Optomechanix

Design Study:
Zeiss Stemi Stereo Microscope

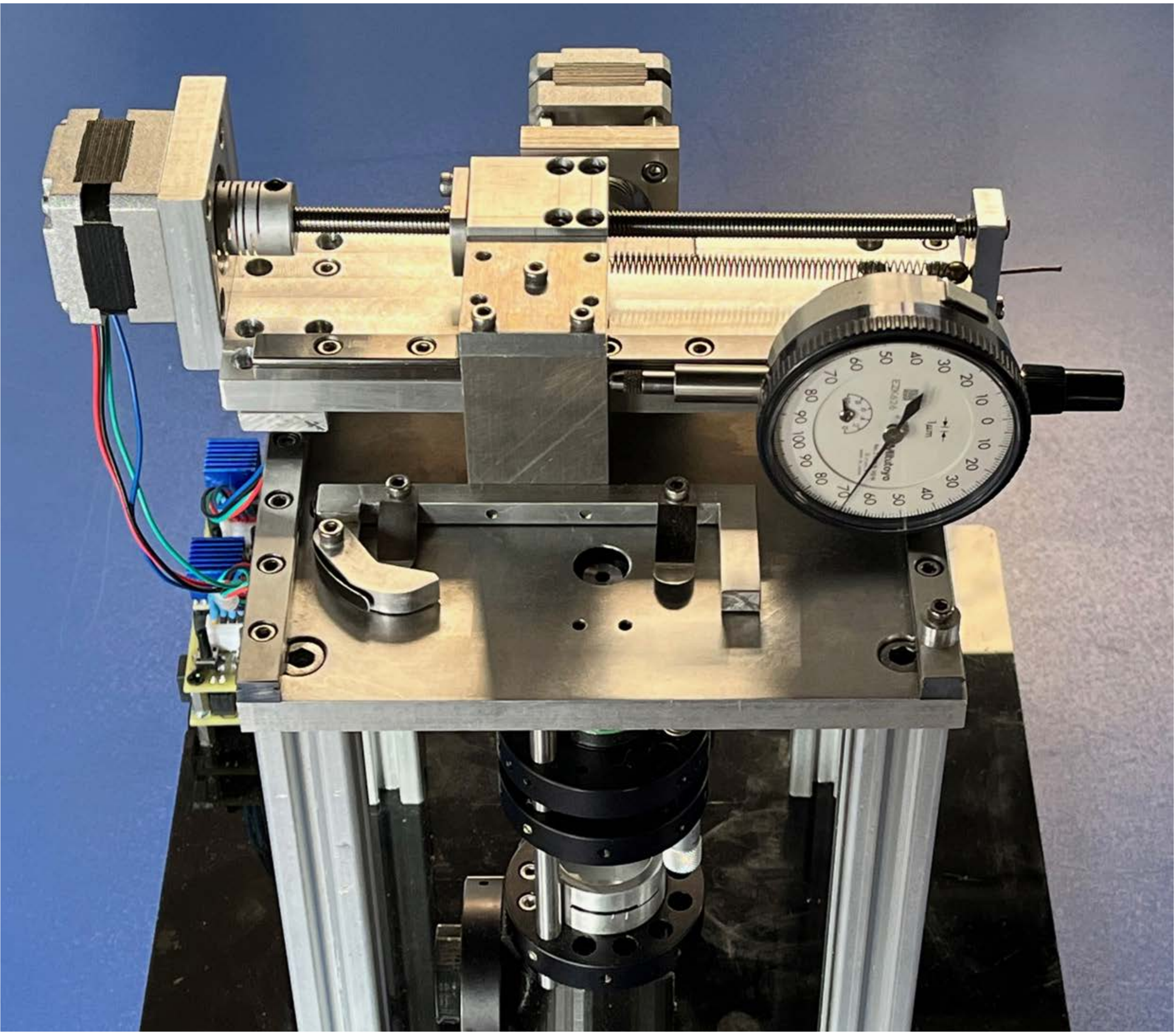
Building a Cubical Microscope with Optoform

Designing a Sub-Micron Multi Axis Stage

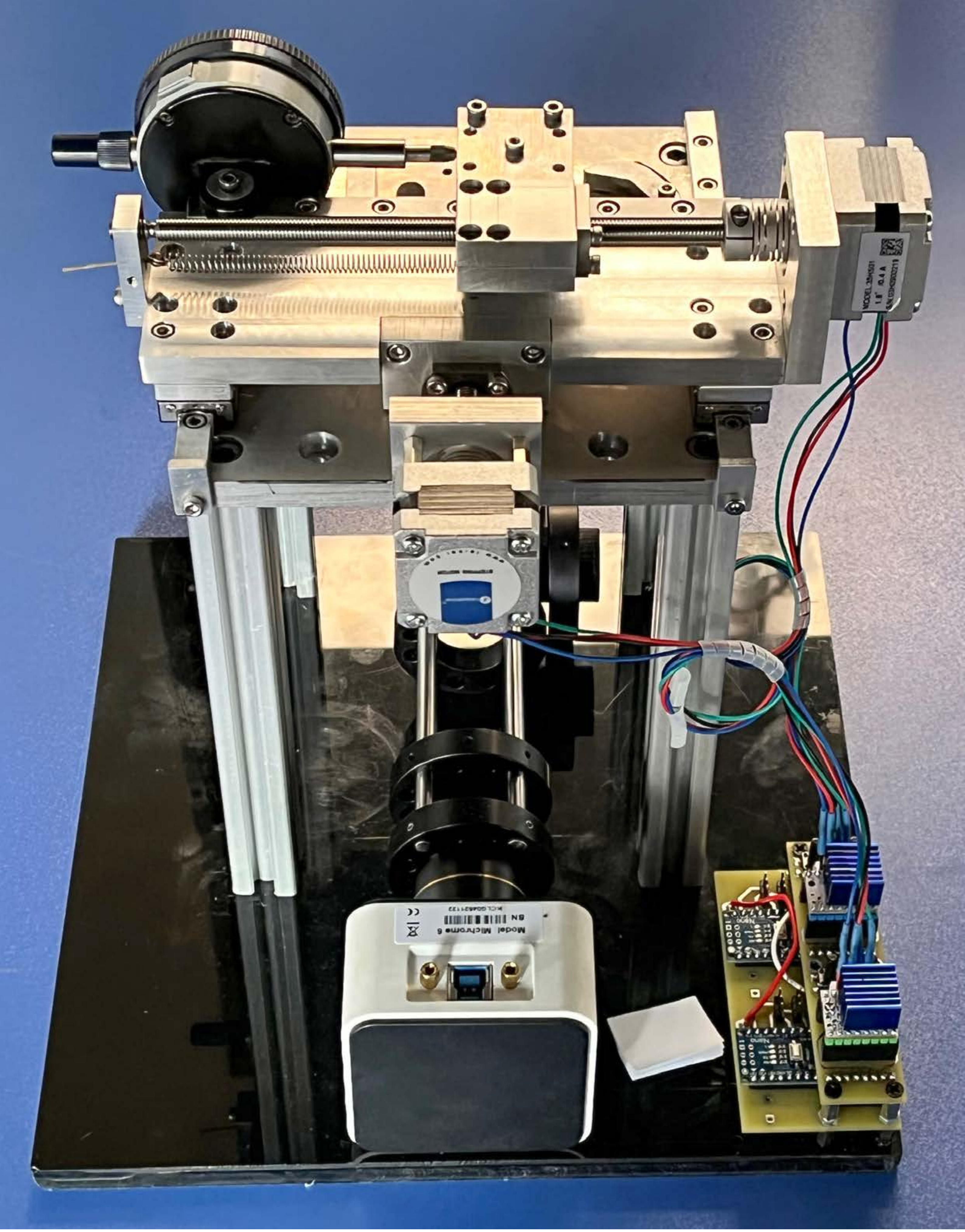
How We Pass Through Time

Building a Motorized Scanning Inverted Microscope

Jan-Mar 2023



Technical journal of OMiD, Opto-Mechanical Institute of Design



Back View of the Scanning Inverted Microscope designed and built by Dr. AMir Asadollahi

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M.C. Escher in his youth

This issue Dedicated to:

M.C. (Maurits Cornelis) Escher (1898-1972). He was a Dutch graphic artist whose genius, and creativity became well known in the 20th century through world wide exhibitions of his work after his passing. He was educated at Haarlem School of Architecture, and Decorative Arts. His most famous works were Sphere (self portrait) 1935, Relativity (1953), and Waterfall (1961). You could see most of his work at his official website: www.mcescher.com

Escher's art became well known among scientists, and popular culture, especially after it was featured by Martin Gardner in his Apr 1966 Mathematics Games column in Scientific American. Escher's work showed mathematical, imaginative, space age, impossible solids, impossible buildings, and sometimes three views of the same building in a single drawing, connected together at right angles, and closest a drawing could get to the realm of a dream.

Below-right, self-portrait has been the focus of many of M.C. Escher's drawings. I was so much influenced by his work, and sometimes I used his perspective tricks (above, left) to show how optomechanical instruments work.

The Sphere (1935)

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Contributors: Dr. Amir Asadollahi

Optomechanix is a quarterly journal of Opto-Mechanical Institute of Design (OMiD), with technical articles for practical, hands-on opto-mechanical engineers. This magazine is privately founded.

Cover page photo: A scanning inverted microscope prototype using Optoform.

Front back: Back view of the scanning microscope showing the imaging camera

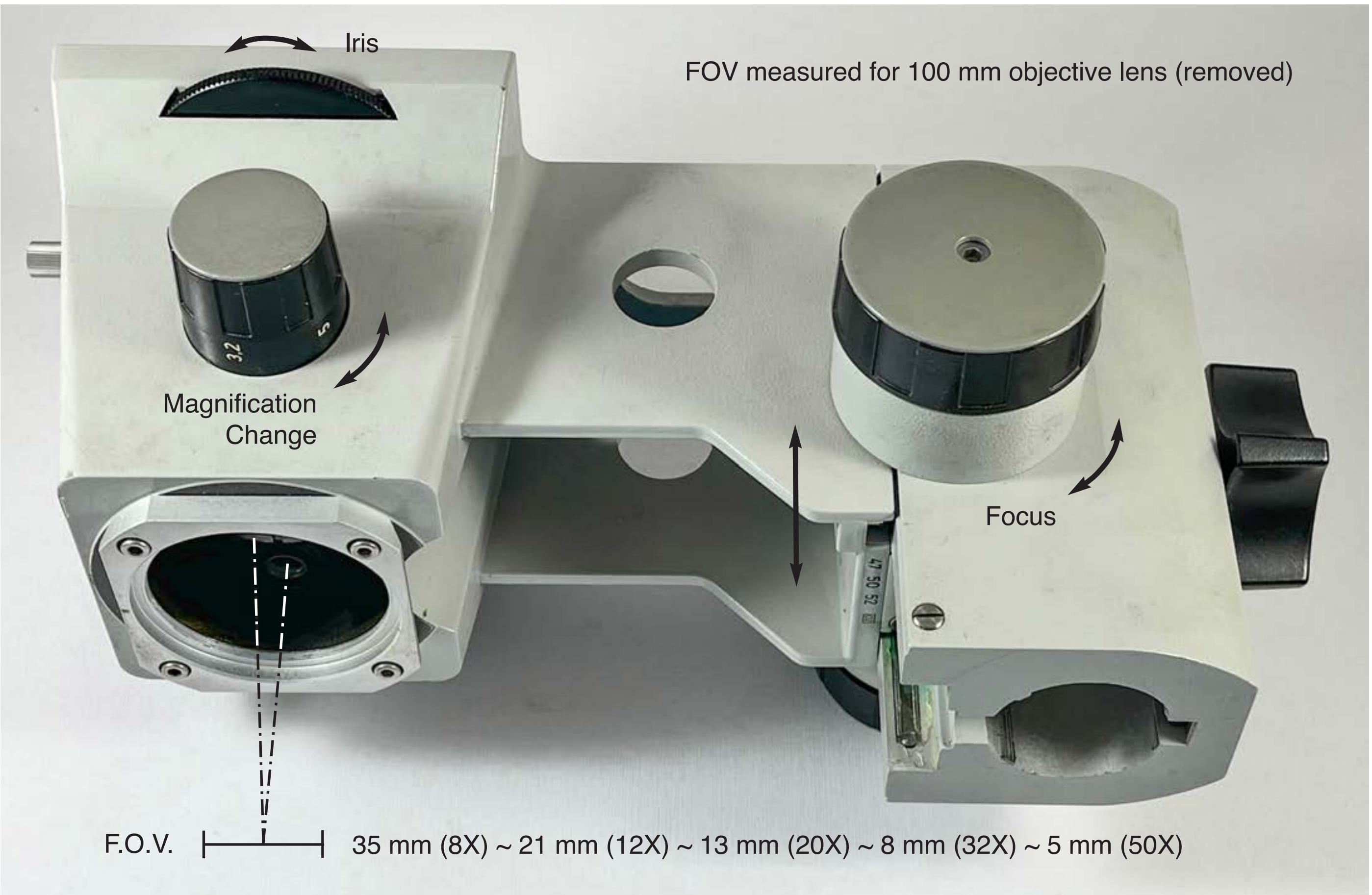
In This Issue:

We covered the optomechanical engineering of Olympus CX21 in our last issue: It was a detailed design review of the microscope along with its manufacturing parts count, and cost analysis. One reason I spend so much time explaining microscopes is because we could later implement those ideas in using Optoform. In this issue, we're going to study one of my most favorite stereo microscopes: Zeiss Stemi. I have been using Zeiss Stemi for at least 30 years, and today, you could find one on eBay in good working condition for around $350, and I will show you how to make a simple stand for it. But before you go buying them, make sure it comes complete with a pair of Zeiss eyepieces, its detachable objective lens, and after you receive it check to see it it has smooth focusing knob, and good detent on its magnification knob. Many Zeiss objectives of this age exhibit element separation, so you must also check for that. This is a high quality stereo microscope for everyday use around your lab.

I postpone this issue of Optomex because I was going to cover Photonics West but I won't cover the show in much detail because I wasn't able to make it to the show. According to SPIE, this was the biggest PW show in recent years (at least compared to last year), with over 1,400 exhibitors, 22,000 registered visitors from 85 countries, generating so much enthusiasm at Moscone Center during last week.

In this issue, we're going to learn optomechanical design by designing a highly sensitive motorized stage, and we are going to see how a cubical inverted microscope is built with Optoform. We are also going to continue in the series "Psychology of achievement" on the last section of this issue. One of the most delightful experiences I have had in life has been spending much of my life with the youth. I am often invited to give lectures at universities, and that's how I get to know, and understand their ideas, and state of mind. I am passed 60, so I have so much of my life experience to share.

Ali Afshari
Editor in Chief,
Optomechanix



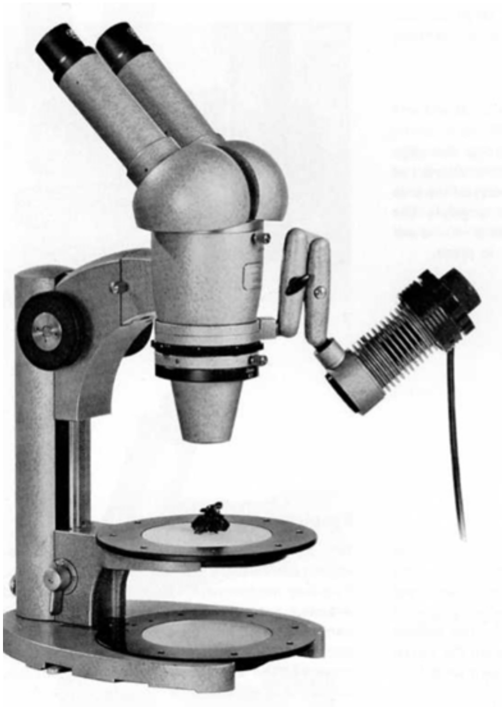
With its simplistic, elegant design, Zeiss Stemi has one of the most beautifully designed microscope housings in industry. I would not be surprised if this was a Dieter Rams design. The design follows a cubic, rather than spherical design scheme of classical Zeiss microscopes, and it was a radical change in Zeiss microscope body form. Zeiss shifted to the cubical design, and still continues that philosophy to this day (page 4). In body design, all microscope manufacturers like Zeiss, Leica, Nikon, and Olympus followed the spherical shape but later switched to cubical form.

Optomechanics of Zeiss Stemi Stereo Microscope

By Ali Afshari

In this issue, we're going to study one of my most favorite stereo microscopes: Zeiss Stemi. I have been using these microscopes for at least 30 years, and today, you could find one on eBay for around $250 but make sure it comes complete with a pair of Zeiss eyepieces, its detachable front lens, and make sure it has a smooth focusing knob, and good detent on its magnification knob.

I personally don't understand why new microscopes are being built! I mean looking at this 30 year old microscope, it's a fully flexible design to accept a variety of accessories, and it has a modern look to it. Zoom versions of Stemi have been also introduced but they look cumbersome. This design suits well for a compact optical design with a selectable range of district magnifications.




Left, 1950's **Zeiss Stereo Microscope I** with incident illumination, and version **III** with transmission illumination (right).


1980's Zeiss Stemi Stereo Microscope with 60 degrees inclined viewing, and LED light illumination

Zeiss Stemi microscope design is compact, and relatively light weight. It’s an infinity design so a C-Mount camera adapter (below) could easily be added below the viewfinder head without changing tis focus or magnification.

Right, two types of eyepieces: An all-metal eyepiece set, and the plastic version on the right. Zeiss uses a series of extrusions around the mounting tube of the plastic housing (right) to reduce friction. If dropped, plastic proves to be a much better option.

The first thing about stereo microscope is you'll notice there are two independent microscopes that are aligned together to view the sample at a slight angle. The Stemi design is an infinity telescope type (seee page 9). So, although the two eyepiece tubes are slightly angled with respect to each other, the rest of the light path in this design is parallel, and you could take off its viewfinder, and use it as binoculars, focused at infinity.

The advantage of this design is if a video attachment is added below the binocular head, it will not affect the focus or parallelism of the system. The magnification change is performed by changing various telescopes in front of each line of sight.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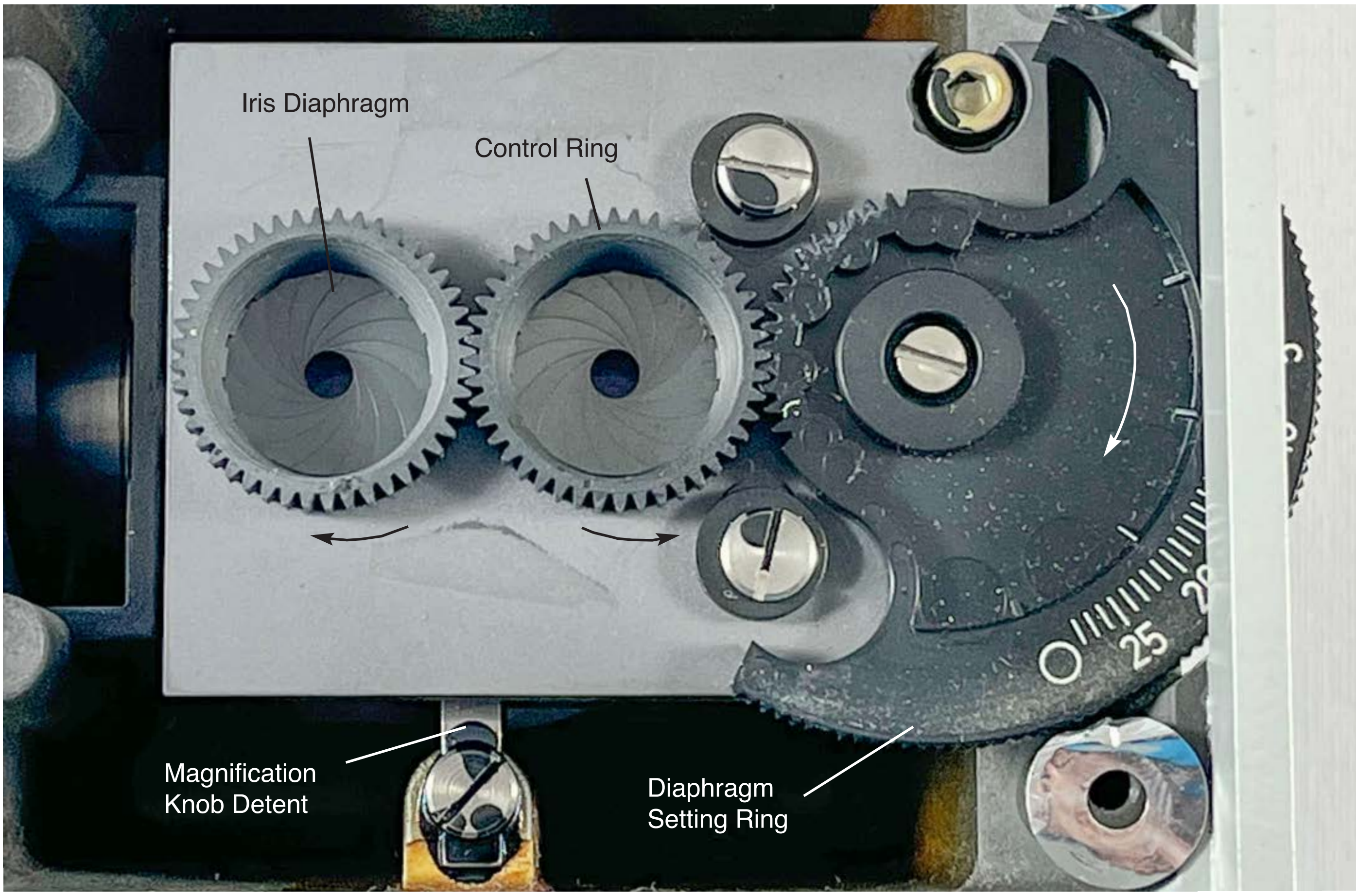
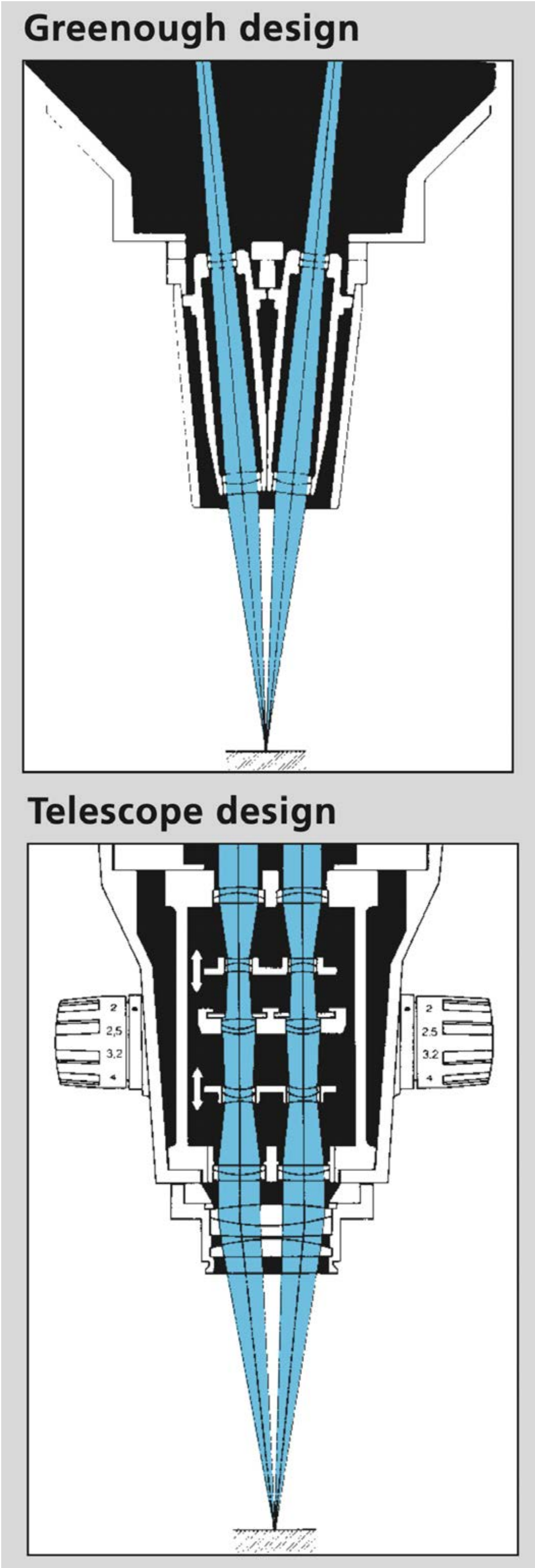
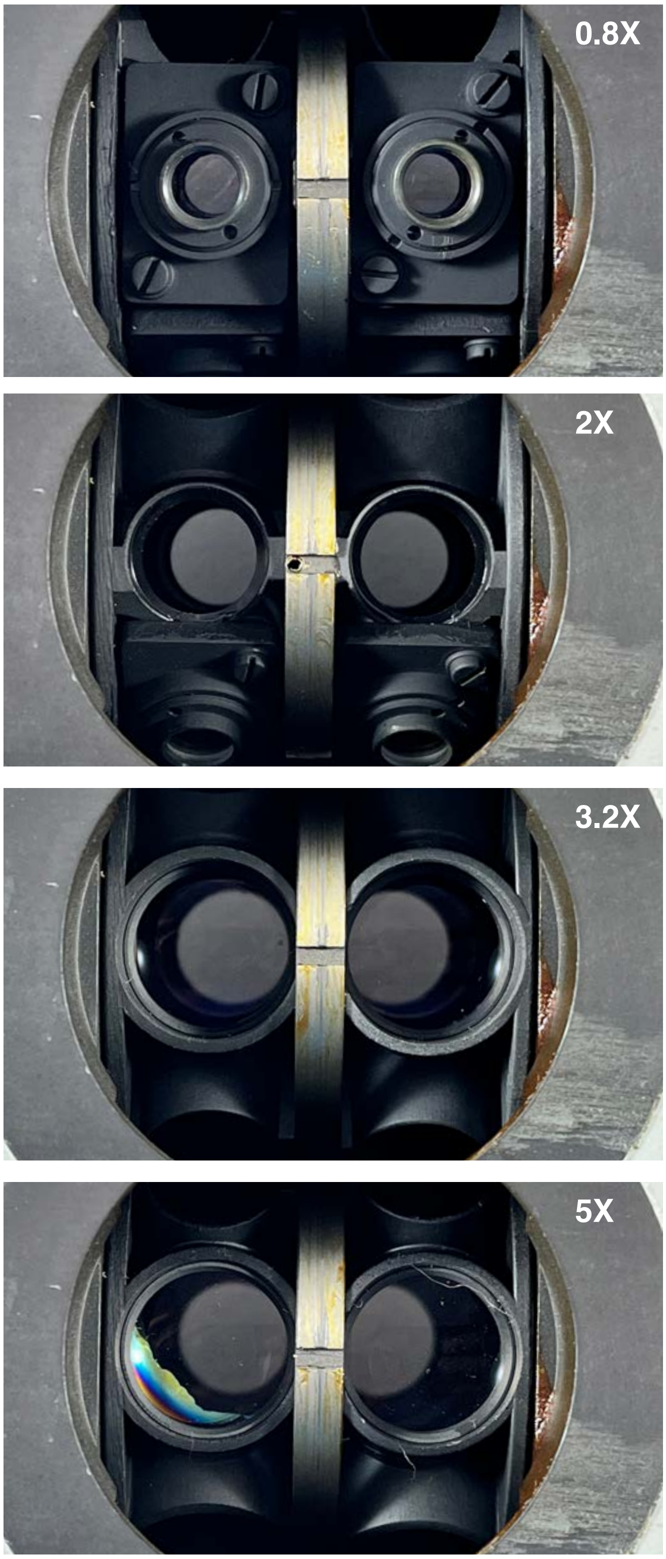
Bottom view of binocular optics with focusing knob, and magnification change.



