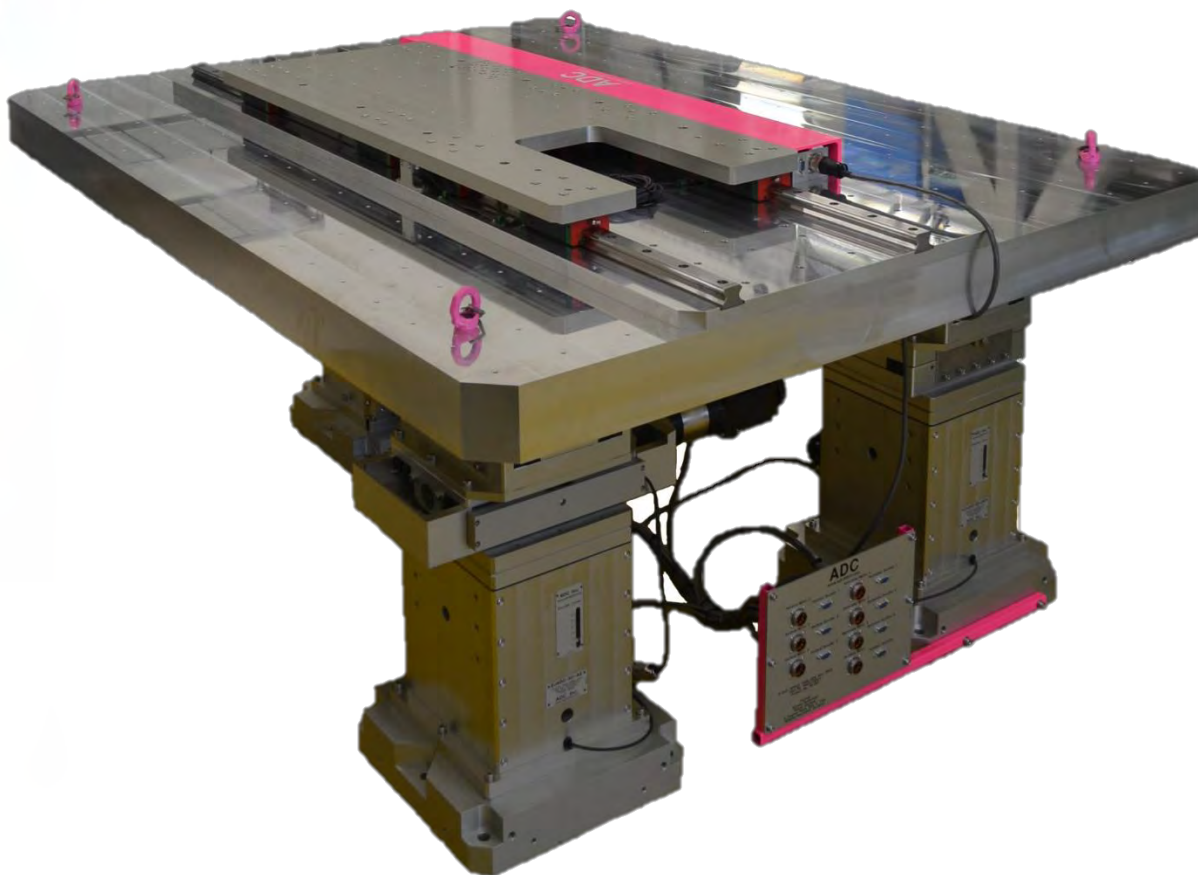


High Precision Optical Tables

High precision, motorized optical tables for Synchrotron, Neutron, FEL, and High Radiation Scientific Facilities



2019



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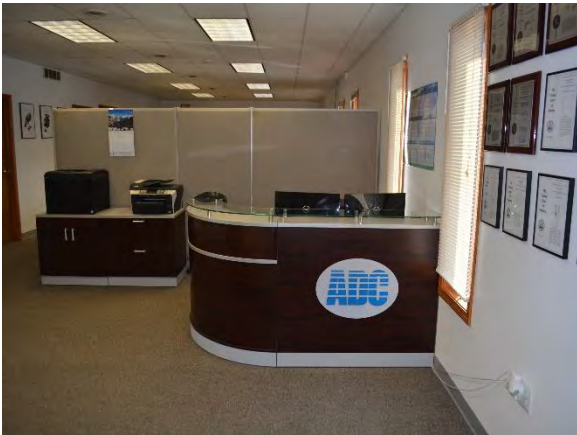
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Company Overview

ADC USA, Inc.

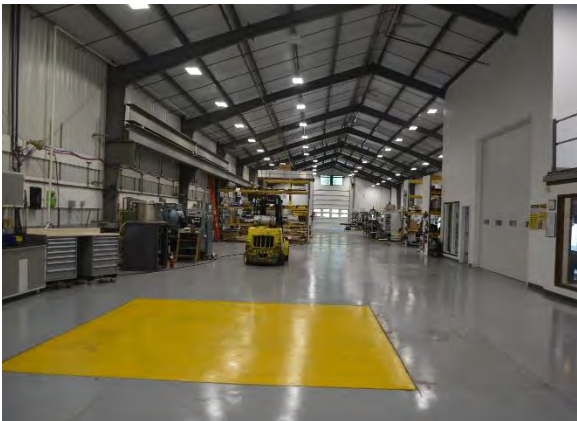
ADC USA, Inc. (ADC) is a leading developer and supplier of complex scientific components and instruments for large government laboratories and corporations around the world.



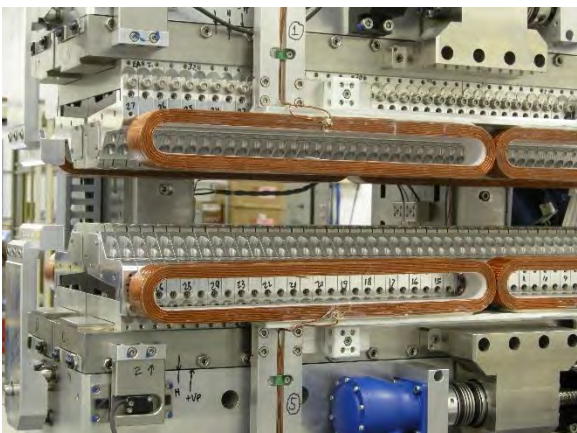
ADC, like many successful companies (and rock bands), got its start in a garage in 1995. Our garage was in Ithaca, NY, on the shores of Cayuga Lake and home of Cornell University. ADC has since grown into a worldwide leader in the field of design and manufacturing of complex research instrumentation.

ADC provides machining systems and products to our diverse customers from structural metal fabrication to turn key design products with complex control systems.

We specialize in optical tables and beamline components.



ADC occupies over 22,000 square feet of space. This includes our in-house machine shop. We use precision equipment to verify each order and are committed to delivering precision machined parts. We are very proud of our shop and the capabilities we can offer because of our state-of-the-art precision CNC milling and CNC turning machines.



Our engineering department works closely with our customers to realize designs that meet their technical requirements. Through an iterative process, we have developed standard designs that can be optimally customized for each new project. Our engineers provide incisive trouble shooting and technical recommendations to our customers resulting in high performing cutting-edge instruments.

Company History

ADC was incorporated in 1995 starting in a small office at Cornell Business and Technology Park. ADC established itself as a custom design manufacturing prime contractor. In 1995, ADC won its first contract for \$10,700 working with Crouse-Hinds-Cooper Industries. By 1998, ADC had expanded enough to occupy its first building with 3,000 square feet of office and workshop space. The company grew steadily throughout the next decade, always reinvesting in the people and new engineering design, manufacturing and assembly equipment to provide the most cost-effective solutions to our customers.

We have come a long way from our modest beginnings by developing our expertise and capabilities while continuing to provide excellence in products and service. ADC now consists of different departments to make up the framework of our operations: Engineering Design and Analysis, Manufacturing and Planning, Temperature Control/Clean Room Assembly/Testing Facility, Ultra-High Vacuum (UHV) Facility, Metrology Laboratory, Magnetic Measurement Facility (Undulator Testing Facility), and Electronics and Instrumentation. Our comprehensive facilities give our engineers the capacity and freedom to innovate.

Today, ADC has a worldwide reach. ADC's vision is to be a global leader in the development and manufacturing of innovative products for scientific and research markets.



Optical Table Overview

ADC has been a leading supplier of high-quality optical tables to the synchrotron and neutron source scientific community as well as FELs and laser-based experiments for over 20 years. Many of our optical tables have been in operation nearly that long in facilities around the world. Our tables are noted for stability as well as range of motion and load capacity.

ADC has continuously improved our designs by supporting our customers' unique needs for space constraint, load capacity, vibrational stability, positional precision and stability, encoder position feedback, and base and frame requirements. ADC has developed a portfolio of optical table components such as base and frames, lifts and lateral stages, floor location and attachments, wheel and air bearing movement, breadboards, and controls. These components are customizable to meet specific applications. Options include base material (steel or granite), size of table, and of motion. This catalog provides more details on our optical tables and custom designs along with specific applications and references.

Standard high precision lift stages with up to 200mm travel, with more stages available to achieve 6-axis operation, and reach load capacities of 2 ton



Research Grade Breadboard provides rock-solid stability and rigidity for all research applications, we can also substitute an aluminum plate for high load capacity versions



ADC Custom feet that have travel in the X, Y, and Z planes to ensure the breadboard's parallelism to the floor



Accurate, and reliable NEMA stepper motors with different encoder, winding, and shaft options



Solid, vibration-damping granite provides the level foundation for the table

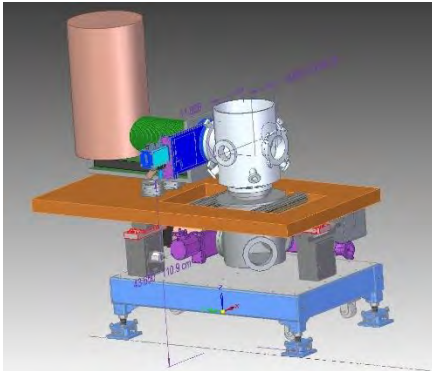


High efficiency, low noise gearboxes with numerous ratio options and minimal backlash

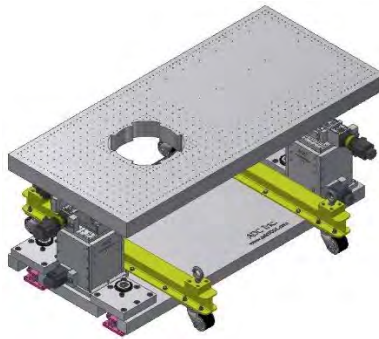
General Information

The Design Starts at ADC

ADC designs systems from the ground up. This means we can build a system from just a simple idea. Our engineering staff has extensive experience designing and building systems from scratch. We have a large library of designs to help make a very modular system. We can take a customer's ideas from a preliminary design all the way to a final product.



Preliminary Design



Final Design



Finished Product

Floor Mounting

- Adjustable feet
- Air Bearings
- Custom Casters
- Floor Grouting



Breadboard

ADC typically uses Newport's Optical Breadboards to provide rock-solid stability and rigidity to support demanding research applications. They are available in different thicknesses, lengths, and widths.



Motors

ADC's High Precision Optical Tables are provided with motors and limit switches for the required motions. ADC uses standard Lin Engineering NEMA bi-polar (2-phase) stepper motors with 200 steps/rev (1.8°/step). Depending upon the application and customer requirements, stepper motors of sizes NEMA 23 or 34 may be used. These motors can be controlled with the majority of off-the-shelf controller/drivers on the market. Planetary gear boxes from CGI are provided on optical tables to achieve high resolution and load capacity. **ADC also offers the option of using a 5-phase stepper motor or servo motor on the Custom High Precision Systems.**



Limit Switches

Motions in all axes are fitted with mechanical limit switches. Depending on the size and scale of the system there will be a range of limit switches used. In smaller systems a Burgess PN: F4T7Y1 with a lever modification will be used. In larger systems a Honeywell BZ-2RQ18-A2 switch is used. All limit switches are calibrated and tested by ADC's engineers to ensure proper operation and travel. Limit switches are also mounted in slots so they can be adjusted if a different travel is required.



Linear Incremental Encoders

Linear incremental encoders are available as an additional option for Optical Tables. ADC uses high resolution Renishaw TONiC series encoders. TONiC is Renishaw's new super-compact non-contact optical encoder that offers speeds up to 10 m/s and resolutions down to 1 nm for both linear and rotary applications. Offering significant enhancements to Renishaw's existing range of high-speed non-contact optical encoders, TONiC also gives improved signal stability and long-term reliability, low cost of ownership and refreshing simplicity.



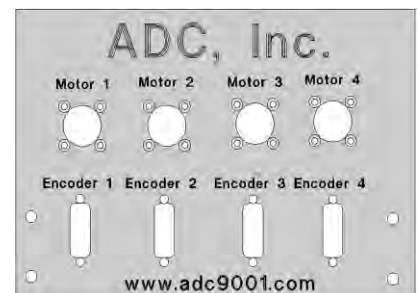
Linear Absolute Encoders

Linear absolute encoders are also available on most of ADC's equipment. The Renishaw RESOLUTE is a true absolute, fine pitch optical encoder system that has excellent dirt immunity, and an impressive specification that breaks new ground in position feedback. It is the world's first absolute encoder capable of 1 nm resolution up to 100 m/s.



