

Subject: Application Overview	Product: MP2300, MP940, DD	Doc#: AO.MCD.05.111
Title: Rotary Table Indexer		

Rotary Table Indexer

Application Overview

Rotary table indexers position the rotary table to a specific location so that some type of process can be executed. Examples of these processes include removing product from the rotary table, packaging the product, or placing a label on the product. Rotary tables are used across a wide range of industries, from packaging to assembly. Rotary tables can be driven through a gearbox or directly via a direct drive motor.

Application Challenges

- Absolute Position Management – Controller must translate encoder data along with the moves to identify absolute position within the revolution, as well as the number of absolute revolutions
- Positioning w/out Gearbox (DD motor) – Inertia ratio remains higher as the load is directly coupled to the load, requiring unique motor characteristics
- Increased throughput – Higher productivity should result from the addition of this motion control solution due to higher speeds and lower downtime
- Smooth Motion – The solution must yield smooth motion to reduce machine wear produced by jerky accelerations, resulting in increased machine life and lower maintenance (more uptime).

Yaskawa Products

Products	Product Features and Benefits
MP2300 with Sigma II or Sigma III	<ul style="list-style-type: none"> - Pre-developed absolute rotary table indexer Solution Package developed specifically for the Direct Drive servomotor - High-performance Mechatrolink-II motion control network
MP940 with Sigma II	<ul style="list-style-type: none"> - Pre-developed rotary table indexer Solution Package that can be customized to a specific machine using standard servomotors - Easy-to-use Icon Based programming environment
DD Motor	<ul style="list-style-type: none"> - High-inertia, high-torque motors suitable for direct drive applications - Absolute encoder with 20-bit resolution (1048675 counts)

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Application Solution and Benefits

Application Solution Benefits for MP940 with Standard Servomotor

Absolute Encoder Integration

This is the first, and most important, step. Data from the absolute encoder is unusable raw from the controller without translation. The ABSHNDLR1 and ABSHNDLR2 function blocks along with special code handle this important translation, and output the correct value into position monitor.

Inside Revolution Current Position

When the machine is powered up, the axis ladder drawing calculates the current position of the table within one revolution. This current position is modified by the gear ratio to model the true table position. This modified counts/rev is updated every revolution or on reset. It is used to provide a location for when the indexer is recovering from an error, or when the number of positions changes. This allows the indexer to function immediately after having power cut or the emergency stop hit, even if the operator shifts the table after the servo is disabled.

Absolute Revolution Position

The absolute position of the motor advances by a certain static amount per cycle recalculated every time the number of positions per rotation changes. This static amount is put into the SMOOTH function as a range, yielding a smooth path with minimal jerk from one position to another. The output from the SMOOTH function is actually what is added to the absolute position, and translated into motor output.

Application Solution Benefits for MP2300 with Direct Drive Motor

Absolute Encoder Integration

The Direct drive Motor has an integral 20-bit absolute encoder. The Mechatrolink Servopack reports the absolute position to the MP2300 upon power up.

Inside Revolution Current Position

This is done with the use of the offset; this allows the indexer to function immediately after having power cut or the emergency stop hit, even if the operator shifts the table after the servo is disabled.

Absolute Revolution Position

The true absolute position of the motor is in IL8016. The modularized position within one revolution is constantly recalculated. The index is one revolution, and this static amount is put into the SMOOTH function as a range, yielding a smooth path with minimal jerk from start to finish. The output from the SMOOTH function is actually what is added to the absolute position, and translated into motor motion.