Adjustable iris diaphragms for the left, and right eyes are linked for simultaneous depth of field adjustment.

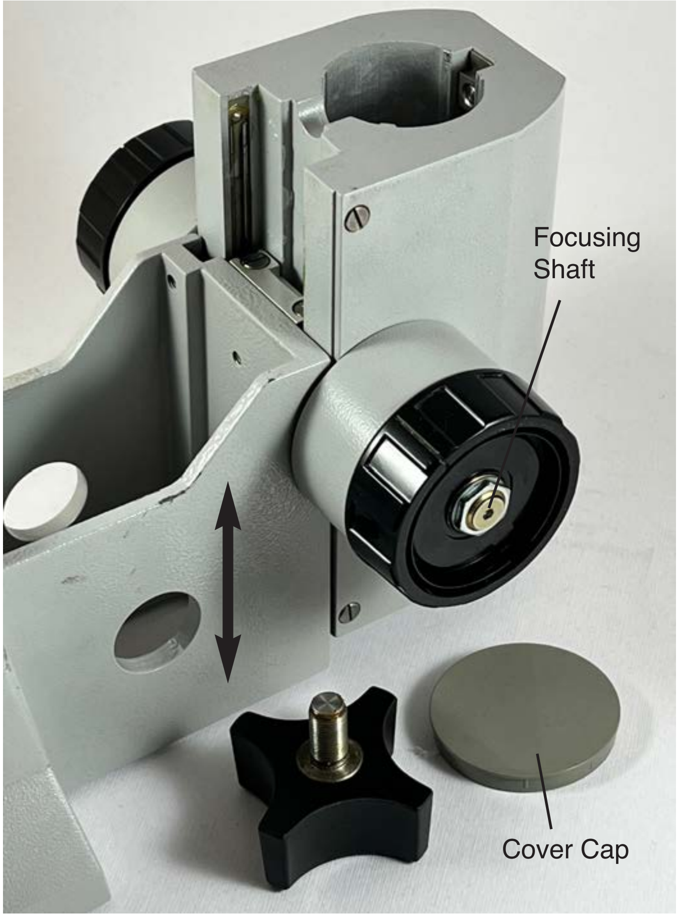




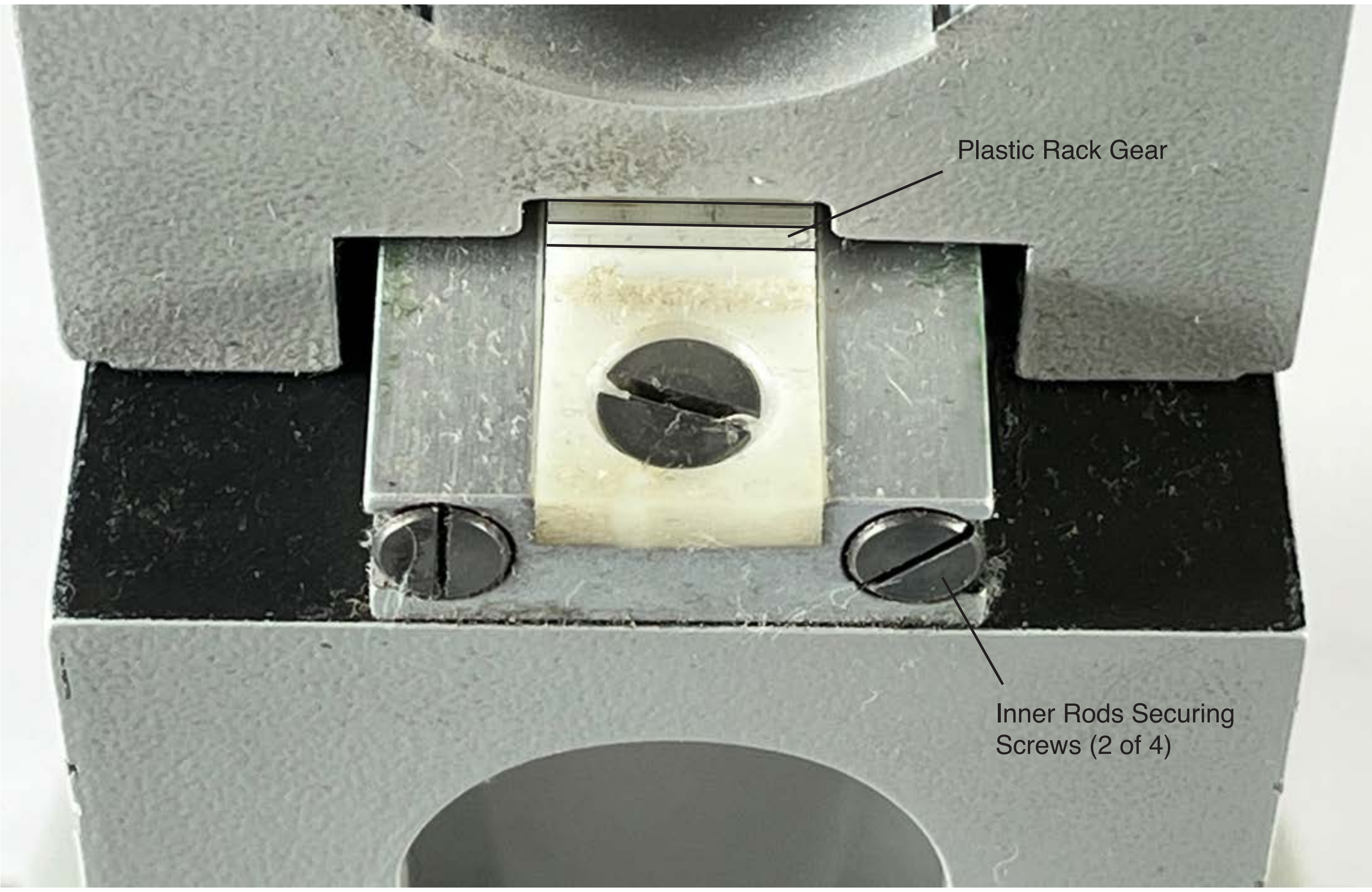
Left, Comparison between Greenough and Telescopic design. Right, bottom view of different magnification settings in Zeiss stereo viewing.

In older Greenough design (left), images from two separate microscope tubes generate the 3D image coming from two separate objectives oriented at a stereo angle.

In Telescope design, two microscopes are in parallel, and share the same objective to form the 3D image. Since the two beams are parallel, a camera attachment may be added above or below the telescope without altering the optical design. Various objectives could also be utilized to change the working distance of the microscope.

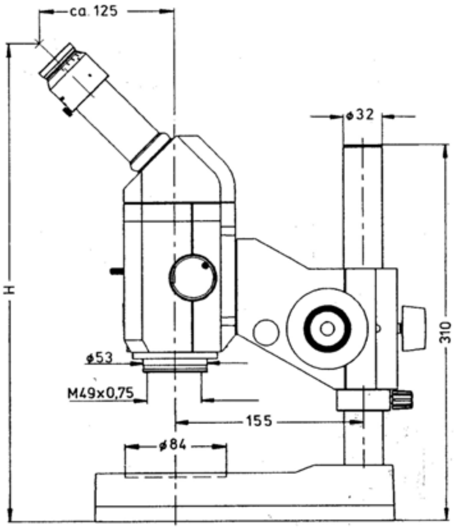


Linear travel of focusing mechanism utilizes steel rods as guide rails for its linear bearing path way.



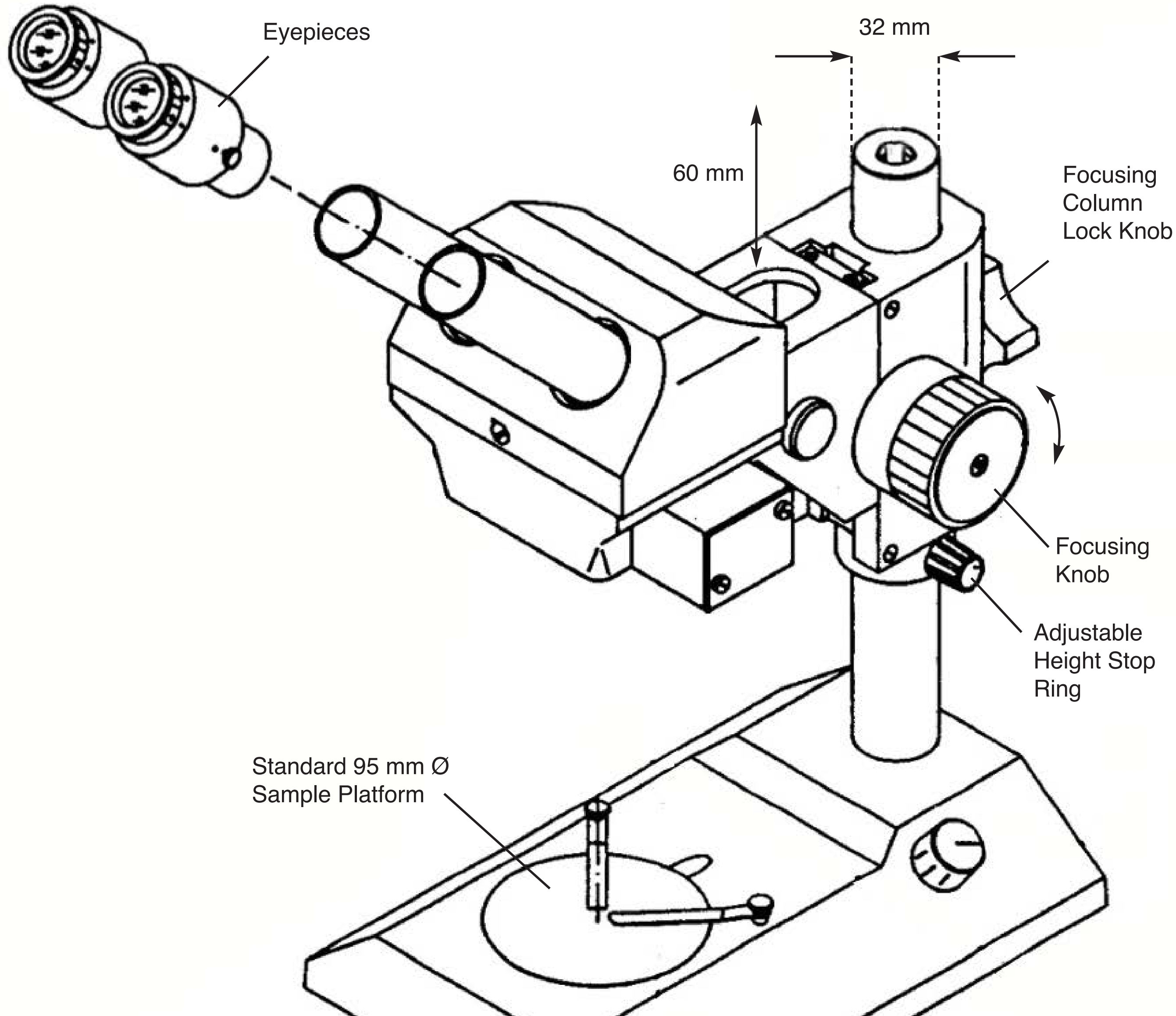
Top view of focuaing rails / rack and pinion gear. Total trvel of focusing mechanism is 60 mm.

Focusing Mechanism



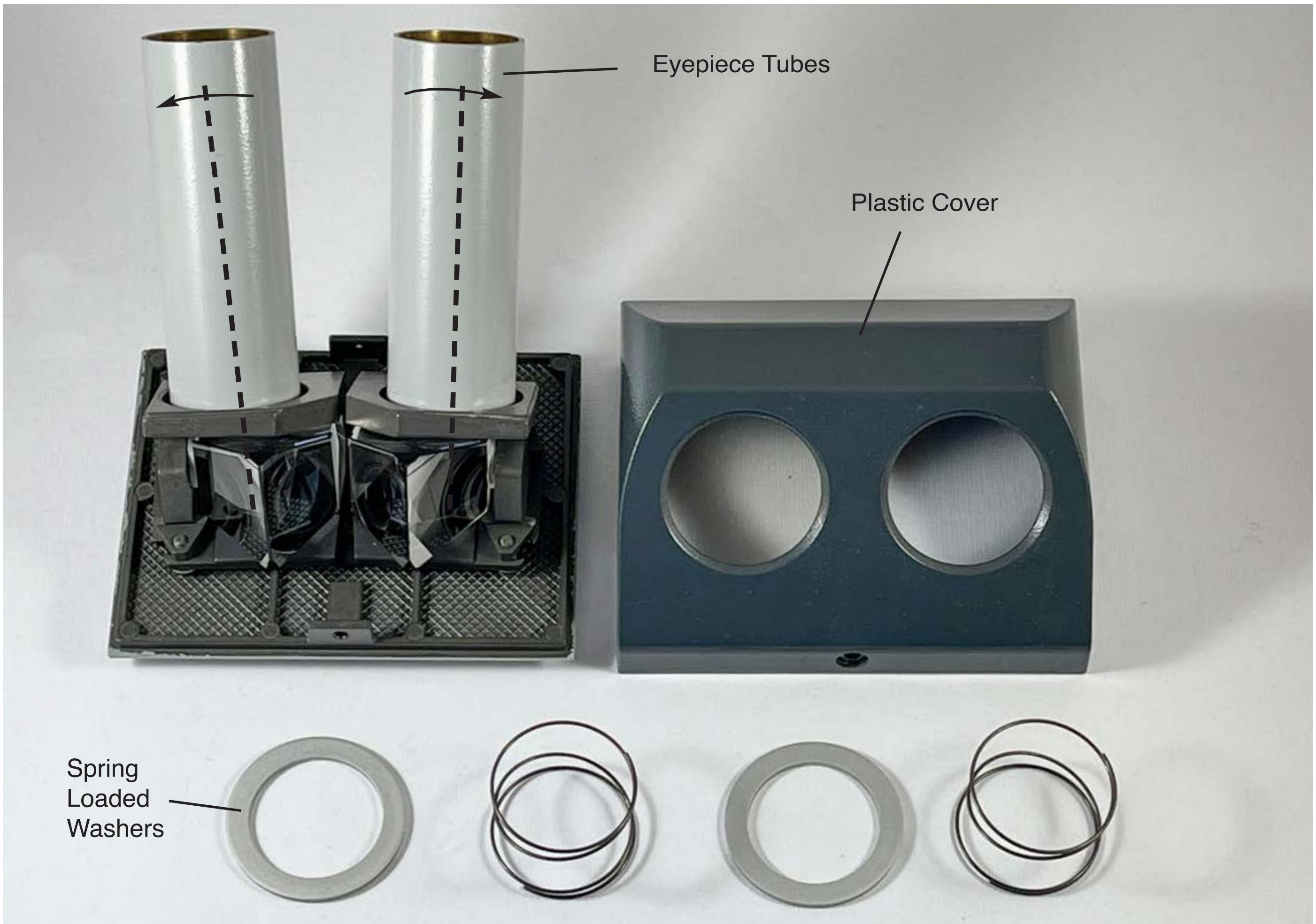
Rack and pinion focusing in Zeiss Stemi is friction based, whose friction is adjustable by holding one of the focusing knobs on the right or left, and tightening the other focusing knob against it. Disassembling, and putting back together the guide pins is not an easy task. Large flat head screws contain the guide rails for its linear bearing focusing assembly.

The microscope body is relatively light weight but it's a challenge to lift up and down by a single focusing knob. The helical focusing gear is made of steel while the rack itself is hard plastic, rarely ends up being worn out.

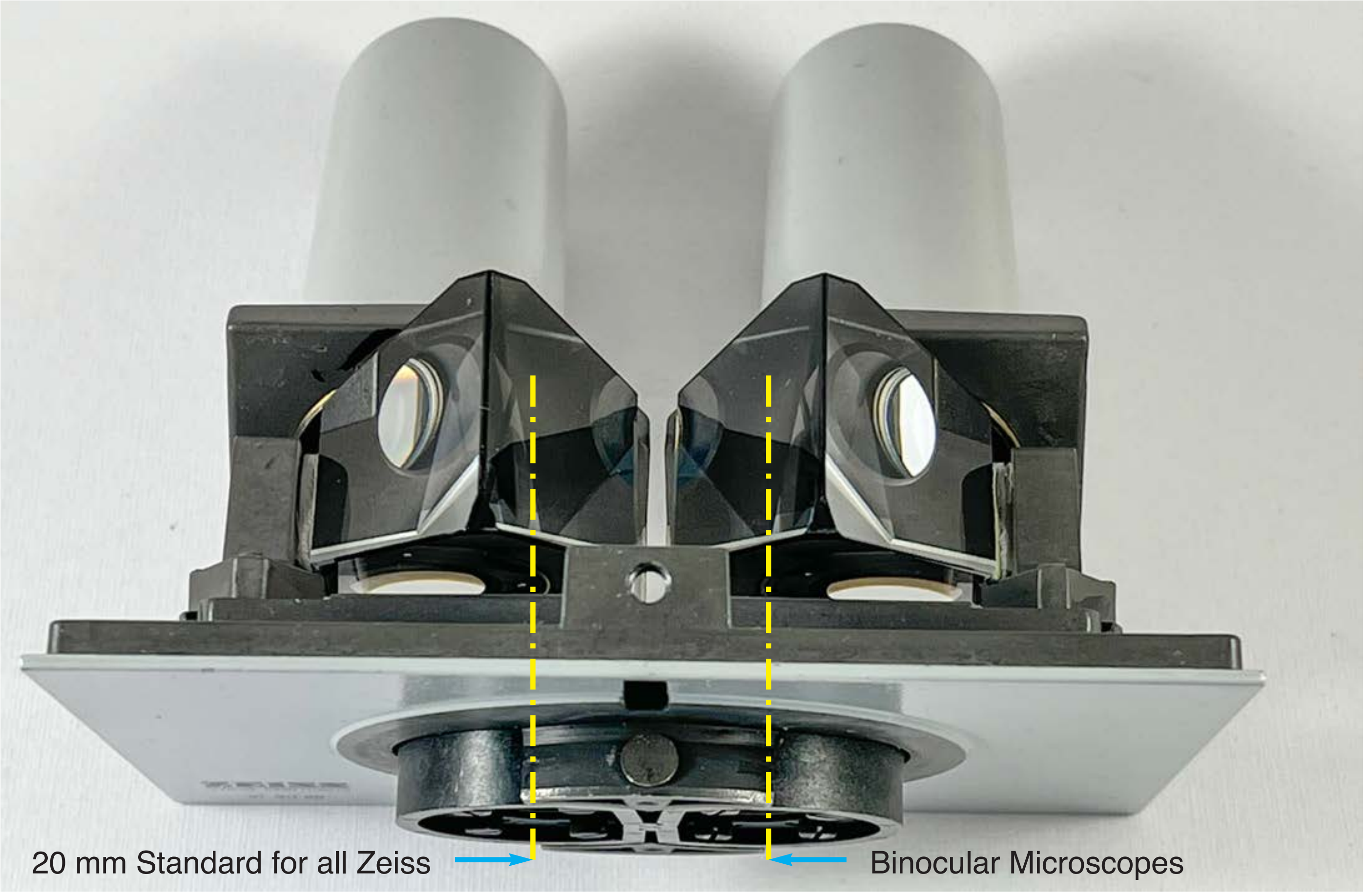


You could easily make your own custom stand for Zeiss Stemi by mounting a 1 1/4" rod on a wooden platform. The focusing mechanism is built into the microscope itself.