Cabling & Connectors

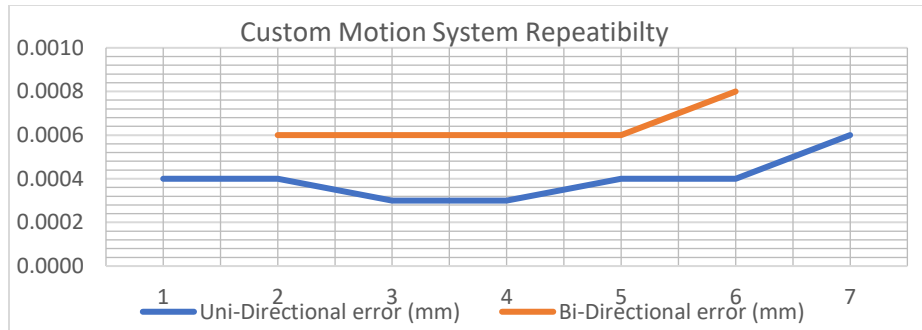
To ensure proper operation of the system, all cabling, wiring and connectors supplied comply with the EMC and NEC directive. To meet these criteria, all conductors and connectors used have sufficient and appropriate shielding capacity. The shielding efficiency is affected by a number of factors such as the overall cable installation and the components employed. Therefore, continuous and homogeneous shielding is done by the use of screened conductors. ADC provides a proper routing and grouping of cables installed. Consideration is given to the design of the cable management system, so practical assembly/disassembly of individual sub-assemblies is not affected during installation or maintenance.



All optical tables feature a control panel to allow for simple and organized electrical connections.

Testing

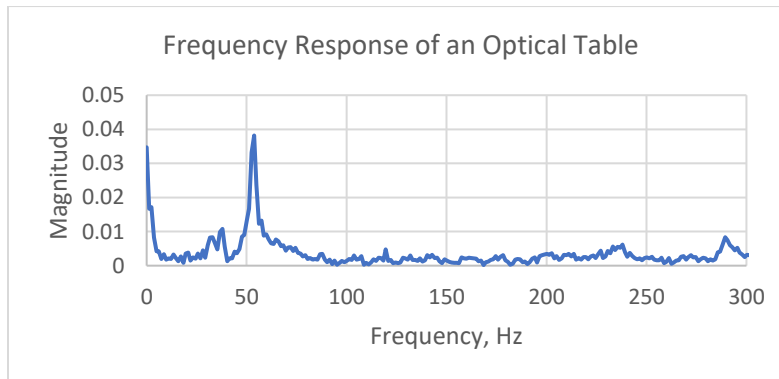
ADC's Custom High Precision Systems are typically designed, built and tested based upon customer specifications/requirements. Typical measurements include mechanical repeatability and frequency response measurements. ADC provides a detailed report with delivery of the equipment to the customer. Below are examples of actual mechanical repeatability measurement tests performed on previous projects:



Uni-Directional error 0.0004 mm / Bi-Directional error 0.0006 mm

Frequency Response of Built Table

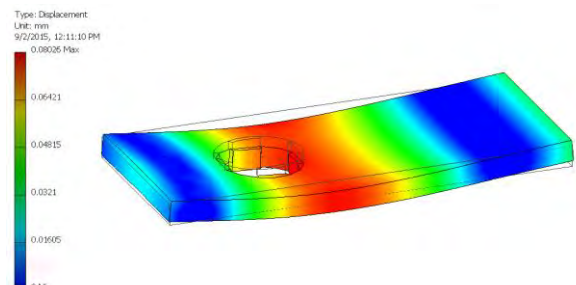
The vibrational response of a Custom High Precision System was measured using an accelerometer. Data was recorded on an oscilloscope and exported to Excel for further processing. Using a Fourier analysis, we are able to graph the frequency response. The table was excited using a dead-blow hammer. The oscilloscope took data at a rate of 2,500 samples/sec and sample size for the Fourier analysis was 2,048. Results showed a natural frequency at 54 Hz.



Measured frequency response of the optical table. These results indicate a fundamental frequency at about 54 Hz.

FEA on the Table Deflection When Loaded

In order to maintain the accuracy of the table, it is important to minimize the deflections due to bending under loading. Although a 4" table is typically used, different thicknesses are possible. At right is an analysis to examine the effects of a deflection on a 4" thick table. These results show that the deflection would more than double if a 3" thick table was used. Therefore, it was decided to use a 4" thick table unless it became absolutely necessary to use a thinner table in order to meet the overall height requirement.



Custom Optical Tables

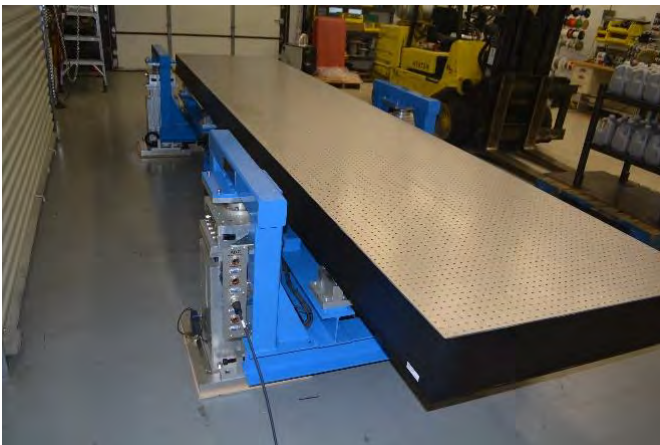
SLAC Custom Optical Table



SLAC National Accelerator Laboratory
2575 Sand Hill Road M/S 1
Menlo Park, CA 94025



ADC built this custom optical table for SLAC National Accelerator Laboratory. The table features a large optical breadboard which is 204" long and 42" wide. The length of this table will allow SLAC to combine two existing optical tables into one combined table in order to create a more stable and repeatable experimental setup. The table has three degrees of freedom with micron accuracy and a 1500 lb load capacity. The table has been custom designed to fit within the space constraints of the facility and integrate with neighboring equipment.



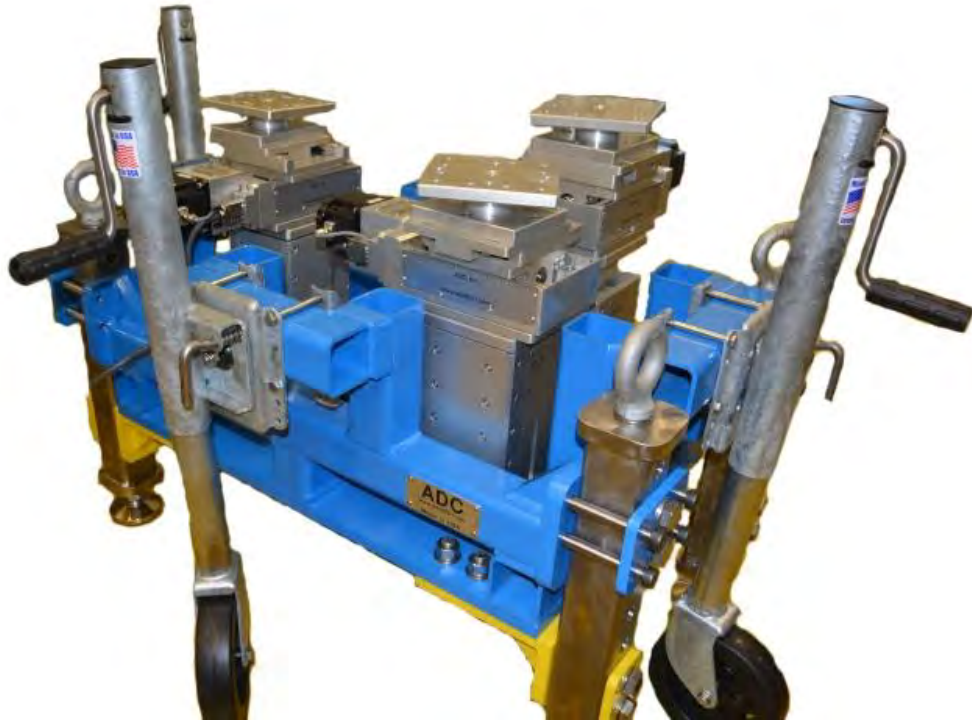
AlbaNova Custom Optical Table



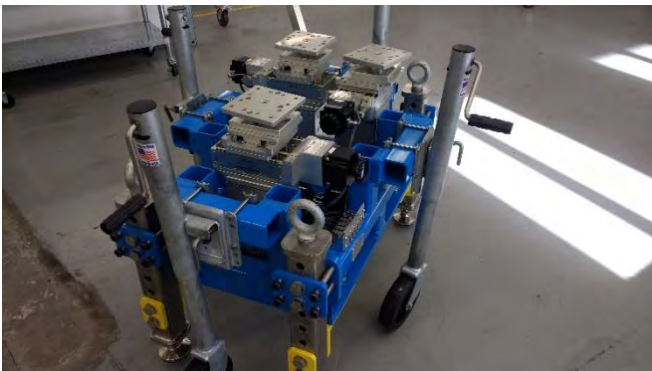
Stockholm
University

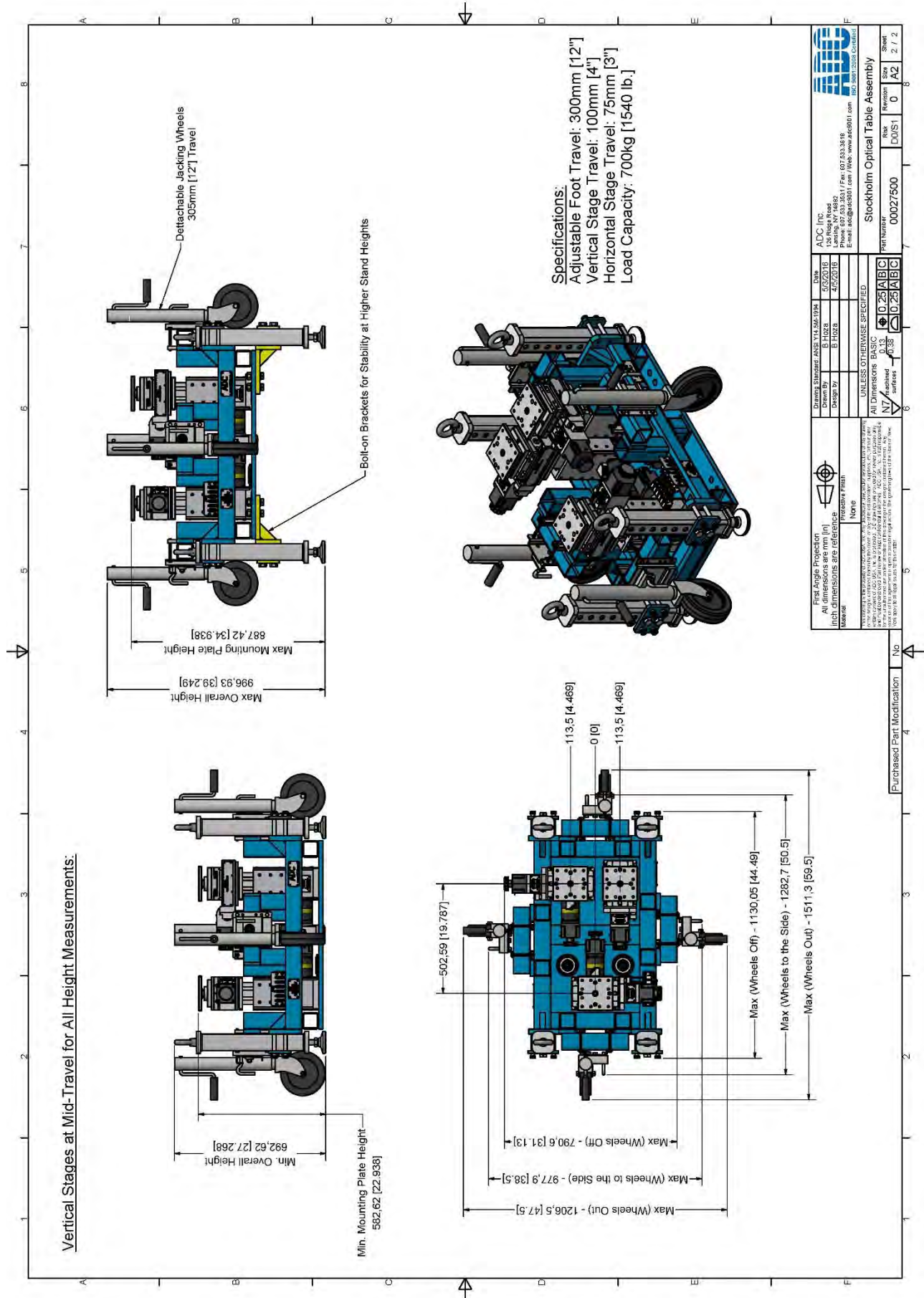
Customer:

Stockholm University
Alba Nova University Center
Roslagsvägen 30 B
SE-114 19 Stockholm, Sweden



ADC designed an optical table with 30 cm of height adjustment built into the support structure for AlbaNova University Center. The precision motion system for controlling the optical table is supported by a welded steel frame with adjustable stainless-steel columns on each corner. The height of these columns can be continuously adjusted over the 30 cm range by the combined adjustment of the bolt location and the height of the swivel mounts at the base of each column. The stand also features detachable jacking casters which can be used to adjust the table height without the need for a forklift or crane. The design features ADC's 400 series jacks and slides and has 100 mm of vertical travel, 75 mm of horizontal travel and 6 degrees of freedom. The stand and motion system can support a 700 kg (1540 lb) load.





APS 2-Degrees of Freedom Optical Table



Customer:
Argonne National Laboratory
9700 S. Cass Avenue
Lemont, IL 60439



This optical table was designed for Argonne National Laboratory (ANL), for use with their KB microprobe. This table has two degrees of motion. It is capable of 75 mm of vertical travel in both directions from the neutral location with the use of four DJ450-150 jacks driven by a single TS43B torque stepper motor. Additionally, the slide allows for 50 mm of horizontal travel in both directions parallel to the short axis of the table. The table is equipped with a custom 8-inch-thick breadboard for stable equipment mounting. The motor, limit switches and control panel are located on the same side of the table for maintenance convenience. This table also grants the capability for shelving to be installed on the underside plate, while the design allows for easy installation of Renishaw encoders.





