



TSUDAKOMA

HOW TO SELECT A ROTARY TABLE

COMPARISON: WORM VS. DIRECT DRIVE

WORM WHEEL / WORM SPINDLE SYSTEM

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| Advantages | High Accuracy | Guaranteed mechanical positioning & repeatability accuracy is very good. Scale option is available for ultra precision. Customer has flexibility to choose according to the accuracy required and their budget. |
| | High Output Torque | Tsudakoma's high torque transfer efficient worm system & gear reduction creates high output torque from a compact servo motor. |
| | High Clamping Torque | Tsudakoma offers various types of advanced clamping technologies, with either a pneumatic or hydraulic supply, based on the table model. |
| | Compact Size | Thinner body design compared with Direct Drive motor system. |
| | Low Thermal Deformation | Chiller unit is not required for rotary table cooling. |
| | Maintenance | Routine maintenance - Easy adjustments. Repairs - Lower cost for replacement parts and labor. |
| | Interface Costs | Standard interface hardware & software required. |
| Disadvantages | Lower Speed | Up to 88.9 RPM (Maximum RPM) |
| | Mechanical Parts Wear | Periodic backlash adjustment may be required based on use and accuracy requirement. |
| | Reversal Error / Lower Finishing Capability | Lower surface finish can be expected due to gear train reversal error when contouring. |

DIRECT DRIVE MOTOR SYSTEM

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| Advantages | High Accuracy | Direct measuring scale feedback system is standard |
| | High Speed Rotation / Indexing | Up to 1,000 RPM Various speed options are available based on Direct Drive motor selection. |
| | No Reversal Error / Ideal for Finishing | No mechanical reversal error. Provides excellent surface finish when contouring. |
| | No Mechanical Parts Wear | Maintenance free. |
| Disadvantages | Low Output Torque | Large size Direct Drive motor required to handle heavy loads, unbalanced loads & heavy duty machining. |
| | Larger Size | Physical size of the rotary table is larger than the same size of a worm system rotary table. |
| | High Thermal Deformation | Direct Drive motors generate a lot of heat. A chiller unit is required based on the application and the accuracy requirement. |
| | Maintenance | Difficult to adjust or repair. Crashes may be catastrophic. |
| | Complex Tuning / Adjusting | Complex servo tuning and adjustment is required for different applications. |
| | Higher Interface Costs | Special interface software is required for Direct Drive motor. |



GUIDE FOR SELECTING ROTARY TABLE

1. Are you looking for a high speed indexing table?

****Work Sample****

High volume automotive parts production, multi-face machining production with high speed machine such as a tapping center.

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| Worm System | Up to 88.9 RPM. Good choice if load is heavy and off-center such as a trunnion style. |
| Direct Drive | Up to 150 RPM. Good choice if work piece is light and on-center. |

2.) Are you looking for a high speed table for contour machining?

****Work Sample****

Aerospace parts such as an impeller, blisk, blade & medical parts.

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| Worm System | Roughing & finishing can be done with same table. Surface finish might not be of sufficient quality because of reversal error & limited rotational speed. |
| Direct Drive | Best surface finishing expected. Reduces cycle time for finishing, but it may take more time for roughing because of lower output torque. Fine tuning is required. |

3.) Does your application have a heavy weight fixture / work piece, or does it have an off-center unbalanced fixture?

****Work Sample****

Trunnion style fixture.

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| Worm System | Tsudakoma's high torque transfer efficient worm system works great a handling heavy duty application with high driving torque. |
| Direct Drive | To avoid vibration & excessive heat generation, adjustment of the max. RPM & acceleration / deceleration parameters may be required for every application. Total cycle time may be even longer using the same size rotary table with worm. |

4.) Is your machine work space limited and require a compact rotary table?

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| Worm System | Motor cover design can be modified to fit in required space. Thinner body design with larger output torque compared to same size Direct Drive motor table gives customer more flexibility for different applications. |
| Direct Drive | Depending on application, a large size Direct Drive motor may be required on the rotary table. Then, the table size becomes larger and thicker. With tilting table design, center height of tilt axis needs to be higher due to rotary axis body height, and it will cause Z-axis travel limitation. |





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