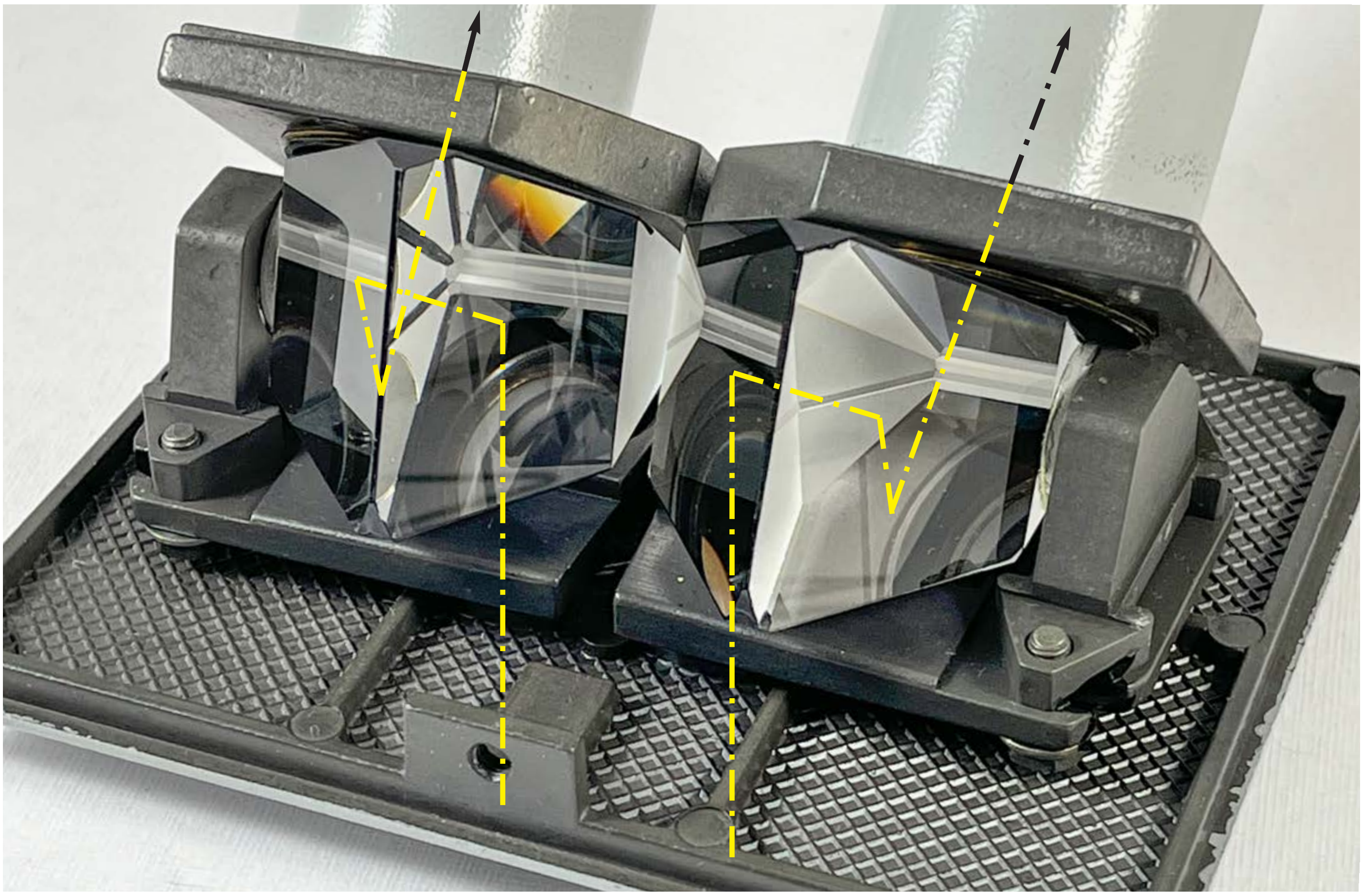
The binocular head removed to show its two slanted eyepiece tubes.

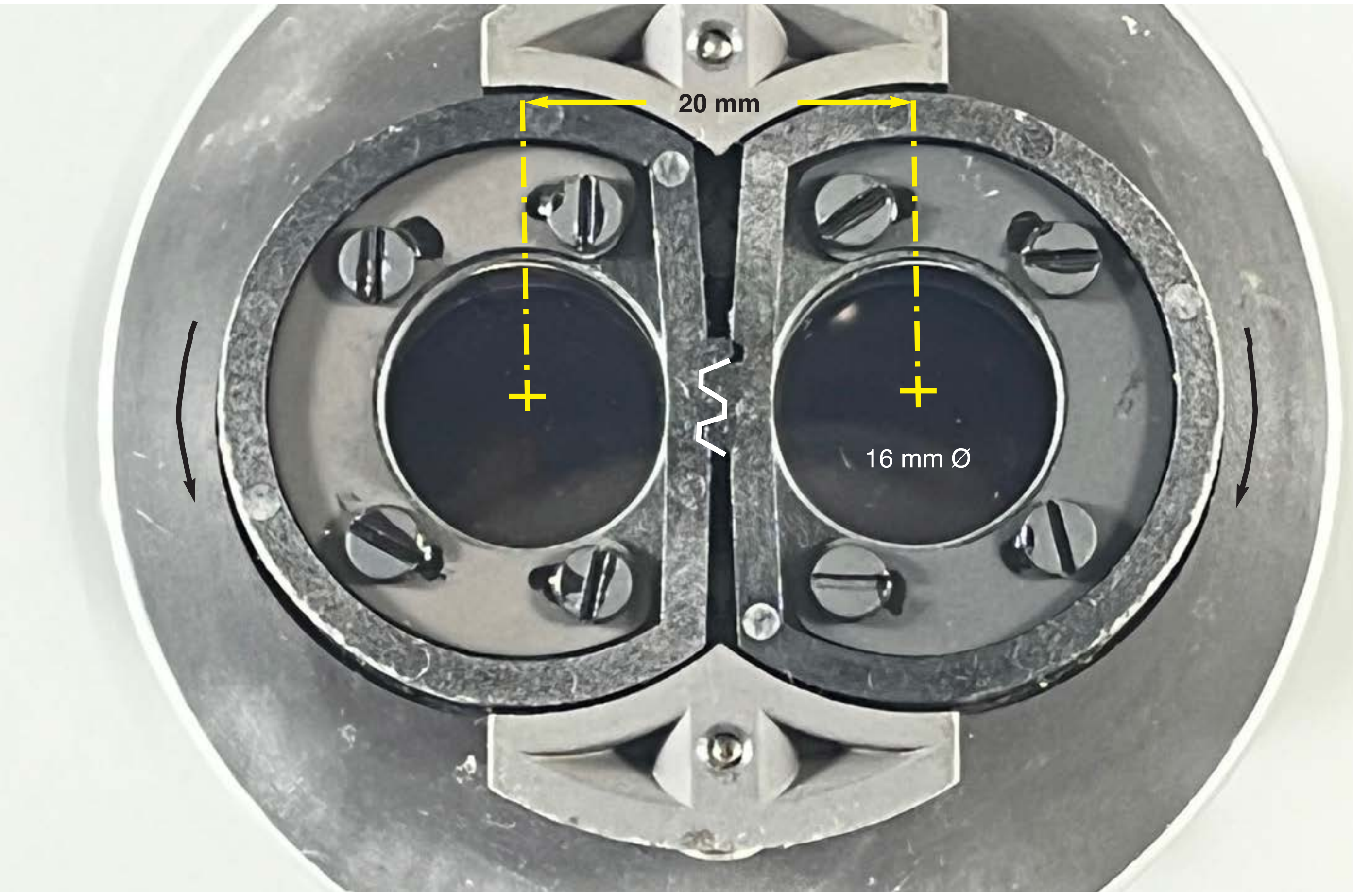


Adjustable eyepiece tubes slide two spring loaded washers against the internal wall of plastic cover to dust seal the system.

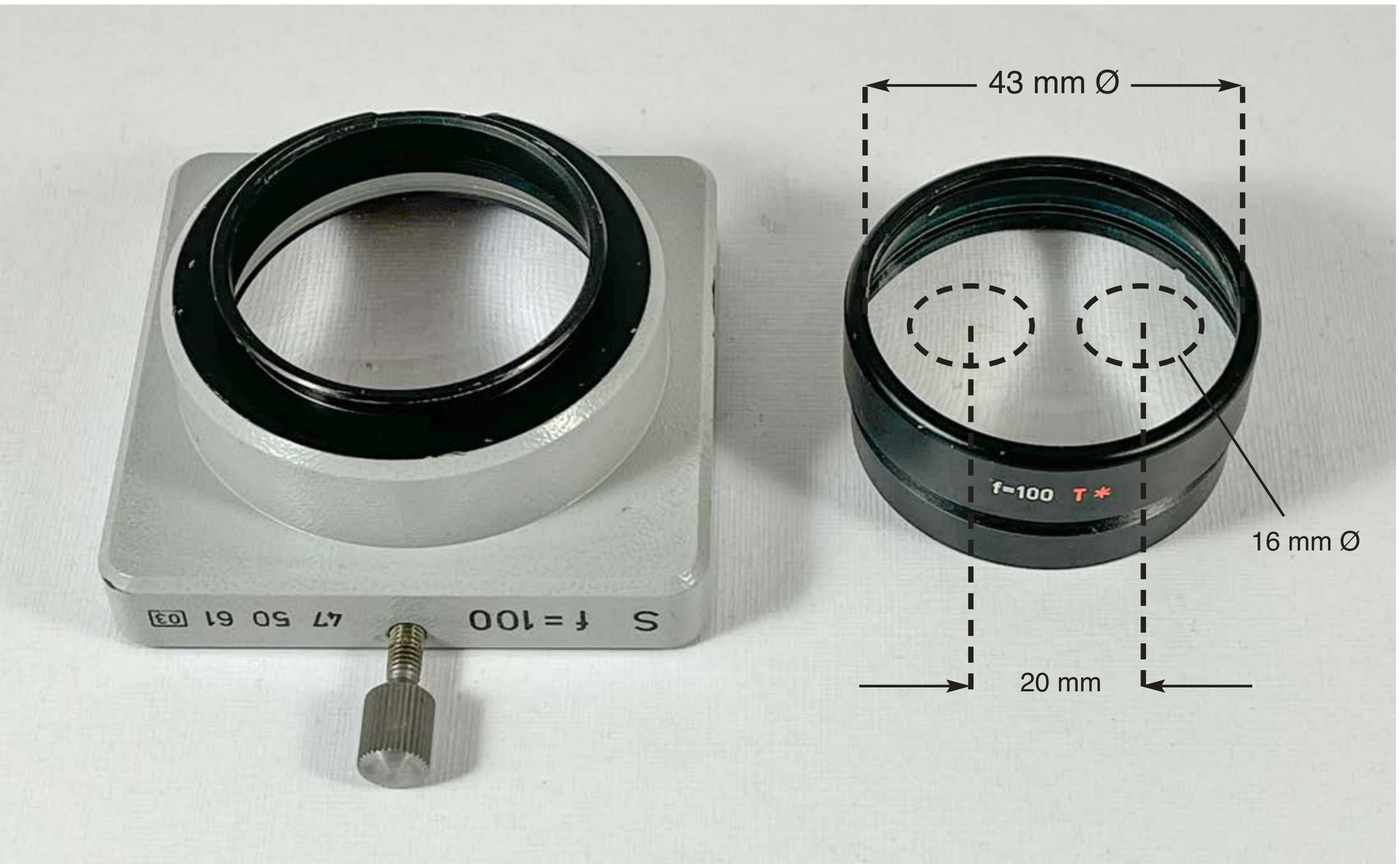


The prism work in binocular head provides 60 ° inclined viewing. The prism angles are shown below, containing roof prisms to correct image orientations coming through each tube (below). The image centration with the mechanical axis is crucial to assure image alignment while viewing tubes are rotated to adjust for interpupillary distance.





How the right, and left viewing tubes are engaged to maintain symmetry as the interpupillary distance is adjusted.



Internal, and external objective lenses attachable to Stemi: Several focal lengths are available to set the working distance. For example 100 mm is for 100 mm distance between the objective, and the sample. The left model has a dovetail ring for attaching LED ring lights.

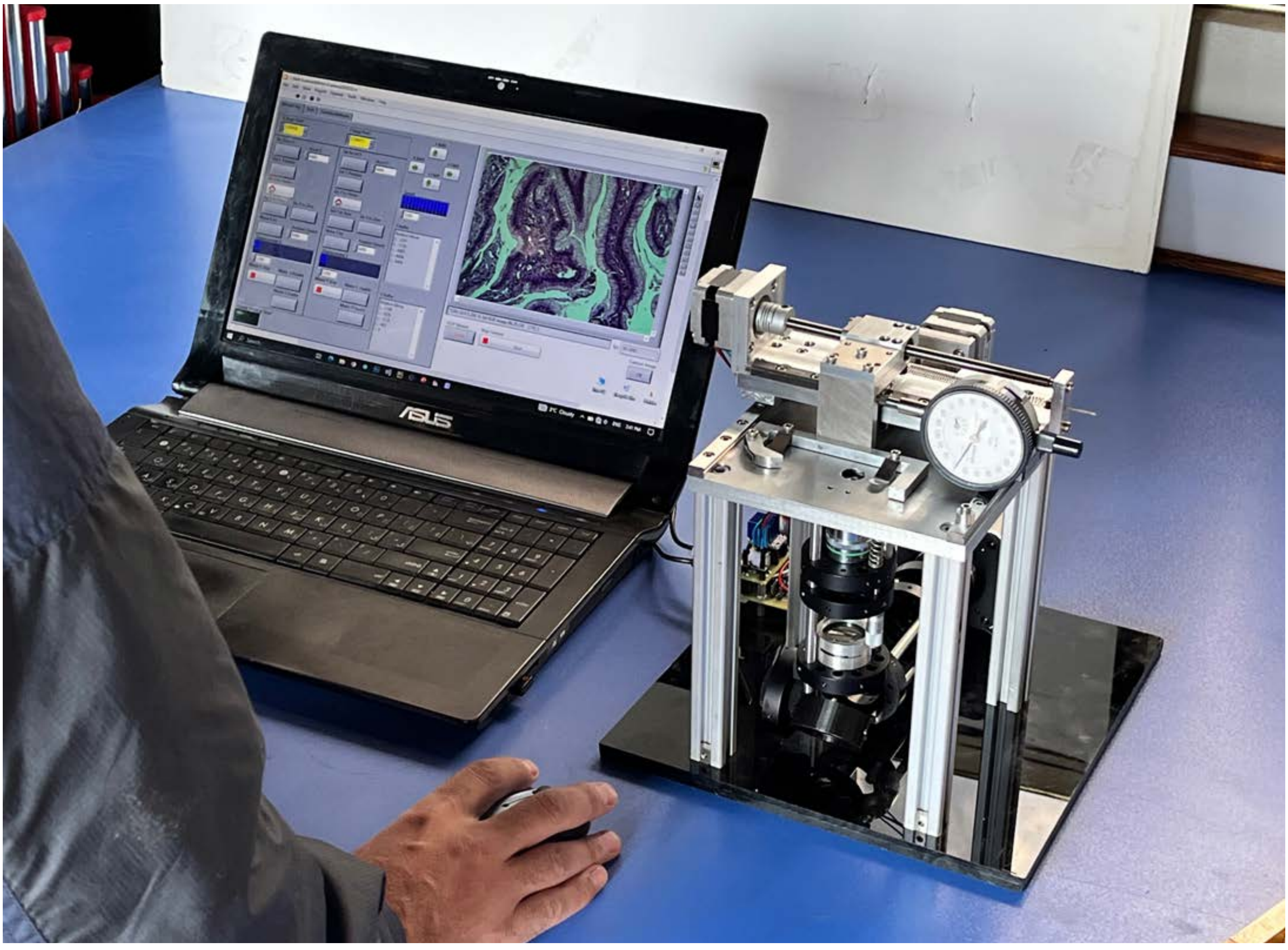
Building a Scanning Inverted Microscope

By Dr. Amir Asadollahi

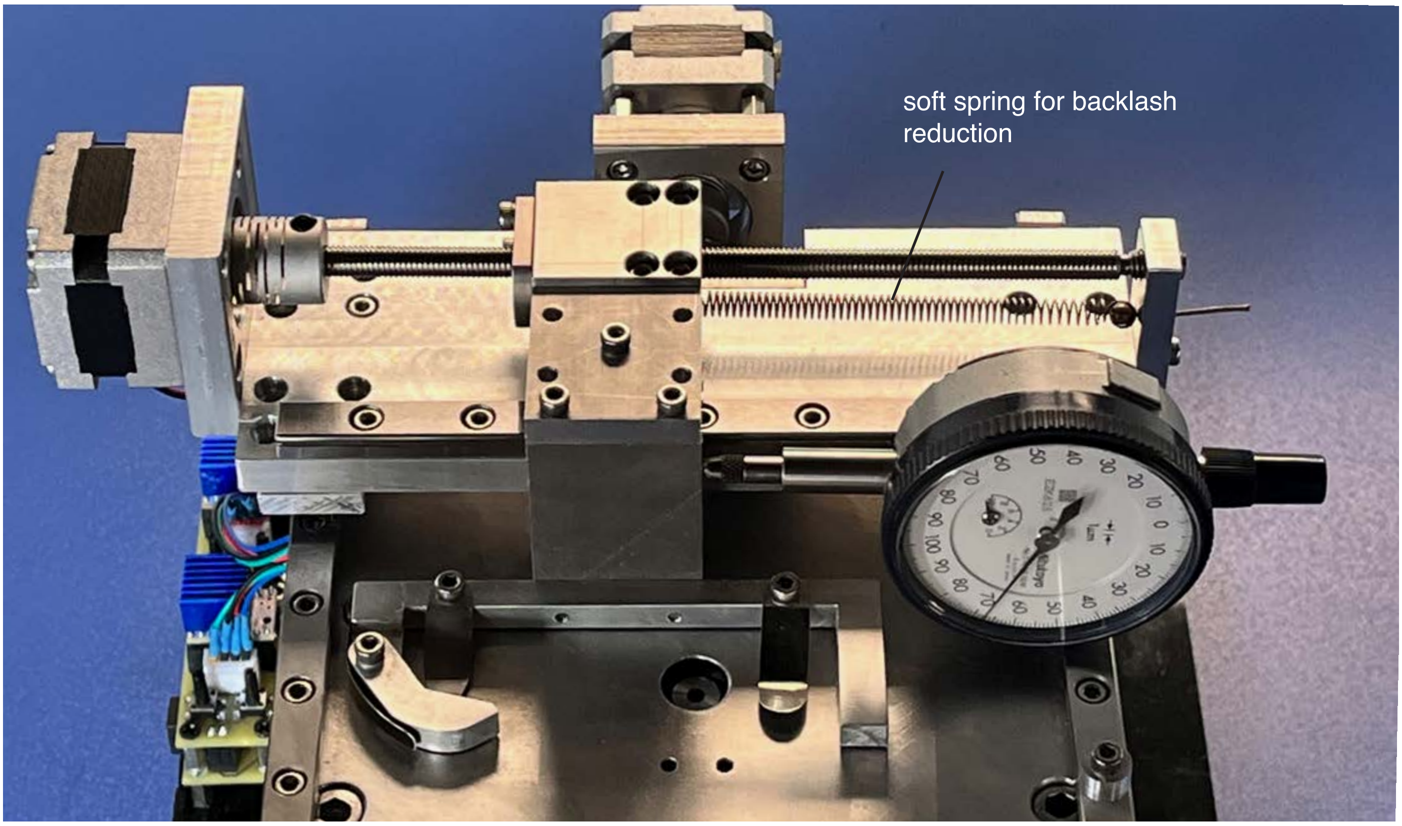
Cubical inverted microscope housings have been around for at least a decade. Several packages have been made available by Etaluma, and many similar models keep appearing at trade shows from time to time since manufacturers realize their popularity. They have a simple/elegant package that is easy to place on a desktop, and could be filled with all sorts of hardware ranging from a simple bright field microscope to more sophisticated fluorescent filters, with motion control. The cube is the most favorable in optical design because you could consider it as decorating a living room: You could place the drawer on one side, the table in the middle, a book shelf against another wall, and perhaps the kitchen on its open side. With the same freedom, the optics, and filter wheels, and light source can be housed at the lower end of the cube, while the sample slide scanning portion could be easily placed on top.

I will explain the motorized stage control portion, and software while building the opto-mechanical portion with Optoform. There are basically two stepper motors in this design to drive the X-Y stage via ball screws, positioned at two heights to clear path for one another. I used lab view to control the motors, and to display the images on a PC. The scan control portion of the software basically allows to set the steps for each motorized stage, and stop for capturing each image, and storing it on the hard drive. Lab view offers a menu for the camera to set its brightness, and gamma, etc. There are off the shelf boards to drive 2 or 3 axis stepper motors, and LabVIEW offers quick interface to the motors, end switches, and feedback.

Building motorized stages with off the shelf components is challenging. The motor has its own two rigid ball bearings, while the ball screw, and the linear bearing guide also has their own rigid path. I first tried to simplify the design but it caused too much backlash. So, I finally went with independent ball bearings for the ball screw at its both ends.

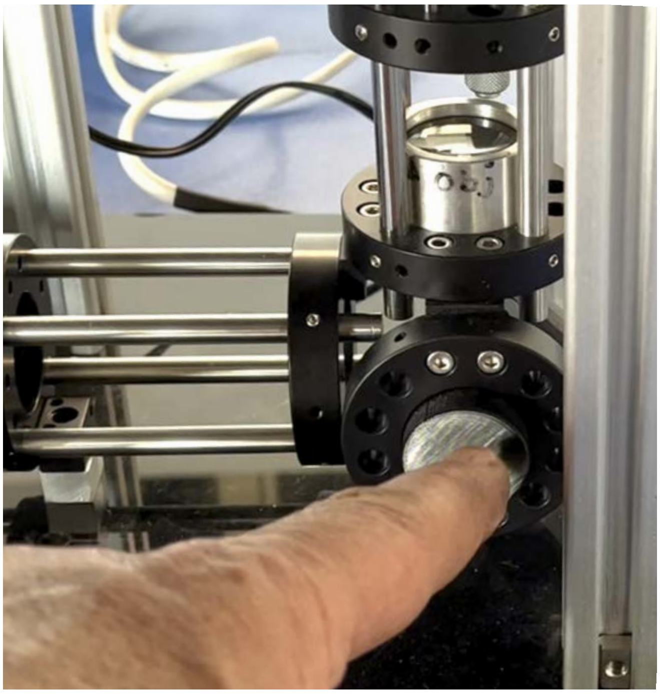


Running the Lab View software for image stitching.