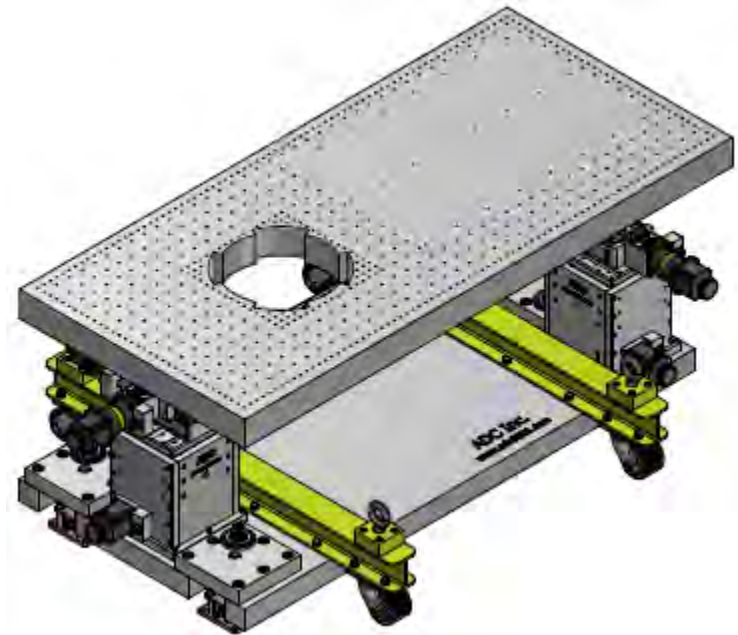
SLAC 6-Degrees of Freedom Optical Table



Customer:
SLAC National Accelerator Laboratory
2575 Sand Hill Road M/S 1
Menlo Park, CA 94025



ADC designed this optical table for SLAC National Accelerator Laboratory to both support and accurately position research equipment. The optical table was designed to have 6 degrees of freedom with sufficient travel, resolution, and repeatability in each direction to meet all of SLAC's specifications. The overall dimensions of the table, as well as the features machined into the surface of the table, have been custom designed to support SLAC's microscope, chambers, and related components. Additionally, the optical table has been engineered to support the load of the microscope and its related equipment without any significant deflections, helping to ensure the accuracy of the table.



Specifications:

Paul Scherrer Institut (PSI) High-Capacity, 6-Axis Optical Table

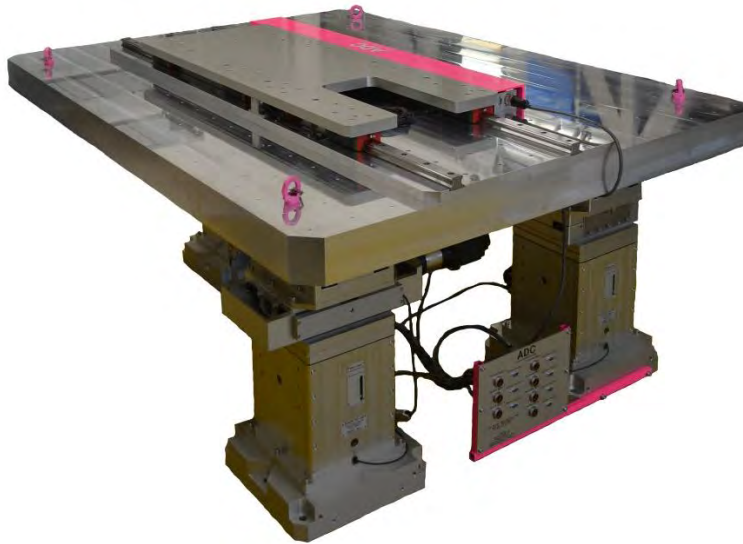


Customer:

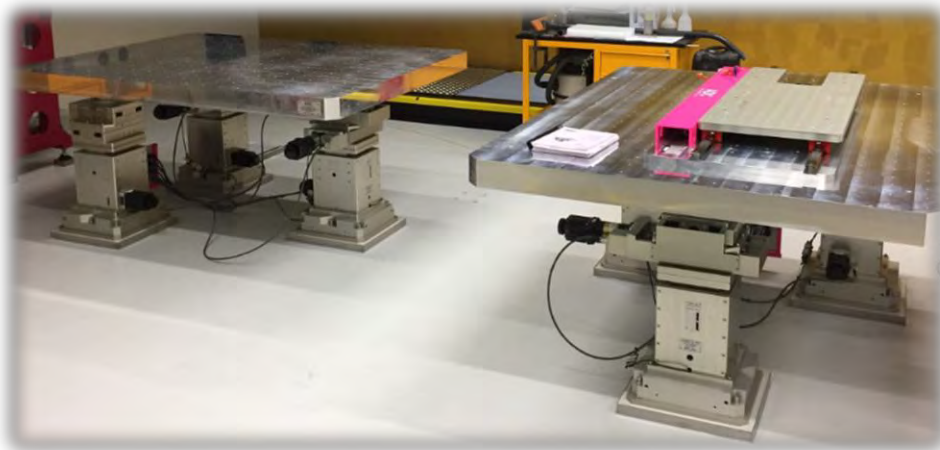
PAUL SCHERRER INSTITUT

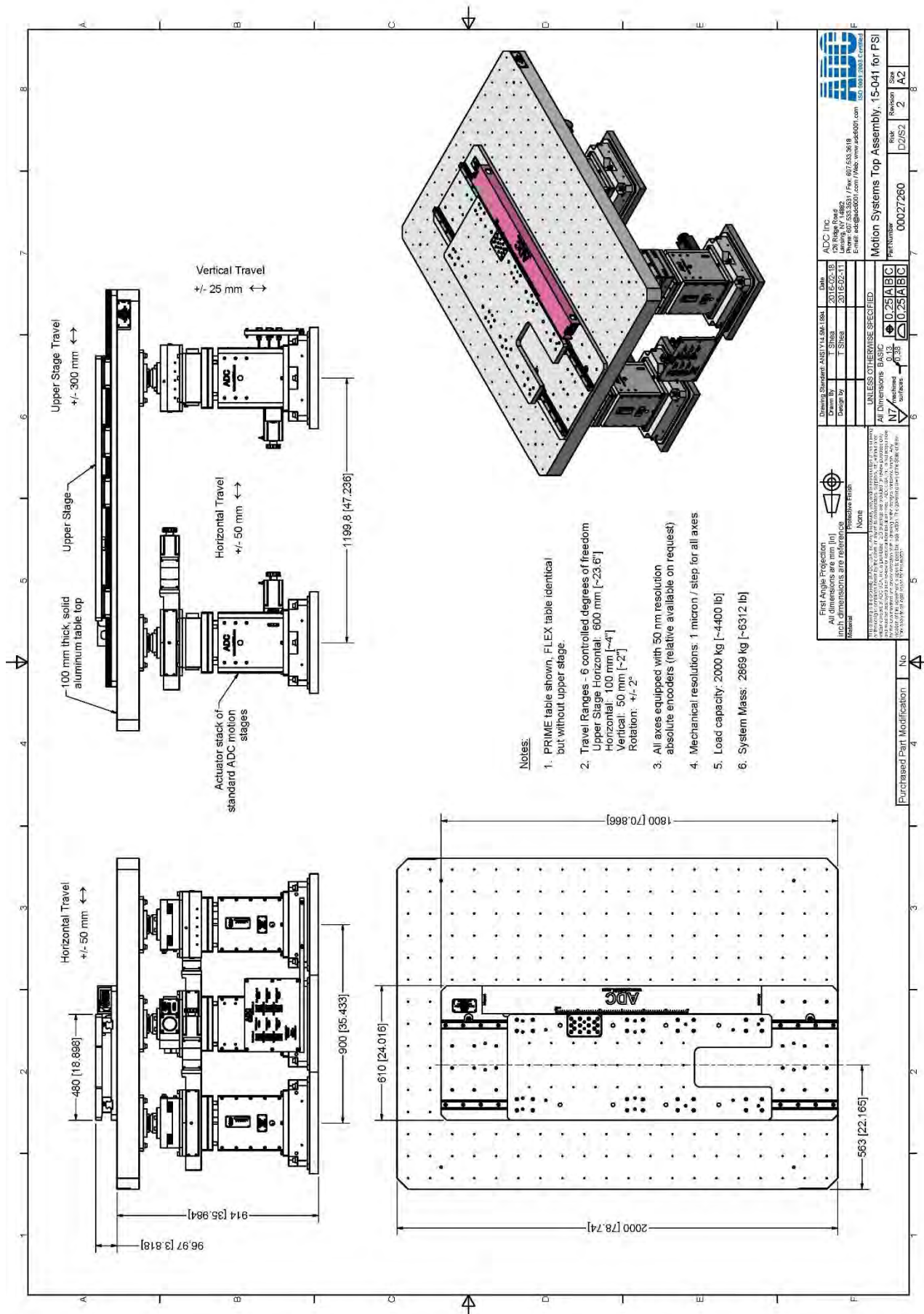
Warenannahme Ost

CH-5232 Villigen PSI; Schweiz





A pair of identical optical tables was designed for Paul Scherrer Institut (PSI), to be installed in the Swiss Free Electron Laser (FEL) as large-scale manipulators for optical equipment. One of the two tables was topped with an additional horizontal axis to provide additional travel for the 2000 kg PRIME instrument and its surrounding vacuum chamber. From the crane capacity limitations in the hutch and the customer's desire for grouted foundations, it was decided to forgo the traditional base plate with casters and instead build the table in place, carting in each actuation stack separately and then placing the table atop the three stacks. All motions were driven by stepper motors through ball screws, and feedback was provided by absolute encoders.





Notes:

1. PRIME table shown, FLEX table identical but without upper stage.
2. Travel Ranges - 6 controlled degrees of freedom
Upper Stage Horizontal: 300 mm [-23.6"]
Horizontal: 100 mm [-4"]
Vertical: 50 mm [-2"]
Rotation: +/- 2°
3. All axes equipped with 50 nm resolution absolute encoders (relative available on request)
4. Mechanical resolutions: 1 micron / step for all axes
5. Load capacity: 2000 kg [-4400 lb]
6. System Mass: 2869 kg [-6312 lb]

		ADC Inc. 28 Ridge Road Suite 100 Farmington, CT 06031 Phone: 860.633.3331 / Fax: 860.633.3618 E-mail: adc@adc9001.com / Web: www.adc9001.com		Motion Systems Top Assembly, 15-041 for PSI Part Number: 00027260 Risk: D2/S2 Revision: 2 Size: A2	
Drawing Standard: ANSI Y14.5 (MIL STD)		Date: 2016-02-18			
Drawn by: T. Shick		Check by: T. Shick			
Design by: T. Shick		Date: 2016-02-11			
		Positive Friction		UNLESS OTHERWISE SPECIFIED: All Dimensions: BASIC N7 / machined 0.03 / surfaces 0.25 / ABC 0.25 / ABC	
First Angle Projection All dimensions are in [in] Imperial dimensions are preferred Metric dimensions are shown in parentheses		THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF ADC INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF ADC INC. A CAD FILE MAY BE OBTAINED FROM ADC INC. FOR THE PURPOSE OF REPRODUCING THE INFORMATION CONTAINED HEREIN. THE INFORMATION CONTAINED HEREIN IS NOT TO BE USED FOR ANY OTHER PURPOSE.			
Purchased Part Modification: No		4			

APS 2-Degrees of Freedom Optical Table

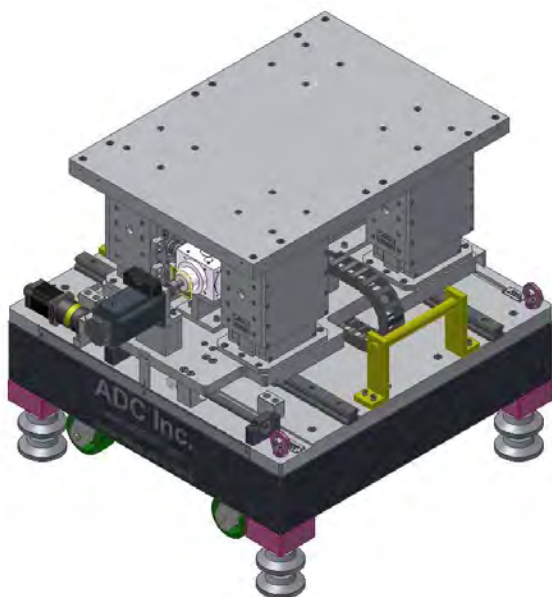


Customer:

Argonne National Laboratory
9700 S. Cass Avenue
Lemont, IL 60439



This optical table for the Advanced Photon Source at Argonne National Lab has two degrees of driven motion, vertical and horizontal. The vertical motion is accomplished by four ADC 5-kN utility jacks driven by a single NEMA 34 stepper motor to prevent binding. The horizontal motion is supported on THK HSR35 rails and driven by a 20x5 mm ball screw from NSK with a NEMA 23 stepper motor and 10:1 planetary gearbox. All motions have adjustable limit switches to change the travel within the maximum range. Adjustable feet were used to meet the customer's height requirements, placing the table top at 725 mm from the floor while sitting on the feet at mid vertical travel. The addition of handles to the system, in conjunction with large, durable casters, makes the system easy to move around the facility as needed. The table is designed to have a full range of horizontal travel without having the overall dimensions exceed 825 mm in the direction of horizontal travel.

