



Subject: Winding Overview	Product: MP2000, MP2000iec, Sigma-5	Doc#: AO.MCD.06.168
Title: Winding		

Winding

Application Overview

Winding is a procedure to take up and package material in roll form for more efficient handling or in preparation for a subsequent operation. In a typical industrial application, a winder is employed to roll up a continuous or limited length of material such as wire, paper, film, metal or textiles. The winder and finished roll are referred to by different names in different industries.

<u>Industry</u>	<u>Winder Name</u>	<u>Roll Name</u>
Paper, Textile, Film	Winder	Roll
Wire	Takeup, Reeler	Reel
Wire	Spooler	Spool
Metal	Coiler	Coil
Textile	Beamer	Beam

Wound materials may be stretchable or non-stretchable. Winding of stretchable materials is more complex and critical than non-stretchable materials.

Materials typically wound include:

Wire and Cable	Textile Materials
Paper	Glass Fiber Materials
Business Forms	Plastic Film
Metals and Foils	
Metal	
Textile	

Generally, plastic film is extensible (stretchable) material, most other materials can be considered non-extensible. Rolls may be wound by applying drive torque at its center or its surface. As a result the two major categories of winders are:

-Center Winders

-Surface Winders

Winder drives are designed to improve the wound package and eliminate material breakage.





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Application Challenges:

- Control of a motor under dynamically changing requirements
- Acceleration to a fixed speed, deceleration to zero speed
- Changes in speed and torque during operation
- Detailed sequencing for flying slices and roll changing
- Speed and torque need to be controlled
- High process speed
- Wide speed range
- Changes in processed material

Yaskawa Products:

Product	Feature	Benefit
MP2000 Series (MP2300 – MP2200)	48 axis of servo amplifier control from one controller	Complex Winding applications easily handled
	Ethernet, DeviceNet, Profibus modules all available.	One controller for varying customer specifications
	Integrated Machine Controller	PLC, I/O, Motion, and Networking functionally in one unit minimizes integration issues.
	Pre-configured function blocks	Streamlines programming
MP2000iec Series (MP2300Siec – MP2310iec)	IEC61131-3 Programming Environment	Global standard environment provides programming familiarity and consistent performance expectations
	Ethernet/IP and Ethernet Modbus TCP protocols	Most widely used protocols in the industry enhance communication with plant-wide systems
	Distributed network connections to servo axes	Easy quick-connect cable reduces system wiring and improves reliability
	4,8,16 axis control versions with electronic gearing	Best combination of price vs control capabilities
Sigma-5 Servopacks and Servomotors	Autotuning	Out-of-the-box, automatic adaptive tuning requires no intervention or specific knowledge by the installer and speeds installation
	High resolution serial encoder	20-bit resolution translates into excellent speed and torque ripple characteristics. High noise immunity is afforded by serial encoder technology utilizing error-checking algorithms.
	EN954-1 Category3 StopO input	Built-in safety circuit for regulatory compliance





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	High torque to inertia ratio	Dynamic performance in a small space saving design
	High IP ratings available	IP67 on some models permits both solid debris and liquid containments easing machine design requirements
	Auto ID Encoder	Machine commissioning requires no loading of motor data into the amplifier – plug and play operation

Application Details:

The winder drive supplies the necessary torque at a controlled speed to accomplish material windings. Different materials require different tensions during winding, with plastic films very light and cable and steel very heavy tensions. Some materials such as plastic films and papers will elongate and separate if over-tensioned.

Winder drives are classified by their method of control and include:

- Constant Tension Center Winder (CTCW)
- Line Speed
- Dancer Position (pot or transducer)
- Torque Regulated Speed Follower (TRSF)
- Hyperbolic or Differential

Typical processes or sectional machines that include winders:

- Printing press in paper and film
- Wire insulation line in wire
- Galvanizing line in metals
- Casting or extruding line in film