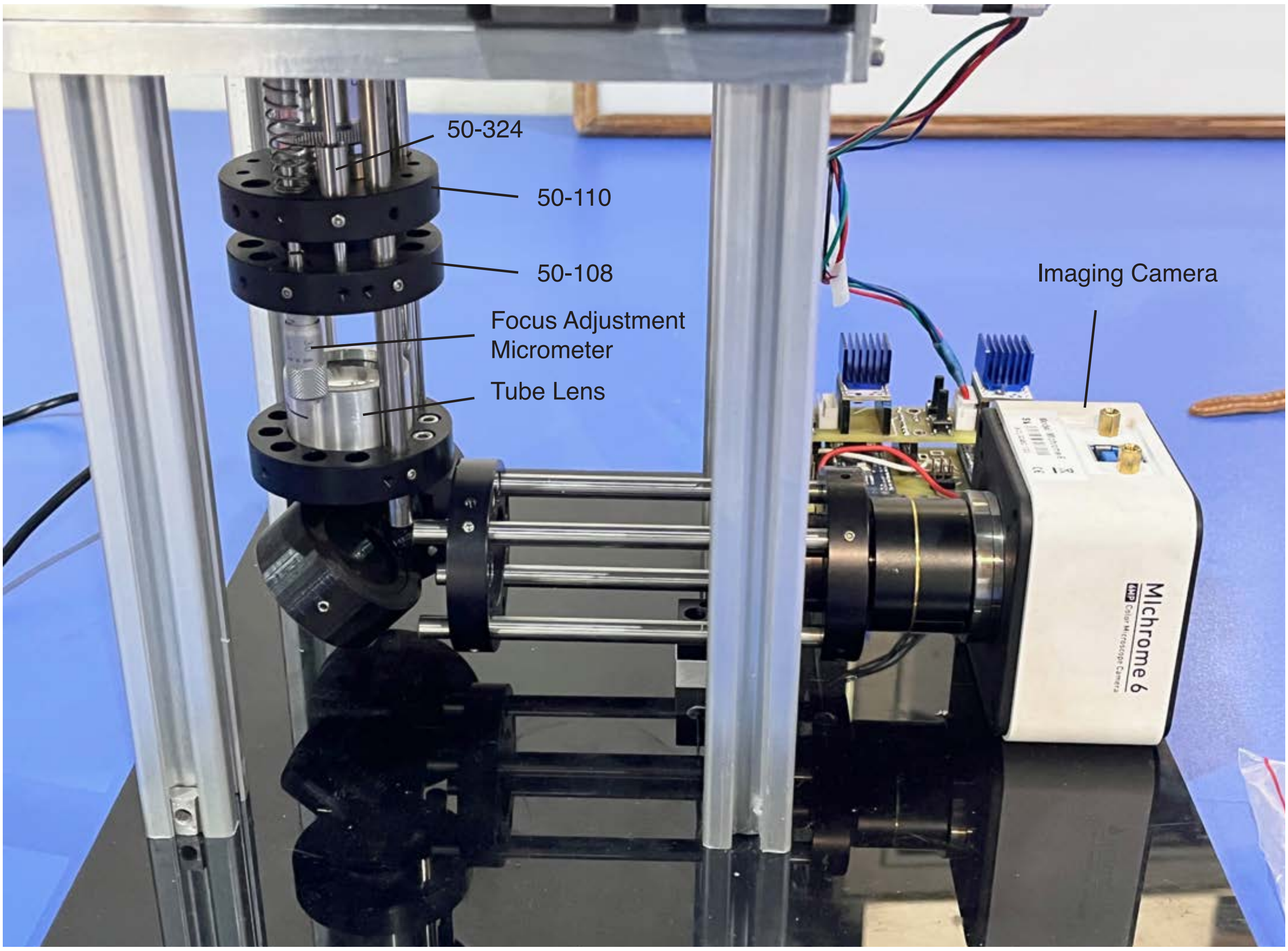


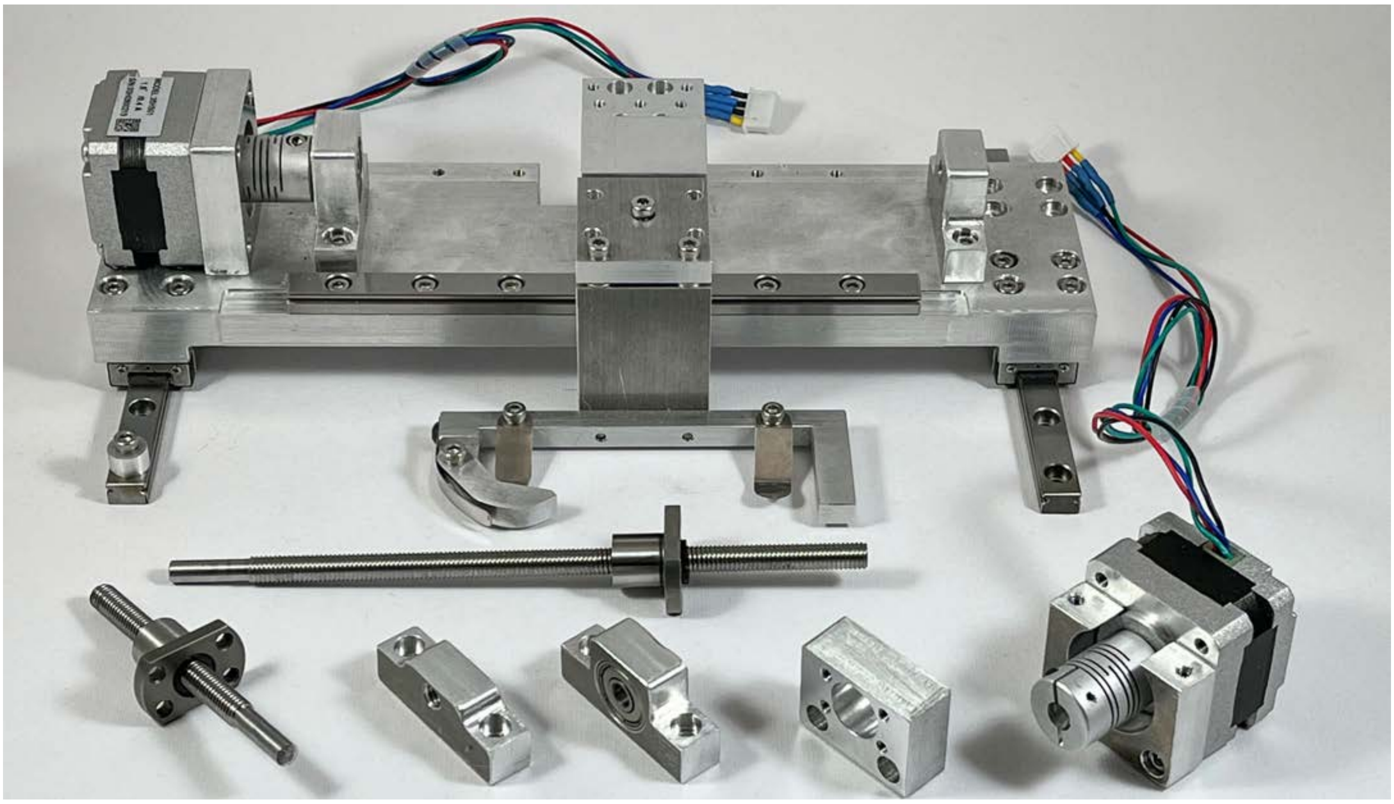
Measuring the backlash of the ball screws as the X-axis is driven by the stepper motors.

Aligning the ball screw with the linear bearings axis.

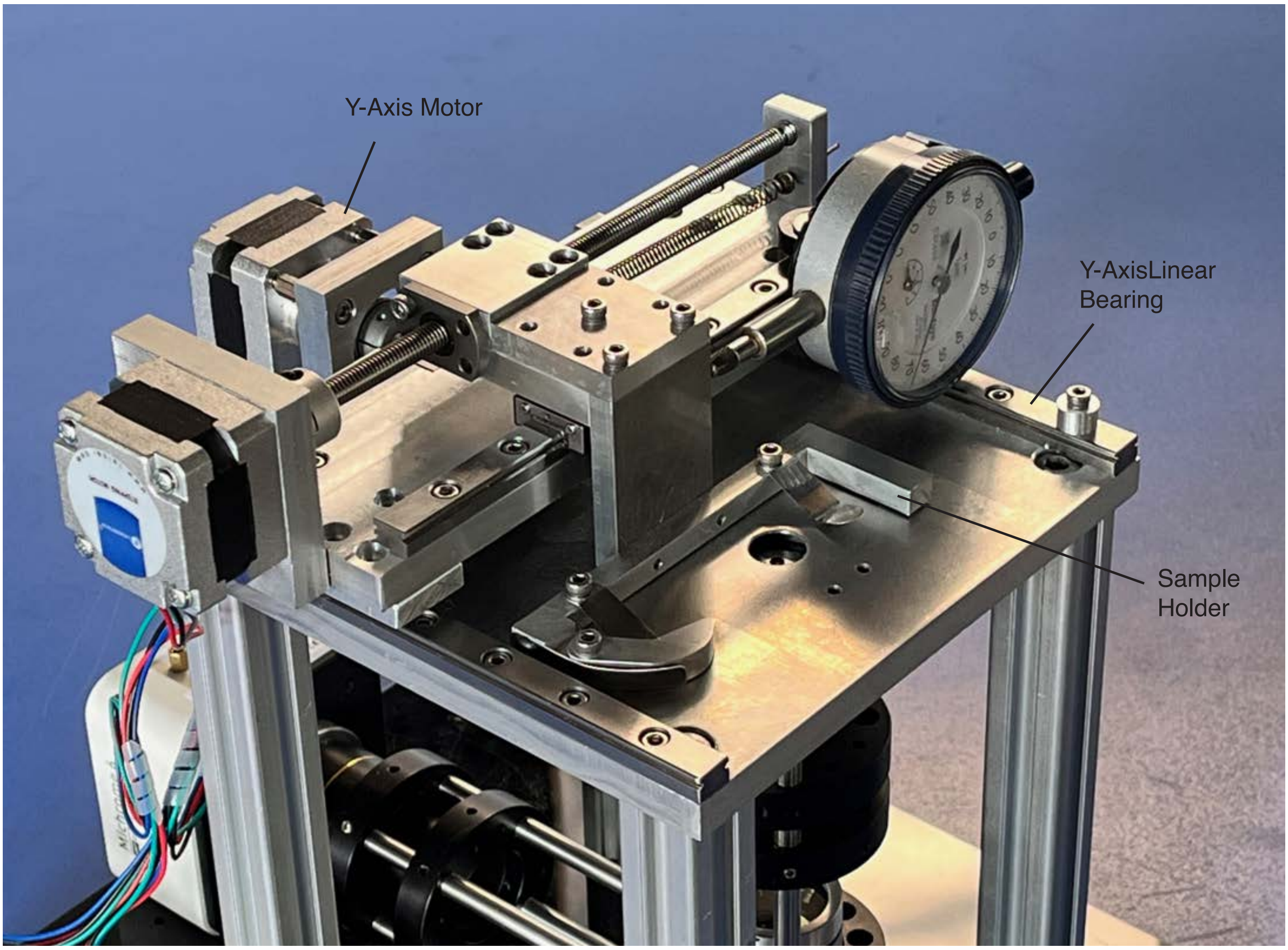


Above, the working distance of the microscope objective is set by an adjustment micrometer (right). Two linear bearing guides 50-324 support the microscope objective (below), mounted on a traveling linear bearing mount 50-110. This assembly is constructed via a 2-rod system for easier axis to the microscope objective replacement. A single magnification, as in this case, utilizing a 40X objective is sufficient to provide extreme detail utilizing image stitching.

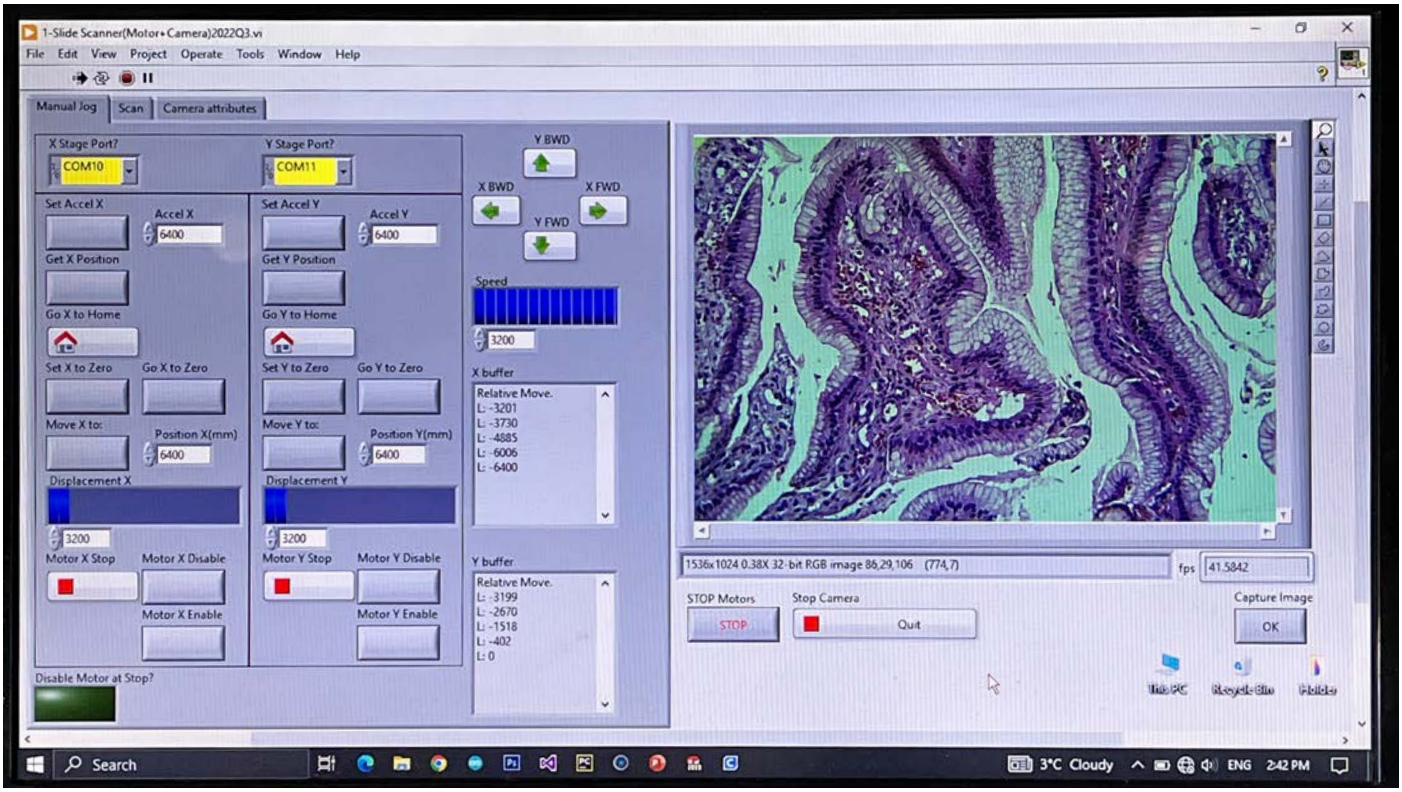




Above, machined parts for X-Y translation mechanism before anodizing, and assembly. Below, an isometric view of the X-Y stage, and the sample holder. In this design, the sample is slightly pressed against the top surface to ensure its continuous focus during the entire scan. The platform surface therfore has to be so smooth and flawless from scratches.



Above, mounting the objective focusing assembly against the top plate. Below, detail of user interface constructed with Lab View software. The microscope could be programmed to automatically scan, and stitch together a large sample are at high resolution. The scan control portion of the software basically allows to set the steps for each image segment to be captured, and stored into the hard drive. Lab view offers camera control menu to set its brightness, contrast, and gamma, etc. The images are then stitched together via free downloadable software that takes the stored images to



create a large image. However, utilizing the Lab View software requires a backlash free translation stage that is not mechanically possible, but if it is repeatable, it could be compensated with software. Otherwise other software may be needed that utilizes pattern recognition to assist image stitching, and is not so sensitive to backlash.

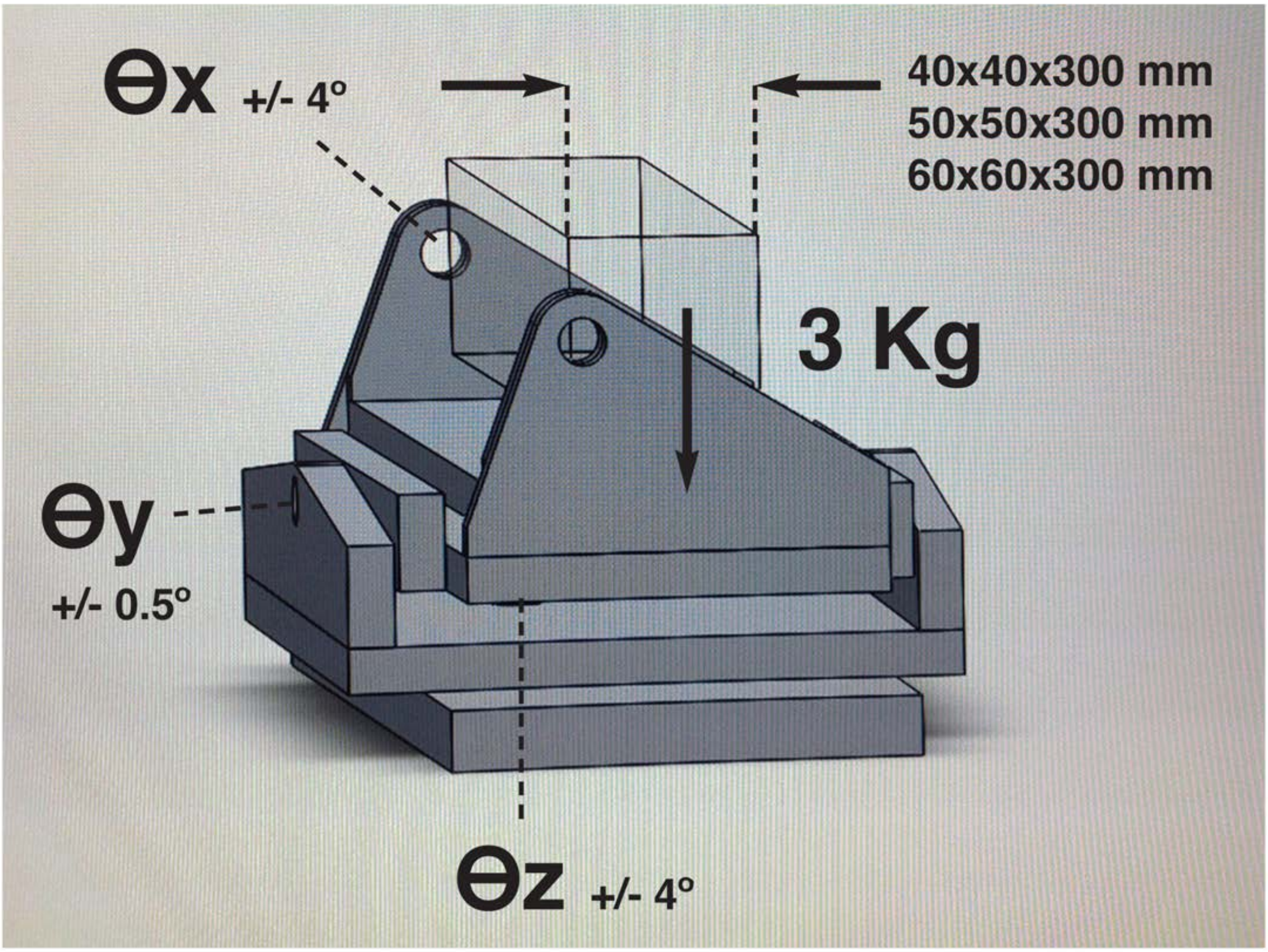
Designing a High Sensitivity Tip-Tilt Stage

By Ali Afshari

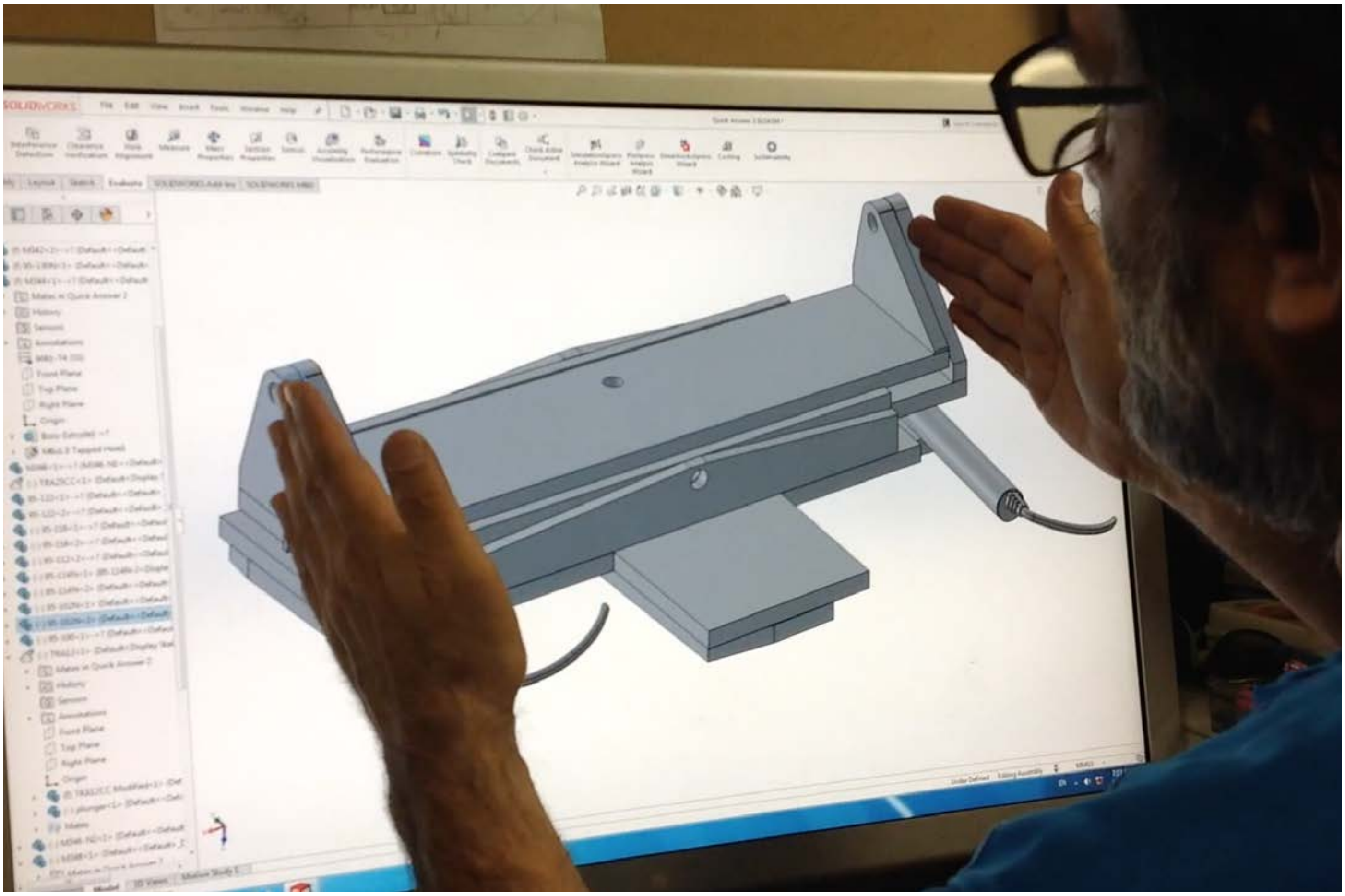
I recently did a design for a tip-tilt/rotation stage that I think it's a good case study to share with Optomex readers. Back in JPL years, I remembered how flex bearings were utilized to correctly position the pick-off mirror of widefield / planetary camera II to correct the spherical aberration of Hubble Space telescope, and I decided to use the same flexures for this design. If you haven't utilized flex bearings, this would be a good article to read.

The basic requirements for this design are shown below. Basically, they needed a platform to secure a relatively large block of glass in front of a Zygo interferometer to measure its surface accuracy. To accomplish this, the Zygo beam covered a portion of the 300 mm long glass block, and scanned across it to measure its surface. A reference mirror always stayed fixed above or below the block so to compare the reflected beam with respect to that portion of the glass block being tested.

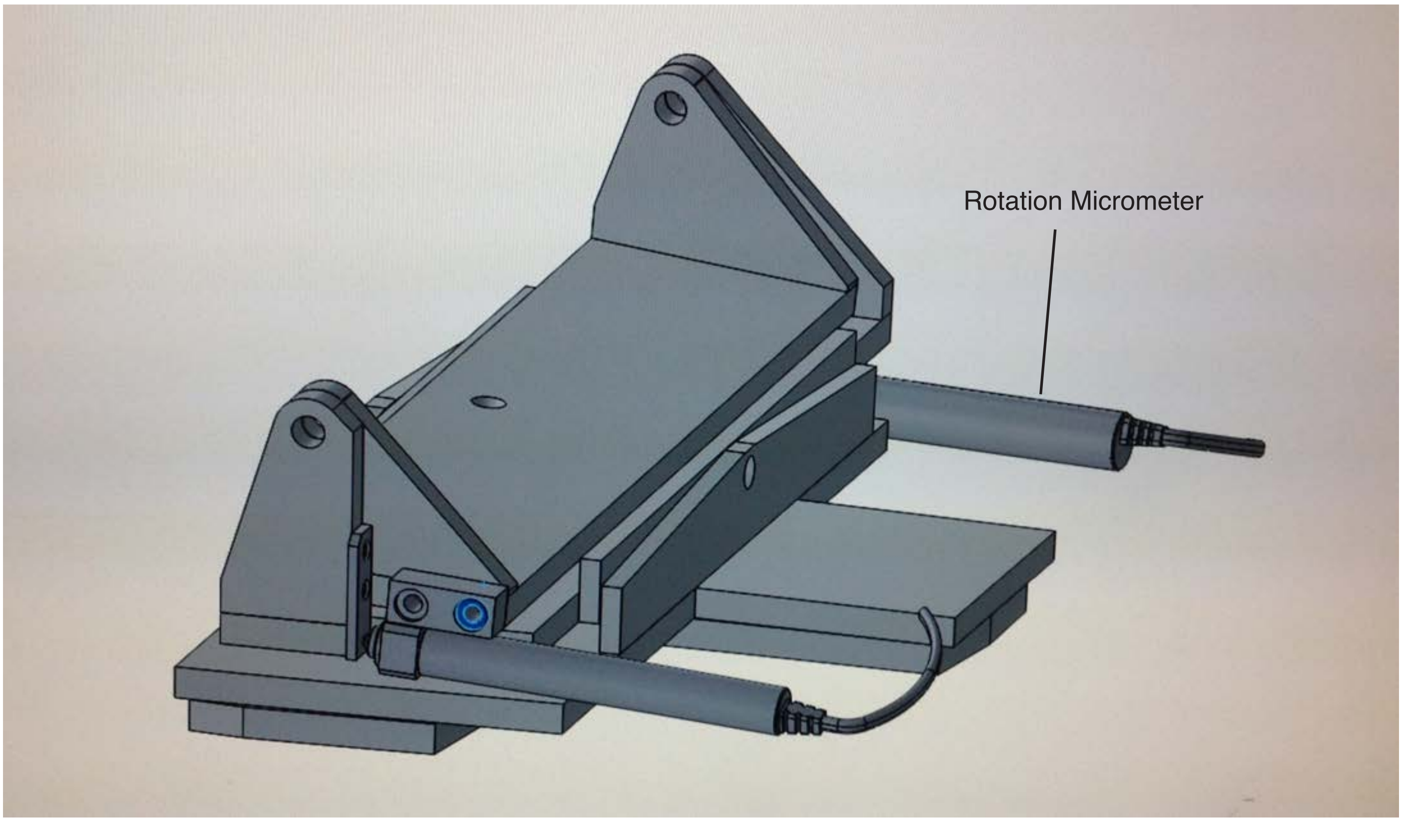
It was then the job of a tip/tilt/rotation stage to keep the glass block surface always perpendicular to the Zygo beam while translating it's entire length across Zygo's 5" field of view (see page 23). This was a tough task knowing how much the weight of the glass block could affect the three axis stage below. In any case, my initial idea was to place the center of tip/tilt/rotation at the center of glass block (next page). However, after overseeing the tight requirements, and the fact that several size glass blocks were to be tested, I simplified the design to a more rigid structure (page 23). High resolution motorized mics were to be utilized to position the stage, so the arm lengths had to be correctly set to provide the required resolution, and repeatability.



