Product Applications

PBC LINEAR MOTION SOLUTIONS

RST

CRT

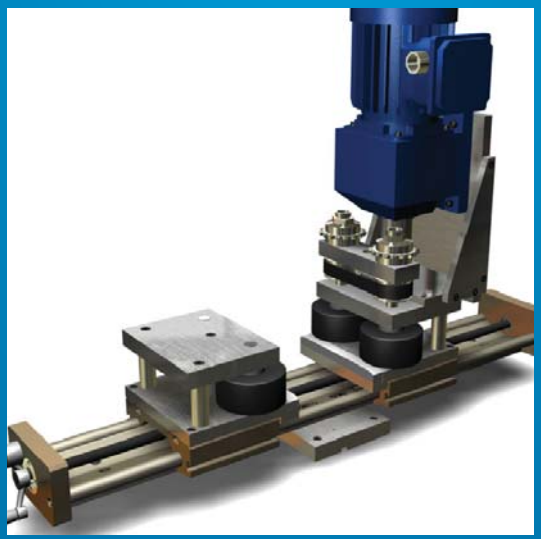
VT

LAT

GST

PRT

TGT



PBC LINEAR

A PACIFIC BEARING CO.

Pillow Blocks Supply Gentle Lift on CW Shaw Bed of Nails Exhibit

"How much do you trust your linear bearing technology?" That is the type of question PBC Linear asks design engineers on multiple different projects demanding reliable performance, long product life, and simple integration. On a bed-of-nails lift table application, the question becomes more to the point. For linear ball-bearings, any slight contamination of the bearing cages can lead to breakage, stalling or total machine failure; which results in a low rate of confidence when lying on a spiky table. CW Shaw Inc, a designer and fabrication firm that specializes in bringing interactive, fun and educational museum exhibits to life was posed with this problem. After considering the design, load, environment and necessary long-term operation, CW Shaw opted for Simplicity pillow block housings to guide the support rails on the bed-of-nails lift table.

The bed-of-nails lift table requires linear guidance capable of handling loads up to 1000 lbs.

To demonstrate the full effect of the exhibit, the lift table needed to be raised/lowered by 3", handle loads up to 1000 lbs (for safety) and move at a moderate speed of 5 ft/ minute. Potential contamination was also a factor CW Shaw considered. Any trace of dust or particulate posed a risk of system failure; raising safety concerns. Therefore, CW Shaw sought a linear motion system that would not fail under contamination (dust and carpet fibers). Since most museums operate on fixed budgets, CW Shaw also held maintenance-free operation as a crucial design pre-requisite; which is why he turned to Simplicity linear plane bearings and pillow block assemblies.

Simplicity products are a proven solution when requiring maintenance-free, worry-free linear motion. Designed and refined for over 25 years, Simplicity technology has been successfully applied in some fo the most extreme environments: temperature extremes, high contamination and shock vibration. The bearings travel using a proprietary Frelon liner which transfers the load and glides over dust and other particulate without damaging the shaft. Also, since they are composed of no rolling elements, Simplicity pillow block housings will NOT catastrophically fail; allowing for reliable and safe linear guidance of the support rails.

Two Simplicity pillow block assemblies were installed at each end of the lift table to support load and guide the lift rails. CW Shaw noted no problems in performance and, over time, has implemented the design for several nail bed exhibits throughout the country—some of which have been running without fail for 5-10 years.

CW Shaw Inc has over two decades of experience in exhibit design and providing visitors with an exciting and informative way to view real world applications. Company owner Charlie Shaw is a self-taught designer who views his unique creations through the eyes of the visitor; allowing him to build engaging exhibit pieces that effectively speak the language of museum goers around the world. To see more examples of CW Shaw exhibits, please visit www.hofl.org.

Simplicity®: The Preferred Choice for ADI's New De-burring System

Advance Design Industries (ADI) in Sheffield Village, Ohio has designed and built innovative custom machine systems for industrial and defense applications for more than 50 years. Their latest problem-solving design, a de-burring system that removes burrs from hobbed gears, was constructed using a series of drive platforms, a robotic with grinding tool attachment and brushing stations. To accurately and repeatedly position the various stations, in a multitude of pre-programmed locations, ADI required a linear motion system that could endure the contaminated environment and heavy loads of the application. To accomplish this, they turned to PBC Linear products once again, due to their successful implementation of previous systems designed together.

The Application

For the de-burring system to succeed, ADI required a linear motion technology that could perform under 50,000 lbs of load in a dirty, industrial machine-tool work area. De-burring is the process of removing burrs, or excess protruding material, from large gears (70-120" in diameter). Eventually, these gears will be utilized as the driving mechanism for applications such as crane turn tables and energy efficient wind turbines.

The de-burring machine rotates the gear through the robotic grinding station, then through each brushing station for an assured, smooth end-product. Excess material not removed, could result in noise, binding and installation problems. Three drive platforms as well as the robot and brush stations, riding on PBC linear bearing system, adjust to the locations for various sizes of geared rings.

The Problem

An immense load (50,000 lbs) and harsh environment restricted what technology ADI could use for linear motion. Ball-bearing systems would deteriorate with vibration and spall shafting under the heavy load. Excess dirt, dust and particulate can collect in the ball cages, resulting in stalling and catastrophic failure. The drive platforms, though very important to adjust for different gear sizes, are seldom used for day-to-day functions; thus requiring a linear system that needs little lubrication, but still provides smooth and reliable performance when needed.

Size adjusting station on ADI Deburring System.

The Solution

For this application, ADI favored plane bearing technology due to its ability to thrive in contaminated environments and sustain even disbursement of forces versus the small point of contact provided by ball-bearings. Additionally, the bearings need to prevent stick-slip, a common problem to bearing systems which are not routinely in motion. As a result of previous application success, performance and cost efficiency, ADI decided to implement Simplicity bearings as the linear motion system for all stations of the de-burring machine. Simplicity self-lubricating linear plane bearings require little to no upkeep maintenance, excel in harsh environments and handle heavy load applications. This is due to the bearings' design and FrelonGold® liner. Simplicity bearings can run for years under constant or intermittent use. The low friction, self-lubricating system requires no additional grease or oil (as long as application is within design criteria). Frelon Gold® has also been shown to handle up to 20x the load of a traditional ball-bearing! The Simplicity bearing wipes all dirt, dust and grime clean off the shaft—providing a reliable, smooth and long-lasting linear motion system.

The Result

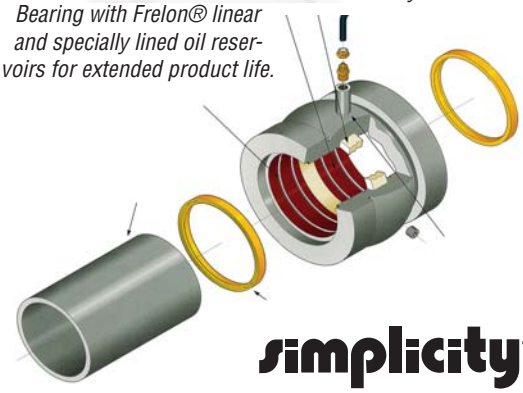
Simplicity bearing/shafting assemblies were installed into the drive platforms, robot station and brushing station of the system. Testing was conducted over a period of two months with the bearings performing without failure. Now, ADI is looking into manufacturing additional gear de-burring systems guided by Simplicity technology.

Doctor Bearings Provide Constant Linear Motion in Paper Mill Since 1992!

16 years and counting, what seemed like an impossible promise back in the early '90's has evolved into the new standard for doctor blade bearings. PBC Linear's doctor bearings are not a new product; however they show PBC Linear for what it is, providing long-lasting innovative solutions to the toughest linear motion applications. PBC Linear's doctor blade bearings have been running for over a decade in paper mills all over the country.

16 year life

Bearing with Frelon® linear and specially lined oil reservoirs for extended product life.



Paper mills typically present a difficult environment for reliable linear motion. Corrosion, steam, water, dust, and vibration all play a part in interfering with the process and cause failure with rolling element doctor bearings. Traditionally used doctor ball bearings experience fretting corrosion due to the intense vibration caused by the large paper dryers in the mill—also causing unplanned downtime. PBC Linear's doctor ball bearings have no moving parts, thus fully preventing catastrophic failure. Their patented and time-tested Frelon liner dramatically reduces shock vibration and can withstand caustic chemicals, high loads, and intense heat. With no moving parts to seize up, and their protective liner, PBC Linear's doctor bearings are perfectly suited for long lasting life in the paper mill environment.

3 month life

Applicable in both dry and wet end applications, PBC Linear's doctor bearings require minimal maintenance. Dry-end applications are provided with an air over oil lubricator and urethane double lip seals to keep the oil within the bearing.

This allows for constant lubrication and improved product life. In wet-end applications, PBC Linear's doctor bearings require no additional lubrication. The doctor bearings are composed of 316 stainless steel housing for enhanced chemical resistance for a prolonged life cycle that can last for over a decade!

PBC Linear doctor bearings eliminate unplanned downtime, paper web breaks, and increased profits. Paper plants around the country that have implemented PBC Linear's doctor bearings only need for maintenance or replacement is to send the original doctor bearings back to PBC Linear for refurbishment every ten years.

"We have found that rather than purchasing new doctor bearings that customers are so happy with the original ones we provided that they would rather we simply repair the doctor bearings they have already been using," says Regional Sales Manager, Ray Stojonic.

PBC Linear Doctor Bearing after 16 years of performance.

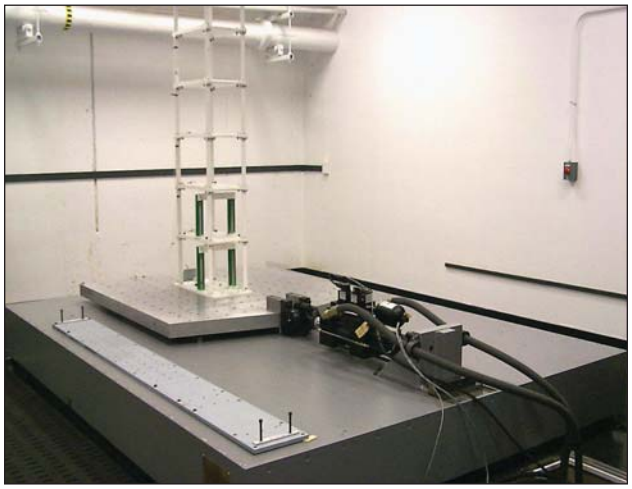
Simplicity® Products Do Not Fail When Conditions are Shaken Up!

Simplicity linear bearings have been installed in an earthquake simulation machine developed by the Washington University Structural Control and Earthquake Engineering Lab (WUSCEEL) in St. Louis, Missouri. Due to their ability to tolerate intense shock and vibration without fretting and require no added grease or oil, the PBC Linear plane bearings were perfectly suited to handle the job.

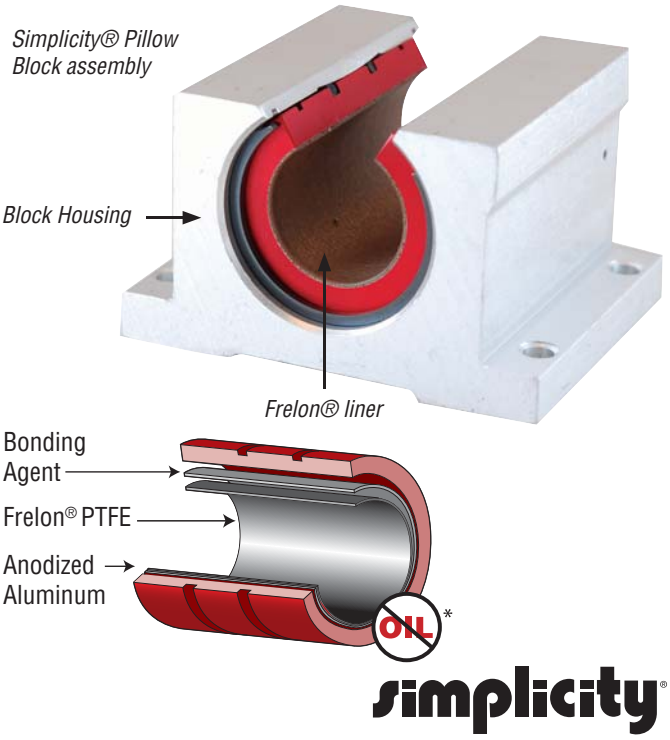
Intense shock vibration is an obvious pre-requisite to study the impact of earthquakes and structure analysis. To recapture the conditions of an earthquake, researchers construct what is typically referred to as a "shock table." A shock table is a machine that simulates the conditions of an earthquake. The entire structure weighs up to 850 lbs, and when vibrating can exert 3-4 g's of force on the bearings and shafting.

Simplicity® linear plane bearings are designed to last in the toughest environments; including heavy loads and short strokes. With no rolling elements, the linear plane bearings contain no moving parts to fret and seize up; this completely eliminates the potential for catastrophic failure. Their proprietary FrelonGold® liner also enhances load capacities and dampens shock vibration—making the Simplicity line an attractive candidate to anyone seeking to study earthquakes or other heavy load applications. Combined with PBC Linear ceramic coated shafting, the Simplicity plane bearings provided smooth, quiet and long-lasting linear motion even in the cruel environment created by the shock table.