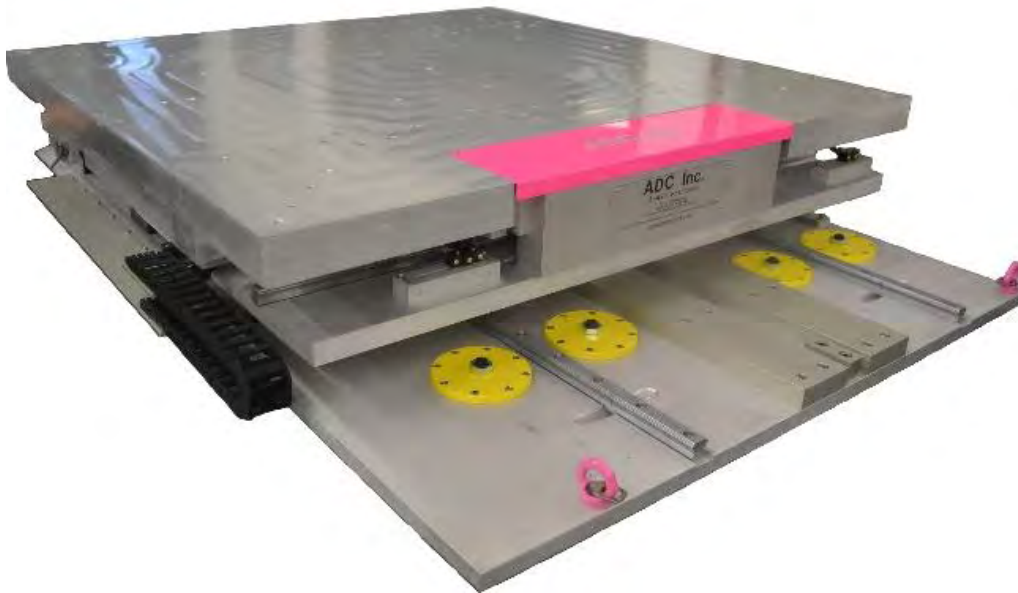




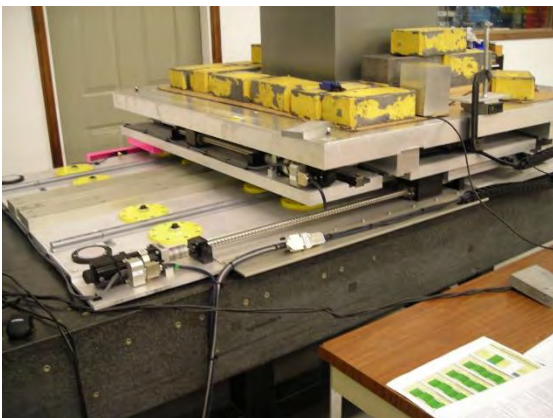
3-Axis Motorized Positioner

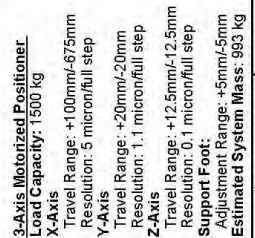


Customer:
National Synchrotron Radiation Center
SOLARIS
U1. Czerwone Maki 98
30-392 Krakow, Poland



This custom high load, high precision 3-axis motorized system was designed for one of the first two beamlines at SOLARIS. The system allows for vertical axis positioning for a 1500 kg load. All three motions are supported on THK rails and driven by a ball screw with a NEMA 23 stepper motor and planetary gearbox. All motions have adjustable limit switches to change the travel within the maximum range. The mechanics allow the three degrees of freedom motion of the movable platform work surface. Vertical motion (Z direction) and horizontal transversal motions (Y & X direction) of the platform work surface are controlled and operated by means motorized stages.

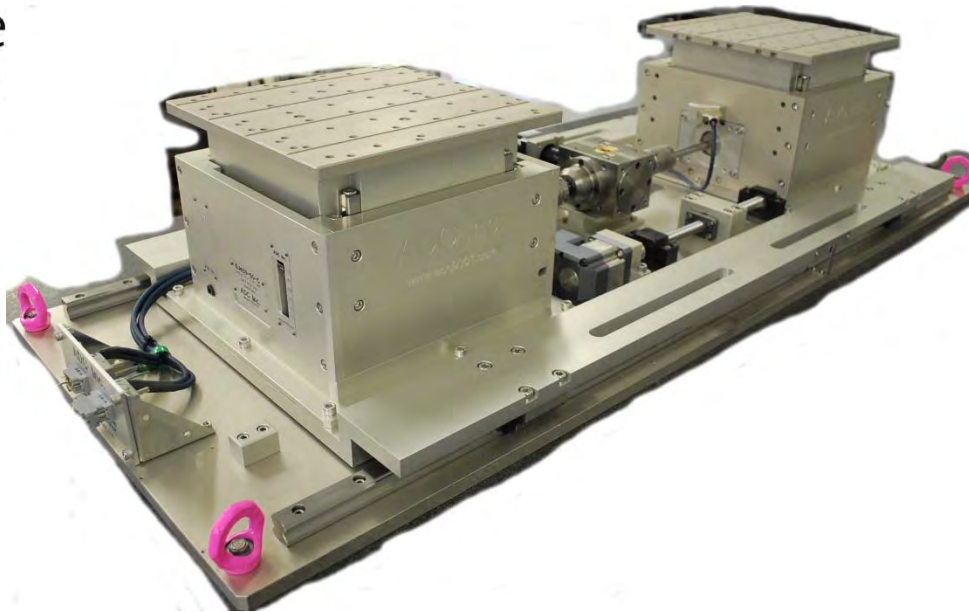




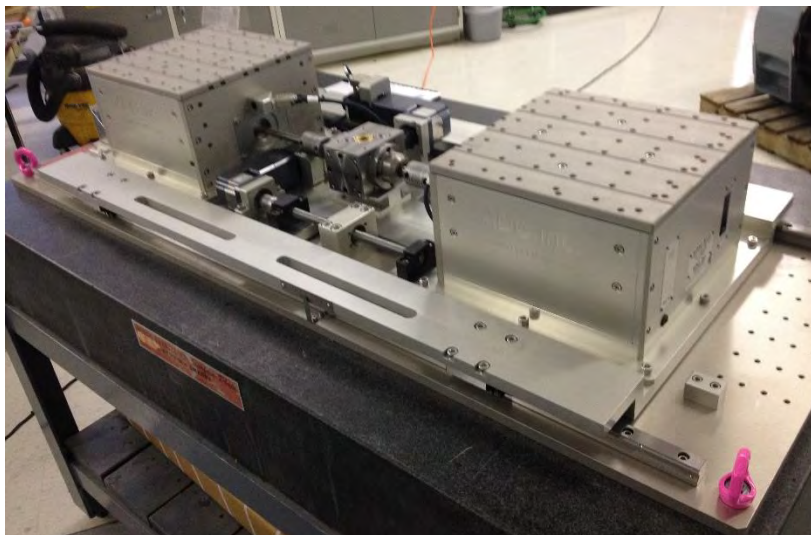
APS 2-Degrees of Freedom Optical Table



Customer:
Argonne National Laboratory
9700 S. Cass Avenue
Lemont, IL 60439



This optical table is a 2-axis motion system designed to lift a 250 lb load and move +/- 25 mm both horizontally and vertically for Argonne National Lab. The horizontal motion is based on a linear slide design that ADC has continually improved in the past few years to meet the high demands of the industry. The linear motion is supported by THK HSR25 guide rails and bearings. A preloaded 16x2 mm ball screw coupled to a NEMA 23 motor and a 20:1 gear reduction allows the unit to have a 0.5 μm resolution. The vertical motion consists of 2 ADC DJ450-50 jacks that are driven by one Nema 23 motor and a 20:1 gear reduction, which is then coupled to a Tandler spiral bevel gear box which allows the jacks move simultaneously. The simultaneous motion is preferred to avoid potential binding of the jacks which is common with driving each jack individually. NB SVS 6100 crossed roller bearings provide a stable and smooth platform for the vertical motion. A 2" thick Newport bread board will be mounted on top of the jacks, by the customer, and will provide a stable base for mounting equipment as necessary.



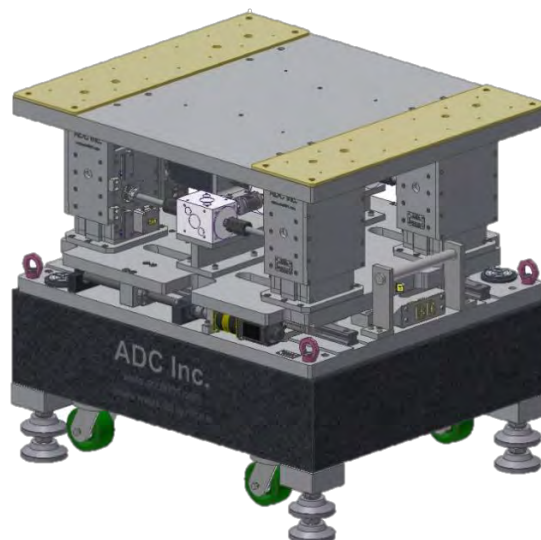
Cornell High Energy Synchrotron Source (CHESS) 2-Degrees of Freedom Optical Table

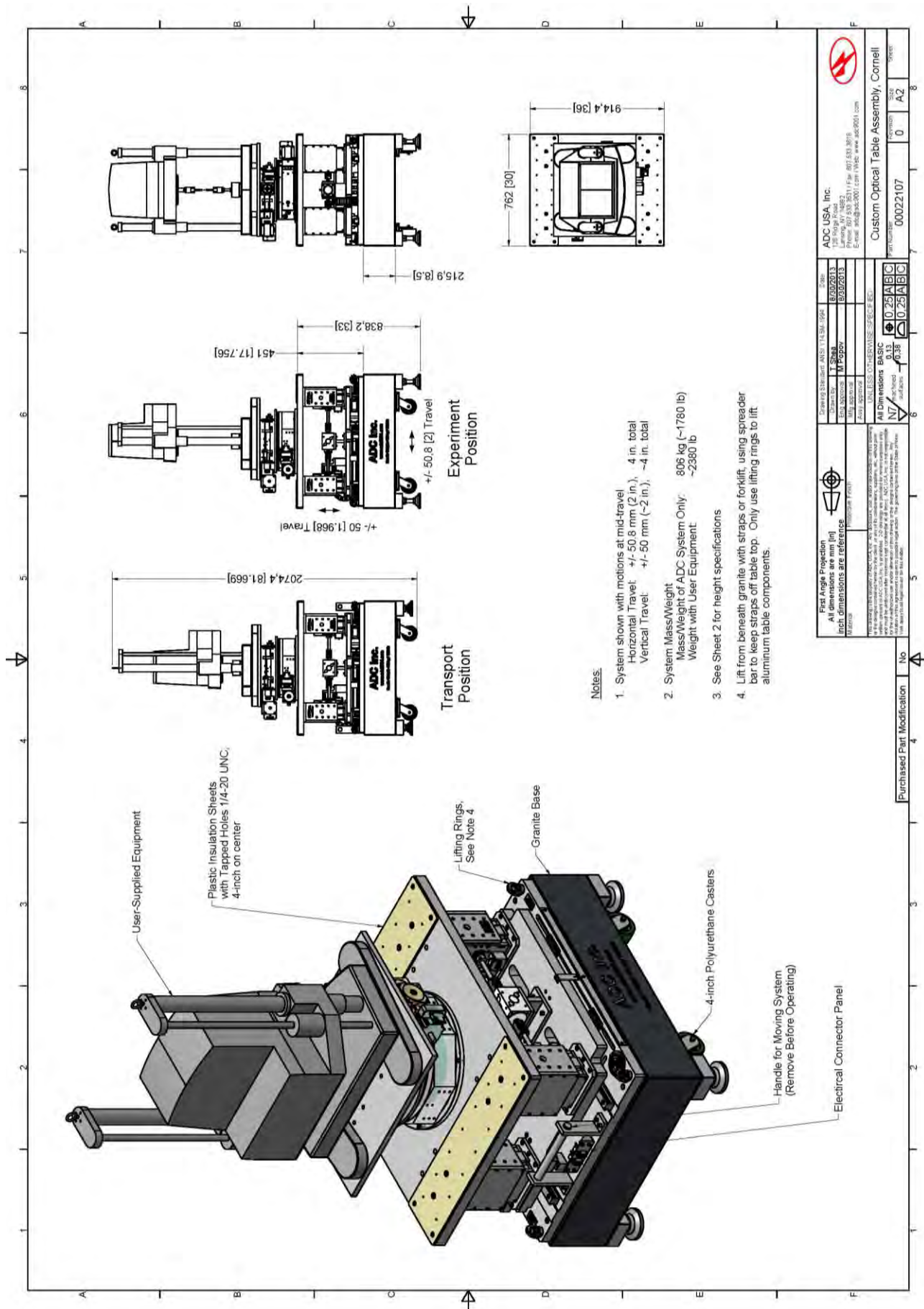


Customer:
Cornell University
Wilson Synchrotron Lab and Ring
161 Synchrotron Dr
Ithaca NY, 14853



This optical table for Cornell's CHESS facility has two degrees of driven motion, vertical and horizontal. The vertical motion is accomplished by four ADC 5 kN utility jacks driven by a single NEMA 34 stepper motor to prevent binding. The horizontal motion is supported on THK HSR35 rails and driven by a 20x5 mm ball screw from NSK with a NEMA 23 stepper motor and 10:1 planetary gearbox. All motions have adjustable limit switches to change the travel within the maximum range. Adjustable feet were used to meet the customer's height requirements, placing the table top at 33 inches from the floor while sitting on the feet, but keeping the overall system shorter than 80 inches while resting on the casters. The addition of handles to the system, in conjunction with large, durable casters, makes the system easy to move around the facility as needed.