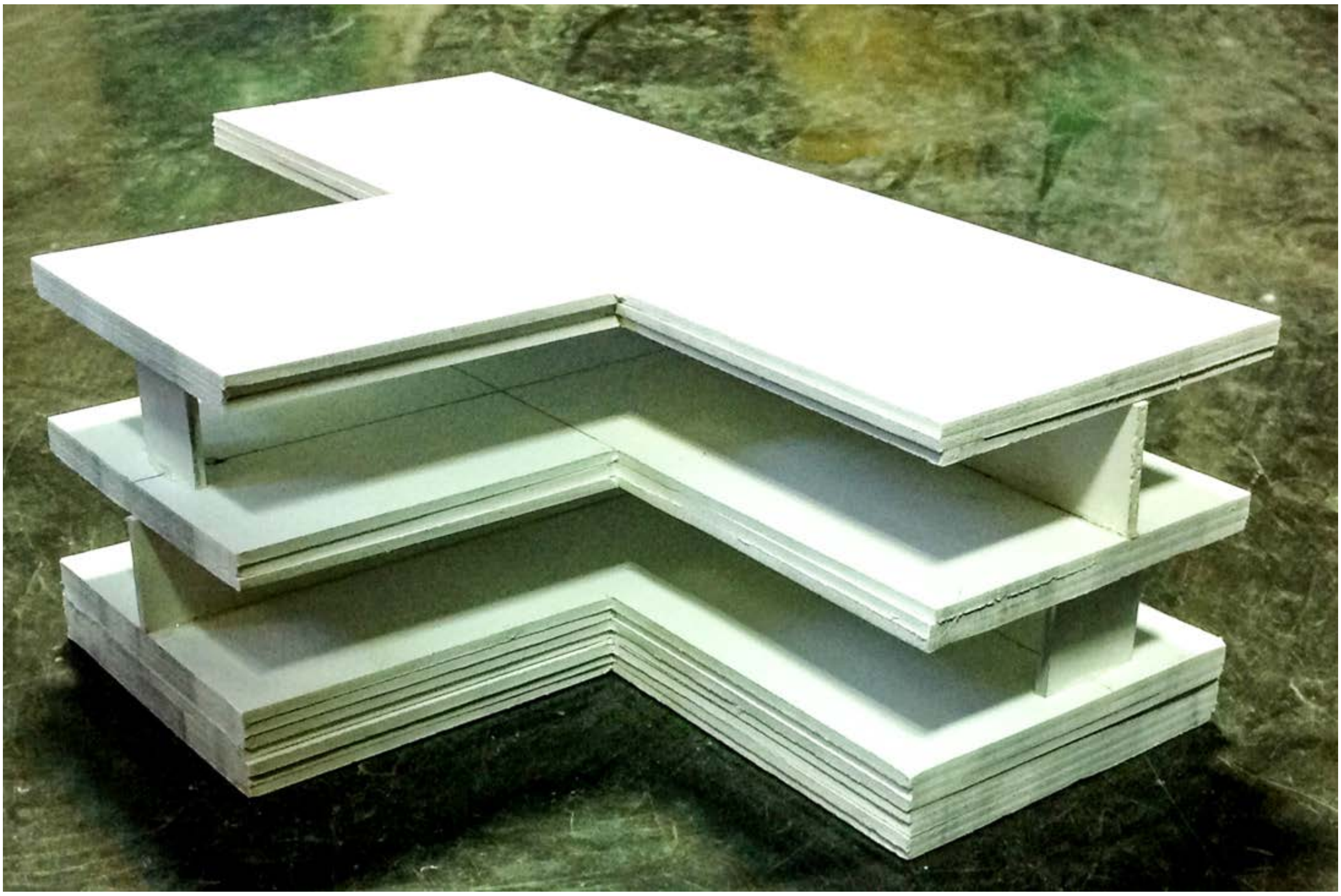
Two Axis Motorized Tip-Rotation/Manual Tilt platform, shown with 300x40x40 mm mirror.
Range: +/- 4 degrees Θz, Θx, +/- 0.5 degrees Θy
Resolution: 0.001°



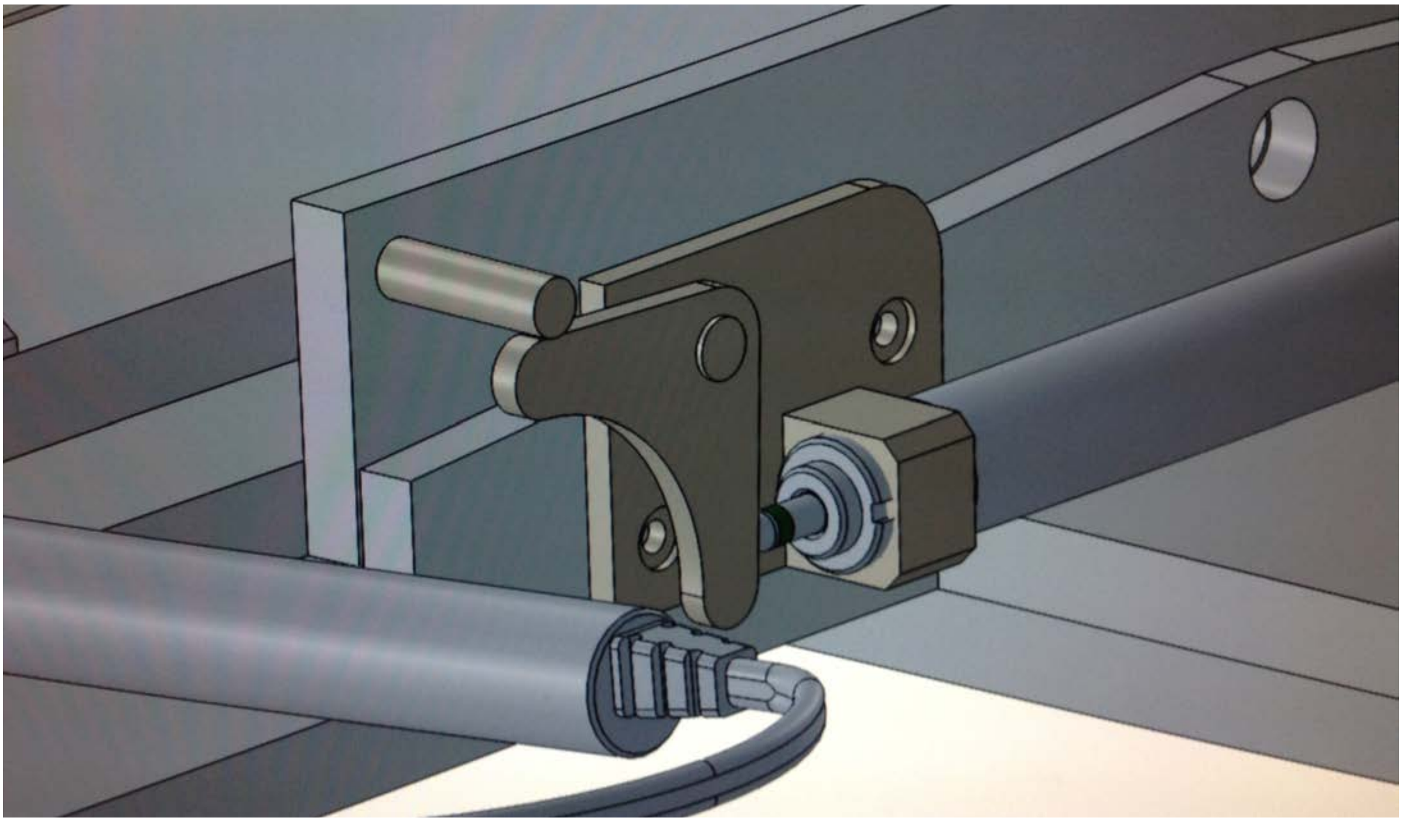
Visualizing the stage's tip/tilt/rotation in solidworks.



Initial SW design reveals the placement of micrometers to perform tip / tilt, and rotation.



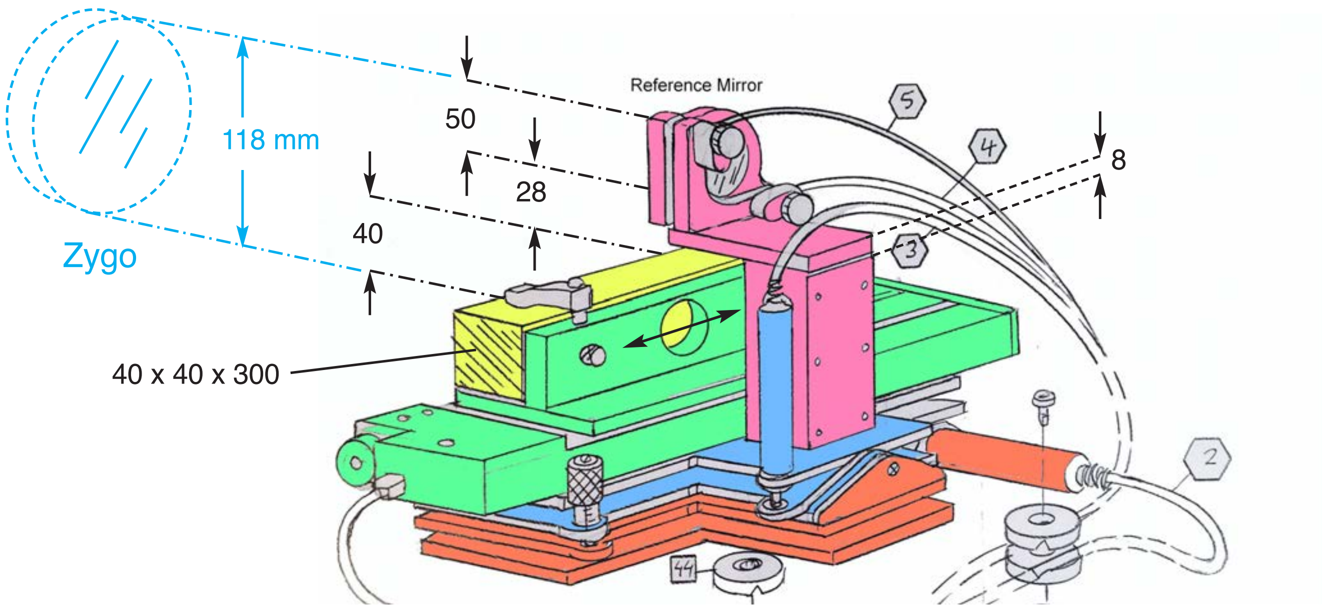
A full sized plastic block model of the stage was constructed for size, and weitght visualization.



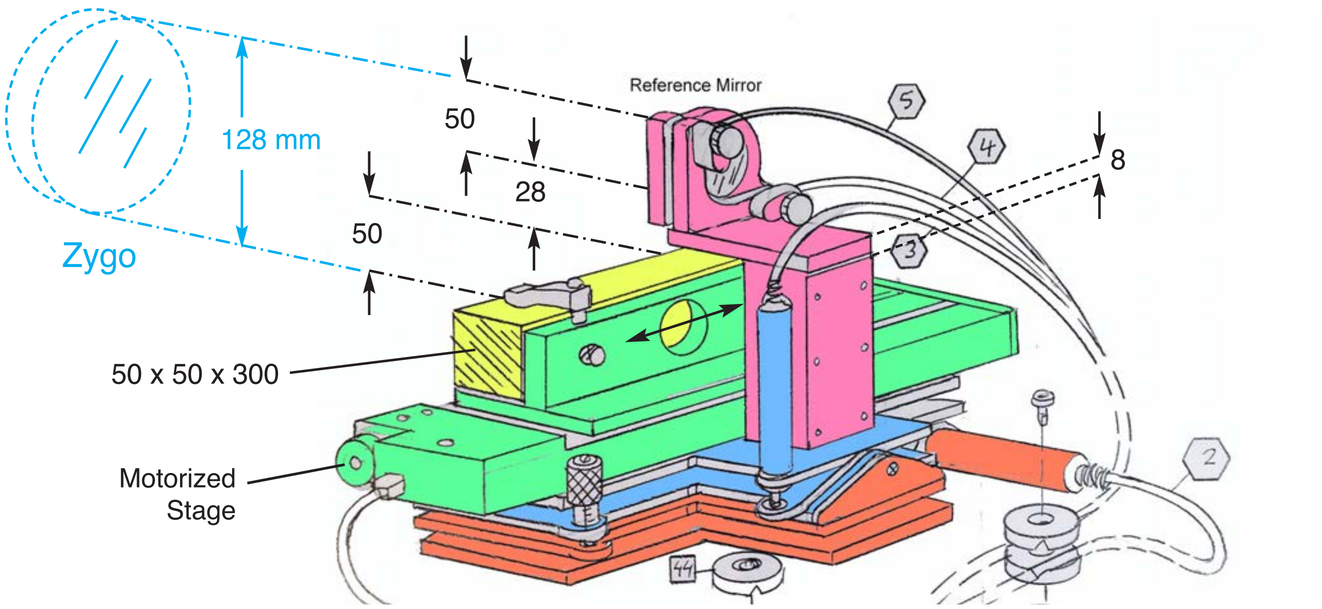
Close-up view of the initial SW design allowing the micrometer to lay flat across the stage while pushing one side of the stage up and down for the tip-axis.

Zygo's coverage of test mirror+ Reference mirror with a 4" front aperture:

Note: 20 mm clearnace is needed for test mirror clamping/ and insertion clearance.



1) **Coverage aperture for 40x40 mm mirror block is 118 mm, with 4" aperture, 20 mm of reference mirror surface will be cut off.**

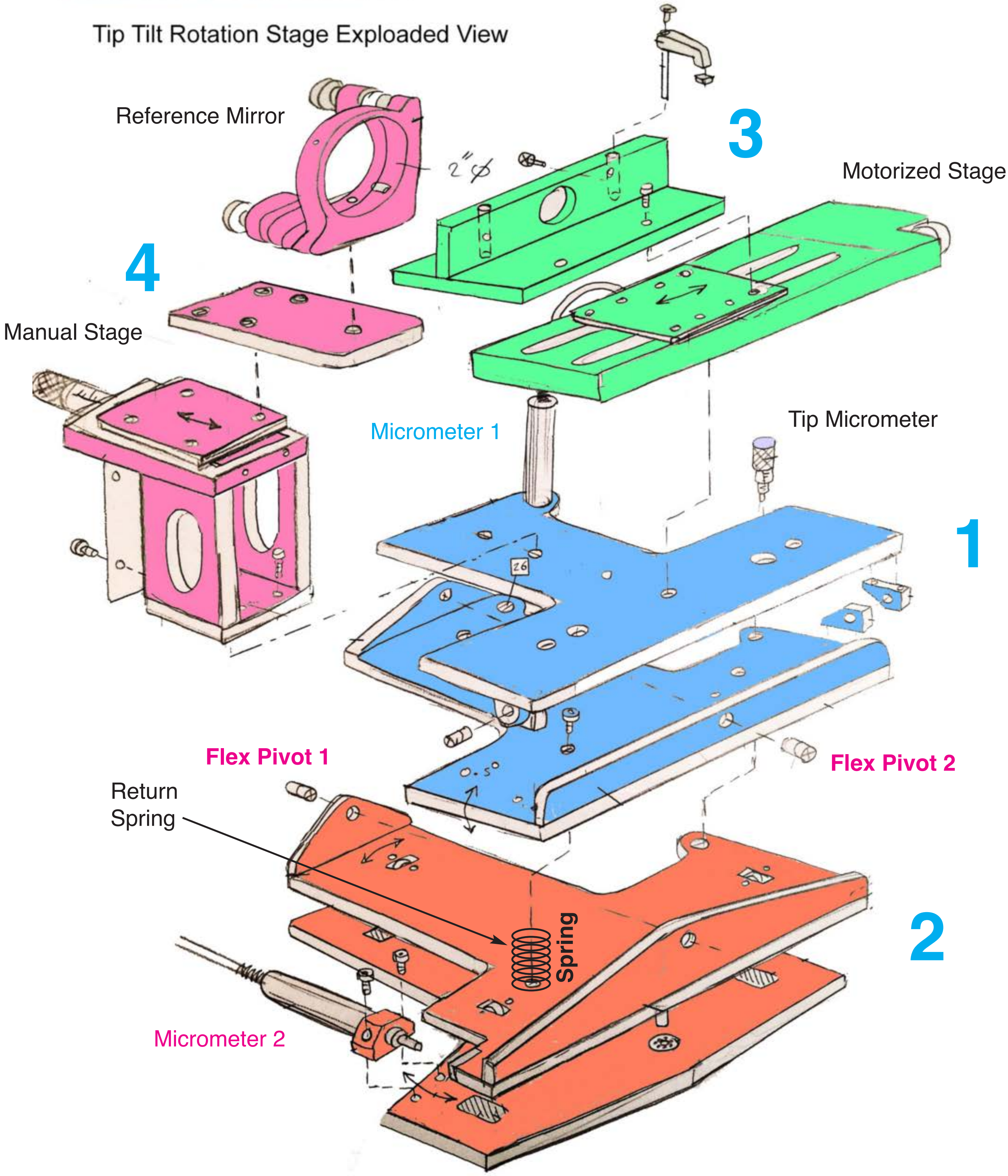


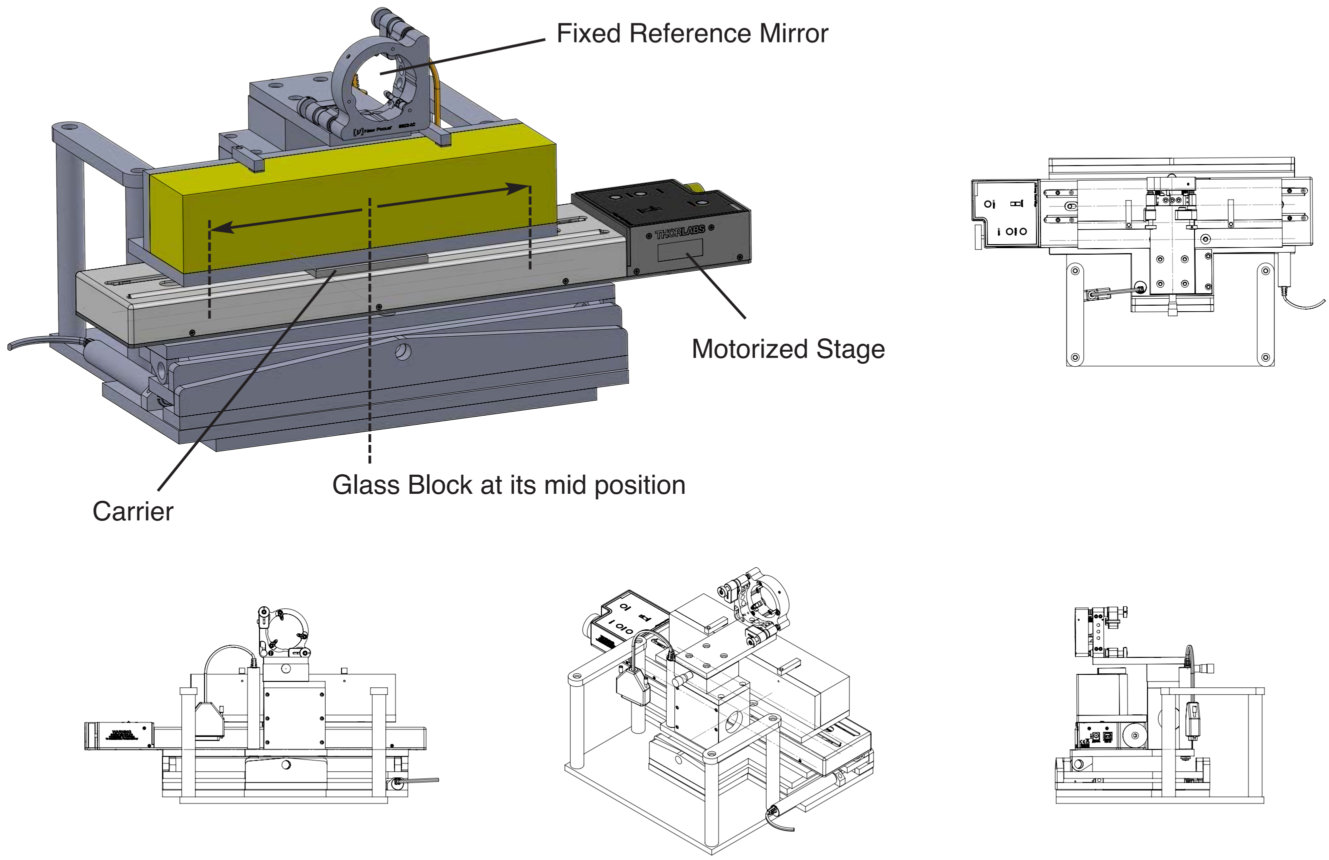
2) **Coverage aperture for 50x50 mm mirror block is 128 mm, with 4" aperture, 30 mm of reference mirror surface will be cut off.**

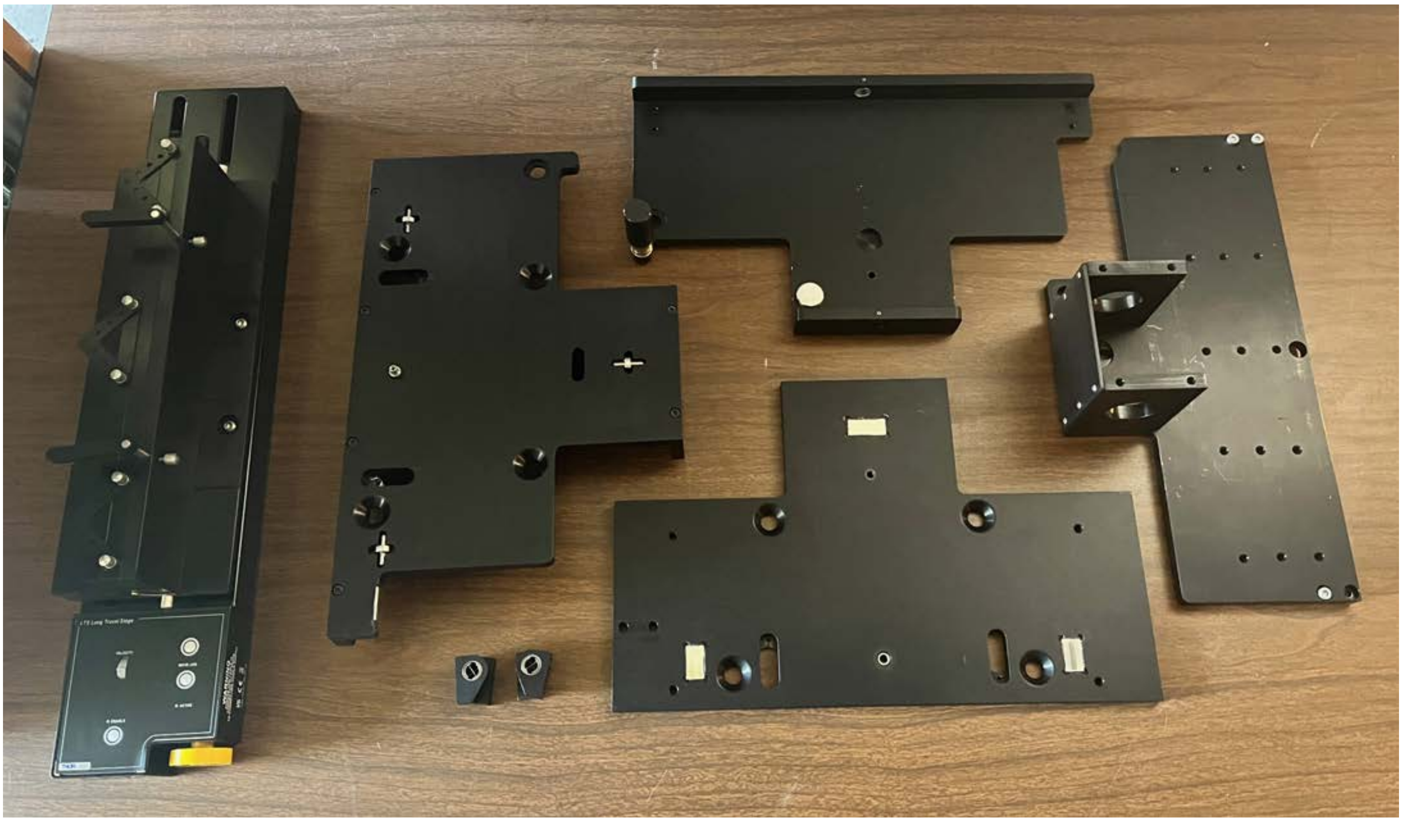
3) **Coverage aperture for 60x60 mm mirror block is 138 mm, with 4" aperture, 40 mm of reference mirror surface will be cut off.**

Measurements for a 4" Zygo aprture (above), and for a 5" aperture (below). Zygo interferometer, and the reference mirror above the glass block remain fixed while the glass block is translated across the field of view of the interferometer.