The WUSCEEL shock table is used to test for a wide range of structural analysis: bridge and building stability research, fragility curves and vibration control of aero systems. Any structure or material that could be affected by an earthquake or other high vibration surroundings is put to the test on these tables. These experiments prompted the researches to discover new ways to build earthquake resistant bridges, more reliable air planes, and stronger buildings.



WUSCEEL shocktable used to measure effects of earthquakes on building structures.



simplicity®

Simplicity® Keeps Automotive Welding Line Running

The automotive production line centers around several machines all working together with production workers to ensure high production rates and quality. A kink in this chain can halt production and greatly increase costs to a staggering level. PBC Linear was recently called in to a major automotive manufacturer to devise a solution to crashing welding guns on the manufacturer's production line.

The Problem

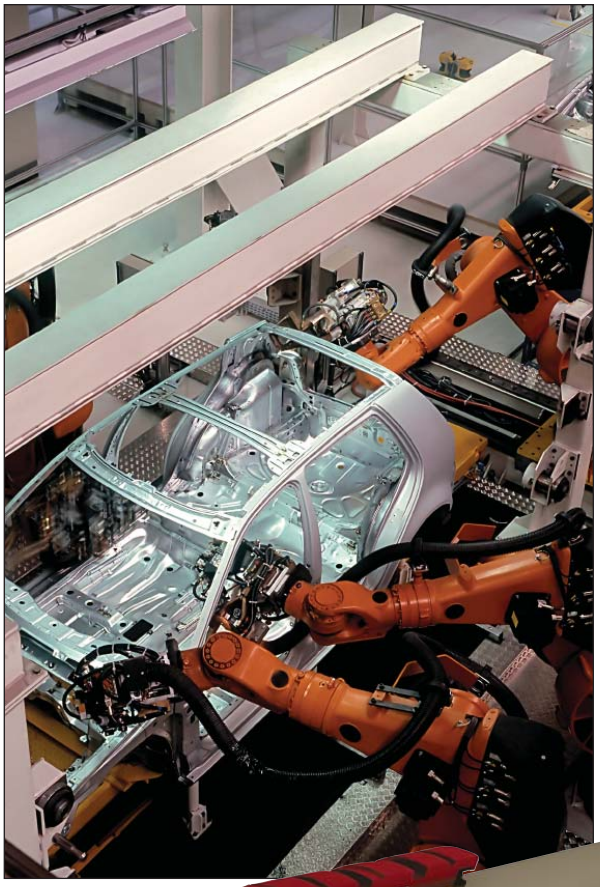
When the manufacturer contacted PBC Linear, the welding guns were running on conventional linear shafting and ball-bearing technology. Welding slag particulate collected along the shafting, causing the system to fall off track and machine inaccurately. The slag build-up also caused the bearings to stall, seize up, and catastrophically fail—resulting in unplanned downtime and skyrocketing production costs.

Solution

PBC Linear recommended their proven Simplicity® linear bearings and highly accurate shafting. Equipped with Frelon® GOLD iner to allow for a high tolerance against contamination, heat, and shock vibration, the self-lubricating Simplicity bearings were well-suited for the welding application. The automotive manufacturer recommended installing the parts in the two welding guns with the history of the highest slag accumulation. Eight months later, the manufacturer reported PBC Linear's shafting looks as it did the day it was installed! The Simplicity bearings harmlessly wiped the slag and other contaminants off the shaft—promoting smooth and long-lasting linear motion.

Results

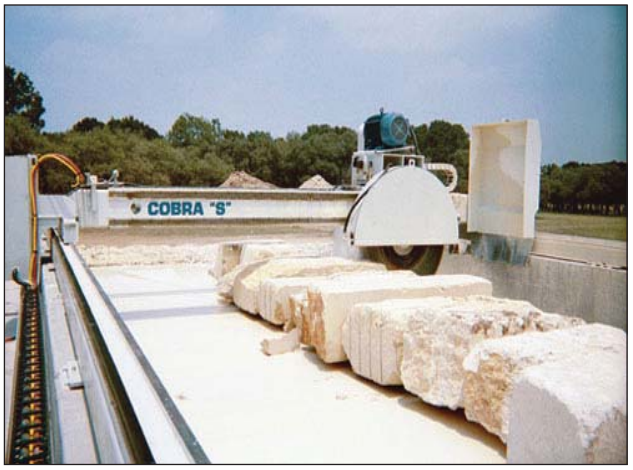
With 150 other welding machines using the competitors failing ball bearings, PBC Linear was asked to install their replacement system on the remaining welding guns.



simplicity®

Simplicity® Bearings Put Stonework Manufacturer Back on Schedule!

Stonework machining has to be precise and productive. CNC multi-axis machines cut large bullets of stone into counter tops, floor covering, stone laminates, and many unique shapes used in the laboratory and as building façades. The cutting and routing through stone creates clouds of dust, coolant swarf and other industrial waste that is tough on linear motion way systems, particularly for rolling element linear motion. Coolant slurry and stone dust created by the machining process goes everywhere, washing out lubrication and jamming ball and roller bearings. Downtime and routine maintenance robs users of productivity! Continued operation also damages the machine further resulting in more costly repair. A prominent machine builder that designs and manufactures stone working/ cutting machinery recruited PBC Linear to devise a solution.



Cutting saw running with long lasting Simplicity® components.

The manufacturer's machinery has been used for every possible facet of stone-working from quarry-work to kitchen counter-top machining. These machines are designed to last in harsh surroundings; however their linear guiding system experienced repeated binding and stalling in the field. Stone dust, particulate and leaking coolant caused the systems original roller bearings to bind up and fail. Constantly replacing the failed components resulted in increased costs and production time. After enduring this cycle of replacing unfit components long enough, the stone-working manufacturer sought out another linear system and turned to PBC Linear.

Round shaft rail assembly

Example of cutting stonework.

PBC Linear recommended installing their round shaft Simplicity® linear plane bearings to replace the failing rolling element bearings. With no moving parts, self-wiping design, and round profile; contamination does not build up and stall the Simplicity® bearing's travel. PBC Linear's proprietary precision ground Frelon® liner riding on a coated hardened shaft is the key for low cost, maintenance free, linear motion. Simplicity plane bearings plow smoothly through contamination, dirt and dust. The bearing also dampens vibration, tolerates temperature extremes, and is chemical resistant—all while providing smooth, quiet and precise linear motion.

A few months after installation, the stone-working manufacturer noticed incredible improvement in the performance of their stone cutters. Unexpected downtime, production costs, and repair maintenance all decreased.

Custom Simplicity® Pushdown Foot Assembly Saves 95% on Scrap!

Carpet tufting creates a tough environment for linear motion products. Processing synthetic fibers into carpet backing using a high speed, reciprocating short stroke machining system, a carpet manufacturer was experiencing unplanned downtime due to linear bearing failure and massive profit loss due to thousands of yards in scrapped end-product. Poor quality and damaged carpeting were sited as the main reason the manufacturer lost up to 54,000 yards of carpet to scrap. When PBC Linear came in to examine the application, they discovered the root of the problem was the machine's ball bushings within push down foot assembly.

Carpet tufting machine with Simplicity® assembly installed at the feet.

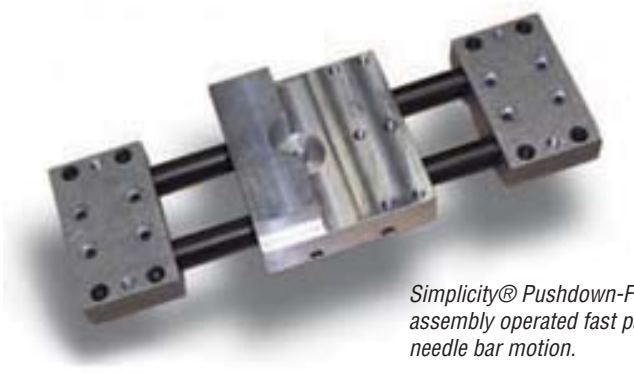
The Application

Each carpet tufting machine uses 36 ball bushing bearings and steel shafting assembled into a pushdown foot system (4 bearings and 2 rods of steel shafting per pushdown foot, an average of 9 pushdown feet per machine). This system is utilized within the application to operate the needle bar in quick, reciprocating up to 1600 cycles/minute short strokes. The needle bar holds 4000 tufting needles that conduct the crucial processing of the fibers. Precise and repeatable linear motion is necessary for optimum manufacturing and the minimization of scrap. The manufacturer also employs non-stain oil along the pushdown foot assembly to ensure smooth linear motion and reduced friction.

The environment of the application is typical for industrial machining. Dust, dirt, grease and carpet fiber particles pose risk for contamination, but no adverse or caustic chemicals are present. The carpet tufting machine is designed to run for continuous, long cycles; therefore the performance is measured by the life of the system and linear feet ran between replacement systems.

The Problem

High speed reciprocating short stroke (.5"-.625") created high impact loads on the system; resulting wearing ball bushings and shafting. This represented the bulk of the shutdown scenarios where maintenance and product replacement were necessary. 1600 cycles/minute raised high reverse inertia, prompting almost immediate wear of the ball bushings and steel shafting. As operation continued, the ball bushings spall fine metal particulate from the shafting, which accumulate within the assembly, wear the seals, and allow lubricants to contaminate the pushdown foot assembly and ball bushings. This mixed with metal particulate created by the ball bushings and shafting to create "black spots" on the finished carpeting. These black spots cannot be washed out, resulting in scrap carpet.



Simplicity® Pushdown-Foot assembly operated fast paced needle bar motion.

The performance quality of the ball bushing system also posed problems and created scores of scrap carpet. The inaccurate tolerances (.005/.007") of the ball bushing system allowed for rocking motion along the needle bar. This phenomenon, known as needle wander/loss motion, results in loss of positioning and missed tufts—leading to poor quality carpeting. This occurred almost immediately after the initial installation, and grew more prevalent as the system wore under use. Throughout operation, loss motion and contaminated carpet resulted in 34,000-54,000 yards of scrap material and lost profit.

Simplicity Pushdown-Foot Assembly

A Simple Solution

To solve the problem of wear and progressive wander/loss needle bar motion, PBC Linear outfitted their Simplicity self-lubricating bearing into the specified pushdown foot assembly for the carpet tufting machine. Simplicity's close tolerance ID bearing (.6240"-.6245") and close running clearance (.0015"-.0018") held the needle bar in tight position for precise and repeatable operation. The bearing's proprietary FrelonGold® liner ran smoothly along steel shafting and eliminates wear by evenly disbursing the load throughout the bearing; rather than the small point of contact ball bushing products make with shafting. Simplicity self-lubricating bearings contain no rolling elements, thrive in heavy load applications, and push contaminants such as dirt, carpet fiber particulate and grease to the end of the stroke. In short, they were designed to exceed expectations in applications like this.

The Result

Before PBC Linear's Simplicity pushdown foot system and undercarriage were installed, the carpet tufting machines were in a state of constant unplanned downtime due to high maintenance costs and upkeep. After the Simplicity systems were installed in the carpet tufting systems, they became the most productive machines in the plant! Linear footage between maintenance rebuilds of the machine were increased from one million linear feet to over three million. The carpet manufacturer was also pleased to report a significant 95% reduction in scrapped product, eliminating millions of dollars in scrap every year that was previously thought of as "an acceptable loss." Now, they have turned these losses into pure profit!

Simplicity self-lubricating bearing/shafting assemblies were installed into the drive platforms, robot station and brushing station of the system. Testing was conducted over a period of two months with the bearings performing without failure. Now, ADI is looking into manufacturing additional gear de-burring systems guided by Simplicity technology.

Laser Etching System Simplified Bearing Assembly

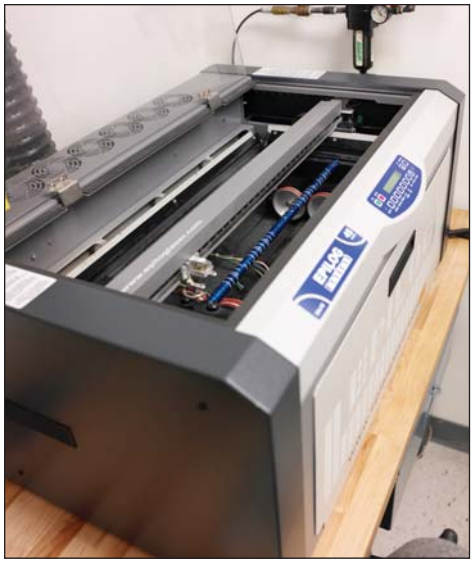
A laser etching design firm was experiencing relentless failures with their lasers; specifically their targeting mirrors. The company used these mirrors to position light onto the etching surface to ensure maximum accuracy and etching quality. However, due to failing ball-bearing linear guides, the mirrors would stall; creating scrap product, increased production time and lost profits. To fix the linear motion problem, PBC Linear™ came in to recommend Simplicity® linear plane bearings and shafting as a solution.

Custom carriage with Simplicity® self-lubricating liner and ceramic coated shafting assembly.

Problem

These lasers were used to etch a range of material, both wooden and metallic. The linear motion system operated the subtle adjustment of the targeting mirrors. As etching persisted, debris, dust and fine particulate accumulated within the ball bearing cages along the linear guides. The particulate caused the ball-bearings to stall, completely restricting the linear guides' movement and stopping the entire system (catastrophic failure). The linear guides would then need to be swapped out until the process repeated itself. This cycle of swapping out damaged linear guides for new ones resulted in a short product life and massive production costs.