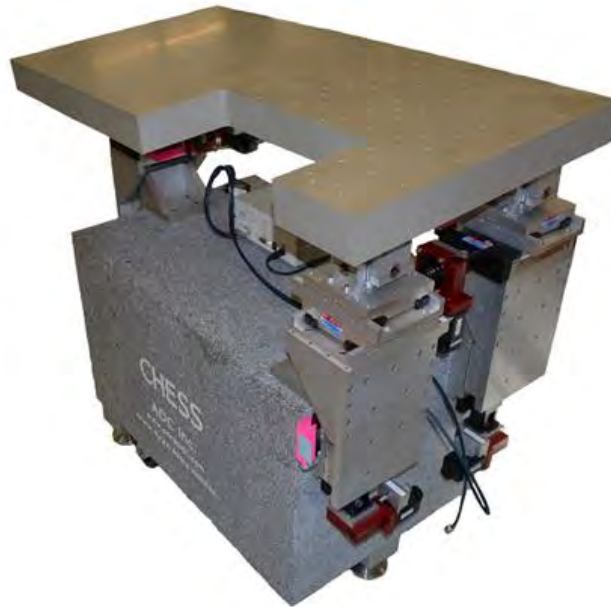




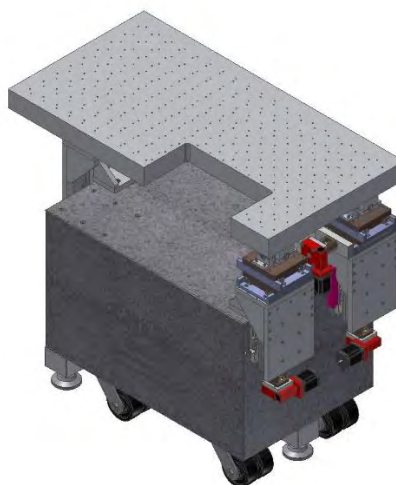
Cornell High Energy Synchrotron Source (CHESS) Custom Optical Table



Customer:
Cornell University
Wilson Synchrotron Lab and Ring
161 Synchrotron Dr
Ithaca NY, 14853



A system was designed for CHESS that contains three vertical stages and three horizontal stages. This allows for six degrees of freedom for the system. The vertical [y] stages are a custom design based on standard ALM MLP6-10/GB10 MM stages and have a range of motion of ± 76 mm [3"]. These vertical stages use a Lin Engineering NEMA 23 triple stack stepper motor with a 60:1 right angle gearbox. The horizontal stages [x & z] use the same motor with a 20:1 right angle gearbox. They are custom designs based on standard ALM PGA6-8-2/GB2MM stages and have a range of motion of ± 19 mm [0.75 in]. The system also has a base made of granite that weighs around 9.6 kN [2200 lb]. The base has four heavy duty casters and three adjustable feet for positioning and leveling. The table top is a custom-made aluminum breadboard with a custom hole pattern. The aluminum is 635 mm [25"] wide, 1220 mm [48"] long, and 76 mm [3"] thick.



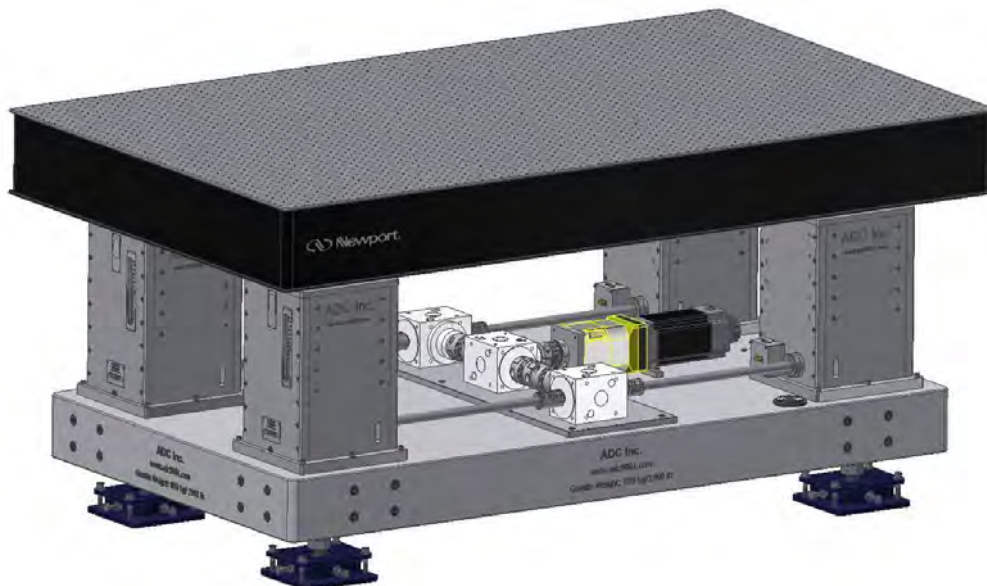
Brookhaven National Laboratory 1-Degree of Freedom Optical Table



Customer:
Brookhaven National Lab
Receiving: Bldg. 98 Rochester Street
Upton, NY 11973



This optical table is a one axis motion system designed to lift a 3,500 lbs load and move +/- 50 mm vertically for Brookhaven National Lab. The vertical motion consists of 4 ADC DJ600-50 jacks that are driven by one Nema 34 motor and a 20:1 gear reduction, which is then coupled to a Tandler spiral bevel gear box which allows the jacks to move simultaneously. The simultaneous motion is preferred to avoid potential binding of the jacks which is common with driving each jack individually. An 8" thick Newport bread board is mounted on top of the jacks and will provide a stable base for mounting equipment as necessary.





The Air Force Office of Scientific Research (AFOSR) 3-Axis Optical Table



Customer:

AFRL – Jacobs Technology Inc.
2145 Fifth Street
Building 24 C, Area B
Wright-Patterson AFB OH, 45433



This 3-axis optical table built for The Air Force Research Laboratory (AFRL-Jacobs Tech) was designed for use in PIV experiments. The Newport optical breadboard provides a rigid surface for mounting and supporting measurement equipment. Utility jacks each have a load capacity of 25 kN. Each linear slide is actuated by precision ground ball screws and supported by caged ball linear guide rails.

This custom controller driver can be controlled in either of two modes. The first mode uses a 3-axis analogue joystick interfaced directly to a Galil DMC-4133 controller. In this mode a personal computer is not required. The second mode uses a custom graphical user interface control written in LabVIEW for the project. This software is compatible with Windows XP through Windows 7.





APS 6-Degrees of Freedom Custom Optical Table

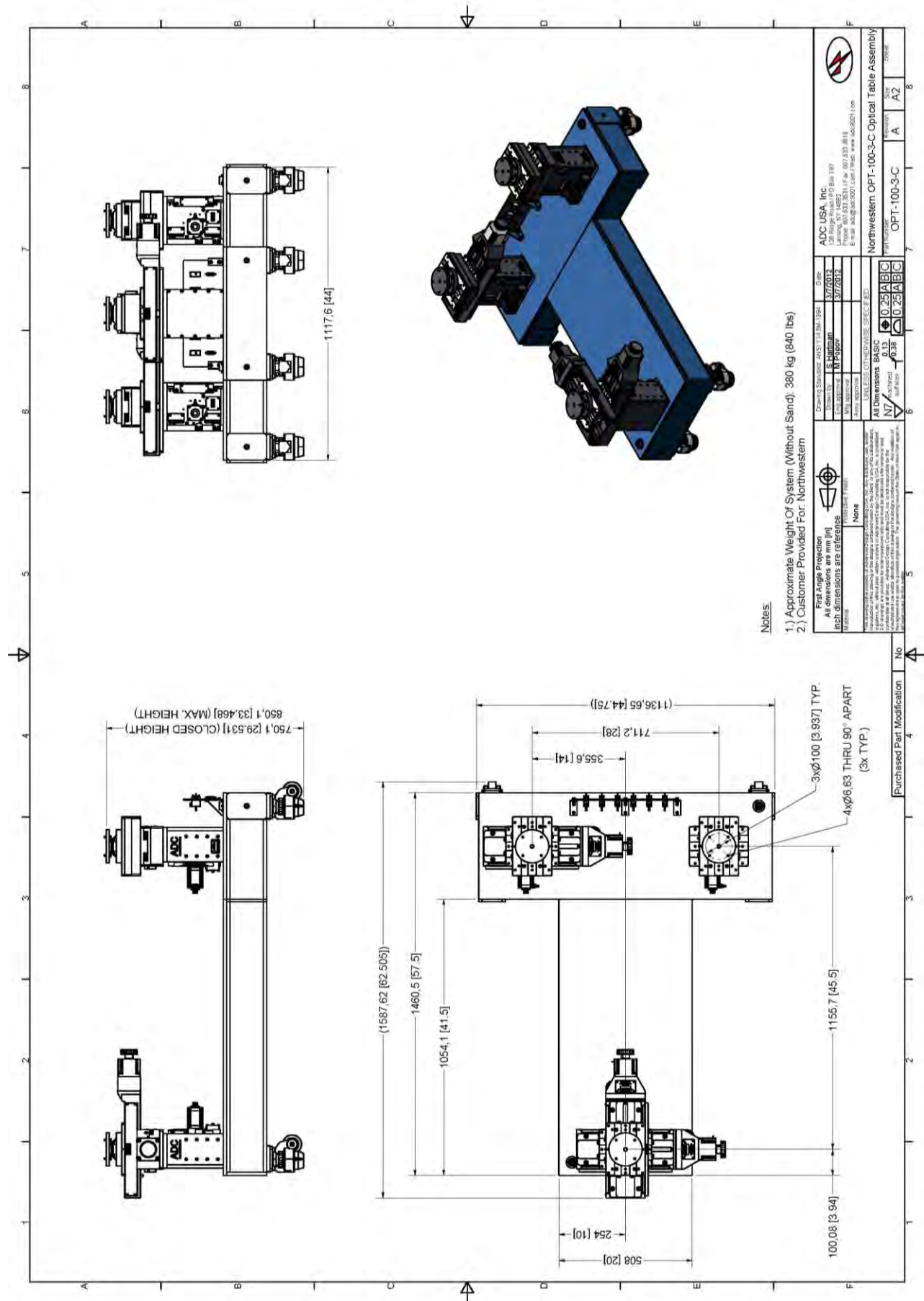


Customer:
Argonne National Laboratory
9700 S. Cass Avenue
Lemont, IL 60439



ADC's 6-Degrees of Freedom High Precision Motorized Optical Tables employ an arrangement of standard products to create a table with 6 DOF (degrees of freedom) positioning capabilities. The system base is comprised of welded tubular steel with a powder coated finish. To lower the natural frequency and provide passive damping, the base is also filled with sand. When in use, the table rests on four integral leveling feet. When in transport, the feet are retracted, and four integral casters allow for easy handling. These precision tables comprise of crossed-roller bearings and ballscrew drive for use in experimental stations.





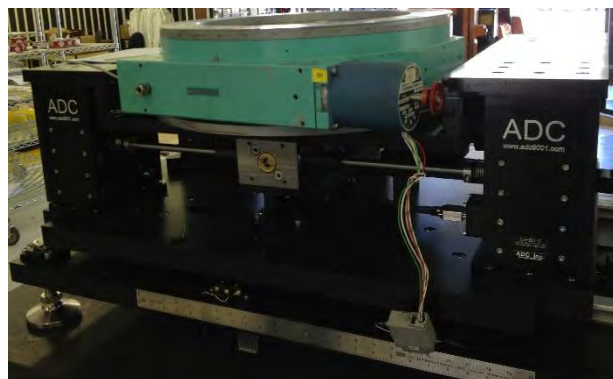
Cornell High Energy Synchrotron Source (CHESS) 3-Degrees of Freedom Optical Table



Customer:
Cornell University
Wilson Synchrotron Lab and Ring
161 Synchrotron Dr
Ithaca NY, 14853



This optical table is a 3-axis motion system was designed for G-Line at CHESS. The horizontal motion is based on a linear slide that ADC has continually improved in the past few years to meet the high demands of the industry. The linear motion is supported by THK HSR35 guide rails and bearings. A preloaded 20x5 mm ball screw coupled to a NEMA 23 motor and a 10:1 gear reduction allows the unit to have a 2.5 μm resolution. The vertical motion consists of 4 ADC 5-kN utility jacks that are geared to be driven off one motor. The one motor approach is preferred to avoid the potential binding of the jacks that is common with driving each jack individually. NB SVS 4160 crossed roller bearings provide a stable and smooth platform for the vertical motion. The rotary motion for this optical table provides a full 360° rotation and is equipped with fully adjustable limit switches to set travel limits as necessary. A 2" thick aluminum bread board is mounted on top of the rotary stage which provides a stable base for mounting equipment as necessary.