Tip Tilt Rotation Stage Exploded View





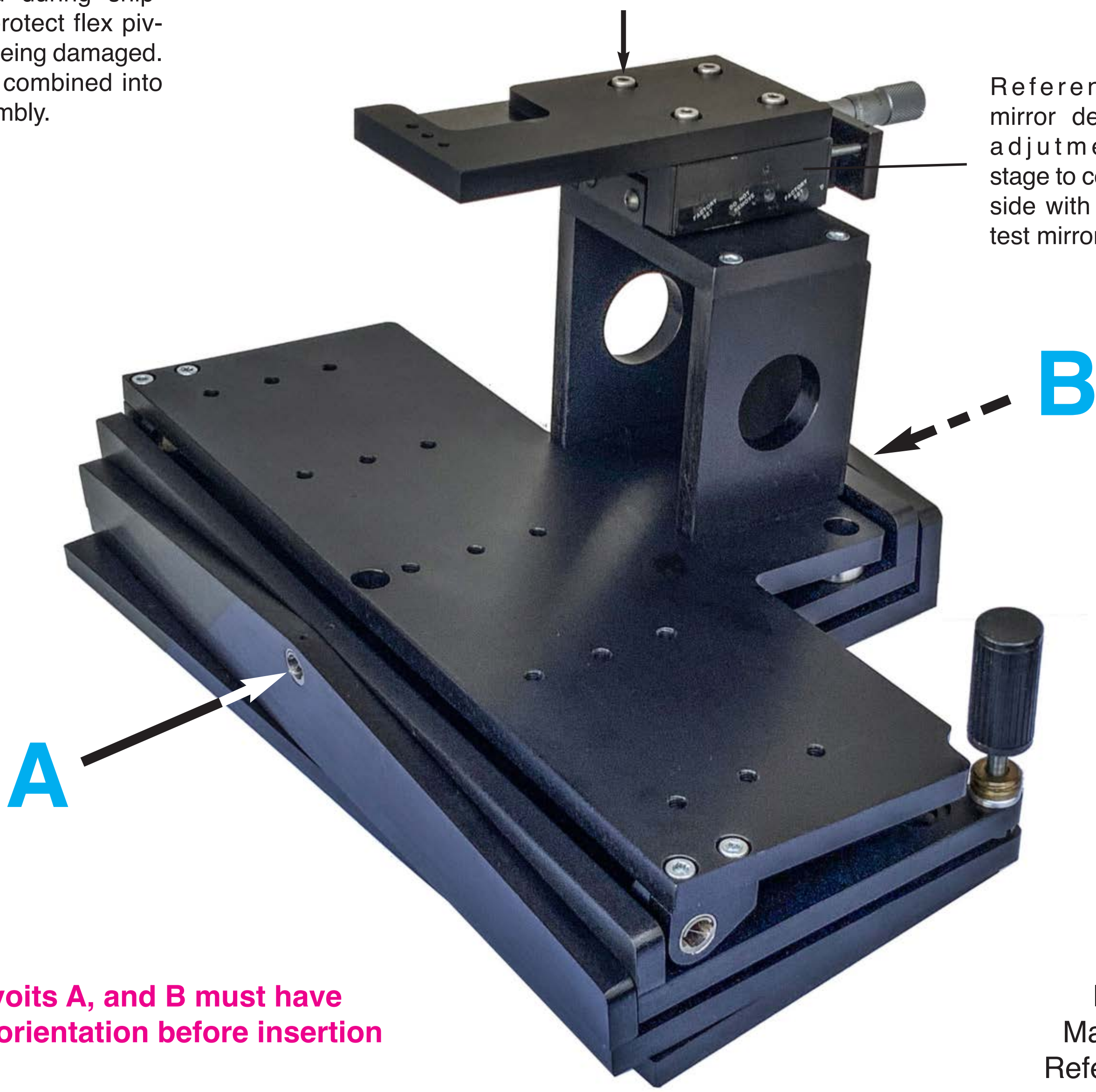


Machined parts of the stage before assembly. Motorized stage, and glass block holder are shown on the left.

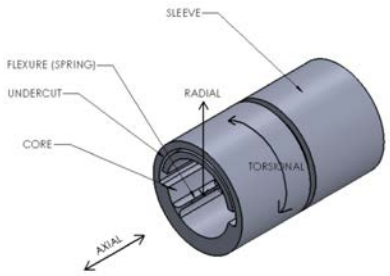
The two assemblies are separated during shipment to protect flex pivots from being damaged. They are combined into one assembly.

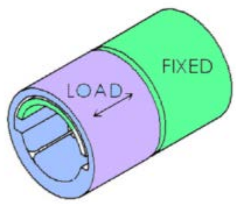
4 Mounting Screws

Reference mirror depth adjutment stage to coinside with the test mirror.



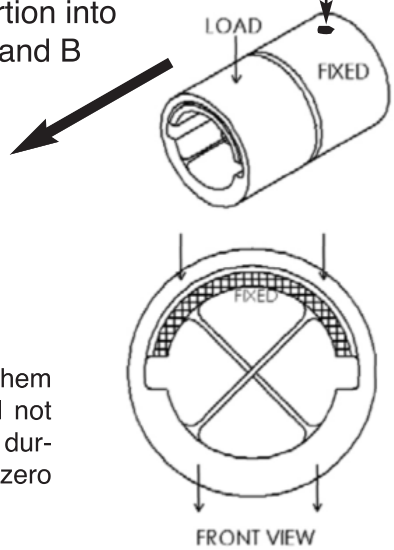
Flex Pivoits A, and B must have proper orientation before insertion





Direction of Insertion into A and B

Ink Marked Reference point

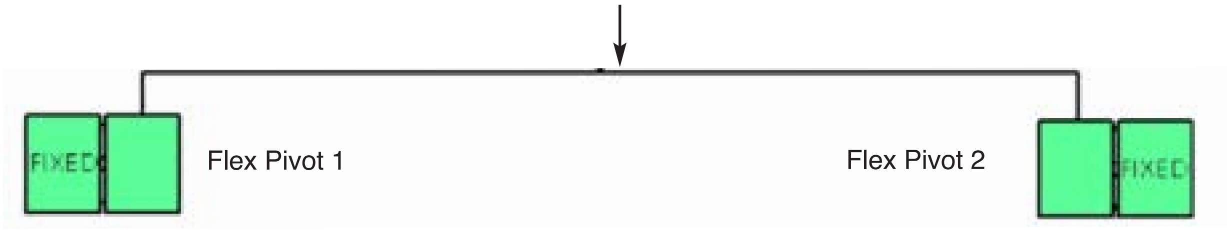


Cross Section

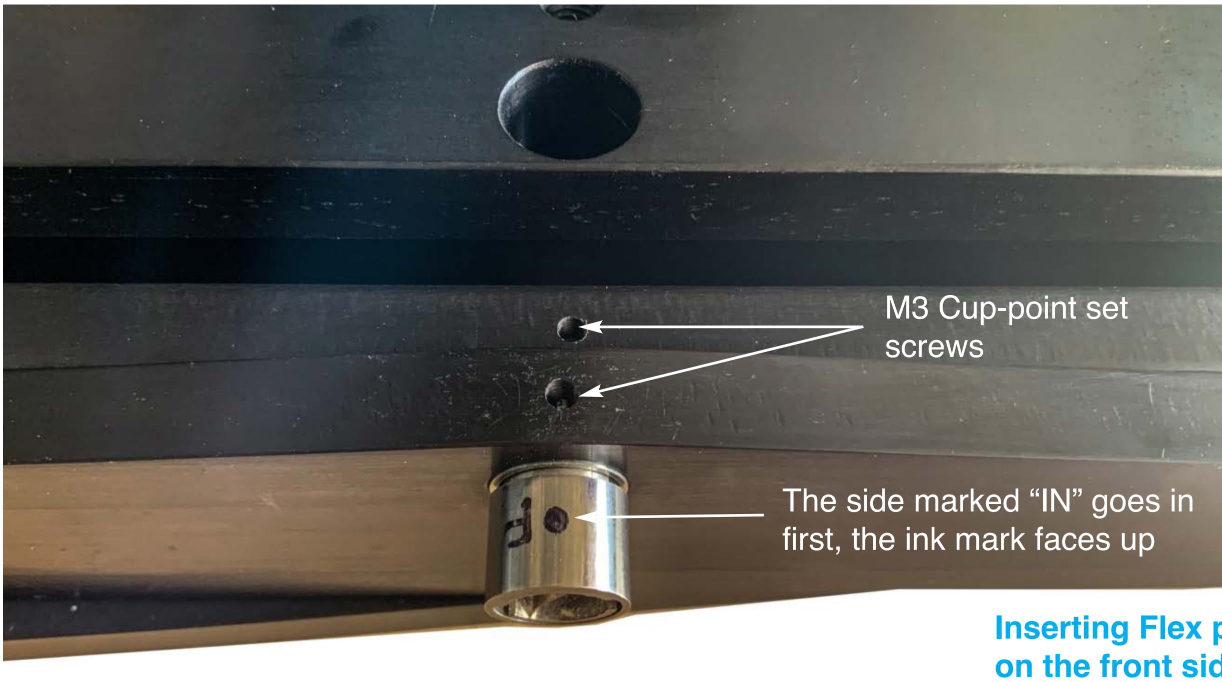
Mounting the Flex Pivots

The flex pivots are marked to help inserting them correctly. If not properly inserted, they will not properly function, and might deform or break during use. They provide backlash free tilt with zero shift in their pivotal axis.

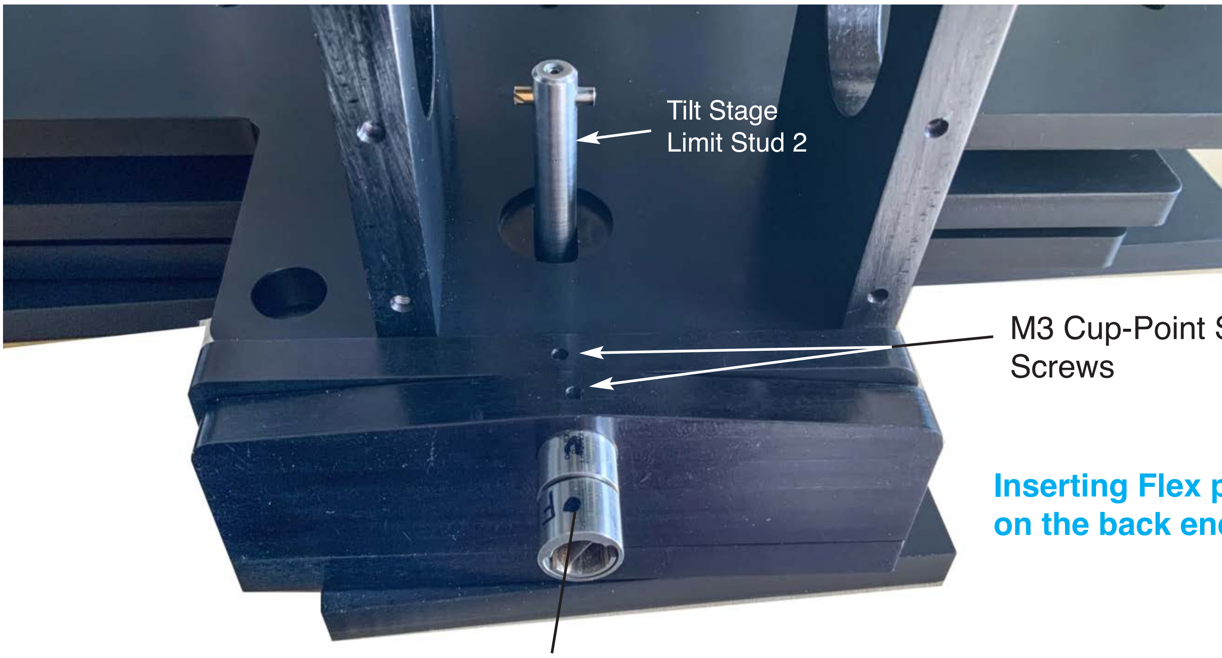
Load = Tip-Tilt assembly + Motorized Stage + Ref. Mirror assembly + Mirror Mount + Mirror



There are two flex pivots that support the Tip-Tilt assembly. There will be quite a bit of load on these pivot joints. They must be oriented first so the fixed side (marked with dot) would be facing out (as shown below). If they are inserted by error, and must be taken out, a slightly undersized tool may be utilized to push them inside the stage. Assembly procedure could start all over again with their proper insertion. After insertion, 4 cup-point M3 screws are utilized to secure the flex pivots in place. Tighten the set screws.



Inserting Flex pivot on the front side



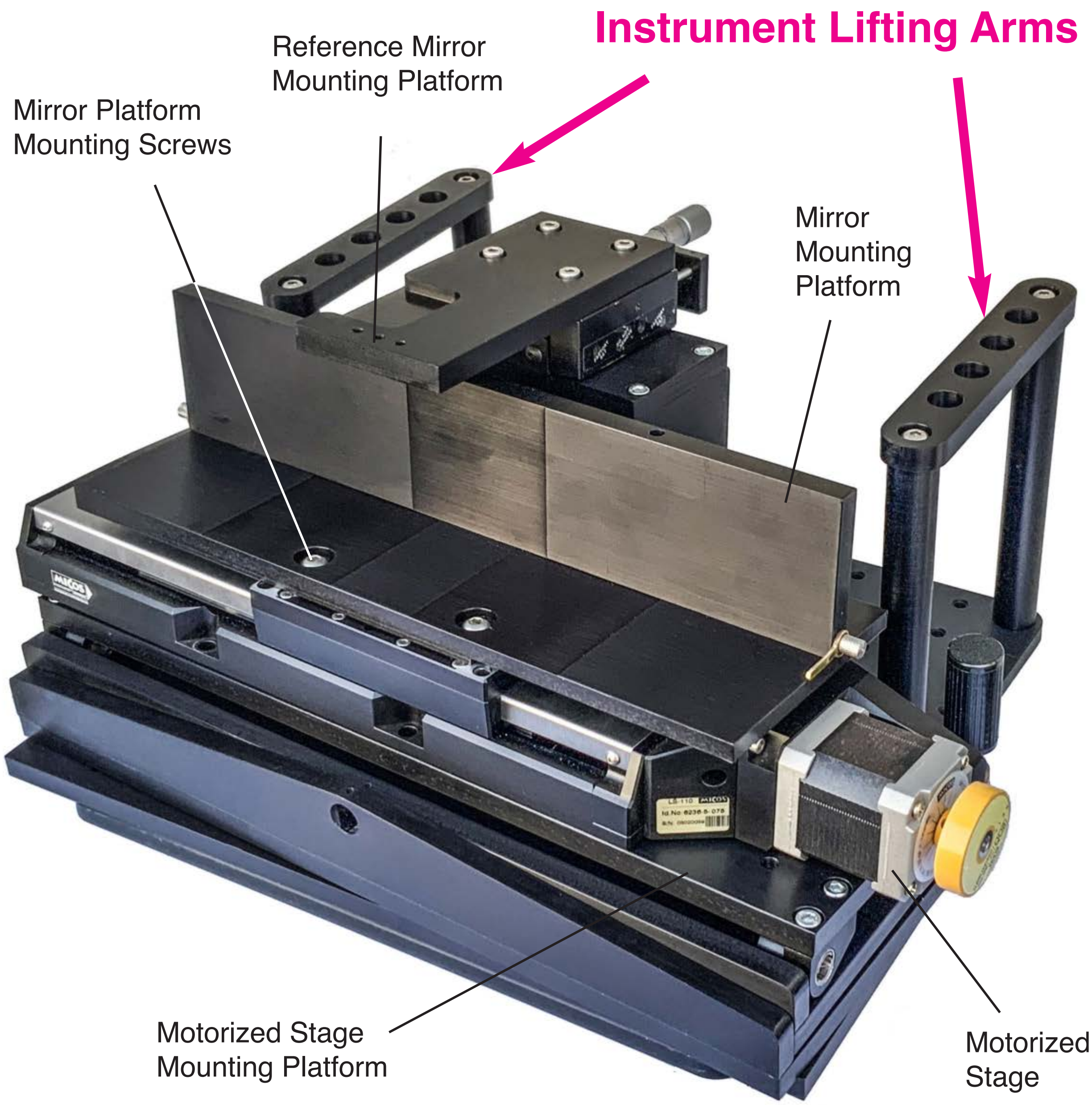
Inserting Flex pivot on the back end

Flex Pivot orientation with ink marks pointing up

Ball bearings for the Rotary portion of the Stage

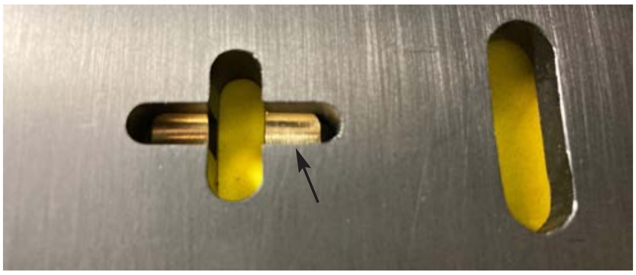
The flex pivots are marked to help inserting them correctly. If not properly inserted, they will not properly function, and might deform or break during use. They provide backlash free tilt with zero shift in their pivotal axis. The Tip-Tilt side of the stage was designed as initially planned using flex-pivot fasteners as their pivot joints. However, the rotary portion proved to be more challenging. Flex joints are too waek as a single pivot point, and they could be easily damaged by unit's own weight. So, anyone unfamiliar with this design weakness could grab the top to lift it, and could break off the upper portion from its lower support base. The final decision went with double ball bearings as the rotational center, and three roller bearings placed as far apart within the assembly to guarantee parallelism throughout the +/- 4 degrees of rotation.

The three roller bearings ride on stainless steel flats for smooth, and reliable operation. Because of this, the stainless paths must be kept clean from dust particles at all times to insure smooth rotation. These bearings are supported on brass half-bushings to assure their precise height (next page). There is a protection scheme implemented to avoid accidental damage, i.e., there is a fixed stud secured on the lower plate riding inside a slot on the top plate that would only allow +/- 5 degrees rotation (next page).

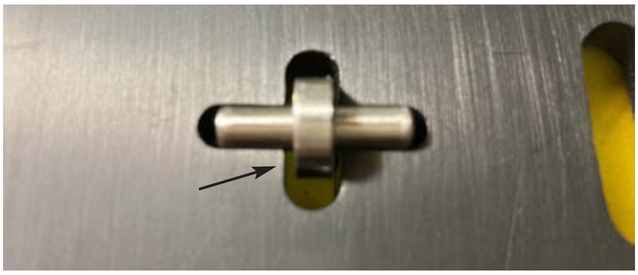


The next point of protection would be the flex pivots that should be prevented from over travel. The tilt platform pivot joints, for example are designed to provide +/- 4 degrees of travel. Several designs were considered, and finally a stop stud was designed to be hard mounted on the stationary portion of tip tilt stage to prevent it from over travel.

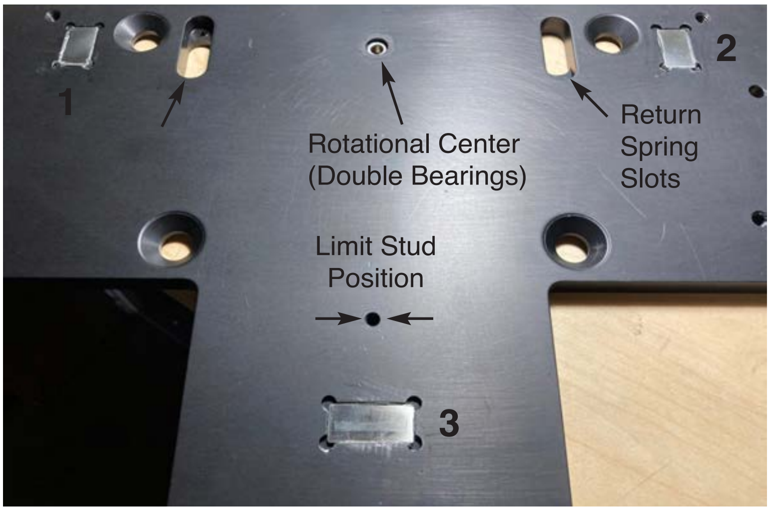
There are two heavy duty handles to provide a safe means to carry the stage but they are too far behind the central gravity of the stage. There could have been two handles extending forward to compensate for this but not without added weight. The entire Tip-Tilt-Rotation stage is packaged inside an instrument height of 69 millimeters.



Brass Supports (2 of 6)



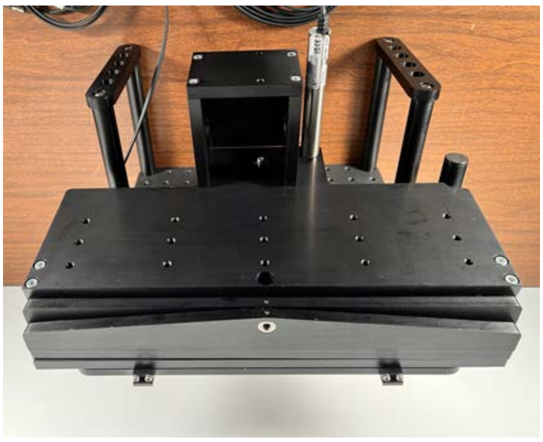
Bearings (1of 3)



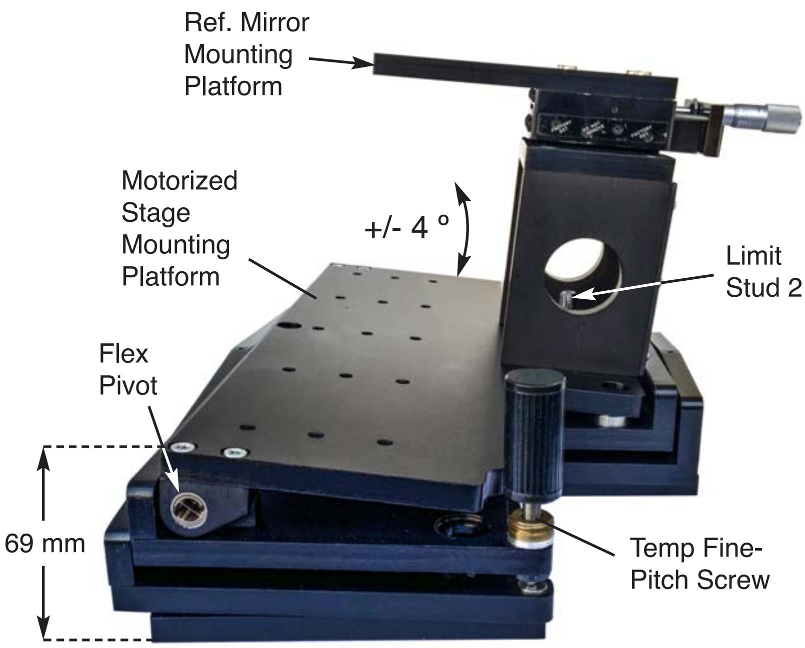
Above, Three stainless pathways 90 degrees apart. Two return springs placed on the right, and left side of pivot point to provide a positive clockwise push against the motorized micrometer's tip.

Right, Low profile/rigid rotary stage composed of three roller bearings, and a pair of precision bearings at its center. The T-shape of this stage is dictated by the test mirror sitting on its front end mounted on a long travel motorized stage, while a reference mirror is supported from the back to stand above the mirror.

