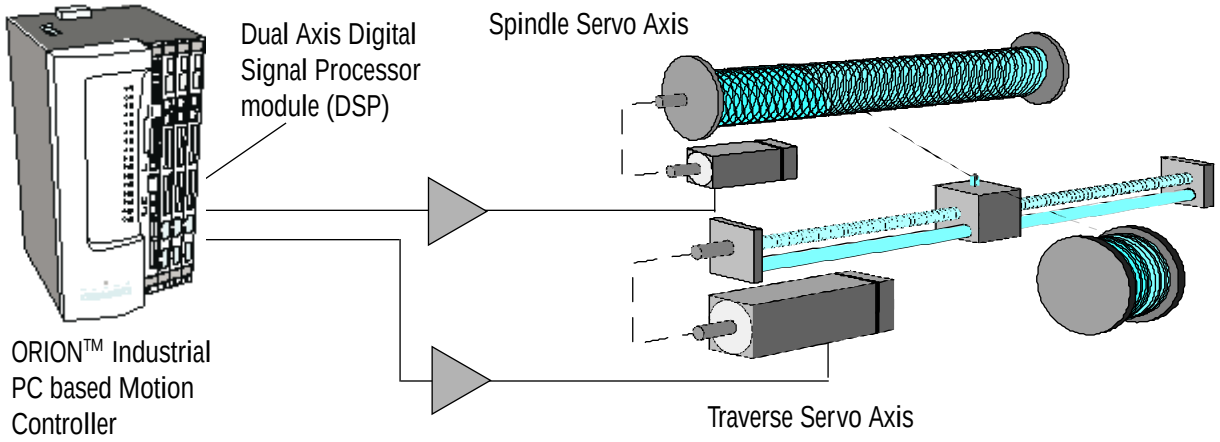
TRAVERSE WINDING



APPLICATION FEATURES AND BENEFITS

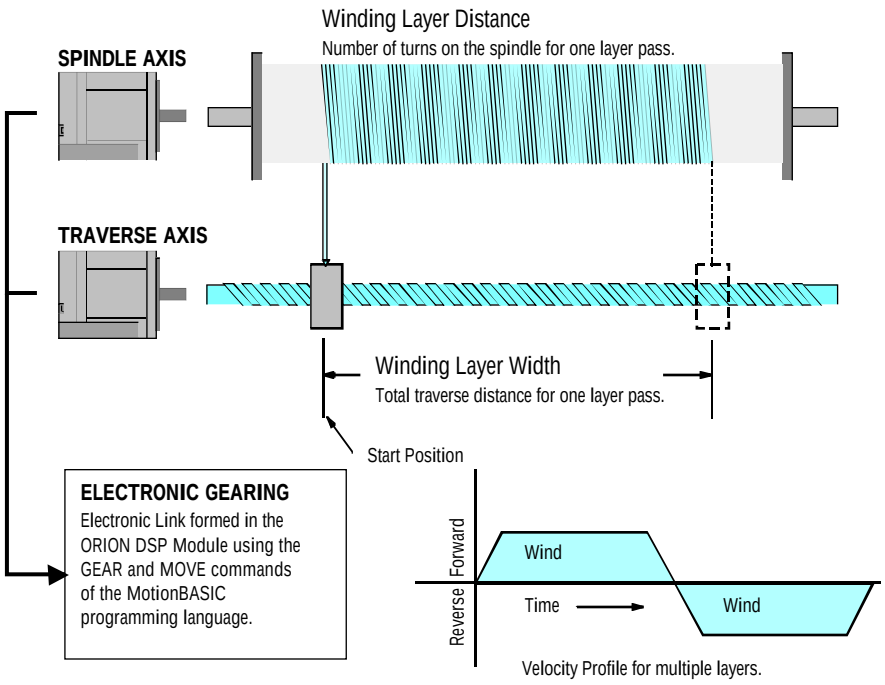
- **Complex wind patterns** --- can be designed into a winding machine by capitalizing on the software capability built into the ORION™ Motion Controller that allows control of the DSP Axis Module servomotor functions and commands integral to the MotionBASIC® programming language .
- **Multi-axis servo control** --- provides versatility in machine control development by allowing flexibility to be designed into the software programs for winding sequences.
- **Quick end-wind reaction** --- all digital servo system utilizing multi-axis electronic gearing capabilities make end point transitions accurate and repeatable, increasing product quality decreasing mechanical wear.
- **Automatic layer counting** --- precise sequences needed in winding critical product segments are quickly developed in the MotionBASIC® programming language.
- **Wind angle control** --- is provided through the advanced mathematical calculations done quickly by the high speed math processor.
- **Fast product changes** --- versatile operator interface touchscreens and mass data storage capabilities of the ORION™ controller allow product recipes to be developed providing simple and quick product changeovers.
- **Batch processing** --- full job control can be programmed into an ORION controller increasing the ability of a winder to manufacture products with minimum operator intervention.
- **Quick cycle times** --- ORION's advanced servo control algorithm techniques bring stable control and agility to fast moving transport mechanisms for high throughput.

INDUSTRY FIT

- Coil Winding
- Plastic film spooling
- Motor armature winding
- Air filters, fiberglass layups
- Rope spooling
- Fuse winding
- Capacitor foil cores
- Transformer cores
- Fiber-optic cable
- Dental floss

OVERVIEW

Multi-axis servo systems applied to a traverse winding machine design can bring the benefits of coordinated motion control through electronic gearing methods incorporated in the ORION DSP axis control module. These methods allow the designs to be done using parameters with values reflecting the actual user units such as winding distances and layer widths.



Velocity Profile for multiple layers.

TECHNICAL BRIEF

Traverse Winding

Only two factors of a traverse winding design are needed for effective use of the GEARING statements of the MotionBASIC® programming language. One is the width of the wind layer and the other is the total angular distance or number of turns travelled by the spindle axis to wind one layer. Once these factors are determined, the values are entered as parameters into the GEAR FOR and MOVE FOR program statements as follows:

GEAR traverse FOR layer.width IN layer.distance

The above GEAR FOR statement starts an electronic link between the traverse and the spindle axis that will cover one traverse width for one spindle distance once the spindle is started.

MOVE spindle FOR layer.distance IN wind.time

The MOVE FOR statement will drive the spindle axis the number of turns for one layer and the traverse axis will follow for the specified width. The traverse axis can be brought back to the start position with the following statement:

MOVE traverse TO start.pos IN retract.time

When an application calls for multiple layers such as spooling and armature winding, the ORION controller utilizes the MotionBASIC® REPEAT function. With the REPEAT function, multiple GEAR statements can be placed into the command buffer as a block and continuously repeated by the DSP axis module. Expanding on the previous example, the commands to run multiple layers would be set up as follows:

REPEAT GEAR traverse FOR layer.width IN layer.distance
REPEAT GEAR traverse FOR -(layer.width) IN layer.distance

The MOVE command is sent directly to the DSP axis module and is not part of the block. It is setup as the pacer and executes for the total wind operation

MOVE spindle FOR (layer.distance) * (# of layers)

While the GEAR and MOVE commands are executed on the DSP, the user's program watches the DSP command counter on the traverse axis. After enough repeats have executed, the program injects a single gearing statement to stop the repeat block and finish the winding segment when the count is within one or two layers from the end of the total wind.

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