NSRRC 3-Legs Motorized Table

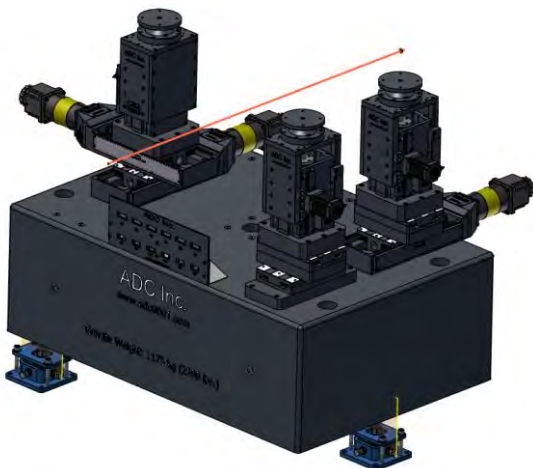


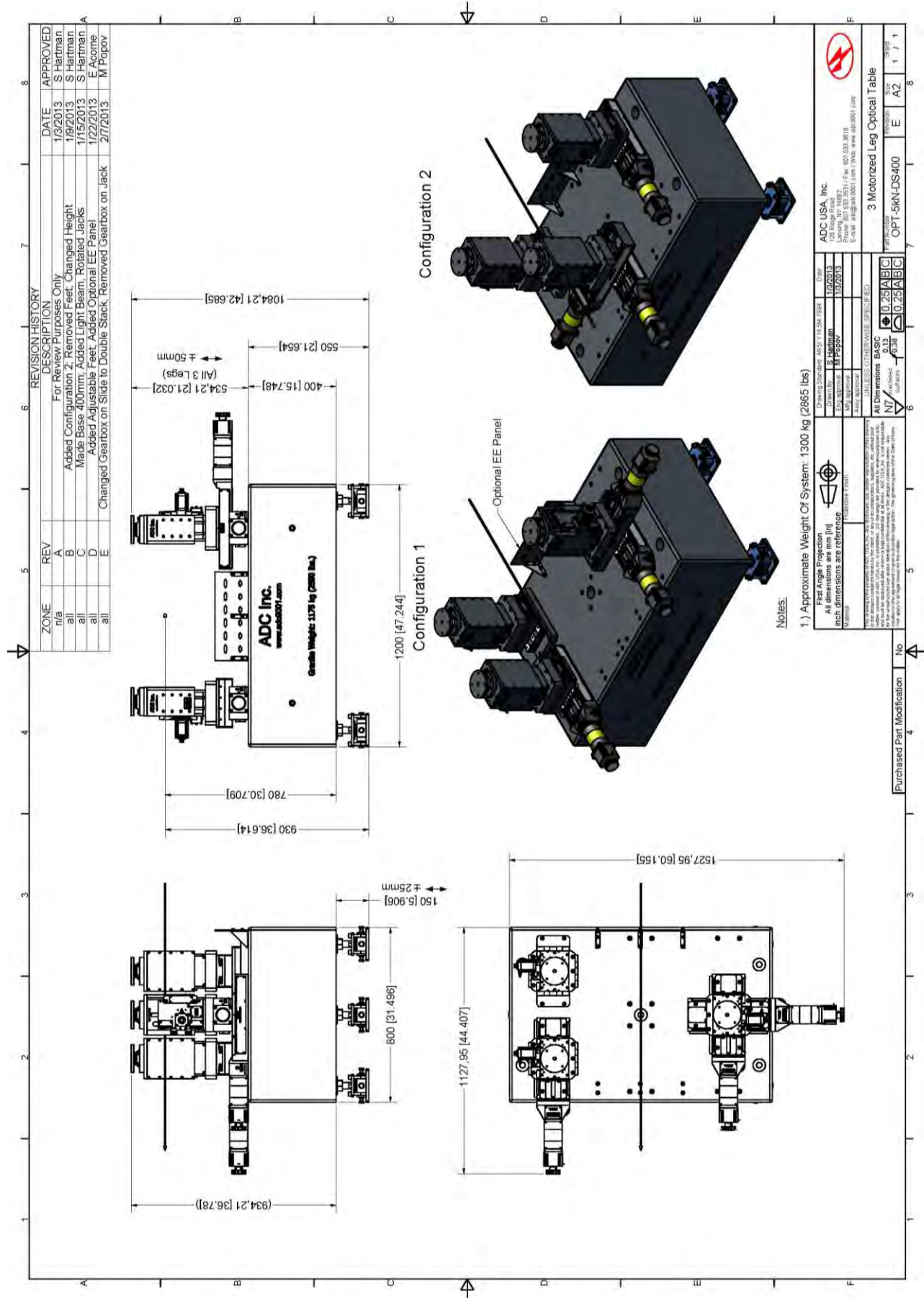
Customer:

National Radiation Research Center
101 Hsin-Ann Road
Hsin-Chu Science Park
30076 Hsin-Chu, Taiwan



This 3-Motorized Leg system is a 6 degrees of freedom system which will allow the user to manipulate a work surface in x, y, z directions as well as in pitch, roll and yaw. The vertical motion is provided by ADC's UJ 5-kN jacks. The rugged black anodized aluminum housing features a precision ground base and top plate, each with multiple utility holes for easy integration into the user's system. The vertical stage is driven by a high class preloaded ballscrew coupled to a high torque 200 step per revolution stepper motor which can be run in full, half, or micro stepping mode to meet your resolution requirements. Maximum rigidity is assured using preloaded crossed roller linear bearings. Each jack also features two adjustable, normally closed limit switches at the end of travel. The horizontal motions are driven by ADC's DS400-100 slides which have a 55:1 gear reduction for increased resolution. The horizontal stage is driven by a high class preloaded ballscrew coupled to a high torque 200 step per revolution stepper motor which can be run in full, half, or micro stepping mode to meet your resolution requirements. Maximum rigidity is assured using preloaded crossed roller linear bearings. Each slide also features two fully adjustable, normally closed limit switches to define the extents of travel. Adjustable leveling feet are placed at the base of the unit to allow the user to level the system to be parallel with the beam. A granite base is used to mount the motions.





CAMD Custom Optics Table



Customer:

LSU - CAMD

6980 Jefferson Hwy

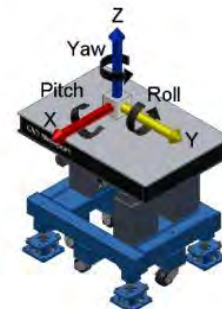
Baton Rouge, LA 70806

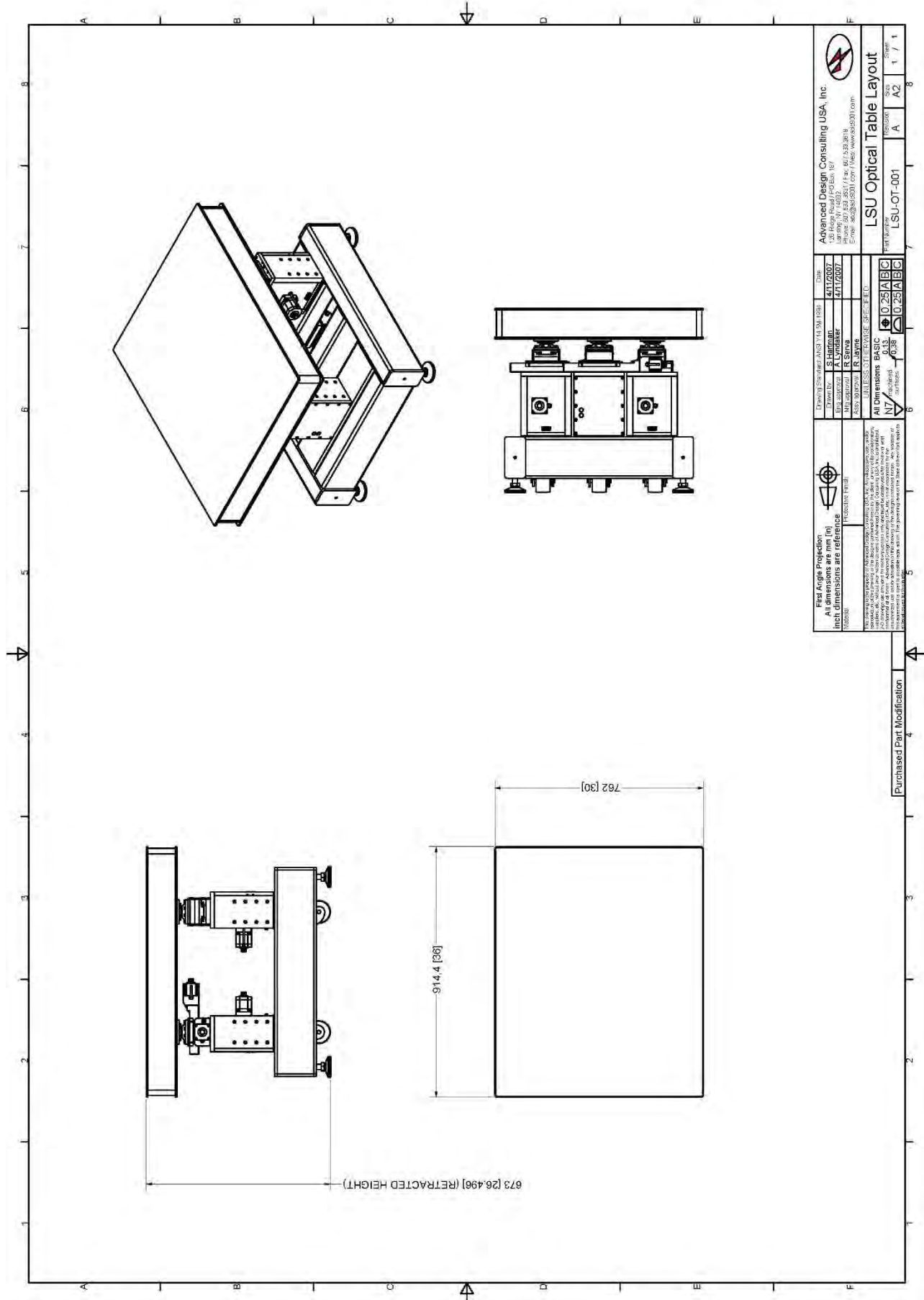




This CAMD 6 degrees of freedom High Precision Motorized Optical Table used Newport Corporation Research Grade breadboards with a grid of M6 tapped holes. The system base was made of a welded steel frame with a powder coated finish. Frames were filled with sand to reduce the table natural frequency and provide passive damping. When in use, the table rests on four machinery feet. When in transport, the feet are retracted and casters allow for easy handling.

Key Specifications:

Degrees of Freedom:	6
Table Size:	3' x 3' (914mm x 914mm)
Vertical Travel (X, Y, Z):	4" (100 mm), 4" (100 mm), 4" (100 mm)
Load Capacity:	1000 lbs. (454 Kg)
Motion Repeatability:	$\leq 1 \mu\text{m}$ (with encoder)
Work Surface Holes:	M6 Grid
Breadboard:	100 mm Newport
* Comes with large casters.	





			
First Angle Projection All dimensions are mm (in) Inch dimensions are reference		Advanced Design Consulting USA, Inc. 128 Major Road / PO Box 107 January, NJ 08033 / Tel: 607.252.2074 E-Mail: adc@adc9001.com / Web: www.adc9001.com	
REFERENCE TABLE		LSU Optical Table Layout	
Note: All dimensions are given in millimeters (mm) unless otherwise specified. All dimensions are to be maintained unless otherwise specified. All			

DLS 2-Degrees of Freedom Custom Optical Table



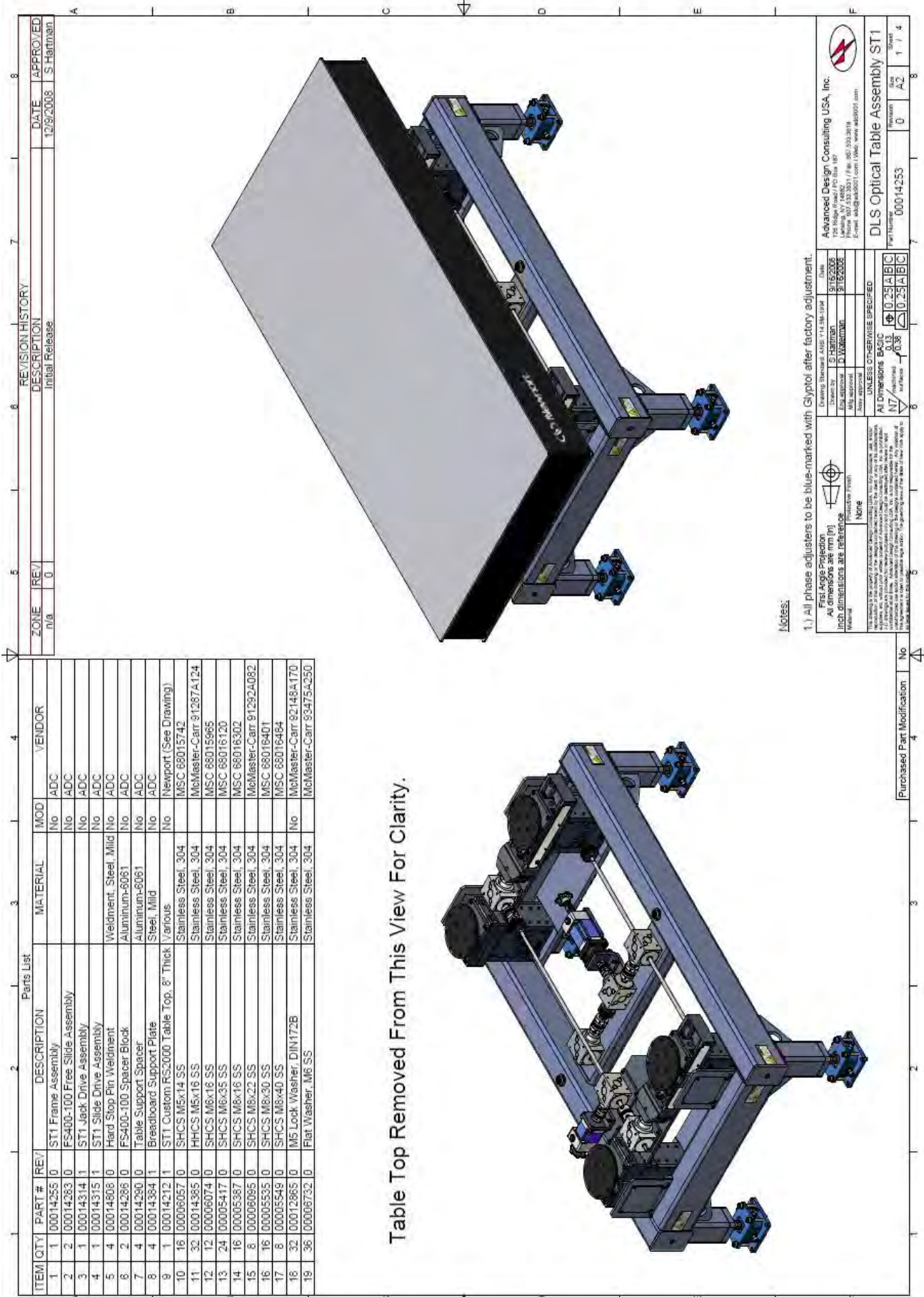
Customer:

Diamond Light Source Limited
Finance Department
Diamond House
Chilton, Didcot
Oxon OX11, ODE United Kingdom



This DLS 2 degrees of freedom High Precision Motorized Optical Table used Newport Corporation Research Grade breadboards with a grid of M6 tapped holes. The system base was made of a welded steel frame with a powder coated finish. Frames were filled with sand to reduce the table natural frequency and provide passive damping. When in use, the table rests on four machinery feet. When in transport the feet are retracted and casters allow for easy handling.