In practice, this is much easier said than implemented: Because of its T-shape design, anyone unfamiliar with its support footprint, could pry off the upper portion by lifting it up at point 3 (left). To prevent this, a limit stud is mounted close to roller 3 to protect the system.

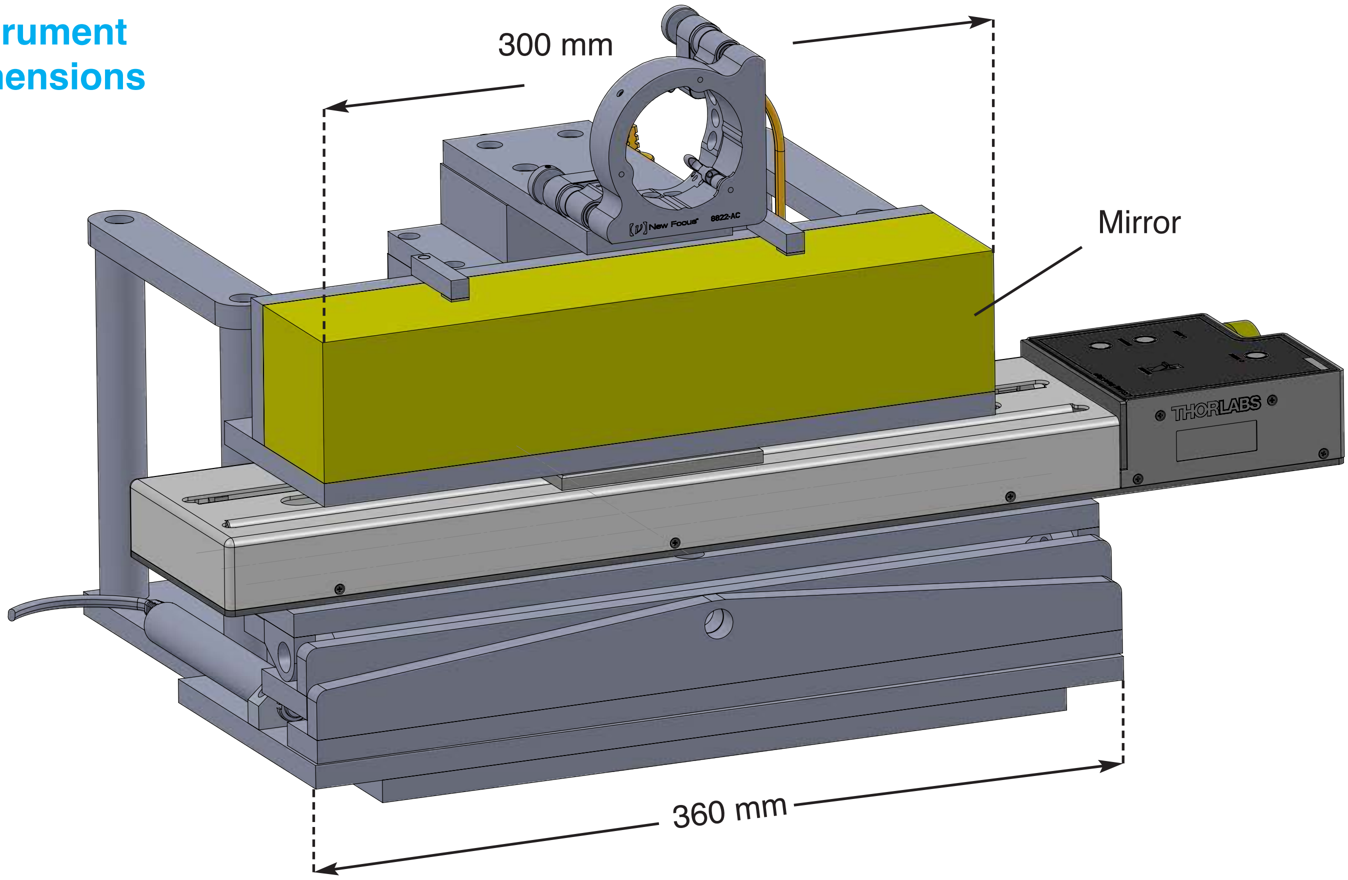


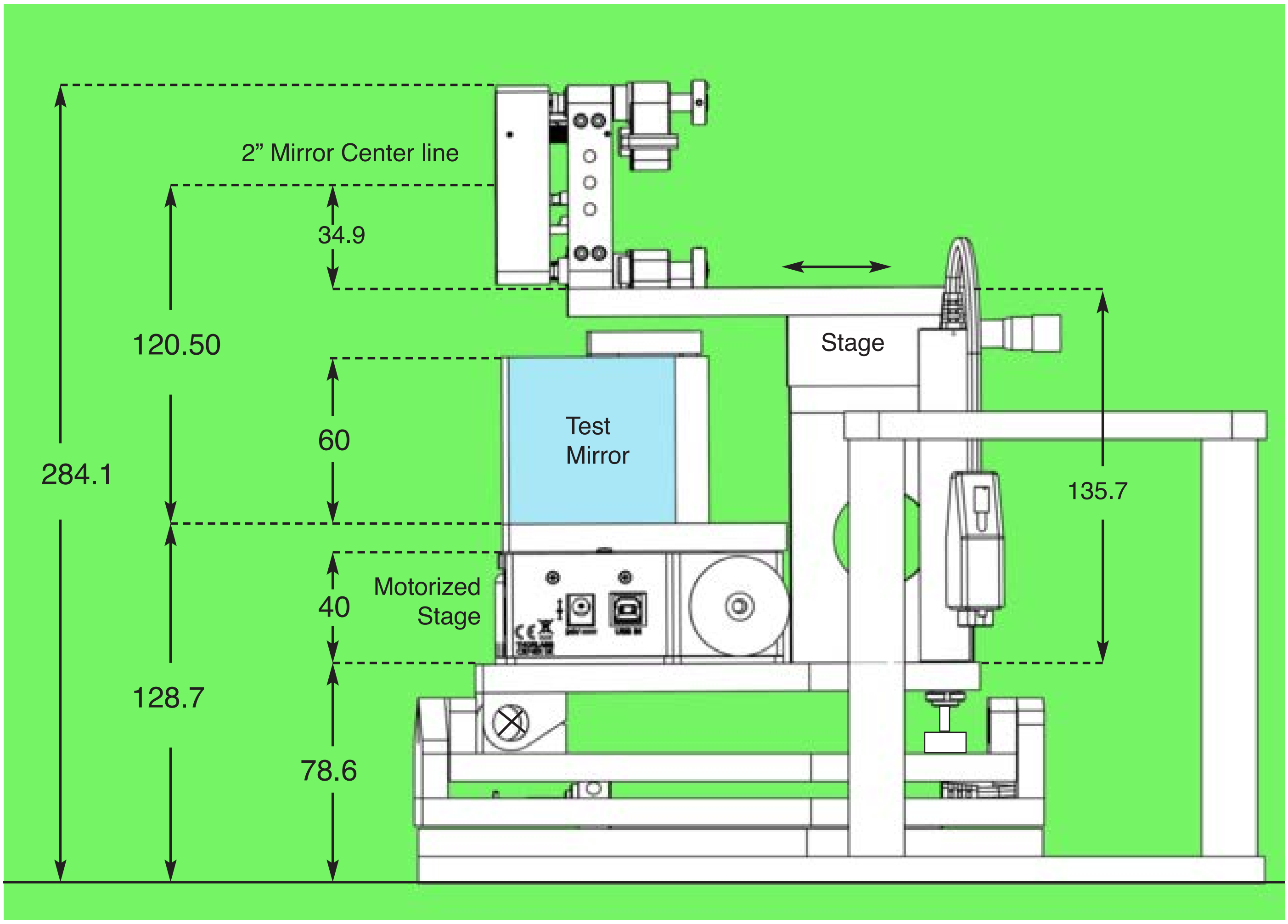
Side view (right) shows how low profile is the height (69 mm). Frontal view of the stage (above) shows motorized micrometers installed.



Side View

Instrument Dimensions

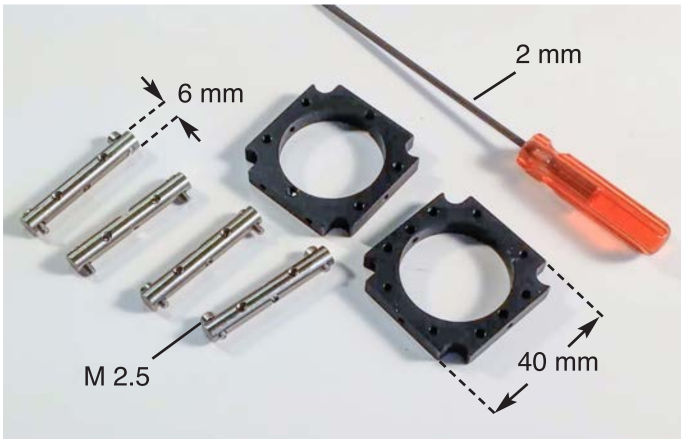


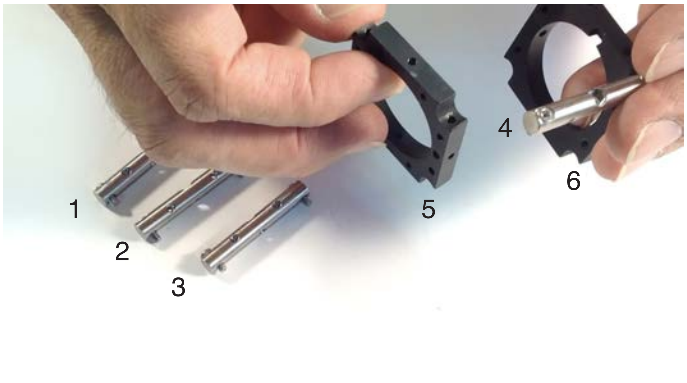


The New Look in Optomechanics with Optoform II

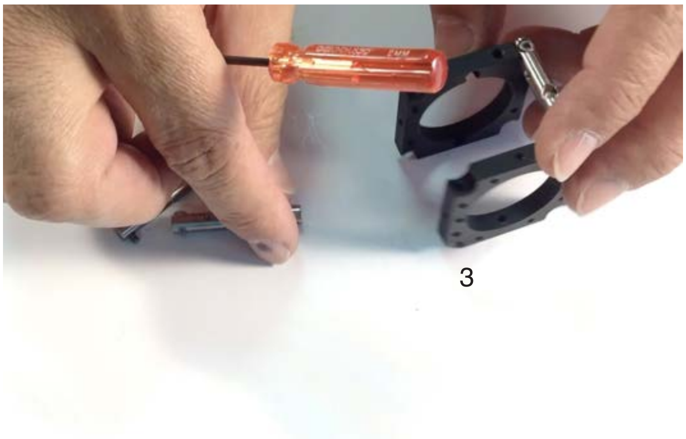
If you haven't yet utilized the new Optoform II, you aren't having enough fun with optics. Its a true erector set in optics. Optoform lives off of that fertile imagination of the child that's still in you. The new 6 mm thick 40x40 mm mounts were unheard of before because these mounts no longer ride along the rods: They are hard mounted to the rods. This not only provides much higher rigidity; it allows mounting much larger diameter optics. The Maximum diameter optics you could insert within the rods in Microbench or Thorlabs' cage system is 32 mm, but in Optoform II, it's 50.

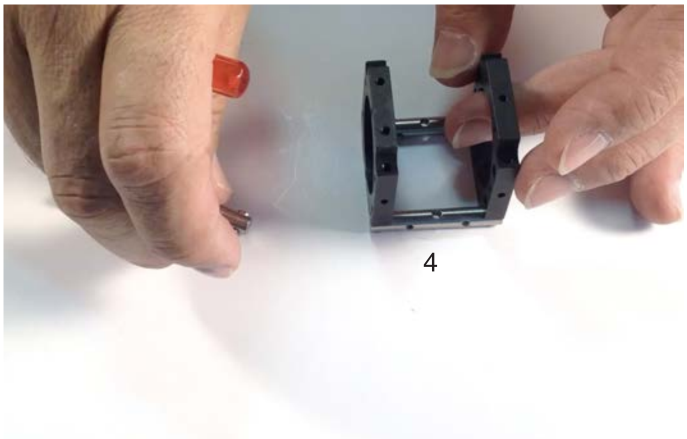
Cubes in Optoform II (assembled below) are far less expensive to build than prior art because they are built with two mounting plates, and four rods, yet everything is made of light-weight Aluminum. We just use Nickle-plated rods here because they are easier to distinguish, but everything can be dull black anodized to reduce internal reflection. One more thing: Optoform II mounts are covered with thin metal cover sheets that can be cut to any size, and shape to cover any instrument you build to make it light tight. As you'll see in the next pages, new Optoform II assemblies are built not with individual components but with pre-assembled modules that you could build for later use.

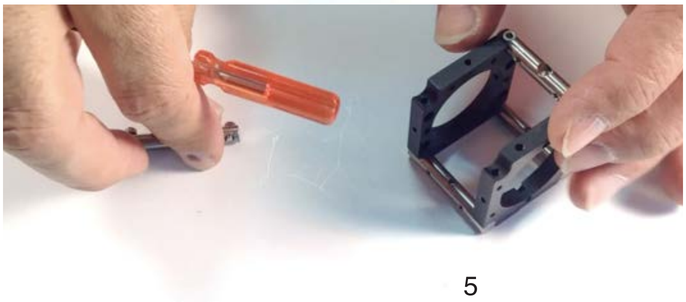


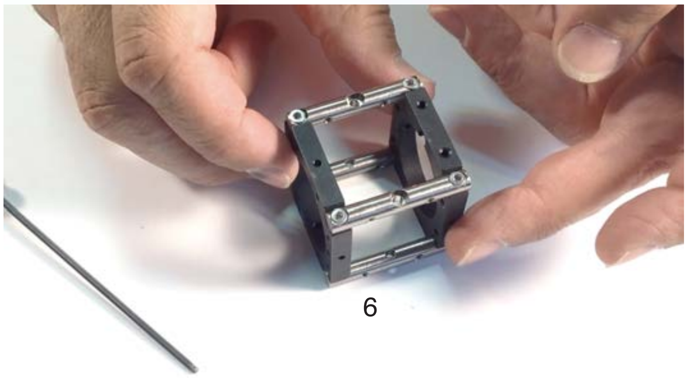


Building a simple Cube with 2 Mounts, and 4 Rods ...

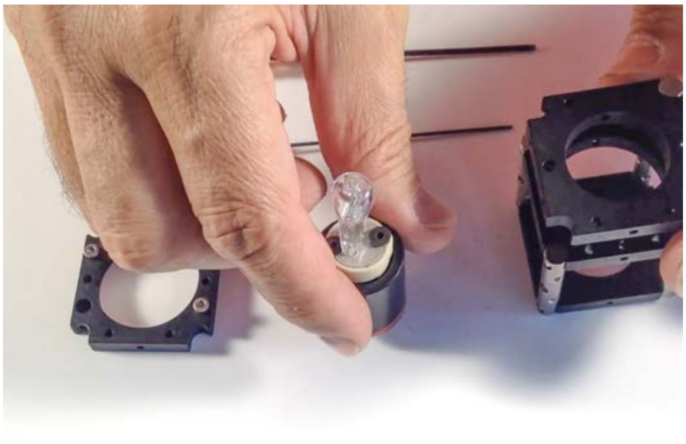


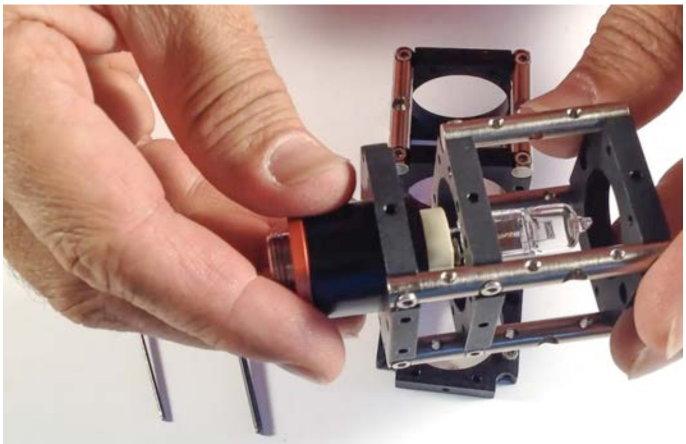


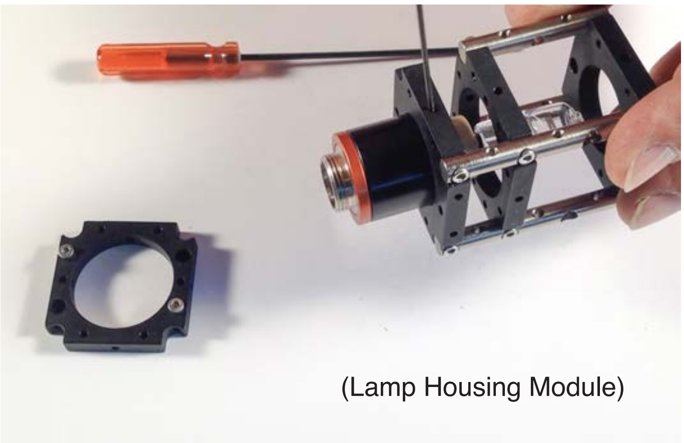




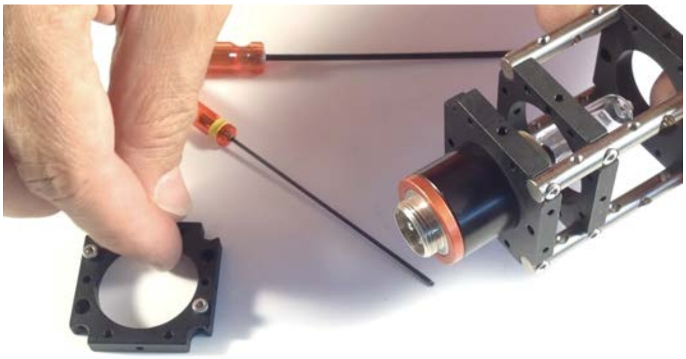
Optoform II uses **Allen head screws** instead of set screws to secure the rods to ensure their maximum rigidity. Mounting the rods outside the mounts allows the **maximum diameter of optics to increase** from 32 mm **to 50**. This also allows the **thickness of the mounts** that were ordinarily 10 mm to be **reduced to 6**. The result is **lighter weight**, **lower cost modules** that could be combined **to create system level concepts**.

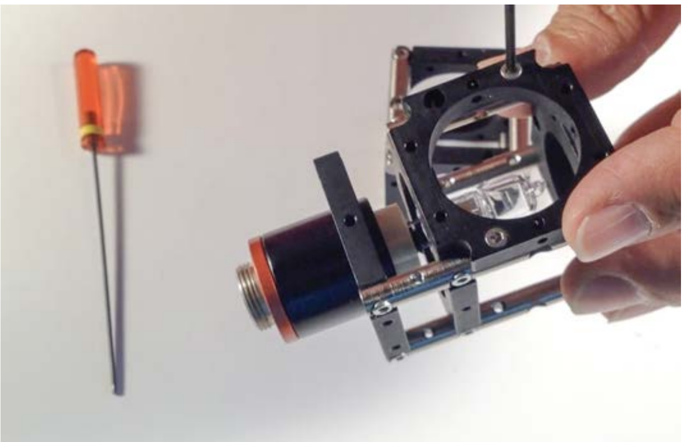


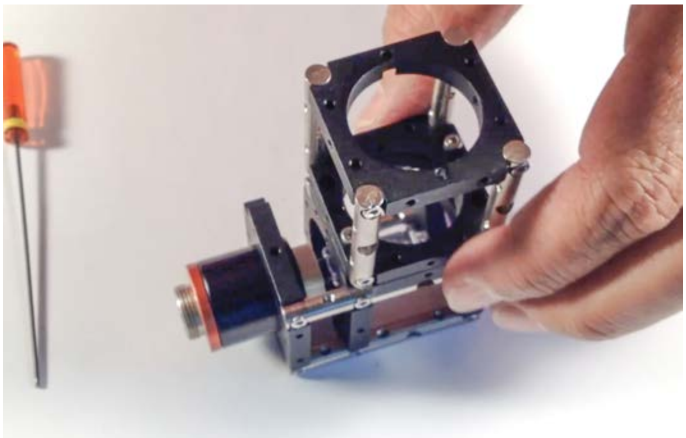


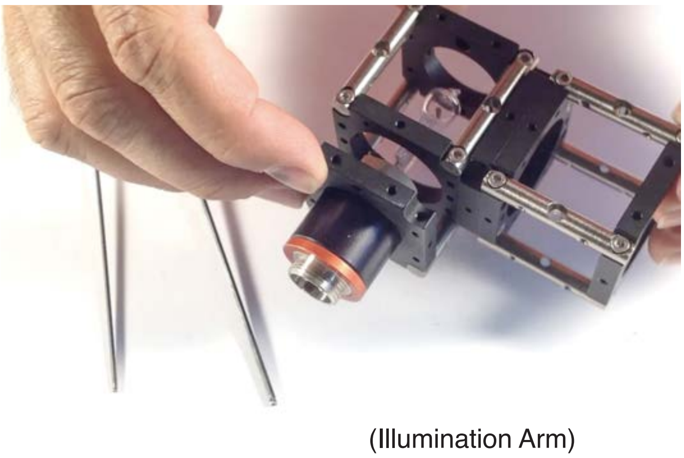


(Lamp Housing Module)

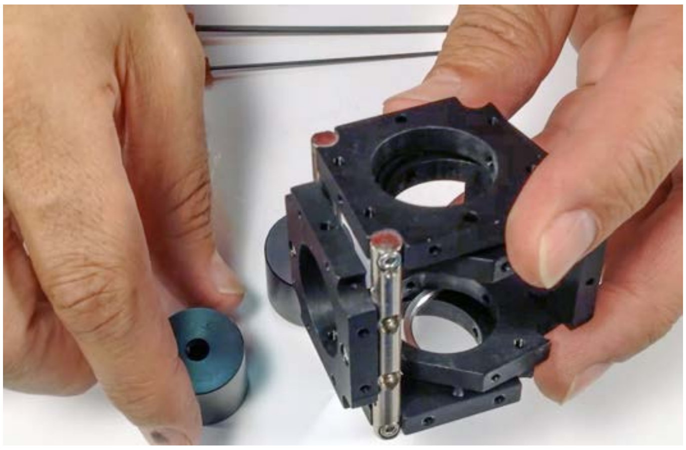


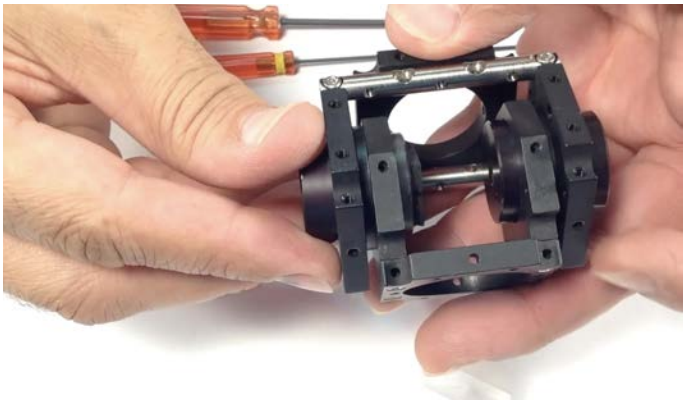




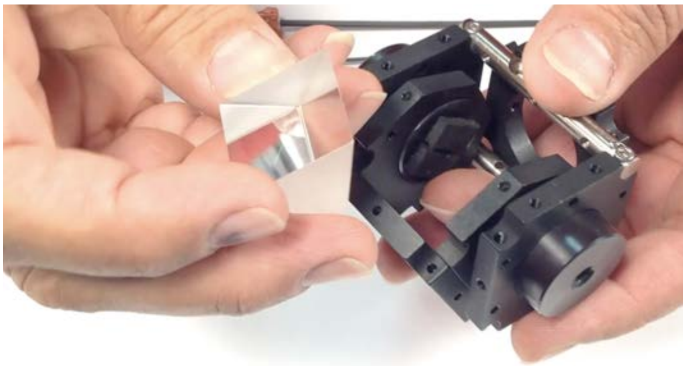


(Illumination Arm)

