FEATURES:

- ◆ Solves complex problems such as **OPTICAL ALIGNMENTS** and **TOOL CENTER POINT PROGRAMMING**
- ◆ Enables **AEROSRIPTPLUS FUNCTIONALITY** on each controller you deploy
- ◆ Runs **MULTIPLE AEROSRIPTPLUS** programs simultaneously with a single license
- ◆ Includes complex **APPLICATION SPECIFIC** programming that is ready for use

## AUTOMATION1 AEROSCRIPTPLUS SPECIFICATIONS

OPTICAL ALIGNMENT ROUTINES			
Topic	Function	Description	
Spiral Search	<b>SpiralFine()</b>	The SpiralFine function works in a very similar way to the SpiralRough function, except that it includes a maximum radius parameter instead of a power threshold parameter. The algorithm terminates when this radius is reached, and then the axes return to the point of the highest power reading.	
	<b>SpiralRough()</b>	The SpiralRough function executes a spiral motion pattern, sampling the power during the profile, with the origin of the spiral being the axes coordinates at the time the command is executed. The algorithm terminates when the power reading reaches a user-defined threshold.	
Centroid Search	<b>Centroid1D()</b>	The fiber Centroid... functions are a fiber alignment method that is particularly useful when the power peak is a plateau or has multiple peaks. Centroid1D(), Centroid2D() and Centroid3D() will move to the edges of a power peak and then use this data to identify the center of the power peak.  <i>Requires first light!</i>	
	<b>Centroid2D()</b>		
	<b>Centroid3D()</b>		
Intelligent Process Search	<b>FastAlign2D()</b>	The FastAlign... functions use an intelligent process to explore an area and locate the optimized power location. FASTALIGN can be configured to use anywhere between two and six axes, and finds a point where the power reading exceeds a user-defined threshold. These functions provide simple use in complex alignments, six-degree-of-freedom alignments and coordinate alignments across aligners.  <i>Requires first light!</i>	
	<b>FastAlign3D()</b>		
	<b>FastAlign4D()</b>		
	<b>FastAlign5D()</b>		
	<b>FastAlign6D()</b>		
Raster Scan Search	<b>Geocenter()</b>	The Geocenter function executes a raster scan pattern of user-defined size and records each time the pattern passes through a userspecified power threshold. Once the raster scan is completed, the algorithm calculates the geometric center of all the power distribution defined by the recorded threshold points.	
Local Power Search	<b>Hillclimb()</b>	The Hillclimb function is used to search in a positive or negative direction along one axis at a time for a local power peak. If the peak is not identified in the first direction, the direction is reversed and the rest of the axis is explored. Once a peak is found, the algorithm returns to this position.	

**AUTOMATION1 AEROSCRIPTPLUS SPECIFICATIONS**

<b>TOOL CENTERPOINT PROGRAMMING</b>		
Topic	Description	
<b>TCP Machine Tool Standards</b>	<p>Standards exist in the machine tool industry for associating linear and rotary axes and defining positive move directions of all axes. Adhering to these standards removes uncertainty when anticipating how machine axes will move in response to motion commanded in part space.</p> <p>The positive move directions and the orientation of the axes in the Part coordinate system are defined per the right hand rule as shown to the right. The left hand image is for positive linear convention and the right hand image is for positive angular convention.</p>	
	<p>Rotation occurs about a part linear axis per the relationship shown in the figure to the right. When TCP is active, the A axis rotates the tool center point about the part X axis, the B axis rotates the tool center point about the part Y axis and the C axis rotates the tool center point about the Z axis.</p>	
<b>Machine Configuration</b>	<p>To perform TCP kinematic calculations, the controller must know the locations of the tool, part and rotary axes and the configuration of the rotary axes.</p> <p><b>Offset Position Configuration</b> A common approach to establishing machine configuration is to specify offsets between the points of rotation of the rotary axes and the location of the tool and the part. This configuration mode accommodates the input of coordinates based on their distances from the Part or Tool Tip they are connected to.</p> <p><b>Absolute Position Configuration</b> Another common approach is using the absolute positions of all system elements based on their location in a "World" coordinate frame.</p>	
<b>Acceleration Limiting</b>	<p>The CoordinatedAccelLimit parameter will stop or slow down path velocity for non-tangent linear moves. The DependentCoordinatedAccelLimit parameter will stop or slow down program velocity for non-tangent rotary axis moves.</p> <p><i>Note: The effect of changing speed on the machining process may prevent the use of Acceleration limiting in applications which require constant surface speed.</i></p>	

chart continued on next page

## AUTOMATION1 AEROSCRIPPLUS SPECIFICATIONS

TOOL CENTERPOINT PROGRAMMING		
Topic	Description	
<b>Commanded Velocity Filtering</b>	<p>A low pass IIR filter (TrajectoryIIRFilter) or moving average FIR filter (TrajectoryFIRFilter) can be applied to the velocity command of the virtual and/or physical axes. The filter is applied continuously and will modify the program path by rounding all of the transitions between moves, even those that do not exhibit large accelerations.</p> <p>The positions of the linear servo axes are calculated from the virtual x/y/z axes and the servo rotary axis commanded positions. Similar filter settings should be applied to both virtual x/y/z and physical A/B/C axes to ensure consistent phasing of commanded position used to calculate the servo X/Y/Z positions.</p> <p><i>Note: Applying a filter to the servo rotary A/B/C axes and servo X/Y/Z axes will cause the servo X/Y/Z axes to lag behind the servo rotary axis position command.</i></p>	
<b>Path Optimization</b>	<p>Lead on/lead off moves or “skywriting” is commonly used in X/Y applications to ensure the tool is only engaged in the material at constant speed. The calculation of lead moves or skywriting sequences is more complex on 3D shapes as the inserted path geometry cannot cause a collision between the part and the tool. Normally the process consists of a lead-off and lead-on move inserted between two nontangent features. The tool is turned off before the lead-off at constant surface speed. The path velocity decelerates to 0 during the lead off move. The controller moves to the start of the lead-on move, which is tangent to the next path segment and the system reaches constant speed during the lead-on move and enable the tool at the end of the lead-on move.</p>	

## AEROSCRIPPLUS ORDERING OPTIONS

<p><b>File Type</b></p> <hr/> <p><b>Compiled AeroScript Library File</b></p> <p><b>Files*</b></p> <hr/> <p>-F1      Optical Alignment Algorithms, Compiled AeroScript Library File</p> <p>-F2      Tool Center Point Programming, Compiled AeroScript Library File</p> <p><small>*Note: to load and run AeroScriptPlus files on your controller, your Automation1-iSMC motion controller must be configured with the -AP1 option.</small></p>
---