PBC Linear was faced with the challenge of creating a new system that not only endured the environment and provided high accuracy positioning for the targeting mirrors, but also came in under the cost of the ball-bearing linear guide assembly. A lightweight system was also important to the laser etching firm in order to ensure accurate positioning.



PBC Linear's solution provided subtle and precise adjustments at system's target mirrors.

Solution

With the particulate-heavy environment in mind, PBC Linear resolved to implement their Simplicity self-lubricating linear plane bearings and complimentary, light-weight ceramic coated shafting. Simplicity plane bearings contain no rolling elements; therefore particulate cannot obstruct their smooth and quiet linear motion. Using PBC Linear's proprietary self-lubricating Teflon® liner, contaminants are pushed off the shafting. Also, Simplicity plane bearings do not require the additional lubrication and periodic maintenance that ball-bearing products do; which further extends the life of the laser etching system.

Result

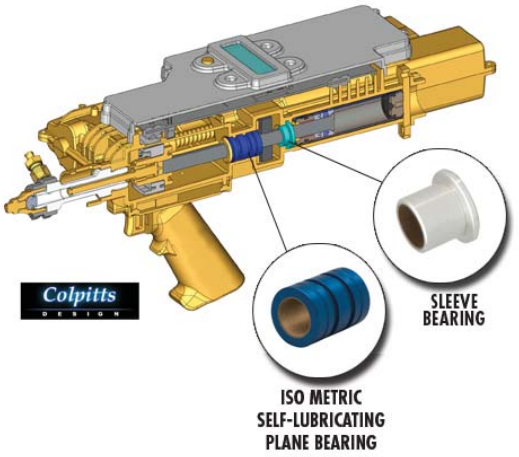
Once installed, the Simplicity bearings and shafting produced a lighter, longer-lasting and more cost efficient system for the aiming mirrors. Metal and wood particulate proved to be no issue for PBC Linear's bearings as they glided through the dust and debris for assured, accurate mirror positioning. Simplicity bearing/shafting assemblies were installed into the drive platforms, robot station and brushing station of the system. Testing was conducted over a period of two months with the bearings performing without failure. Now, ADI is looking into manufacturing additional gear de-burring systems guided by Simplicity technology.

Simplicity® Bearings Installed into Acushot's™ Needle-free Injection Gun

Healthy animals are necessary for efficient stockyard production. Disease and other bacterial conditions thrive in close quarters; making regular vaccination for all livestock a natural pre-requisite. However, implementing and documenting consistent injections for all animals is tedious, expensive and, in some cases, hazardous. To solve these problems, Acushot, an innovative veterinary design company, designed an automated, needle-free injection gun for mass livestock vaccination. The design required a linear bearing system to absorb recoil. Acushot™ turned to Colpitt Designs, who recommended PBC Linear's Simplicity® plane bearings for the task.

Acushot's Needlefree system provdes documented and safe medication dosages to livestock

Typically, hand-held needle injections were used for vaccinating the animals in the stockyards and barnyards; however, with thousands of animals coming through production at once, successfully and safely supervising the injections became an increasing concern. Acushot's™ new system eliminated needles, removing the possibility for an unsafe employee needle-slip. The unit also enhances sanitary conditions, the battery powered injection unit can be used hundreds of times without risk of cross contamination to the animals.



For a rapid prototype and possible added refinements to their design, Acushot™ turned to Colpitt Designs—a third party engineering firm. Colpitt worked to reduce components and assemble the triggering/injection system by using a varying degree of strength gas cylinder to provide up to 600 pounds of force. The system also automatically saves each dose with a time stamp for accurate vaccination records. The cylinders are designed to inject the vaccines to the same recommended depth as a typical needle that would have been used on a range of animals. The injector can be set to inject from 0.2cc and deposit it just in the skin of the animal and up to 2.5cc can be injected to the recommended depth into the muscle of the animal.

Colpitts immediately set to work. Using a simplified approach, they were able to reduce moving components and make the design more cost-effective; while still adhering to Acushot's™ criteria. The final product was a lightweight, compact and battery powered needle-less injection unit that packed up to 28,000 psi delivery pressures while concurrently documenting each injection.

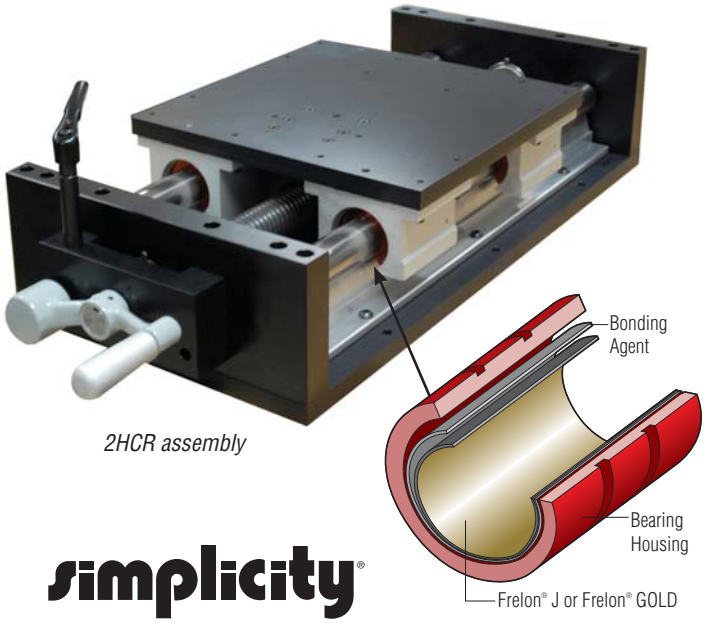
One obstacle to overcome was finding a linear bearing assembly to support the force of the injection delivery. Throughout a cycle, 650 lbs of force act on the bearings; which would be under constant use in extreme temperatures and outdoor working conditions. To solve this, Colpitts Designs used Simplicity® plane bearings to withstand the system parameters and environment of the application.

Simplicity® bearings glide using a proprietary Teflon liner. This provides even disbursement of forces throughout the bearing and smooth, reliable travel. Bronze and linear ball bushings spall the shafting under the high forces and short stroke which accumulate and contaminate the system; resulting in catastrophic failure. Simplicity bearings self-lubricate to ensure smooth and quiet operation for constant or intermittent use. They also thrive in temperature extremes (from -400°F-400°F)! These design factors allowed Simplicity® to drive consistent and satisfactory performance of Acushot's™ injection gun.

No needle trauma recovery was necessary for the animals; in fact the livestock does not even take notice when given their injection with Acushot's™ new injector. The new injection unit also reduced the diameter of the injection mark to about 1/8th the size. Easy to use with no extra vaccine containers the Acushot™ system improved productivity, safety and the overall health in stockyards and barnyards world wide.

Linear Slides from PBC Linear Assembled in Underwater Drill

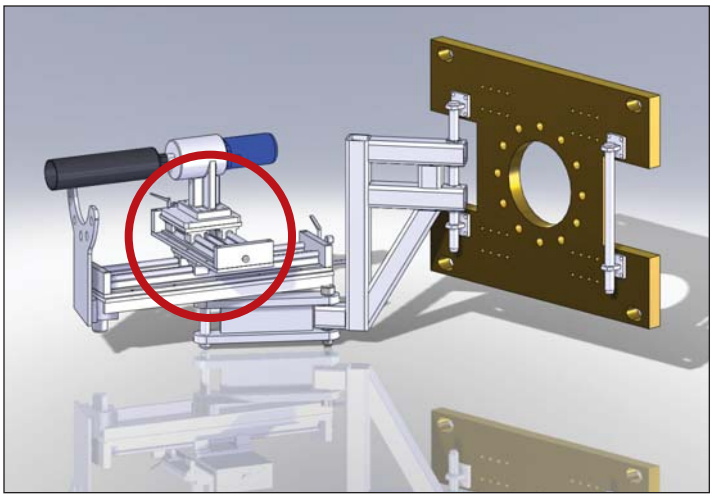
Deep underwater in the Gulf of Mexico, PBC Linear is providing smooth and precise linear motion for submarine oil pipeline maintenance and repair. Using their Linear Slide Technology (LST), which implements PBC Linear self-lubricating Simplicity® products and patented Frelon J® liner for long-lasting wear life, an engineering company who specializes in designing custom-need products crafted a drill supported by PBC Linear control and guidance. This newly designed underwater drill allows for highly accurate and targeted repair of submarine oil pipelines that funnel a wide assortment of fuels to the US.



2HCR assembly

Submarine oil pipelines lie on the waterbed in lakes, rivers, and—in this case—gulfs. They are utilized for transportation of fuels such as natural gas, kerosene, diesel fuel, and propane. These pipes periodically require maintenance and repair; however, since they are located on the bottom of the ocean floor, a special drill assembly is needed to complete the task. The entire repair operation necessitates the drill to be man-operated, since the drilling and repairing entails subtle and careful fine tuning. Designed with PBC Linear's 2HCR linear slide, the drill assembly could be easily adjusted and calibrated by hand, even underwater.

The 2HCR hand crank linear slide provides specialized linear motion and exceptional control. Outfitted with proprietary stainless steel Simplicity self-lubricating bearings, shafting, and Frelon J liner for enhanced corrosion resistance, the 2HCR linear slide is well-suited for the underwater environment, constant salt water immersion, and load capacities required for the application. The cast aluminum counterbalanced hand crank with ball screw lock puts the control solely in the operator's hands and facilitates easy modification and use. The end result was a highly accurate drill that could carefully bore through the concrete oil pipes for enhanced maintenance and repair.



Rendering of linear stage drill assembly and configuration.

Nuclear Reactor Re-fueling Supported by Hevi-Rail® Bearings

For sustained linear motion on high load capacities, PBC Linear's Hevi-Rail® heavy duty bearing system is second to none for long-lasting linear motion in the toughest of environments. This reputation was put to the test when Hevi-Rail® was designed into a rotating "lazy susan" system for nuclear reactor vessel stud racks by Quality Engineered Products. Supporting immense weight, the Hevi-Rail® bearings ensured a safer environment for the maintenance team and dramatically decreased prep time.

Nuclear plant saved hours on labor and improved overall safety.

A nuclear reactor vessel generates a large amount of power, but periodically requires inspection and re-fueling. This necessary maintenance can only be performed while the reactor is powered down. Time is critical in this case, the longer the reactor is powered down, the less overall electricity produced. To re-fuel the reactor, a maintenance crew needs to unbolt the vessel by removing ALL 54 studs that secure the head. Each individual screw weighs upwards of 600-700 lb, and calls for an overhead crane to lift. Traditionally, these studs would be placed in square racks that constantly needed repositioning under the overhead crane for successful loading. This made the time required for unloading the studs to rise excessively and caused a potential risk factor for the maintenance crew. However, Quality Engineered Products designed a new type of stud rack using PBC Linear's Hevi-Rail® machined into a "lazy susan" configuration.

Quality Engineered Product's nuclear stud rack has Hevi-Rail® installed internally

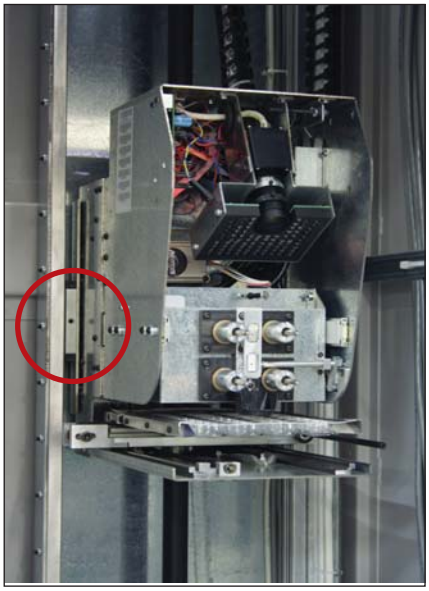
Thanks to the ingenuity of Quality Engineered Products and the long-lasting heavy-duty performance of Hevi-Rail, the maintenance crew no longer needed to waste time repositioning the stud rack under the crane in order to proceed with the loading process. The time saved is doubled as the entire process is performed in reverse during reactor re-assembly after refueling.

About 42" in diameter, the new circular stud rack could be hand-rotated to facilitate easy loading from the crane. Hevi-Rail works to promote an even dispersion of loads and forces being acted upon it. Machined into a circular rail, the hardened steel rail and bearings had no problem tolerating the total weight of 9 reactor studs! The Hevi-Rail® bearing's innovative linear and axial bearings also allowed for a smooth rotating motion that immediately pleased the maintenance crew due to the new-found ease in their job.

To find out more on the RSV Stud Rack or other custom products, please visit Quality Engineered Products Inc. at qualengpro.com.

Pharmacy Sorting Robot Glides without Fail with Redi-Rail® Linear Guides

Pharmaceutical automation cuts dispensing costs, ensures accuracy and increases thru-put, allowing pharmacies to recover their investment, ensure quality and lower costs to consumers. PBC Linear's Redi-Rail® linear guide was installed as a replacement positioning system for Manchac Technologies' fully automated pharmaceutical robot, the Dosis L60. Chosen for its precision linear guidance, sealed bearings and oil impregnated wipers, Redi-Rail ensures smooth, quiet and reliable travel. This allowed the Dosis L60 to fill, seal and label 30 day prescription cards.



Internal components provide precise positioning.

