



MOTION
INDEX DRIVES

Cam Indexers in Automated Positioning Applications



White Paper

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For decades cam indexers have been used in automated lines to provide high precision location and sometimes in multiple stations in order for a process to be performed very accurately. Today cam indexing can be used in a variety of ways and provide a superior accuracy to other technologies.

Traditional gear positioners are okay for manual operations as the operator who is doing a manual application can compensate for inaccuracy of the positioner. During fully automated operations, when the robot is programmed to start an operation at the same position, accuracy and high repeatability is essential to exceptional quality. During coordinated operations, like a mig-welding process, a zero-backlash system is a superior solution over a gear head that can have several arc minutes of backlash.

Cam indexers that are used in fully automated positioner applications offer a superior solution as far as overall accuracy and ability to provide zero backlash operation.



TMF2000 Programmable Index table

➤ **Auxiliary Axis – Fully Programmable**

In 2021 it is still misunderstood that cam indexers only provide a fixed degree of index on the output. Motion Index Drives sells just as many fully programmable indexers today as they do fixed cam indexers. These programmable versions can be equipped with adapters that are ready to accept robot auxiliary axis motors of all major robot brands.

➤ **Zero Backlash Technology**

The cam and cam followers are a real and the most robust “zero backlash” mechanism. The cam followers are preloaded in the cam track and as the barrel cam is rotated it applies force to the cam followers, which creates rotation on the output flange. In a fully programmable Motion Index Drives cam indexer, there are multiple cam followers engaged into the cam at one time, sometimes up to 5 cam followers are used to move the mass on the output dial. The ability to have multiple cam followers moving the mass is what makes these fully programmable units much stronger than fixed indexers of the same size. The use of multiple cam followers also increases the static torque that the indexers can withstand. During operation, these key design features provide a rigid, controlled movement of the load that is being indexed and more importantly when the load is rotating, even over top dead center, the zero-backlash technology will control the load and not allow for it to suddenly drop.

➤ **Accuracy and repeatability**

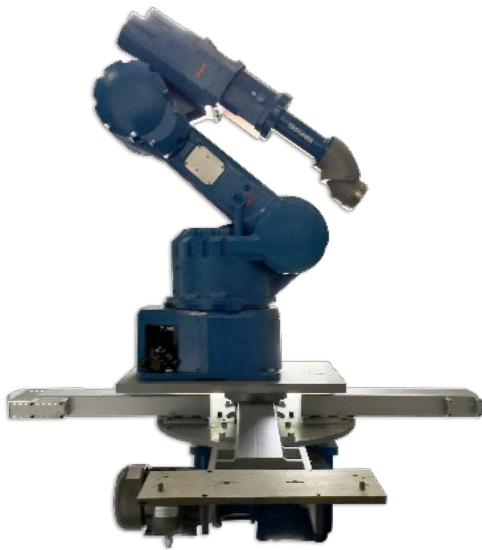
The use of the zero-backlash cam system enables the Motion Index Drives positioner solutions to provide accuracy that can be as high as 5 to 6 arc seconds. The advantage that these accuracies have over standard gear heads is tremendous in an automated weld positioning application. The mechanical repeatability, which is extremely important in automated welding applications, that can be achieved with the cam and cam follower technology is higher than the overall accuracy and when that is comprehended the alternative is not comparable.

➤ **Integrated bearing system**

Motion Index Drives cam indexers have always been constructed with a heavy duty four-point contact bearing on the output dial to provide strength for radial loads and high tilting moments. In the case of higher-than-normal tilting moments requirements most cam indexers can be equipped with an additional bearing support that is fully integrated into the housing of the indexers.

➤ **Large through holes**

Large through holes in the center of the programmable cam indexers allow for utilities to easily be fed to fixtures or other auxiliary cam indexers being utilized in the multi-axis weld positioning system. With the large through holes, slip rings, rotary unions and stationary plates holding aux equipment can be mounted on stationary center columns. These large through holes also allow for robots to be mounted in the center of the cam indexer.



RT400 with Robot Base



RT160 with Slip Ring and Rotary Air Union

➤ **Multiple auxiliary axis system**

By taking the standard high precision cam indexers Motion Index Drives can custom engineer multi axis positioning systems. These systems can range from single axis up to five axis or more and each axis can be used with customer provided or Motion Index Drives to furnish servo motors. Motion Index Drives will size and design the appropriate motors for each axis into the completed system.



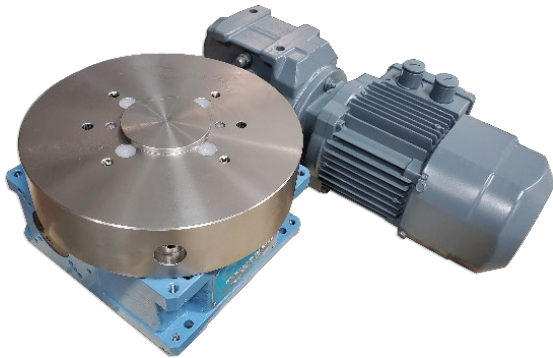
Lift and Rotate



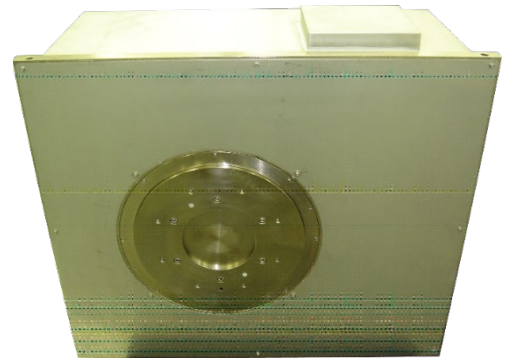
Double Trunnion

➤ **Protective coatings – Sealed units**

Some applications require extra sealing or special coatings. For instance, in carbon fiber machining applications, fine particulates that are extremely abrasive get air born and can wreak havoc on standard sealing material. If not sealed properly the standard oil seals will quickly deteriorate and the abrasive substance can seep into oil cavity of the indexer and cause damage to the mechanical components. Additional sealing would be required for foundry type of applications that also have air born particulates that can intrude into the housing and destroy the mechanical components. Special or additional sealing is also needed in areas where a chemical washdown is routinely done. In the case of a chemical washdown or some type of acidic substance, like jalapeno pepper production, special coatings are absolutely necessary. When the indexers will be used in a chemical washdown or acidic environment, for instance, Viton seals should be used. This type of environment would also require the dial and input shafts to be of stainless steel to avoid corrosion of the machined steel surfaces. The housing in these applications can be coated with a chemical resistant epoxy paint or powder coating. Motion Index Drives can and has customized all its standard indexers to be properly suited for all these harsh environments.



Indexer manufactured for chemical washdowns in food production



TT315 used in automated carbon fiber machining application

Fifty years of supplying precision indexing equipment, we have seen all types of environments. There is no limit to the variety of options available for your application, we are capable of supplying all the necessities to accompany your indexing device to ensure everything fits and runs properly. Our engineers bring experience and training to their knowledge of cam-driven indexers. We understand that innovation in manufacturing technology is invaluable in this era of rapid growth. In order to build the best product possible, you need indexers tailored specifically for your application. We have supplied all these with great success. Almost all of the time with these industries, you must make custom adaptations to your standard products to ensure longevity. Overall, MID believes we can provide a superior indexing solution that is cost effective, reliable, reusable, and manufactured to meet the needs of the customer and the application.

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