ANKA 3-Axis Optical Table

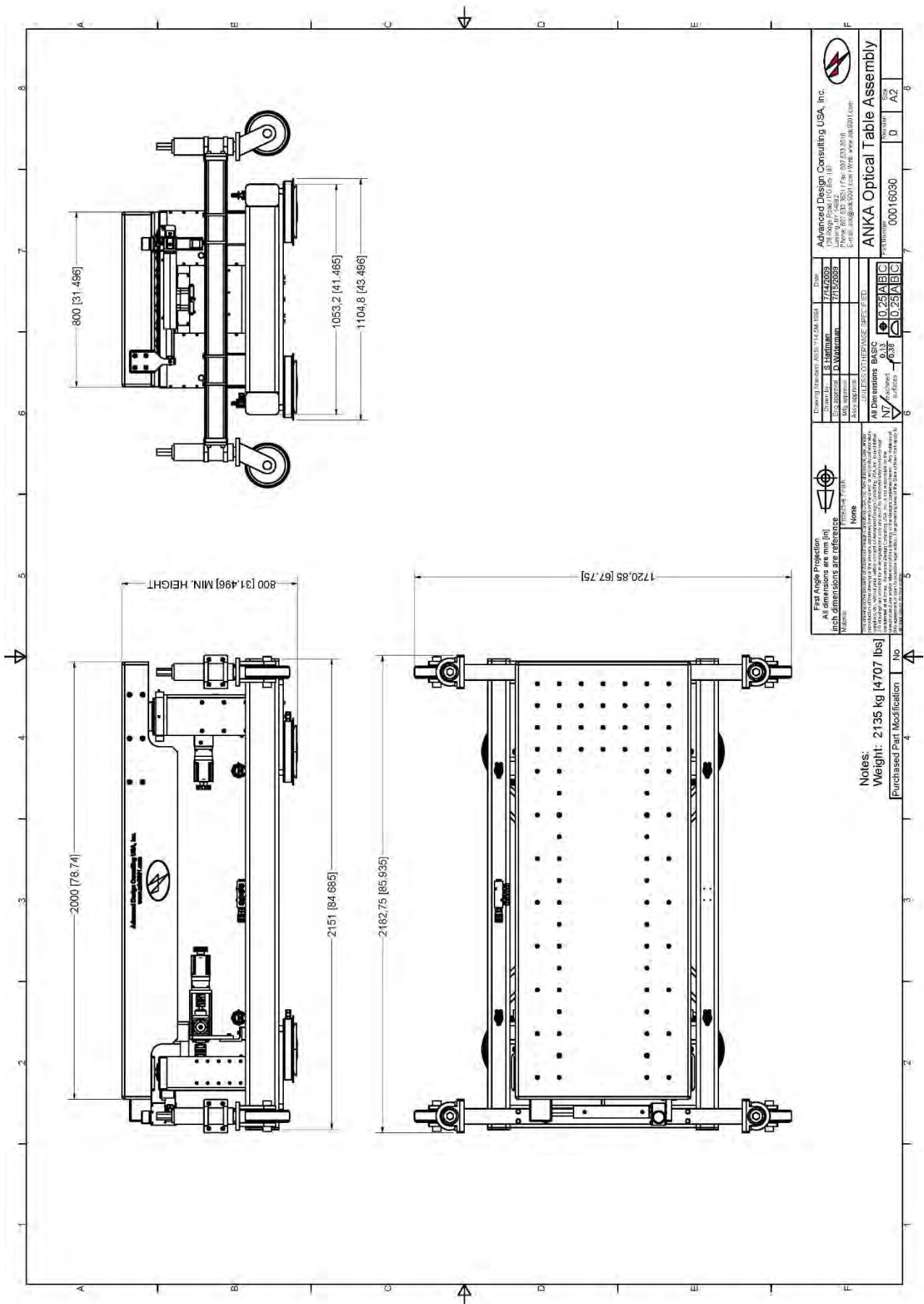


Customer:
Karlsruher Institut für Technologie
Hermann-von-Helmholtz-Platz 1
D-76344 EGGENSTEIN-LEOPOLDSHAFEN
Germany



This high precision table consists of a large, black granite top, with working surface measuring 2000 mm by 800 mm, flat within 0.1 mm, and containing a grid of M6 holes for mounting required items. The granite is 254 mm thick and weighs 1200 kg, thus providing a highly stable platform for sample stages, detector, 205 kg detector translation system, and the fast sample exchange system. Total loading on the table is 1500 kg. It remains stable within 1 μm for up to 3 hours. Removable jacking casters are provided for transporting the system from receiving areas to test and acceptance areas and then to the final destination. Within the hutch, the table will be periodically moved off line when other kinds of experiments are scheduled. For this purpose, air bearing supports are provided under the frame for ease of movement on the smooth marble floor.





ANKA 6-Axis Optical Table

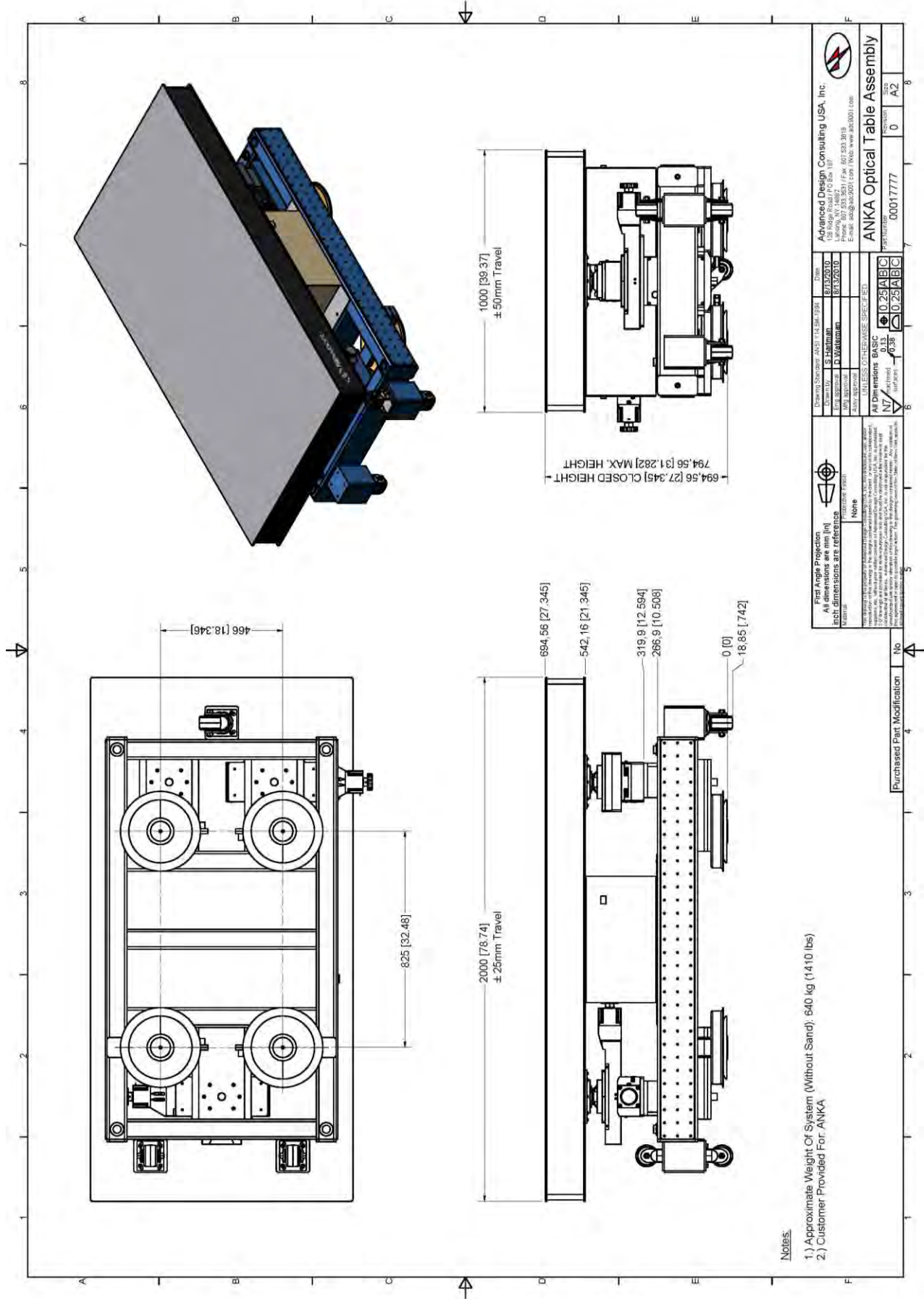


Customer:
Karlsruher Institut für Technologie
Hermann-von-Helmholtz-Platz 1
D-76344 EGGENSTEIN-LEOPOLDSHAFEN
Germany



This ANKA 6 degrees of freedom High Precision Motorized Optical Table used Newport Corporation Research Grade breadboards with a grid of M6 tapped holes. This table incorporated “air pads” for ease of table motion inside the hutch (experimental area). The system base was made of a welded steel frame with a powder coated finish. Frames were filled with sand to reduce the table natural frequency and provide passive damping. When in use, the table rests on four machinery feet. When in transport, the feet are retracted, and casters allow for easy handling.





DLS Custom Optical Table



Customer:

Diamond Light Source Limited
Finance Department
Diamond House
Chilton, Didcot
Oxon OX11, ODE United Kingdom



This DLS 6 degrees of freedom High Precision Motorized Optical Table used Newport Corporation Research Grade breadboards with a grid of M6 tapped holes. This table had a requirement for long Y axis travel. The system base was made of a welded steel frame with a powder coated finish. Frames were filled with sand to reduce the table natural frequency and provide passive damping. When in use, the table rests on four machinery feet. When in transport, the feet are retracted, and casters allow for easy handling.

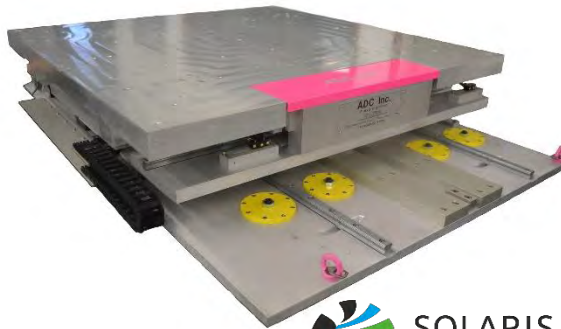




Engineered Systems

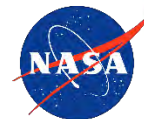


Elettra 2-Axis System with Controller

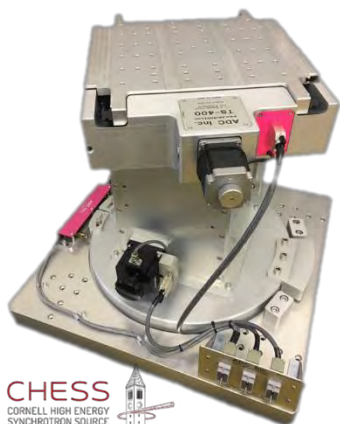


SOLARIS
NATIONAL SYNCHROTRON
RADIATION CENTRE

SOLARIS-3-Axis Motorized System



NASA-Positioning System



CHESS
CORNELL HIGH ENERGY
SYNCHROTRON SOURCE

CHESS-3-Axis Stage Stack



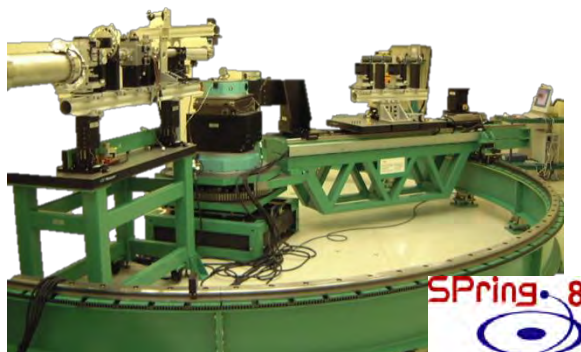
APS-Press Manipulation System



Colorado-Gimbal System



*XYZ & O Multistage
UHV Manipulators*



Spectrometer



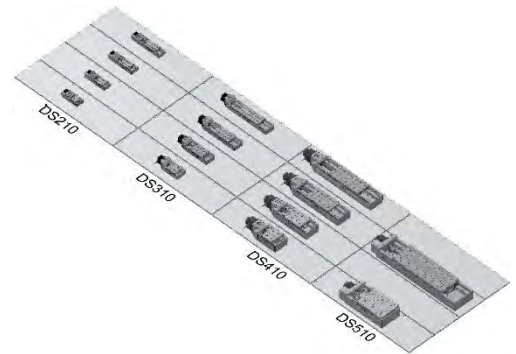
Cryostat Dilution Refrigerator

Motion Stages

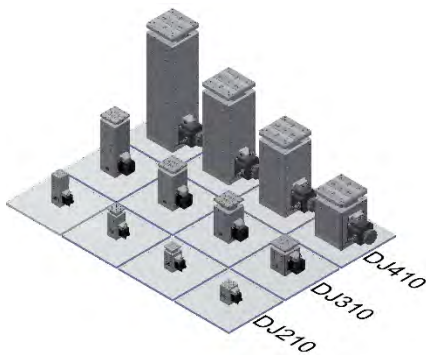
ADC manufactures high quality motion control products and systems that are qualified for Semi-conductor, Automation, and Aerospace industries. Our extensive product line includes linear stages (slides), lift stages (jacks), rotation stages, and tilt stages (goniometers).