Problem

Manchac Technologies provides accurate and immediate prescription sample dispensing. Delivered in a compact footprint (7 ft²), the Dosis L60 system sorts, counts, fills and labels 60 different oral medications for pharmaceutical use without user intervention. Originally this was accomplished using contact trucks and rails assembled into an XY gantry. However, the contact rails would experience periodic binding and system failure due to misalignment and vibration. This would cause severe downtime and skyrocketing repair costs—particularly if the system was out in the field. Lubrication was also periodically applied, but due to the environment and the sensitive prescriptions being handled, the required amount of lubrications was too messy and posed a risk of possible contamination of the prescriptions. Finally, Manchac decided to search for a more apt linear guide product.

The Dosis L60 functions in a controlled environment to protect the prescriptions and run correctly. Pill dust frequently builds up inside the machine and can be corrosive to certain materials. Therefore, Manchac required a precision linear guide system to glide over accumulated particulate and consistently perform all automated tasks.

Automated pill dispensing system.

Solution

PBC Linear's Redi-Rail linear guides were the answer. Its reasonable price, sealed bearings, corrosion resistance and oil impregnated wipers made it a very attractive candidate. Redi-Rail uses a post-processed, anodized aluminum extrusion with hardened stainless steel inner raceways to assure rigidity and precision. The rails are composed of anodized aluminum to provide light weight without losing strength. Redi-Rail's high accuracy pre-loaded sliders utilize precision-ground, double-row ball bearing gothic rollers for fast (10 m/s) operation, high system rigidity and quiet linear motion. The sealed bearings also roll smoothly over accumulated particulate and restrict further contamination. Additionally, oil impregnated wipers allow for timely and clean lubrication along the rail.

Result

After installed, Manchac noticed immediate improvement in the performance of the Dosis L60. Initial testing showed a 20-30% decrease in motor current required for operation. Redi-Rail also allowed for higher travel velocities without chatter or binding. The installation process was also simplified with Redi-Rail, supplying high accurate mounting without the threat of misalignment.

redi-rail®

PBC Linear Provides Upgraded Linear Guide Parts to Bay Area Transit

Bay Area Rapid Transit transports millions of people on a daily basis. These high volume/high traffic trains employ several ways to save on space. One such way is using positive locking seat adjusters that slide out for easy entry and exit. Recently, BART was looking to upgrade their driver's seat assemblies with new parts to ensure continued operation. They turned to C & C Enterprises, who began updating and upgrading various parts of the seat. When they came to the linear guide adjustments, they recognized PBC Linear's Redi-Rail® along with a custom slider. C & C then turned to PBC Linear's expert product engineering team to work backwards and reverse-engineer the custom Redi-Rail® for the seat.

The seat adjustment application was fairly straight-forward. Utilizing the custom Redi-Rail® assembly, the driver could manually slide out 9" at full extension. The seat would then lock into position until further adjustment was necessary. To achieve this, the previous designer created a custom dual carriage slider of their own.

While Redi-Rail® provided optimal linear guidance and smooth motion for the application, PBC Linear engineers thought the custom slider assembly was too bulky and could be improved without necessitating a complete re-design. They immediately set to work creating a new slider. Using a one-piece steel slider component versus the previous dual aluminum sliders, PBC Linear was able to enhance rigidity and performance. The new slider also helped make the entire assembly more cost efficient and easier to install by eliminating a bracket connector; resulting in drastically improved linear guidance adjustment.

Custom Redi-Rail slider designed by PBC Linear

Hevi-Rail® Clears Way for Machine Maintenance and Tooling

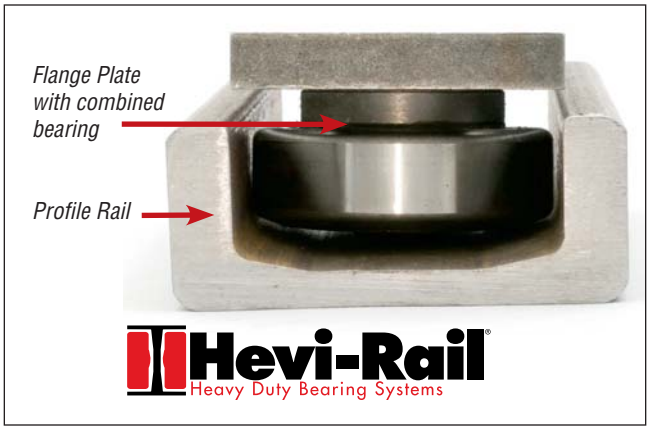
Rolling through a mucky, contaminated environment with incredible ease, PBC Linear's Hevi-Rail® heavy-duty bearing system provided hand-operated linear motion guidance for periodic maintenance and cleaning on a CNC lathe. Cumbersome pumps and filtration systems were continually blocking the cleaning bin of the CNC lathe, and made cleaning the bin next to impossible. After installing the Hevi-Rail product, the filtration system could be moved with a light push; ensuring effective inspection, cleaning and maintenance.

The environment created by the lathe, pumps and filtration system was grimy and full of expelled metal particulate. The pumps and filtration system sit over the cleaning bin, blocking easy access. The system itself weighs up to 250 lbs, and needed to be moved without the constant help of machinery while still complying with OSHA and ergonomic requirements. To solve this, the lathe would require a guide rail system that could not only tolerate the weight of the filtration system and the harsh surroundings, but also be easily manipulated by maintenance personnel.

PBC Linear decided to implement their proven Hevi-Rail linear bearing guide system. Hevi-Rail handles high axial and radial loads, up to 60 tons! Offering a lifetime of durability under continuous use, the Hevi-Rail bearing is designed for both linear and axial motion, and rolls easily over contaminants.

Once installed, Hevi-Rail allowed for the pump and filtration system to be moved out of the way quickly and efficiently; thereby permitting periodic maintenance and cleaning.

Hevi-Rail® installed in harsh environment.



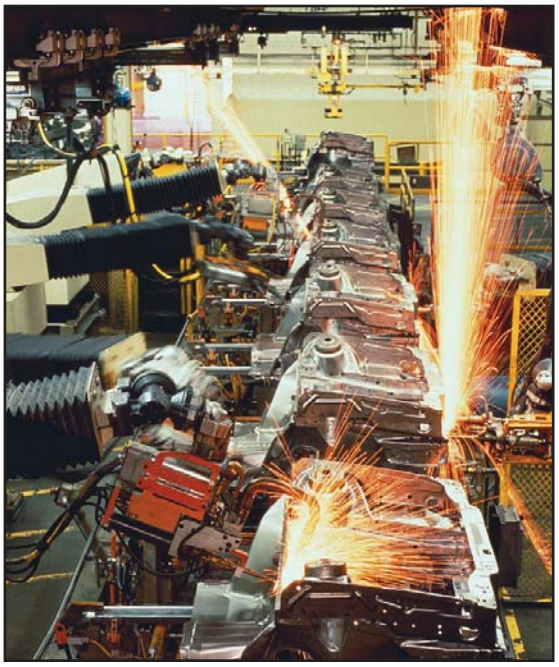
Heavy Automotive Welding Crane Guided by PBC Linear™ Drawer Slide Precision

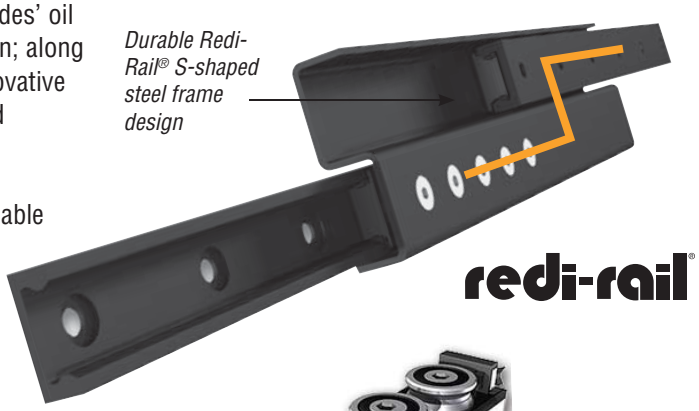
PBC Linear's Redi-Rail® Drawer slides have amassed a proven reputation for providing long-lasting support and precision linear motion guidance in heavy industrial applications. Typically used for heavy-duty drawers in order to ensure easy, ergonomic maneuverability, Redi-Rail drawer slides have recently been installed into a fully pivoting, telescopic soldering crane used for welding various metals—nickel, steel, copper—in the automotive industry.

Soldering and welding large, heavy steel plates requires a great deal of space. This newly designed crane necessitated flexibility in order to cover the specified area and be able to freely solder the materials. The working environment of the crane is the very definition of harsh. Heat, vibration, high loads and flying particulate all act as obstacles against linear motion systems. The crane itself required a telescopic system to endure the working environment and tolerate the 35 lbs of cantilevered load. To solve this dilemma, the welding company turned to PBC Linear.

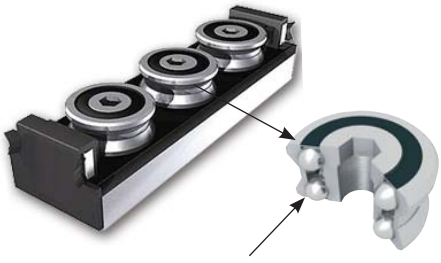
Redi-Rail's drawer slides were the answer. Designed with carbon steel rollers and stainless steel, induction hardened framing, these drawer slides excel in heavy-duty applications. The drawer slides' oil impregnated wipers work to restrict dust and particle intrusion; along with extending the life of the product. Also, the product's innovative S-shaped steel frame design supports high loads and assured precision travel.

After installing PBC Linear's drawer slides, the customer was able to use the enhanced telescopic length to facilitate easy soldering. Presently, the Redi-Rail drawer slides are performing superbly in the application.





Durable Redi-Rail® S-shaped steel frame design



Double row bearing rollers provide high load capacity and accurate travel.

135 Year Old Foundry Refurbishes Production Line with Hevi-Rail®

Foundry slag and other contaminants, coupled with extreme heat and cold make foundry environments difficult for anti friction linear motion systems, the heart of foundry automation. Catastrophic failure and unplanned downtime resulting in lost profits and missed customer deliveries are the norm for most foundries' equipment as they move dirty heavy castings and molds. One well known foundry was experiencing problems in their production line and contacted PBC Linear for assistance. The foundry uses casting tippers to divert dozens of foundry castings after they are molded. These castings can weigh tons and require incredible force to be moved. To reduce the force required to move the castings, an anti friction solution was required. Standard cam followers were originally used to accomplish the task; however, they usually failed after a short period of time, due to the environment. Other competing linear guide systems were brought into solve the problem, but failed within weeks of installation.

High temperature, dirty working environment of foundry line.

PBC Linear recommended their foundry proven Hevi-Rail® product. With the ability to handle extremely high axial and radial loads—up to 60 tons— and designed to provide even dispersion of forces along its guide rails, Hevi-Rail excels in tough and dirty environments. The product's radial and axial bearing components are hardened, sealed and pre-lubricated for years of maintenance free life. The profile guide rail can be easily welded into place or mounted with optional clamp flanges. Stock components and accessories that are simple to set up and align helped to make the conversion trouble free, on time and on budget.

Hevi-Rail® assembly, easily interchangeable system for load applications up to 60 tons.

Hevi-Rail
Heavy Duty Bearing Systems

After installing PBC Linear's Hevi-Rail product into their production lines, unplanned downtime came to a halt, production costs were driven down, net profits dramatically increased and deliveries met. Hevi-Rail has kept the production lines running for two years without incident!

For 135 years, this foundry has been in operation. Now, they can continue well into the future efficiently armed with PBC Linear's Hevi-Rail product. Hevi-Rail can be implemented into a wide variety of high load capacity applications. Durable and long-lasting, Hevi-Rail is built tough to handle the heaviest loads in the most demanding environments.

Hevi-Rail® Keeps Weapon Racks Accessible and Organized

Shipping containers face a constant struggle to optimize storage space and accessibility within a confined area. Organization of stored material is also important for accurate inventory and streamlined loading/unloading. To create an improved solution to container storage, PBC Linear collaborated with Quadcon, a leading designer in storage containment. The task was straightforward: design a racking system that maximized organization and storage for military supplies. PBC Linear recommended implementing their high load capacity Hevi-Rail® linear bearing solution installed in a specially designed assembly.

In the past, storage containers were filled by piling supplies on top of each other; lacking any sense of organization. Finding a specific part within the filled container was extremely tedious, as was organizing and unloading materials after they had been knocked around for a week while travelling to their destination. Quadcon set out to solve this problem by designing internal framing to store materials (guns, munitions and supplies) and maintain organization for the duration of the shipment. After this was completed, they began to seek out quality linear motion components that could be manually operated and endure the containment load and environment.

PBC Linear's Hevi-Rail® extreme load tolerating linear bearing guide system was the answer. Hevi-Rail components thrive in tough applications under extreme loads. Composed of hardened steel and designed to provide even dispersion of forces, Hevi-Rail bearings tolerate axial and radial loads up to 60 tons! For this application, Hevi-Rail components (bearing and profile rail) were installed into the shipping container framing to facilitate manually operated telescopic extension of the racking system. This ensured quick loading/unloading of material and increased access to all stored pieces.

Once Hevi-Rail® was installed into the container's framework, the robust internal racking system could easily be extracted/retracted for up to 2.3 m (90") under 318 Kg (700 lb) cantilevered loads. This drastically improved loading/unloading and allowed personnel to have quick access to the materials they needed. Also, if the outer container shell is damaged, the racking design can be transferred into another container without re-sizing. Perfect for long-term storage of a wide array of materials, PBC Linear and Quadcon's racking assembly is the reliable method for organized shipment.

PBC Linear™ and Miller Weldmaster® Cut Down Assembly Cost

Miller Weldmaster®, an Ohio-based manufacturer of thermoplastic fibers, has turned to PBC Linear's new, cost saving Integral V™ Technology (IVT) for a simplified linear guide system on their extreme performance 112 cross-seaming weld machine! Using a specially designed Integral V™ rail and carriage, Miller Weldmaster dramatically reduced system assembly time, eliminated components, and increased precision on their heat sealed cross-seaming machine.

Utilizing extreme heat to weld a wide variety of thermoplastic fabrics, Miller Weldmaster provides innovative products to a range of industries, including: inflatable materials, truck covers, banners, lawn furniture and more. These fabrics are seamed together using Miller Weldmaster's line of high performance cross-seamers. Due to a painstaking alignment process for overhead linear guide systems, Miller Weldmaster approached PBC Linear for a simplified solution.

The versatility of the IVT design was the answer. IVT can be mounted in either upright or inverted position without losing load capacity, and ideal for many applications. Mounted inversely, the Integral V rail allows the cross-seamer to travel along a highly accurate linear path for very precise welding. Standard rail systems are typically more expensive and require careful alignment and quality assurance for optimum performance. They also require several mounting components and fixtures along the rail for precise mounting, leading to additional production costs and alignment time.

Inverted IVT linear guide assembly.

Custom IVT extrusion reduced mounting components by half.

Integral V™ technology circumvents the pitfalls of the older linear guides with new design improvements and machining techniques. PBC Linear's proprietary SIMO™ process ensures flat surfaces, tight tolerances and rigid guidance. Using concurrent milling, SIMO™ machines all critical edges of an aluminum extrusion in one quick pass—eliminating the extrusions natural inaccuracies of bow, warp, twist and camber. Hardened steel inserts are embedded into the specially designed extrusion for smooth, repeatable travel of the IVT carriage. The end result is the next generation of linear guide systems, IVT significantly reduces mounting components, fasteners and alignment installation time while ensuring precise linear motion travel at a lower total installed cost.

Armed with PBC Linear's new Integral V technology, Miller Weldmaster has been able to cut assembly time by 60%, reduce labor and production costs, and increase accuracy in their new product line of cross-seamers.

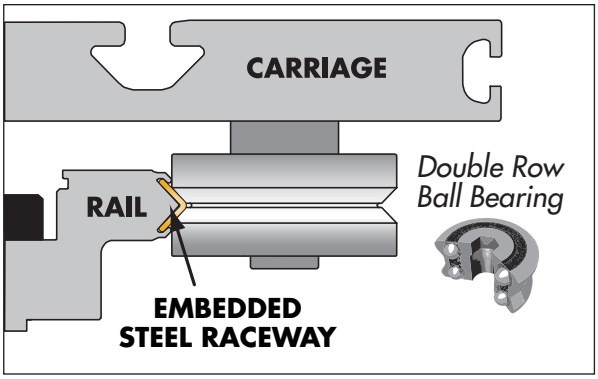
Integral V™ Extends the Reach for Equipois zeroG™

Equipois®, a mechanical design firm that provides ergonomic solutions, works tirelessly to reduce labor strain and improve efficiency in machine-tool applications. Their latest product, the zeroG™, allows for heavy machining tools (grinders, cutters, drills) to be suspended mid-air—providing easy access and operation while eliminating heavy-lifting! For one of their latest applications, Equipois approached PBC Linear for a complimentary linear guide system to the zeroG™ to be installed into a grinding work-area.

Successful linear guidance rested on two factors: ease of movement and load handling. The application required a linear system to support the wide working envelope of the grinding area. Fitted with the grinding tool, the zeroG™ weighs 100 lbs. The linear guide system needed to support the heavy moment load of the grinding arm while smoothly traveling along the guide rail at the hands of the operator.

Integral V™ Technology (IVT) was the solution. Introduced as the next generation linear guide, IVT is designed for heavy load support, precise guidance, and smooth travel. Each IVT linear guide aluminum extrusion is precision-machined using PBC Linear's patent pending SIMO™ process. This creates a stronger, more rigid extrusion that matches the strength of steel—allowing IVT to easily handle high static/dynamic loads. The SIMO™ process machines all critical sides of an aluminum extrusion in one pass, creating a remarkably straight surface (tolerances held within ± .001"). This eliminates the need for fasteners, and drastically reduces alignment/installation time while ensuring high accuracy.

Equipois zeroG™ arm guided by Integral V™

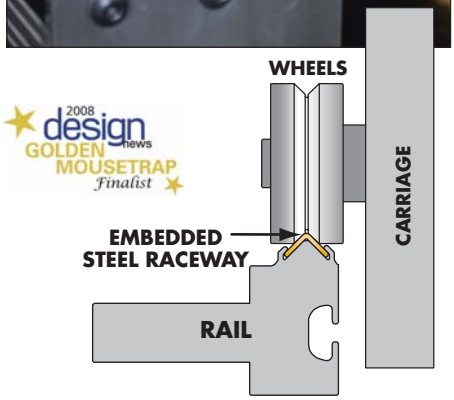


Reduced costs and simplified assembly are very attractive reasons to choose IVT, but the proof lies in the performance. Equipois needed a guide system to support a high roll moment load (the zeroG suspends tools using an extendable/moveable arm attached to the linear guide). Once installed, the Integral V™ linear guide system easily tolerated the required static/dynamic loads (IVT Double Bolt-on tested for roll moment loads of 338 N-m static and 374 N-m dynamic). Gothic arch dual row bearings provided smooth, hand-operated travel of the linear guide; allowing the zeroG™ to be freely used throughout the grinding area.

Easily adapted into the Equipois system, IVT worked great with the zeroG™. The grinding tool operator could bend, pull, align and grind with ease, and IVT gave enhanced movement and freedom to the tooling area.

IVT Lightens up Costs and Improves Precision on CNC Routers

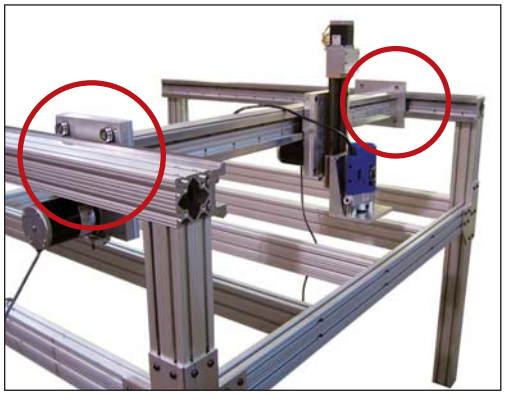
Typical gantry routers can be used to accomplish a wide variety of specialized tasks. From woodworking to foam cutting, CNC routers are a commonplace system found in many different areas on the manufacturing floor. These routers rely on precise linear motion in order to accurately complete objectives. Traditionally, this would entail several mounting components and a painstaking alignment process that drives up production costs and time. However, with the recent introduction of PBC Linear's patented Integral V™ linear guiding system, this alignment process is a thing of the past!



Routers typically have large work envelopes and rely on the gantry's structure to support the router head. The router process relies on high speed spindles that run in excess of 20,000 RPM and require the tool to quickly and accurately machine through the material with a series of high speed cuts. Due to the machining process, the machine base does not have to be as robust as a metal cutting machine and their structural members are manufactured typically out of structural aluminum framing. However before the process can run, the linear guide must be precision aligned in a process that could take hours with the old process, or minutes with IVT.

Integral V™ Technology (IVT) works to reduce installation time and drive down costs by eliminating mounting components while still maintaining a highly accurate linear motion system. Many hours can be consumed by the machine builder to properly align their cutting machine with the linear guide. Conventional linear guide systems rely on mounting components to maintain precision alignment and accurate travel. These mounting components are installed and arduously aligned to ensure precision in a process that can take hours. With IVT, the durable aluminum extrusion maintains its tight tolerances throughout the extent of the extrusion! This is accomplished by IVT's innovative design and PBC Linear's newly developed SIMO (Simultaneous Integral Milling Operation) process.

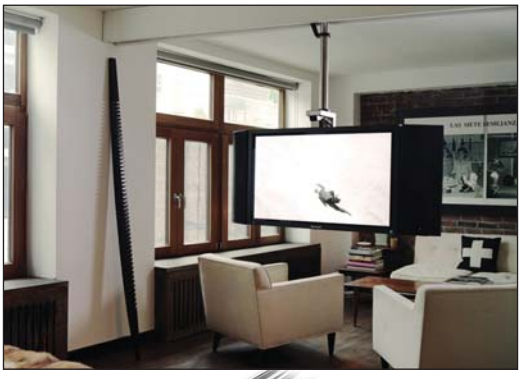
The SIMO process provides precision machined aluminum extrusions and extremely tight tolerances by using synchronized tooling to maintain alignment along the rail. In a straight line production process, SIMO can machine an extrusion concurrently and consistently on all four sides with one pass. This creates a solution to a common problem in several industries: cost efficient precision machined extrusions. SIMO reduces the meticulous alignment phase from hours to minutes. From simple linear guides to customized extrusions for routers, the SIMO can quickly machine out an accurate extrusion at no added cost.



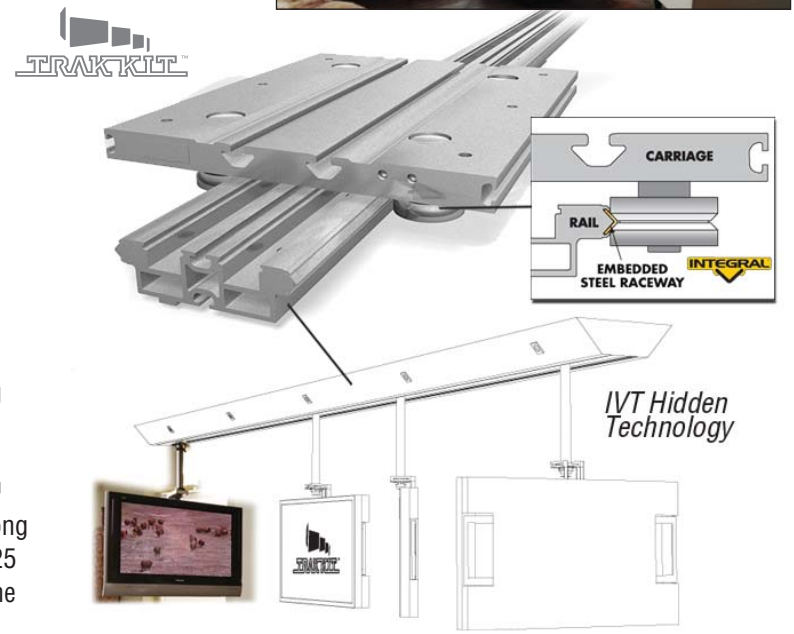
Integral V™ Router Assembly

Recently, IVT has been implemented in several different routers spanning a wide variety of industries. Using custom-built extrusions, IVT has drastically reduced the router's mounting components, installation time, and production cost; yielding a simplified, highly accurate linear motion guide. With IVT's custom integrated frame design, the lightweight aluminum structure can hold up against immense weight and provide highly accurate, long-lasting travel for the router. From installation to the end result, IVT creates a simplified and economical solution to linear motion in routing systems.

Integral V™ and Trak-Kit™ Get Your Flat-screen TV on Mobile Track



Anyone wishing to put their LCD/Plasma flat screens on the right track (so to speak) into their residence or office will be actively pursuing a Trak-Kit™ system: an innovative way to provide mobility and versatility for flat-screens that directly integrates into architectural design. Trak-Kit™ uses ceiling or wall mounting components for suspension and PBC Linear's Integral V guides for mobility and additional load support. Recently, SHAdi + Company, the designing firm behind the patented Trak-kit™ system, chose PBC Linear's Integral V™ linear guide system to support the heavy moment loads created by the various sizes of flat-panel monitors and speakers while ensuring smooth and ergonomic movement throughout the space of the room.



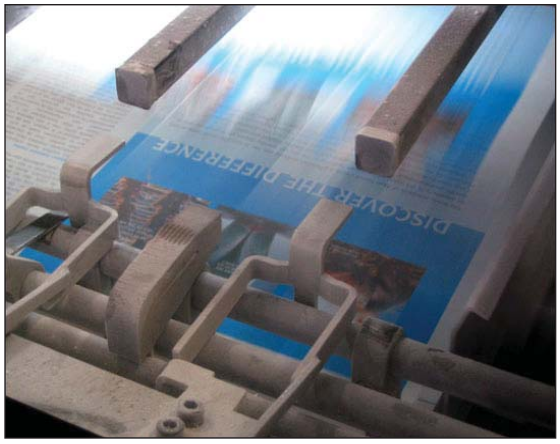
Founder of SHAdi + Company and inventor of Trak-kit™, Farshad "Shadi" Shahrokhi is a student of innovation and architectural design. He is also a self-pronounced audio/video enthusiast; which is most likely responsible for the creation of the Trak-kit™ system. Mr. Shahrokhi saw a niche market in interior flat-screen mobility, and designed the Trak-kit™ system to facilitate the needs of tech-savvy enthusiasts just like him.