Linear stages

ADC's linear slides are driven by a high class preloaded ballscrew coupled to a high torque 200 step per revolution stepper motor which can be run in full, half, or micro stepping mode to meet customer resolution requirements. Maximum rigidity is assured through the use of preloaded crossed roller linear bearings. Each slide also features two fully adjustable, normally closed limit switches to define the extents of travel.



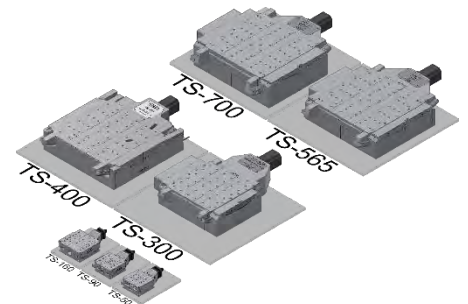
Lift Stages



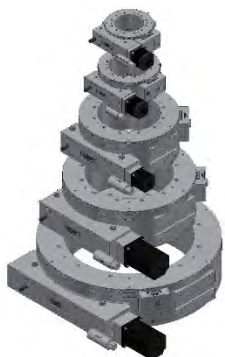
ADC's lift stages are driven by a high class preloaded ballscrew coupled to a high torque 200 step per revolution stepper motor which can be run in full, half, or micro stepping mode to meet customer resolution requirements. Maximum rigidity is assured through the use of preloaded crossed roller linear bearings. Each jack also features two fully adjustable, normally closed limit switches to define the extents of travel.

Tilt Stages/Goniometers

ADC's tilt stages are based on precision curved guide rails combined with a tangent bar (HD Series) or worm gear drive (LD Series) system providing fine angular resolution and accuracy. The stages can be paired to create an orthogonal (X-Y) tilt stage system. All tilt stages come standard with a stepper motor.

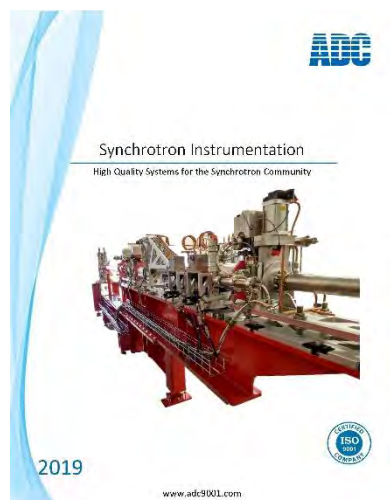


Rotation Stages

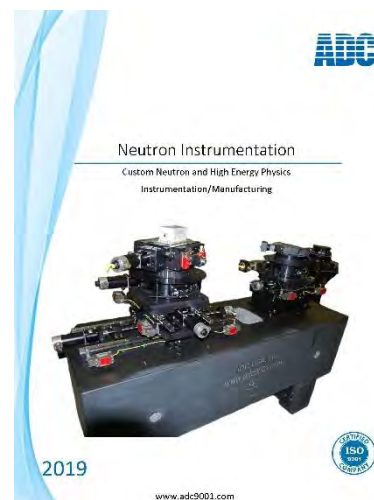


ADC's rotation stages are built upon an industry leading, preloaded, duplexed angular contact bearing set. These stages not only give an exceptionally high running accuracy but allow for large radial and thrust loads as well. Each stage is driven by a precision ground worm gear set and a high resolution, high torque stepper motor. Backlash is reduced by employing a flexure style shimming technique to preload the worm and worm wheel.

For more information on ADC's products, go to adc9001.com to download all of ADC's catalogs.



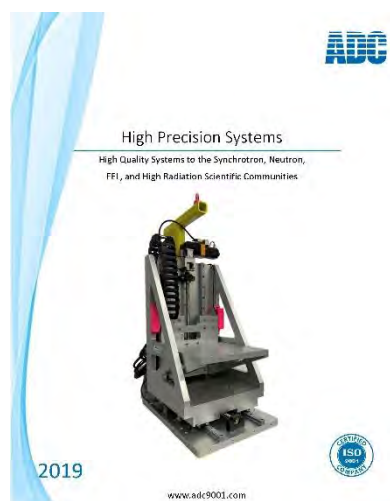
Synchrotron Instrumentation



Neutron Instrumentation



Motion Stages



High Precision Systems



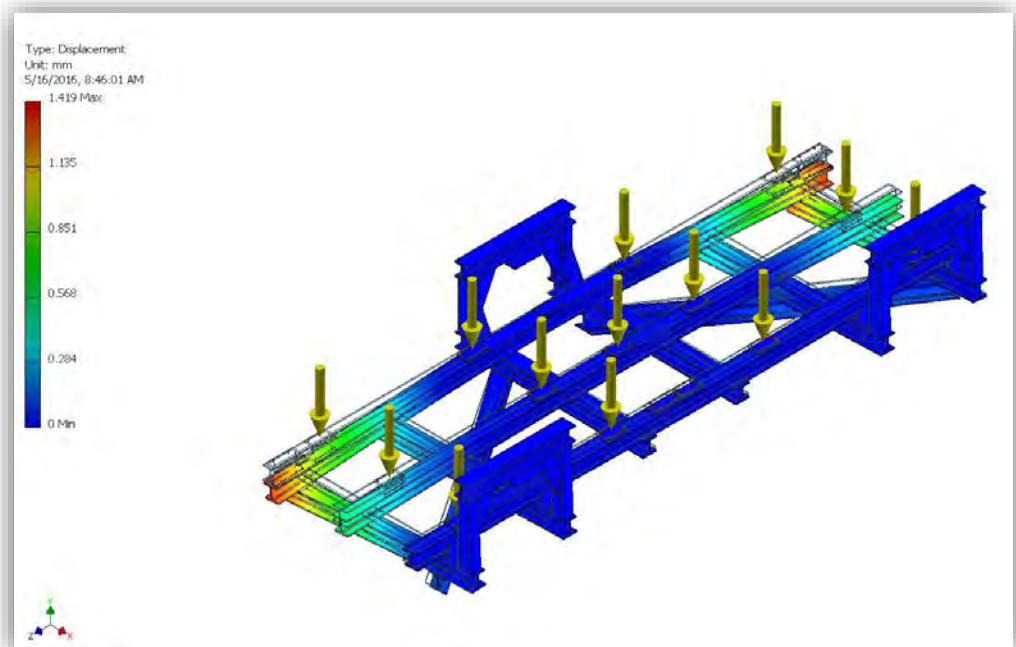
High Precision Slits

Company Capabilities

Engineering Design and Analysis

The Engineering Design and Analysis group is a multi-disciplinary team of engineers with unique training and creativity, and dedication to meeting the needs of our customers. ADC uses the latest computational and graphics software and hardware to approach the most challenging problems in the Aerospace, Automotive, Nuclear, Ultra-High Vacuum, Automated Machinery, Electro-Optical Products, synchrotron, high energy physics, and neutron diffraction communities.

- Finite Element Analysis
- Magnetic Design
- Optics Design
- Conceptual Design
- Materials Selection
- Tooling Design
- Fabrication Specifications
- Virtual Prototyping
- Design Analysis and Optimization
- Detailed Design
- Component Design



Electronics, Instrumentation and Software

ADC's electrical/software engineers and techs can provide custom circuit design and complete turn-key control systems. Some of our skills include integrated PLC design and programming, analog and digital circuit design, logic design (including PLA and FPGA programming), stepper and servo motor applications, microprocessor, RFID, serial and RF communications, and system controllers. The standard motor controls and driver that we offer are the Aerotech Ensemble™ series controllers. However, many of our customers have requirements for custom integration of these components into a functioning system, fully debugged, documented, and ready for operation. Software skills and development platforms include Microsoft Visual C++, LabView, EPICS, Visual Basic, CNC, and generic PLC (AB, NAIS, GE-Fanuc, Schneider, etc.) and Parker ACR and Accroloop. Our primary skill, however, is the integration of these components into a functioning system, fully debugged, documented, and ready for operation.



Vacuum Assembly & Testing

ADC is well equipped to handle any stand-alone fabrication and machining requirement. It is often the integration of these talents, combined with higher level assembly and testing, that brings the value added our customers demand. We have developed processes and employ qualified personnel and systems that allow ADC to assemble and test to challenging requirements. Examples of this include state-of-the-art, high-resolution, extreme-ultraviolet-light (EUV) microscope making measurements in Nano range for Lawrence Berkeley National Laboratory (LBNL); 26 tone, 20-meter-long, 2.3 meter in diameter complex Time-of-Flight Small Angle Neutron Scattering (ToF SANS) instrument for ANSTO, Australia; and Jefferson Lab 12 GeV Upgrade Cavity Parts Project.

ADC utilizes some of the most advanced measurement equipment available to control the requirements that our customer's complex projects require. This is accomplished through the use of Coordinate Measuring Machines (CMM's) equipped with model-based inspection software, providing us with the ability to verify results using customer supplied CAD models, Elcomat 3000 Autocolimator, and Keyence Optical non-contact Micrometer.

Advanced Manufacturing

ADC provides machining systems and products to our diverse customers from structural metal fabrication to turn key design products with complex control systems. ADC is fully equipped with a CNC precision machine shop; and over the past 4 years our unique ability to fabricate/provide parts for precision vacuum machining equipment has grown immensely. Our process begins with providing quotes, which we prepare, based on specific drawing requirements given to us by the customer.

The following are views of ADC manufacturing and major assembly areas.



Equipment

We use precision equipment to verify each order and are committed to delivering precision machined parts. We are very proud of our shop and the capabilities we can offer because of our state-of-the-art precision CNC milling and CNC turning machines. Equipment used for inspections include a Brown & Sharpe CMM, a Jones & Lamson Optical Comparator, and an extensive selection of gauges. We ensure calibrations are performed and are traceable to meet our customers' standards. Our inspection room is temperature controlled to enable the utmost accuracy and consistency in measurements. We can provide a Certificate of Conformance for all processes as required. These are stored electronically and attached to each job for future reference.



CLAUSING CSG-1224 ASDII SURFACE GRINDER, s/n E1TAJ0079, w/PLC Control, Magnetic Chuck

ADC's precision grinder CSG-1224 is especially suitable for heavy duty grinding. The large spindle is supported by four ball bearings to allow for durability.

Welding Capabilities

At ADC, we offer full service custom metal fabrication which includes welding services for short and long production run jobs. Our extensive welding capabilities utilize both robotic welding and manual welding in MIG and TIG and mesh welding for wire products. We are experienced in welding aluminum, carbon steel, and stainless-steel materials. We also have complete resistance welding, also known as spot welding capabilities. Our unique welding shop supports our custom metal fabrication process.

The welding services at ADC support our full-service fabrication process with capabilities including:

- Resistance Welding / Spot Welding
- Gas Metal Arc Welding (GMAW) / Metal Inert Gas (MIG Welding) - This semi-automatic or automatic process uses a continuous wire feed.
- Gas Tungsten Arc Welding (GTAW) / Tungsten Inert Gas (TIG Welding) - A manual welding process that is extremely precise, especially useful for welding thin materials.
- Mesh Welding - electric flash butt welding where the two wires are pressed together, and the electric current is activated

Benefits of TIG Welding

- Superior quality welds
- Welds can be made with or without filler metal
- Precise control of welding variables (heat)
- Free of spatter
- Low distortion

Benefits of MIG Welding

- All position capability
- Higher deposition rates than SMAW
- Less operator skill required
- Long welds can be made without starts and stops
- Minimal post weld cleaning is required

Benefits of Mesh Welding

- wires resist movement
- it is much faster than traditional welding
- it is a high-quality low-cost spot-welding solution



ADC's Service and Support

ADC takes new approaches to shorten assembly and commissioning times. We create modular construction units which can be installed cost-effectively and extended easily when needed. Our customers can count on ADC's continued service support after the commissioning stage.

Through intensive technical training sessions and our policy of involving customer personnel at an early stage, we can assure seamless and rapid familiarization with our new technologies. This approach has meant that, in many major projects, our customers have been able to operate their equipment independently and to their satisfaction within a very short period.

ADC Customer Service team provides installation, installation supervision, after sales support and service, troubleshooting and remote diagnostics. We believe that success is in the details and this philosophy delivers high customer satisfaction and instills a strong sense of loyalty. Our friendly and courteous customer service staff is always available for questions and order placement for the key replacement parts to keep ADCs systems running at peak efficiency. Whether it is a small replacement part or a new component, we are committed to the fastest resolution to customer needs.

ADC is uniquely positioned and invested in providing exceptional after-sales support. Available support and services including:

- Installation and start-up
- Service and repair – factory / service center / or onboard
- Service contracts
- Troubleshooting assistance over the phone
- Engineering and technical sales assistance
- Upgrade and retrofit parts and programs
- Spare and replacement parts
- Tailored factory and on-board training
- On-board system and spares analysis



BUREAU VERITAS
Certification



ADVANCED DESIGN CONSULTING USA, INC.

126 RIDGE RD
LANSING, NY 14882 USA

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organization has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001:2015

Scope of certification

DESIGN, MANUFACTURE, AND DELIVERY OF DEVICES, INTEGRATED SYSTEMS, COMPONENTS AND INSTRUMENTS FOR COMMERCIAL, ACADEMIC, AND GOVERNMENT AGENCIES

Original cycle start date: **31 December 2014**

Certification / Recertification cycle start date: **31 December 2017**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **30 December 2020**

Certificate No. US010798 Version: **1**


Signed on behalf BVCH SAS – UK Branch

Certification body address: **5th Floor, 66 Prescott Street, London E1 8HG, United Kingdom**
Local office: **16800 Greenspoint Park Drive, Suite 300S, Houston, TX 77060**

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization. To check this certificate validity please call: **+(800) 937-9311**



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Page 1 of 1



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 adc@adc9001.com • www.adc9001.com