The Trak-kit™ assembly mounts to the ceiling using a system of brackets and support bars integrated with A/V wires for optimal monitor operation. Once assembled onto a flat-screen monitor, the Trak-kit™ system is mounted to a linear guide for mobility along the track and easy-access viewing (up to 50 ft./15.25 m). The mounted flat-screen can now glide along the track, rotate 360° and in some cases be raised or lowered out of the ceiling! To support this mobility, the linear guide needed to be durable enough to handle the moment load of the flat-screen and Trak-kit™ mount, easily maneuvered for ergonomic use, and compact for aesthetic architectural appeal.

Integral V™ was the solution. Developed in 2008 by PBC Linear, Integral V™ is the next generation of linear guide technology. Integral V™ uses hardened steel inserts directly embedded into aluminum structural framing to eliminate fasteners while providing straight (0.002"/0.05 mm) and even travel across the track. PBC Linear worked hand-in-hand with SHAdi + Company to successfully implement Integral V™ into the Trak-kit system. Their precision machining process, SIMO™, allowed for reduced components, easier installation and alignment. Originally, linear guidance for the Trak-kit was done using complex modular components—requiring several steps in assembly. The simple, dowel-pin joining Integral V™ rails and guides helped speed up Trak-kits production process to meet increased demand for the system. Available in multiple configurations to meet customer-specific needs, Integral V™ can be adapted as a linear guide into almost any application.

PBC Linear™ Provides Smooth Positioning for High End Printer

Smooth, uninterrupted precision linear motion is essential to high end printing, and PBC Linear has been maintaining these qualities since the company fist began in 1982. Using PBC Linear's versatile MT series belt-driven linear actuator and additional support from Linear Guides, part of the Profile Rail Technology (PRT) family, a well-known high-end printer manufacturer could sustain high positional accuracy over a large work envelope for their brand new poster printing system.



This new printing station spans over a 1500 mm long assembly-line resembling work area. During the typical printing process, the inversely mounted MT actuator carefully moves carriages containing the printing stock under the transverse motion of the ink jet print head for accurate, efficient, and high quality printing. However, the printing base—where the paper sits during the printing process—periodically needed mandatory cleaning and standard maintenance. This process required the 25 lb printing base to move just under three (3) feet into the purging area: a station that allows for environmentally safe disposal of printer ink. Once finished, the printer base needed to transfer back into the printing area and resume normal function.

MT series belt-driven actuator provided smooth velocity control for paper transfer.

Profile Rail Technology (PRT) ensured easy rolling guidance for alternate side

PBC Linear recommended installing their MTB-042 linear actuator. The extruded aluminum body is protected by clear anodizing and provides a self supporting and contained linear motion system with convenient t-slots for mounting the unit as well as accessories. The steel reinforced belt drive provides maintenance-free, accurate, smooth and quiet linear motion. The magnetically sealed stainless steel strip cover keeps ink out and actuator particulate in. The MTB-042 provides long-lasting precision linear motion for high-speed, high load applications—even when the actuator is inversely mounted.

As the actuator propels and guides the print carriage. The other side of the carriage is supported and guided by PBC Linear's newly offered re-circulating ball linear guides (PRT) to guarantee smooth and quiet linear motion. The runner block carriages come standard with innovative ball cages to provide higher loads, less lubrication maintenance and smooth and quiet operation. An internal lubrication system promotes long product life. PBC Linear's new linear guide eliminates moment loads applied to the actuator—creating a stable, long-lasting linear motion system.

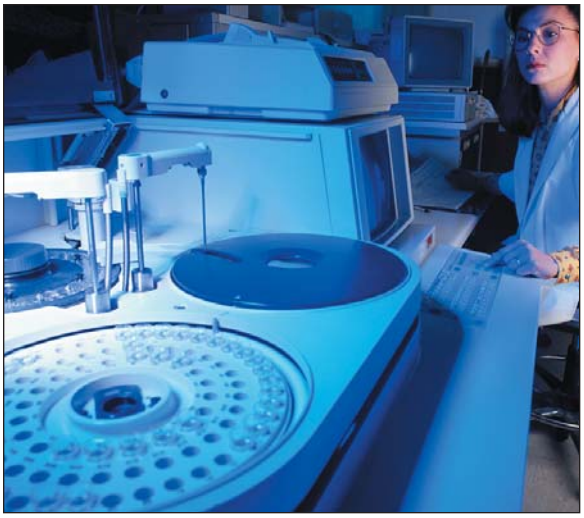
Overall, the printer manufacturer was impressed by the performance of the combined linear system. The vital smooth guidance provided by PBC linear was exactly what the company needed for the high-end printing station.

ML Series Provides High-Accuracy Positioning & Drilling in Medical Equipment

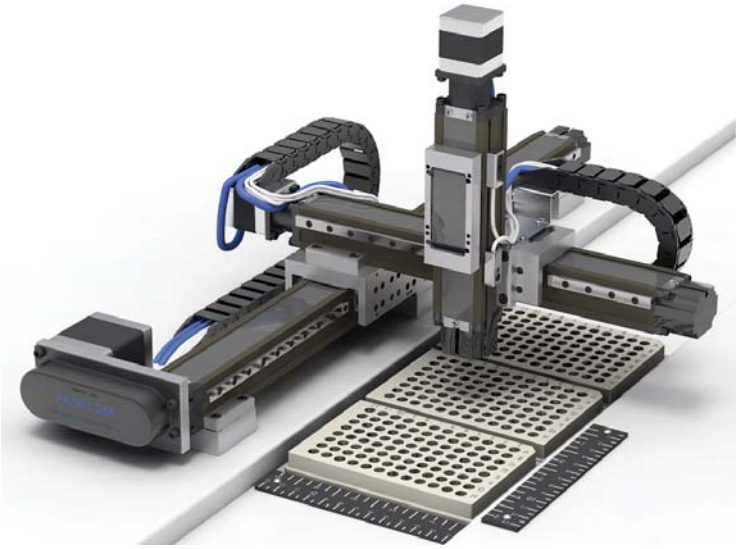
Laboratory and medical equipment manufacturing is centered on precision. When using automated systems to measure samples, accurate positioning and precise travel is key! Recently, PBC Linear was approached to design a fully automated CNC drilling system for laboratory test tube analyzing and storage. In order to ensure precision positioning and drilling, PBC Linear recommended their ML series miniature actuators.

ML XYZ gantry system with high thrust power used for accurate machining of tap holes..

The application required a CNC drilling system that would drill holes on a 12 inch x 12 inch area, creating a peg board. These holes would, in turn, be filled with medical test tubes for safe storage while they await being analyzed in laboratory centers across the country. The medical equipment manufacturer needed a quick, precise and durable mini-positioning system; therefore, PBC Linear designed a complete turnkey solution using three MLB motor driven actuators assembled in a sophisticated XX'Y configuration.



Designed for precision in a small-scale environment, the MLB actuator ensures accurate positioning performance. The mini-actuator comprises a post-processed SIMO™ machined outer profile for precise mounting and durability. This one-of-a-kind machining process allows for fast, simultaneous machining on all critical edges of the body. It also permits the actuator to sustain a lighter weight without sacrificing strength—allowing for a smaller sized (and more affordable) motor. The MLB mini-actuator's "dovetail" style carriage comprises 14 plane bearing surfaces that provide low friction, smooth motion and quiet travel. Power is supplied by a state-of-the-art stepper motor system for optimum control. The final assembled system is at the pinnacle of both precision and performance.



Moving at a speed of 10 inches/second, the CNC drilling system was able to provide advanced positioning and drilling across the pegboard's surface area.

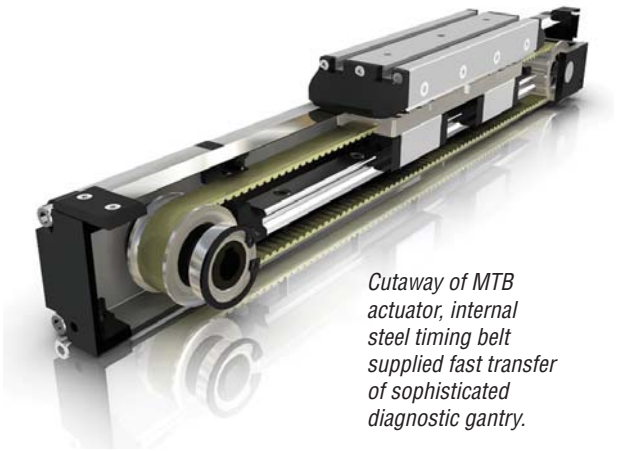
PBC Linear™ Actuators Put Medical Testing on the Fast-track

Clean-room dependant linear motion can be the most painstaking for a product to excel. Grease, oil, and other common lubricants have no place in this environment. For medical testing, keeping a sterile environment becomes even more critical. A slight disturbance could alter test results and cause the need for retesting, wasted money, and lost time. Recently, PBC Linear™ was commissioned to design a gantry system for a completely automated, clean-room dependant medical analyzer. Taking all aforementioned factors into consideration, PBC Linear recommended using their MT series belt-driven actuator to accomplish the task.

Testing and diagnostic time reduced from days to hours.

Accurate positioning in three (3) axis over a work area ranging1830 mm X 3050 mm was critical to this manufacturer of biological analyzers. Utilizing a gantry configuration, PBC Linear provided its high-speed belt driven MT Series actuators preassembled and tested in the 3 axis configuration for easy installation by the customer into their platform.

Sealed against contamination, PBC Linear's MT series actuators are perfectly suited for the clean-room environment—keeping potential contaminants and internal components that could damage the sensitive samples inside the system. Assembled into an XY gantry, the MT actuating system was responsible for test or storage of sensitive biological samples. The gantry was also designed with special mounting components to facilitate precision and rigidity when moving the samples. For example, a highly precise gripper was attached to the end of the smaller MTG actuator with an accuracy of 2mm within the work area. This mechanism acted as the "arm" of the gantry while the remaining three MTB actuators were used to quickly move around the system as a whole.



Cutaway of MTB actuator, internal steel timing belt supplied fast transfer of sophisticated diagnostic gantry.

Before the system is shipped out, PBC Linear puts the MT series gantry through rigorous testing. Measuring accuracy, repeatability, speed, and distance, PBC Linear fine tunes every aspect of the system to ensure quality service for the end user. Using a portable CMM analysis device, PBC Linear can ascertain any potential problems and swiftly tweak the system.

This equipment is used to test for everything, from delicate genetics analysis to substance abuse detection. Using PBC Linear's designed gantry system to provide the accurate movement and transportation of the samples, the medical analyzer reduced testing time from days to hours.

PBC Linear™ Provides Complete, Fast Automation Solution for Medical Sample Equipment

Delicate, critically important biological samples are carefully transported at high speeds using a complete linear motion gantry solution designed by PBC Linear. A medical equipment manufacturer needed a solution for quiet, fast-paced pick-and place automation on their newly designed sample transporting system. Speed and care were crucial for maintaining efficient productivity; however, PBC Linear was met with the challenge of balancing the two.

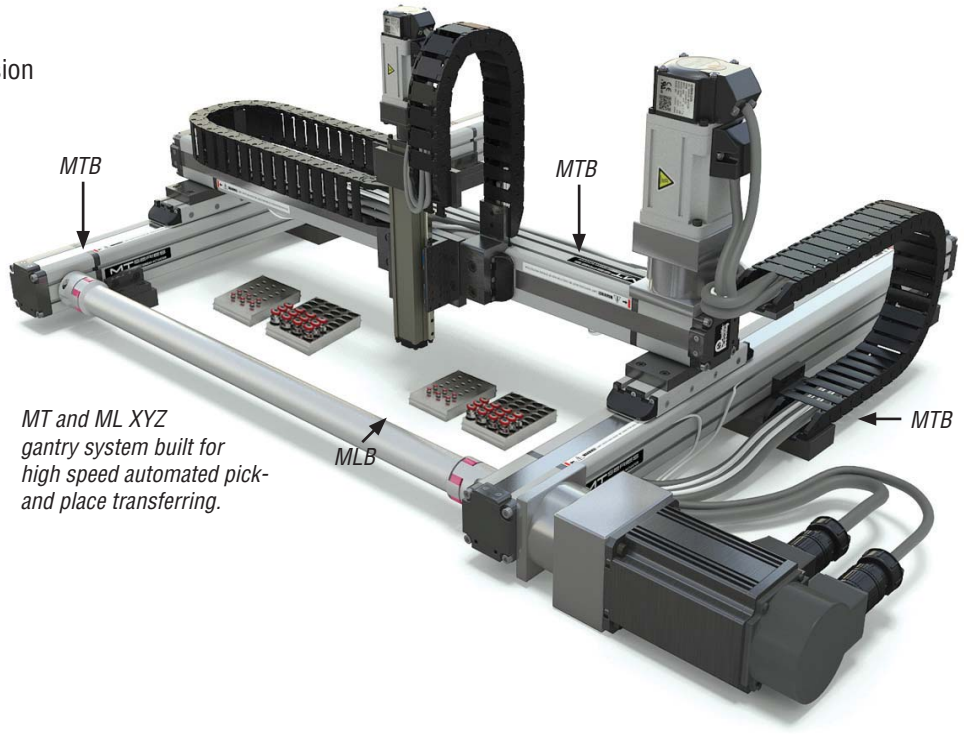
MTB Belt-Driven Actuator

The medical equipment design company relies on the speed of their automated laboratory products to promote high efficiency and performance. Safely storing and transferring samples in the fastest way possible is the bottom line. For a competitive design in this market, the design company turned to PBC Linear for a complete solution.

Using three high performance MTB actuators assembled into an XYZ gantry, the new sample transfer system supported a wide working envelope. PBC Linear MT series actuators are driven by steel reinforced timing belt, which ensures high acceleration and fast travel. MT series are composed of an anodized aluminum housing and carriage; which gives the system strength while remaining lightweight and corrosion resistant. Easily mountable and installed in multi-axial Cartesian gantries, the MT series provided the fast, precise and repeatable guidance necessary for the sample transferring operation.

For careful handling of the samples, PBC Linear installed their ML series mini-actuator to perform the gripping operation. Compact, lightweight and precise, the ML series mini-actuator provides precise linear motion in tight spaces. In this application, the ML moved the gripper in and out of place with careful, sophisticated control.

PBC Linear's complete design was a perfect combination of speed, precision and control—swiftly transporting samples to their desired locations without loss of product or time.



MT and ML XYZ gantry system built for high speed automated pick-and place transferring.

ML series Installed as Precision-Automated Locking System

The MLA miniature linear actuator has already showcased high performance and accurate linear guidance in the medical laboratory environment, but recently a medical supply company decided to incorporate the small actuator into a cabinet locking system. Using their smallest model, PBC Linear helped this medical company design an automated keypad lock for a transportable medical storage unit.

Keypad entry system.

Security is of the utmost importance when housing delicate and expensive medical supplies. To maintain control over their stock of medicine, tools and other delicate devices used, the medical supply company required a linear positioning system small enough to fit into their compact drawers and installed into a keypad lock system. The lock relied on the precise smooth and quiet linear motion to successfully operate the locking pin in and out of position. Traditionally in these systems, a solenoid is used to operate the locking mechanism; however the clinic found solenoids to be too inaccurate to reliably and repeatedly perform the necessary tasks.

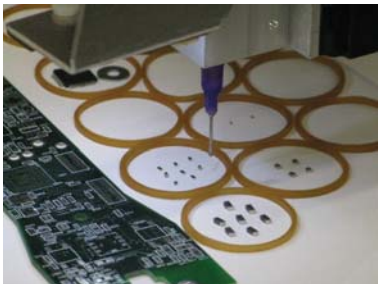
Compact and robust, the MLA only measures about 28mm x 32mm in width and height, with lengths available as short as 190mm. The MLA's profile is precision machined using PBC Linear's proprietary SIMO™ (Simultaneous Integral Milling Operation) process. The SIMO™ process utilizes multiple mills working together to machine all the actuator's critical surfaces simultaneously to ensure accuracy and smooth linear motion at no added cost! This provides a low cost, remarkably straight actuating system without bow, or twist. The MLA is also equipped with a special, no maintenance self lubricated polymer slider to support the actuator's compact design and facilitate stable linear guidance.

ML series installed in keypad lock. 28mm & 32mm profiles, the ML system operated the locking mechanism reliably for secure medical tools and samples.

After installation, the medical clinic reported satisfaction with their locking systems. The compact linear actuator easily fit into the small space, and supplied more than efficient precision motion to dependably lock and unlock the portable medical cabinets whenever they were needed.

Mini-actuator ML Series Automates Precise Circuit Board Assembly

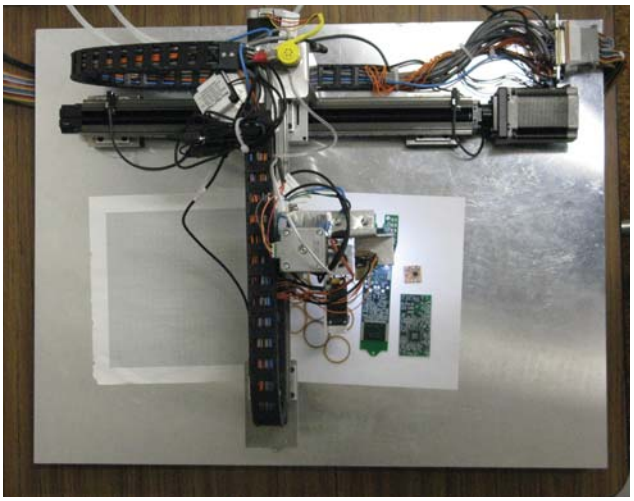
In today's world of space conservative technology – flat-screen TV's, 1" thick laptops and smart phones – the demand for printed circuit boards is on the rise. Assembling printed circuit boards requires repeatable performance and extremely subtle precision is usually too expensive for educational and small business markets. Professor Harvey Silverman's team at Brown University has recently devised a solution to automate the process using PBC Linear's ML series mini-actuators in a multi-axis circuit board assembly system at a suitable cost for these areas.



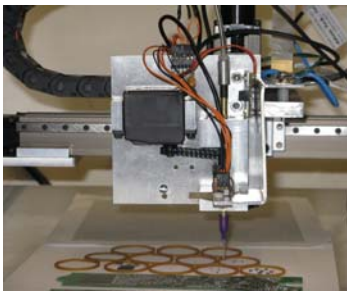
To accomplish the task of circuit board assembly, Professor Silverman needed a linear motion solution that could position tiny surface mount devices (SMD's) such as capacitors and resistors of 0402 size (0.040" x 0.0240") and accurately place them onto solder paste to adhere to the board. The tiny parts need to be handled delicately and adjusted mid-operation to correct for misalignment. The final piece of the puzzle was finding a way to ensure all parts are in the right place.

An ML series XYZ gantry controlled with a vision system was the perfect solution. With a 28 x 32 mm profile, the compact mini-actuator was the optimal size for small-scale circuit board assembly. Also, the ML series is equipped with state-of-the-art components for accurate linear positioning; such as a 'dove-tail' style carriage comprising 14 plane bearing surfaces for high rigidity and smooth travel, single or dual external linear guide supports for enhanced stability and a full line of accessories for use in multi-axis systems.

Designed over the course of a year with product assistance from expert PBC Linear application engineers, Professor Silverman came up with a working solution. Three PBC Linear ML series mini-actuators assembled in a 12 x 14" footprint XYZ system were utilized to automate the surface mount assembly process. Two ML actuators accurately determine XY position while the third moves a vacuum needle part-grabber up and down. A server was also added to allow rotation of the part. In addition, the gripper assembly is outfitted with a small camera to locate loose parts and give feedback to the user utilizing software designed by Ken Silverman. The camera compares images of assembled circuit boards to identify where all the pieces need to go and signals the gripper to re-align if adjustment is necessary. The system can also be switched over to manual control for special assembly projects.



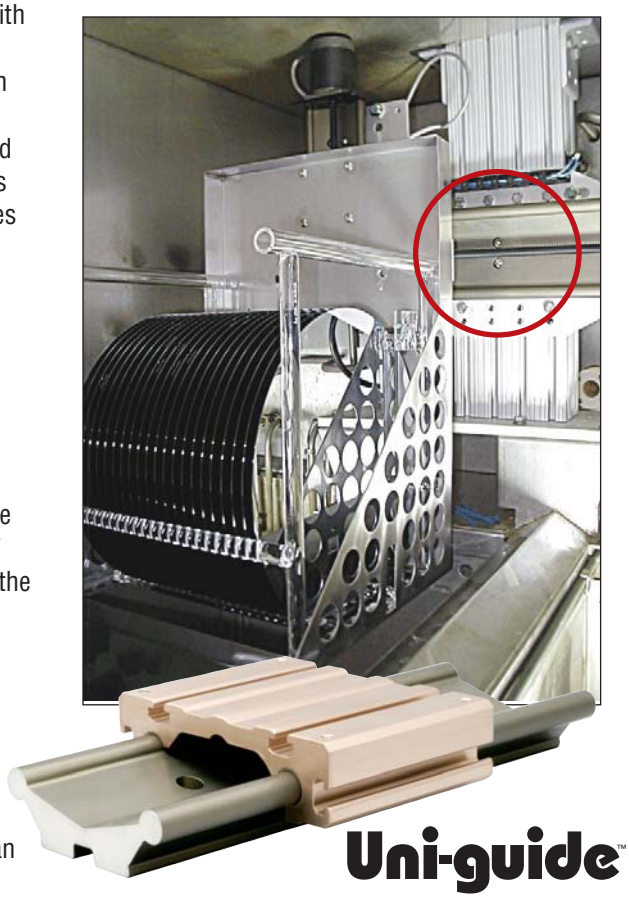
Overhead view of the ML Series miniature linear actuator multi-axis circuit board assembly.



Overall, Professor Silverman was very pleased with the low cost PBC Linear ML solution and its ability to perform the required tasks at hand. He is currently working with PBC Linear engineers to update the design with a new ML series actuator for enhanced pick-and-place assembly.

PBC Linear™ Uni-Guide Shines in Wafer Manufacturing

For over 25 years, PBC Linear has developed working relationships with its customers to help them save money and time by customizing PBC Linear products to their needs. From simple pillow block modification to complex linear slides and stages, PBC Linear delivers on its expertise, allowing the customer to benefit with cost savings and rapid time to market! Class 10 clean rooms—the norm for semiconductors and medical automation—are areas where the Simplicity® technologies exceed all expectations. In these surroundings, PBC Linear's proven smooth moving Simplicity technology requires no lubrication, emit small amounts of particulate, and last for years!



The self-lubricating Uni-Guide glides accurately along the rail without grease or oil.

This automation company manufactures silicon wafers and handling equipment that is housed and operated in extremely clean environments. Wafers are stacked in a cassette which is housed in a SMIF Pod for safe transport between processes. The SMIF Pods provide a mini environment (class 1) to prevent contamination and are the temporary home of the wafers during their processing. The SMIF Pods are attached to a Pod elevator which allows the robot servicing the processing tool to horizontally pick and place the wafer into the tool.

Smooth vertical movement of the elevator POD is essential to prevent the wafer in the cassette from vibrating free or out of position for the robot. Either of the aforementioned conditions could have serious consequences. Destroying the batch of wafers could cost hundreds of thousands of dollars. Although the mini-environment protects the wafers, it is necessary that the environment they reside in remain clean (Class 10) to avoid any contamination during the exterior loading and unloading process. Micro processors and other IC Chips computational power become a function of the density of the etching of the individual circuits on the wafer. Cleanliness means denser circuits and more computing power.

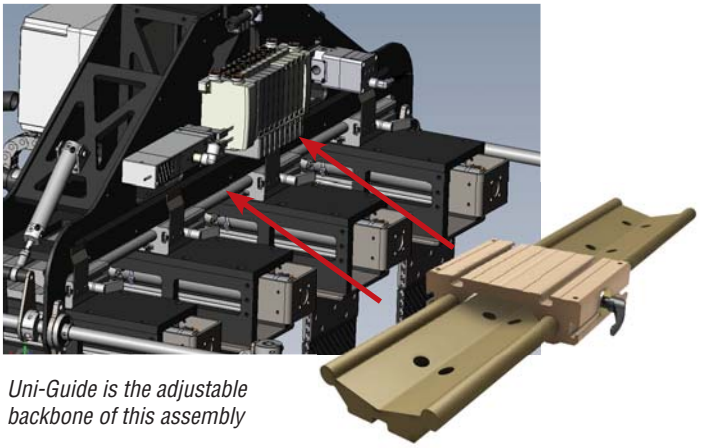
The automation company originally came to PBC Linear for a chatter or vibration free linear guide that could function in a contaminant-free manufacturing facility without dispersing particulates or requiring lubrication. With its precision design, simple two-piece assembly, and proven Frelon® J liner, the Uni-Guide was the obvious choice to handle the silicon wafer transport system used in the manufacturing process. With a proven history in similar applications, the Uni-Guide linear slide has a clean track record providing precise linear motion without added lubricants. The customer, however, was also reaching for more; they wanted a turn-key system to act as the heart of the new wafer elevator. PBC Linear's team of seasoned engineers worked with the customer in designing a complete system that upon delivery simply plugs in and functions perfectly with the rest of the machine. As this mutual relationship has developed, PBC Linear not only supplied the slide but also began to supply the motors, drive screws, guards, limit switches—pre assembled and tested.

Assembled in PBC Linear's clean workroom, the specially designed Uni-Guide is subject to critical testing for accurate travel and alignment. Careful measures are taken to ensure the sterile transportation of the Uni-Guide from testing to when it arrives at its destination. PBC Linear has maintained their production and documentation in accordance with the regulations set up by the customer and upheld its reputation as the destination for solutions to the most difficult linear motion applications and has supplied product in a timely fashion world wide.

PBC Linear Uni-Guide Provides Hartness with Perfect-Fit Packaging Solution

An automated packaging line can vastly improve a company's productivity and cost efficiency; however variant box sizes used by different company's creates a logistics nightmare for packaging system designers. Hartness Automation, a manufacturing process design firm based out of Greenville, SC, decided to implement manual adjustment into their packaging grippers for quick sizing and re-sizing of boxes. To devise a solution, Hartness identified PBC Linear's Uni-Guide as a viable product to complete this task due to the linear slide's ability for high tolerance of moment load, simple design and multiple carriages with custom options.

The application tasks required were relatively simple: manual positioning and locking of the package grippers into place to adjust for the size of the box. The solution would necessitate robust design, simple integration and the ability to tolerate relatively high moment loads (up to 1000 in-lbs). When first designing the new packaging gripper assembly, Hartness was leaning towards profile rail technology guided by re-circulating ball-bearing carriages. However they soon discovered a profile rail system could not support the moment, and began to seek out an alternative solution.



Uni-Guide is the adjustable backbone of this assembly

The Uni-Guide was the answer. After browsing the PBC Linear website, Hartness engineers identified the Uni-Guide as a possible solution as a result of its high tolerance for offset loads. They further noticed the Uni-Guide's simple design would make a perfect fit into their packaging gripper system via utilizing PBC Linear's easy access and downloadable CAD files for all of their products. The engineers then immediately set to work specifying the Uni-Guide into the robotic palletizer design.

With its simple two-piece (rail and carriage) design, the Uni-Guide is an elegant solution that ensures parallelism, straightness and smooth travel. Profile rail technology requires several components to be machined and aligned together to recreate a system similar to Uni-Guide—leading to increased assembly time and cost. The design also allows for the linear slide to handle high moment loads (beyond the 1000 in-lbs load rating mandatory for the application). Available in multiple carriage assemblies with locking hand-break options, the Uni-Guide made a seamless translation into the packaging system.

The result? Hartness noted that PBC Linear's Uni-Guide "fit beautifully" into the robotic palletizer. Installed with four carriages to adjust for the different box sizes and hand-breaks to lock the grippers into place, the Uni-Guide provided simple manual adjustment for the application. Now the grippers could quickly and accurately be sized to transport between 1-6 boxes at a time in 45 unique box shapes.

Hartness International has provided its clients with innovative packaging solutions and total customer satisfaction for over 40 years. Driven by the ever-changing needs of the Global market, Hartness has become a leader in the fields of world-class machinery manufacturing, packaging line design, engineering services, robotic and warehousing automation, and sustainable package development. Hartness serves the Global market with fully staffed offices which are strategically located in the US, Mexico and Germany.

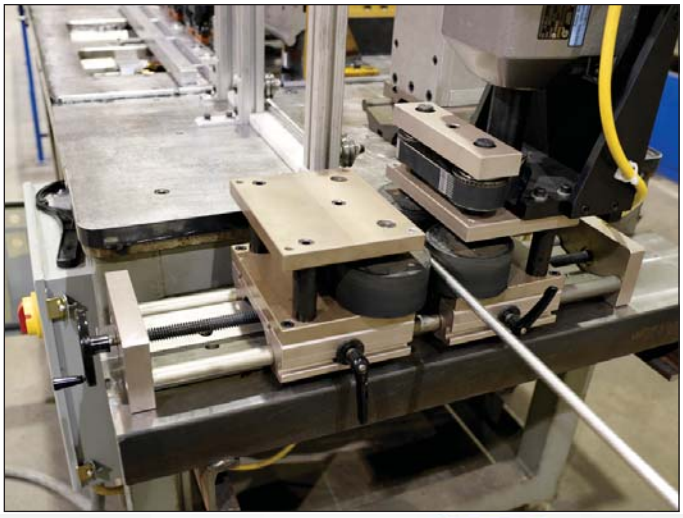
PBC Linear™'s Uni-Guide: Creating a Customized Solution for the Wood Working Industry

PBC Linear is pleased to announce several newly developed, customized accessories for its widely successful and highly applicable Uni-Guide linear slide. Providing an economical solution to material handling and feeding, these new powered and un-powered vices offer precise linear motion founded upon PBC Linear's ingenuity and their proven, long-lasting Simplicity® technology. With its simple, two piece assembly, the Uni-Guide design allows for drop-in installation that is easily customized into these newly available vices that are perfectly suited for the woodworking industry.

Outfitted with the same Frelon® GOLD liner as the Simplicity linear bearing, the Uni-Guide is fully capable of withstanding a multitude of environmental obstacles that cause conventional linear guide systems to seize up and fail. Dirt, dust, wooden or metal chips, fluids, and any other contaminants all DO NOT effect the performance of the Uni-Guide. Extreme temperatures and shock vibration also do not interfere with the system's overall performance. With no added grease or oil necessary, the self-lubricating Uni-Guide provides reliable precision linear motion throughout the entire life of the product.

Completely customizable, the Uni-Guide has several newly available modular positioning accessories. The power feed system simply bolts onto a self-centering Uni-Guide platform allowing for the fast and accurate feeding of material. Backed by a heavy duty motor and gearbox, the Uni-Guide power feeder employs high power and precision linear motion in an easy to install system.

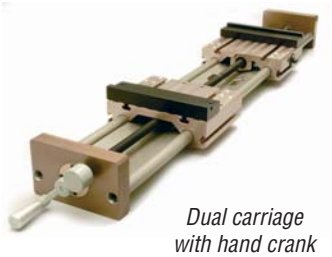
For un-powered applications, low cost holding modules function to create adjustable vices that can handle material ranging from 12mm up to 2.5 meters. With several different locking mechanisms available, ratchet-pinion, angle lock, modular clamp, the vices ensure positive grip; which prevents shifting of production material—such as wood—during machining. These systems also come available with optional air or hydraulic cylinders to facilitate fast loading and unloading of product materials.



Custom Uni-Guide vice assembly

Uni-guide™

Uni-Guide pin lock



Dual carriage with hand crank

Uni-Guide Give Heavy Touch Screen Monitors A Raise

Transportability, quick set-up and a robust assembly are the key factors to consider when designing a display stand; particularly when expensive electronics are involved. Traveling from place to place can result in significant strain on the integrity of the display. Florida Motion & Control, a motion control design firm specializing in integrating hydraulic and pneumatic solutions, recently came up with an answer to moving large monitor stands and quickly adjusting their height. Using the Uni-Guide linear slide developed by PBC Linear, Florida Motion & Control created a positioning stand for large 60" touch screen monitors for exhibition and other large group events.

Uni-Guide two-piece modular guides provideS quick integration and setup handing for the 60" touch screen monitor.

While designing the product, Florida Motion & Control focused on three elements: the stand needed to be easily raised/lowered, low maintenance and easy to set-up. The events the monitor stand would be displayed at are typically supported by minimal staff; therefore the ability for the stand to be moved and adjusted by one person was set as the target benchmark.

PBC Linear's Uni-Guide provided all advantages necessary for high quality performance of the monitor stand. The Uni-Guide is comprised of a simple, two-piece (rail and carriage) assembly that easily fits together without fasteners—reducing tolerance stack-up and allowing for quick design integration. PBC Linear's proprietary Frelon self-lubricating liner facilitates smooth, reliable and maintenance-free linear motion for years. The special liner prevents rail damage by harmlessly absorbing particulates as the carriage glides over them. Also, Florida Motion & Control outfitted the slide assembly with a compressed air spring to supply easy hydraulic raising and lowering of the monitor.

High moment loads were also a major concern. The top-heavy 60 lb monitor stand put significant force on the Uni-Guide; however its sturdy design proved more than enough to support the load. Florida Motion Control commented that the Uni-Guide, "provided a simple, yet effective solution for easy adjustment of the stand," and are currently exploring markets of where it can be implemented.

For more information on the innovative hydraulic and pneumatic solutions at Florida Motion Control check out their website at www.flomoco.com.

FRC Vikings Team wins Innovation Award with Uni-Guide Design

The FRC (First Robotic Competition) is put on through FIRST and used to provide hands-on design/mechanical physics and engineering experience to high school students—along with valuable teamwork building and project management skills. This year, Team 2641 (a.k.a. the Vikings) of Pittsburgh Central Catholic High School decided to implement PBC Linear's Uni-Guide linear slide for reliable operation of their robot's "kicking" mechanism. Installed into a system they designed, the Vikings took the Uni-Guide through a host of competitive events throughout the country, pitting their design against other high school teams in a remote control game put together to test the ingenuity of each team!

FRC varies their game every year. For 2010, FRC rolled out Breakaway: a team effort game using a 27' x 54' carpeted field divided into thirds by two 13" barriers. The teams are grouped into alliances (3 teams and 3 robots per alliance). The robots use varied student-made designs to toss soccer balls at targets located on either side of the field in order to score points—the Vikings accomplished this utilizing their Uni-Guide controlled design. Teams can also score points by elevating or suspending robots by climbing towers at the center of the dividing barriers. To summarize, the alliance has 2 minutes 15 seconds to score the most points using their 3 unique and FRC approved robots.

At the beginning of the season, each team is given a strict budget of $3500.00 to create their unique robot design. For their robot, the Vikings required a reliable linear guide system to conduct the kicking mechanism in order to shoot the soccer balls into the targets. The linear guide would need to endure several performance obstacles: high shock vibration from periodic impact crashes during the game; functioning in particulate-heavy environments due to steel and aluminum filings; and fast changing repeatability under high charged loads.

The Vikings decided to go with PBC Linear's Uni-Guide system. Using a motor driven, dual-carriage design, the Uni-Guide would drive one carriage down the slide and attach to the other. As the second carriage was retracted back up the slide, potential energy built-up—awaiting the trigger's release. Once triggered, the carriage releases in a slingshot-like motion to provide the kicking foot with enough energy to easily knock soccer balls into the goal.

Uni-Guide assembled into kicking mechanism

The Uni-Guide was the perfect solution. The linear slide's plane bearing technology sustained smooth velocity control for the operation of the "kicking foot." Containing no rolling elements, the Uni-Guide tolerates shock forces and contamination without experiencing system failure or binding. The simple, two-piece (rail and carriage) assembly mounts to existing systems and is precision machined to ensure high accuracy and repeatable travel. This reduces cost by eliminating further alignment machining and fasteners that other multiple piece linear guide assemblies require. Available in driven or un-driven assemblies with multiple carriages, the Uni-Guide is well-suited for unique applications that necessitate sophisticated control—even in harsh surroundings.

Put to the test in three regional competitions, the Vikings' robot excelled in mechanical performance due to the team's innovative design and hard-working components; such as the Uni-Guide. The Vikings were even recognized for their design, winning an award for Innovation and Control at the 2010 Long Island Regional (at which they also took first place). To learn more about the Vikings Robotics Team or FRC, please visit their website at http://robotics.centralcatholichs.com/node/1.

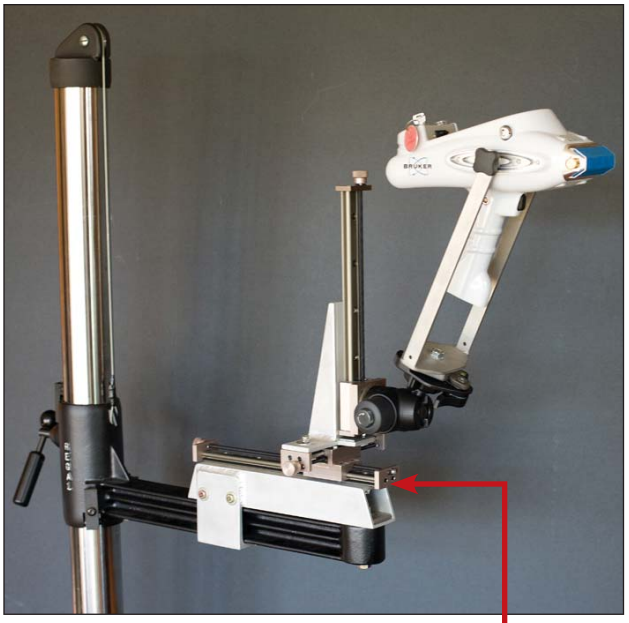
PBC Linear Creates Measuring Stand for Million Dollar Artifacts

PBC Linear was recently contacted by a rare-collections office to provide a measuring and analyzing system that would be utilized on priceless artifacts. This device was required to move around these artifacts and take precise measurements at various angles. The measuring stand had to provide a steady platform, with long travel strokes and be able to be adjusted by hand knob. As they currently did not have any measuring stand that came even close to the movement versatility they were looking for, PBC Linear was asked to produce a solution.

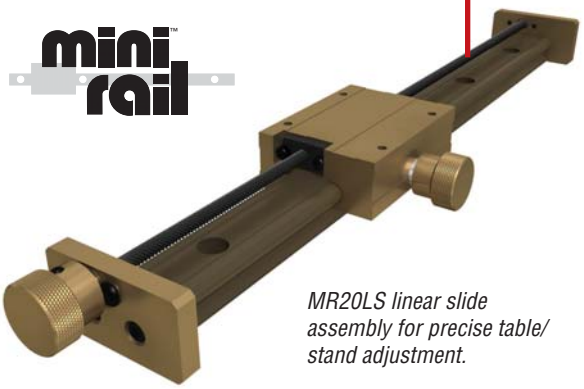
Conventional testing of these artifacts uses CT scans and other analyzing processes to produce data on the size, composition, and age. Many of the artifacts are oddly shaped, making measuring these aspects laborious and extremely time consuming. The collections team required a device that could manually move smoothly around the artifact and accurately measure and record all of the different surfaces. It had to be reliable, light weight and portable.

PBC Linear designed a gantry out of three (3) MR20LS linear slides to provide maximum precision and reliable movement. This new measuring stand was given enough play to move around and accurately measure their largest items—allowing the collections team to receive accurate data on all of their priceless artifacts. Also, the stand could change and replace several different measuring devices to get a clear picture on all aspects of the multi-million dollar artifacts.

Upon delivery of the new measuring system, the collections team was incredibly satisfied with the way the MR20LS linear slide was able to provide the precise movement to allow for the team to capture accurate data for all of their artifacts, regardless of size and composition.



MR20 artifact measuring stand, adjustable to fit and measure priceless materials.



MR20LS linear slide assembly for precise table/ stand adjustment.

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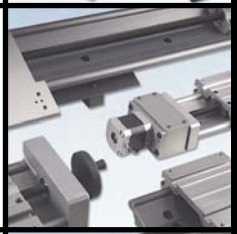
Uni-guide™



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