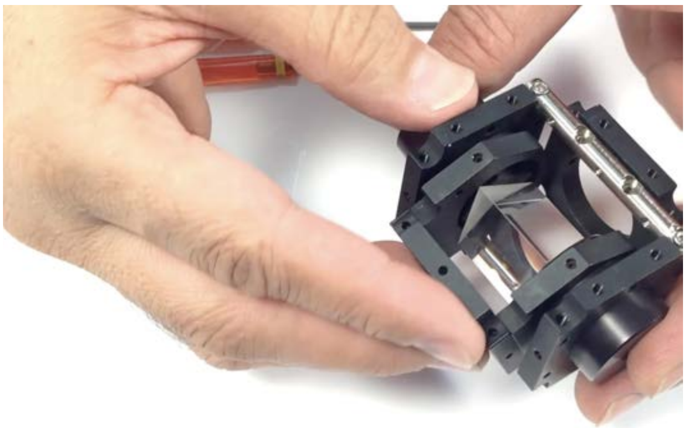


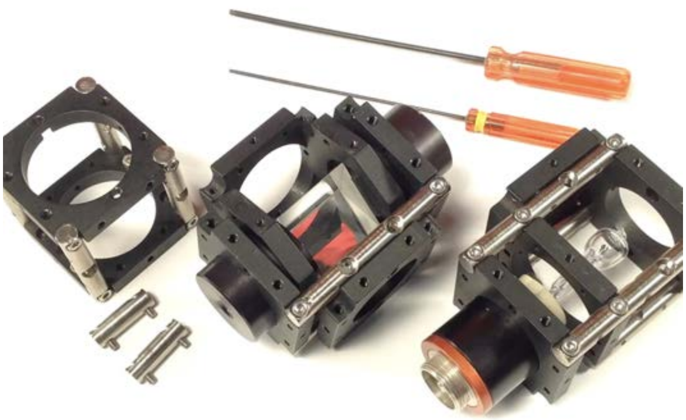


(Swivel Module)

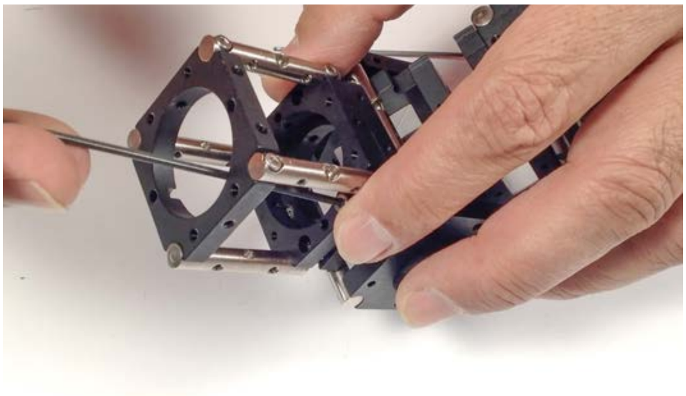


(Mounting the Prism)

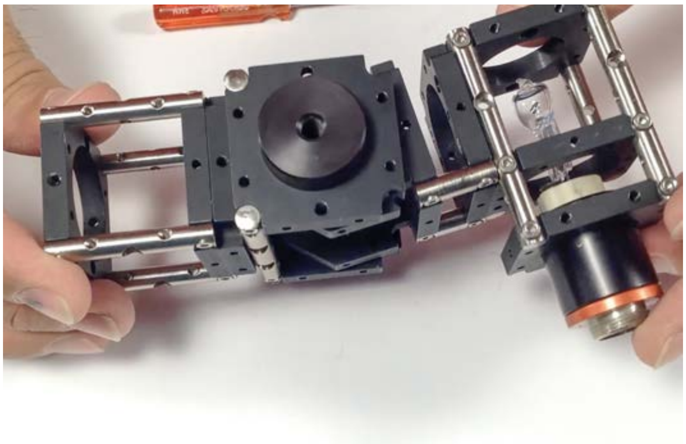


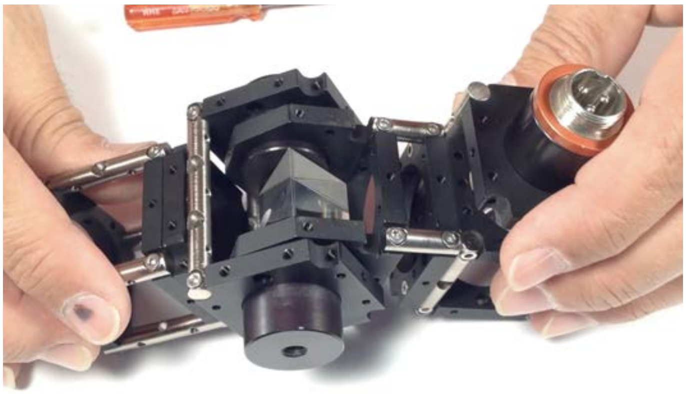


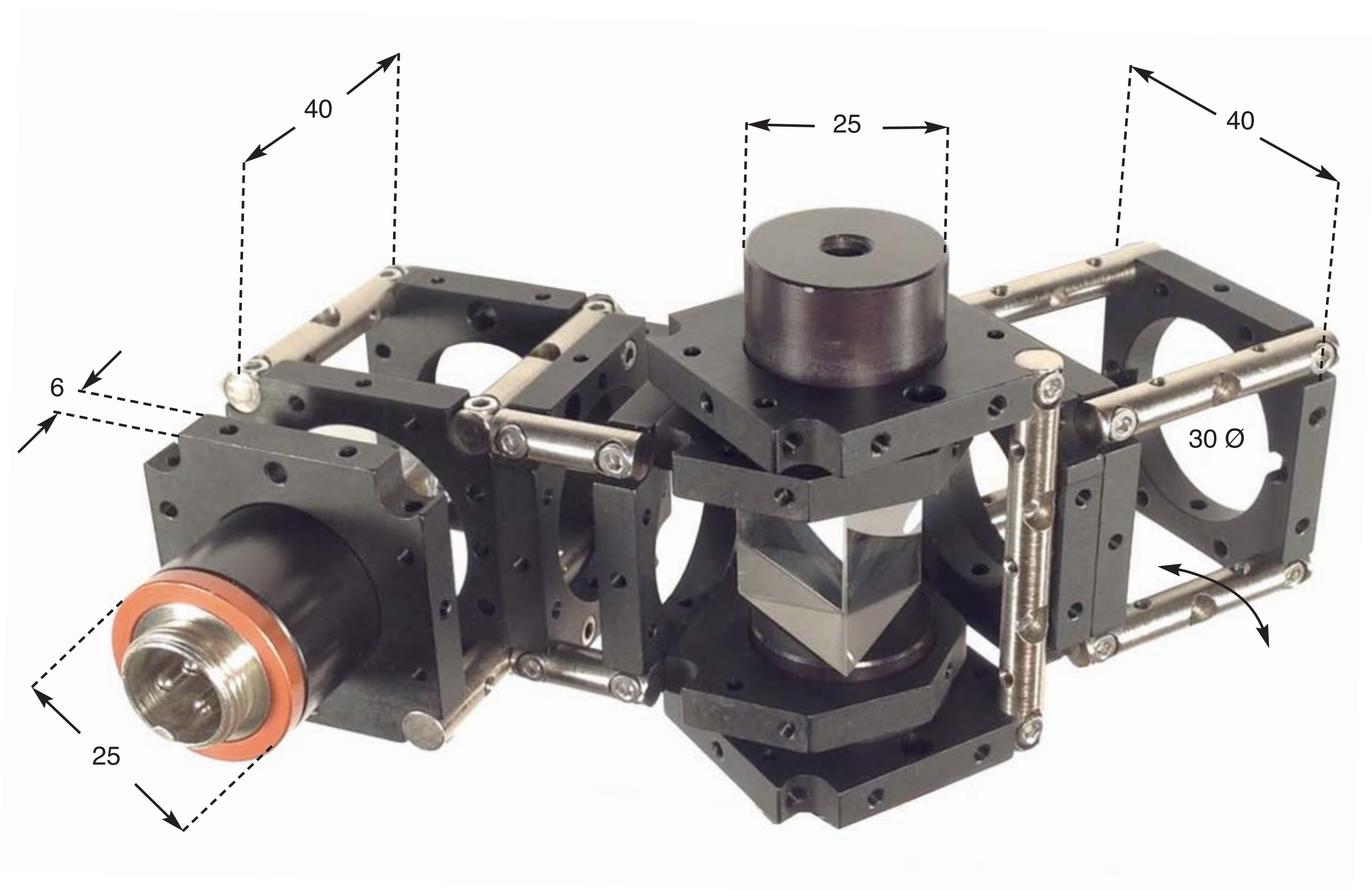
(Modules are ready to be put together)



(Adding the Modules together)







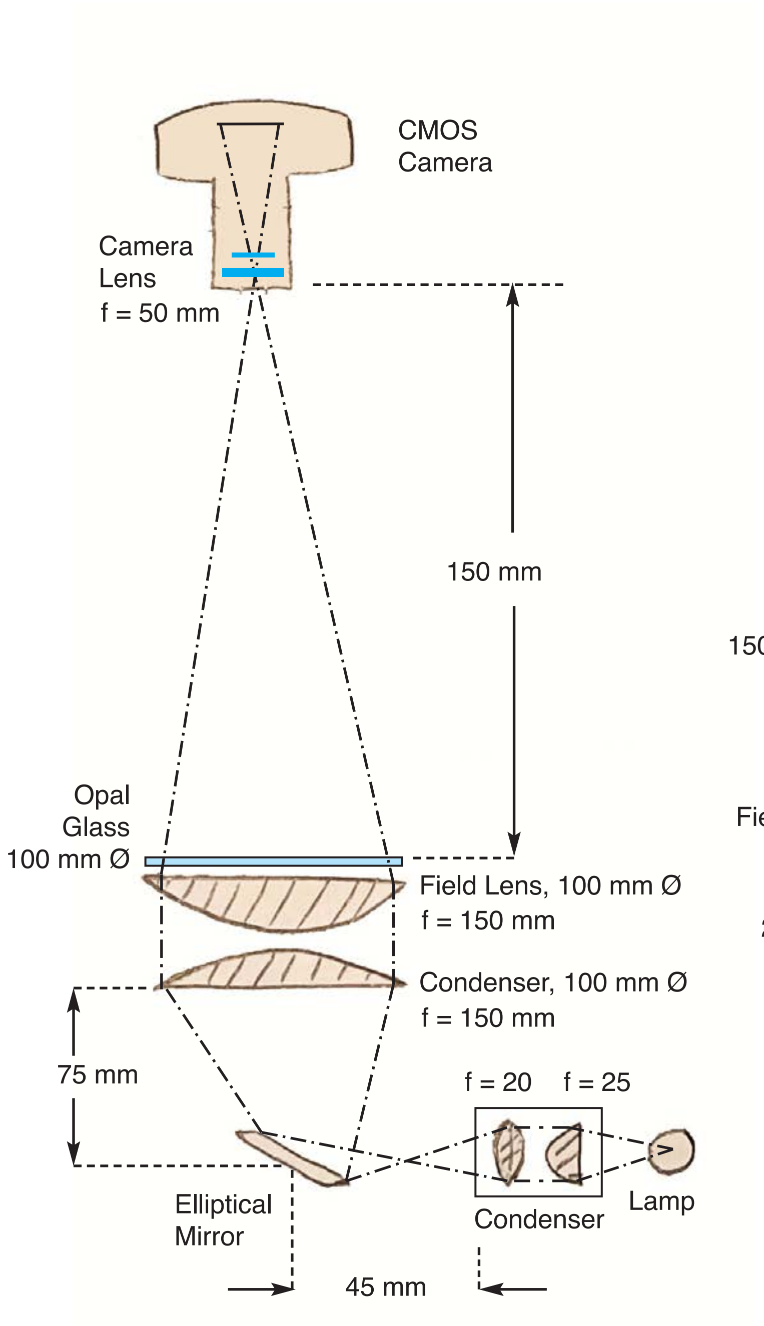
(60° Prism-Type Spectroscope)

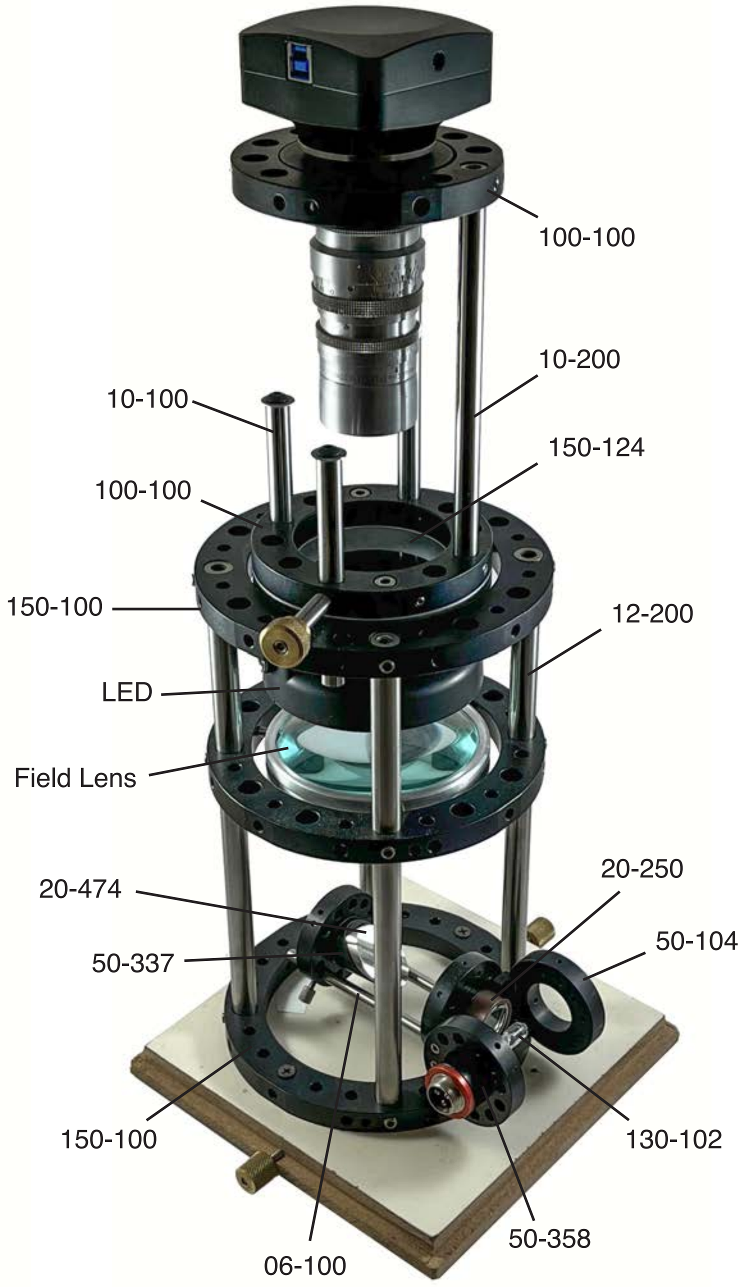
Check out www.optoform.com for more applications

Building an Optical CMM with Back Illumination Optics Part 2

In the past issue, an inspection microscope featuring incident illumination was developed utilizing classical Optoform mounts. In this issue, we are going to discuss the same design but with back illumination optics. In back illumination, the optical field of view of the microscope becomes limited to the diameter of its condenser optics. Large condensers are heavy, and would require a long working distance, hence, increasing the overall height of the microscope. IFor user interface, the lower the height of the sample placement, the easier it is to work with; For incident illumination, the sample platform was conveniently located at the bottom of the machine where it was so easy to see by the user.

As it turned out, a 95 mm diameter inspection area was sufficient, which was well suited for the clearance aperture in Macroptic mounts, capable of accepting 100 mm diameter off the shelf optics. There were actually two possible designs for the rear illumination scheme: One; For standard inspection optics, and two; For telecentric lenses. For standard optics, two Plano Convex condensers are utilized: One, for collimating the beams from the illumination source, and a second one (a field lens) for focusing the rays at the center of imaging lens. This scheme would work for sheet metal inspection, but for thick samples, telecentric lenses would be needed, and a single condenser lens would do.





Ray Diagram of Back Illuminatipn Scheme for a non-telecentric lens.

How We Pass Through Time.

By Ali Afshari

During our routine daily lives, when we get an opportunity to do something, common wisdom says we must jump on it because it might pass us. But how about listening in an ordinary conversation; Have you seen people who don't seem to be listening at all to whatever anyone's saying? As we become older, we realize good listening, and paying attention to many things that happen around us is really an opportunity to receive guidance, and inspiration. As Rumi says in a much deeper way: "Every leaf falling from a tree, has wisdom in it from the source".

My lawyer Paul Ware said he once was at a hospital, complaining to a native America Indian standing next to him, how time passes so quickly. He said: "Time doesn't pass, we pass through time. Time has always been there". Have you ever thought about the meaning of time in this way? What does it really mean? Well, everything in life could be a metaphor for a much bigger meaning. This is where life becomes mesmerizing, and while we are mesmerized, we'd stop listening or seeing or feeling all together! You see that in sports, when a crucial event is shown in slow motion, while the rest of the game is still going. You'd be missing the present to review the past.

Many events in life happen this way. You'd be missing the present while thinking about past or future. That's how our personality type really influences how we perceive the world, as it was explained in detail in Enneagram. This is especially true when we fall in love with someone. The whole scheme of love is also so focused that we completely block everything else going around us. So, what is it that makes us observant of life, if our mind is captured by events, and we miss everything else? It suggests that we are actually observing life in short clips rather than in a continuous realm.

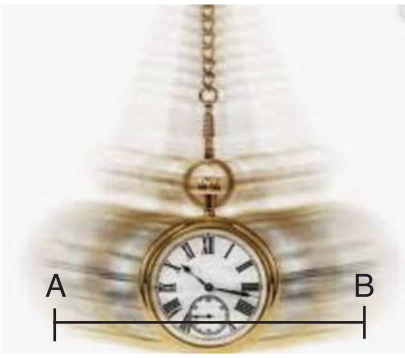
These clips that we observe in our mind, lasts for a short while, and then it ends. For the peaceful mind, these thoughts are well organized, and ordered in a calm way, and they could be easily ignored. In a restless mind, these thoughts create entanglement, and the mind isn't able to make them go away. The peace, and tranquility of a human being are the fruit of our conduct. We are first born in a sort of heaven, receiving so many kisses, and hugs, but we soon realize we are getting further, and further from it, and we can't find a way back. It's only through our journey in life that we could go back to our heaven.

This would be equivalent to the ending of "Titanic". In the last scene, the leading lady went back to the heaven she had experienced on that ship, which was her best life experience. If you are a movie buff like me, this is also displayed in Fellini's 8 1/2 but it was reached when the subject accepted to compromise. Heaven is really remembering all our life's events, and be truly happy about what we have become at the end. "As a man gets on in the years, he wants to live more deeply. A feeling of sad dignity comes upon him." says Chaplin in his last movie: "Lime Light". Dignity comes from eventually finding out what life is all about, but perhaps sad because we've become 90 years old.

Human being is a grand miracle of creation. If you want to know who we are, look at the great examples in human history. The only path to that greatness is not to harm our soul. Human beings are like a book: The one who keeps it authentic wins in life, and the one who alters its pages, suffers enormously. It is by being true to ourselves that our chakras open up to receiving inspirations. Rumi says: "When the morning breeze wakes you up, don't go back to sleep. God is trying to tell you something.

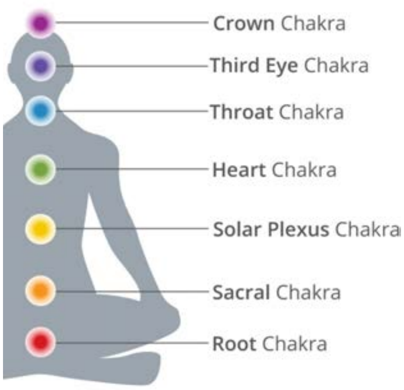
Another way of receiving inspirations is through our dreams. Dream is so unknown to most of us because we are so alienated from who we are as spiritual beings. If you wish to look more serious into your dreams, one way is to make a note of them in your diary. Some people might place a pen and paper next to their bed so they could remember, and record every dream that they have. By doing

Hello darkness my old friend ...
People hearing without listening



Experiencing life in short clips

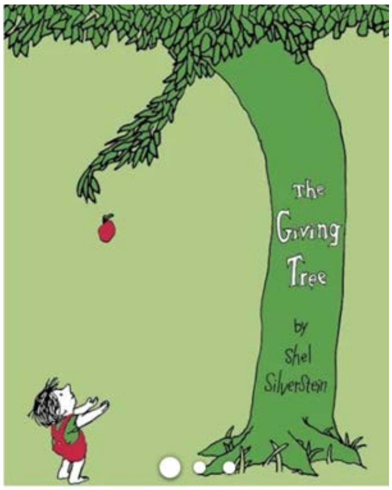
Time in slow motion



Chakras in our body

this, they could start to interpret their own dreams. I wouldn't recommend this because you could end up so obsessed with dreams that you might end up insane! Dreams do have a meaning but it takes so much wisdom, and life experience, and a life teacher to be able to interpret your dreams. To come across your life teacher, one must first have thirst. There are school teachers that teach your math and science, but seldom they could be your life teacher.

Can you interprete your dreams ?



A life teacher is one that you could personally connect with, and they would be like sort of a prophet. Shel Silverstine explains this in his book: "The missing piece meets the big O". Before that, it would be a good step to read an earlier book of his: "The giving tree". In the giving tree, he builds the foundation of what love really is, and in the missing piece, he describes a seeker. The word seeker has the double meaning used literally in the movie: "Harry Potter". The missing piece in Silverstine's story looks like a pizza slice who seeks a companion outside of himself so he could roll. He finally comes across the Big "O", and asks: "Are you my missing piece?" The big O replies: "No, I am not missing a piece". "But I want to be with you ... I've been for you all my life". The big O replies: "You can't catch up with me because I roll, but you flip flop, but let me tell you: Your sharp corners could wear off". The big O leaves the page. In the next two pages, Shell beautifully illustrates how the missing piece tries to catch up with Big O, and how his/her sharp edges start to wear off. In the last page of the book, the small o catches up with Big O.

Life is really the same way. We are all born in heaven. Imagine all the love, and care an infant receives after birth. People would strive to hold a child, and to kiss his/her cheeks. As I said, in a few years, the child learns it's no longer heaven, and they can't find a way back. The only option is to go forward: It would take growing up, going to school, choosing a career, buying a car, falling in love, getting married, buying a house, having children, and the rest of life's journey to eventually go back to heaven. While going through this path, we would come across a teacher that would correct our path depending on what we are looking for. We'll also need to connect with the source to connect with our soul. Gandhi suggests not to care so much about the words as long as our heart is present. We are all children of God, and we could see through it with our own children. I'll never forget when I changed my daughter's diapers. While she stood up, she placed her diaper right onto my face to get up on her feet! We really can't behave any politer while connecting with our source.

When children are born, they are so messy (not like it's shown in movies) but we'll hold, and love that messy child because it's our own. Once I saw a young girl laying handcuffed to a bed in a suicide hospital. She was saved from drug overdose, and from seeing her dress, one could tell she was a young, poorly paid prostitute (gold diggers have more prestige). If she only knew how much God loves messy people, she would have stood up, and claimed her rights. Prayer or connecting with the source is that realization. That's why we live as underpaid as we are because we don't know how special we are. Prophet Buddha found suffering coming from our desires, and most his followers practice turning their back to worldly pleasures. That's not how I think he meant it. While we live our ordinary lives, we need to be a seeker of not more pleasure but eventually finding a way to leave it all behind. I remember reading an interview in Vanity Fair with Jack Nickelson. When he was asked what's his last wish in life? He had replied: "Just one more love". I think that's looking for answers in the wrong place.

Rumi says in his Masnavi: "You have opened so many bags so far in life, take the rest as already examined". Life is purposely composed to be a distraction so seekers are recognized from the rest. You can't stop wanting. You need to change your taste. "Destroy what you love or it will destroy you", as Oscar Wild puts it. As people get older, the seekers eventually take a different path. It needs to come to you naturally. You can't fake, or pretend to be pushing the world aside. Most people do it at 70-80, and then they'd preach about abstaining from undo pleasures. If you want people to listen to you, do it at earlier age! If your taste in life hasn't changed by the time you are 60, life has been blindfolding you.

Chromic

Automatic Chromozome sorting software

Software features:

Compatible to all types of cameras

Online image capture and visualization

Convenient tools for editing metaphase images

One of the best image processing algorithms for enhancement of microscopic images

Last generation Artificial intelligence algorithms for classification of chromosomes

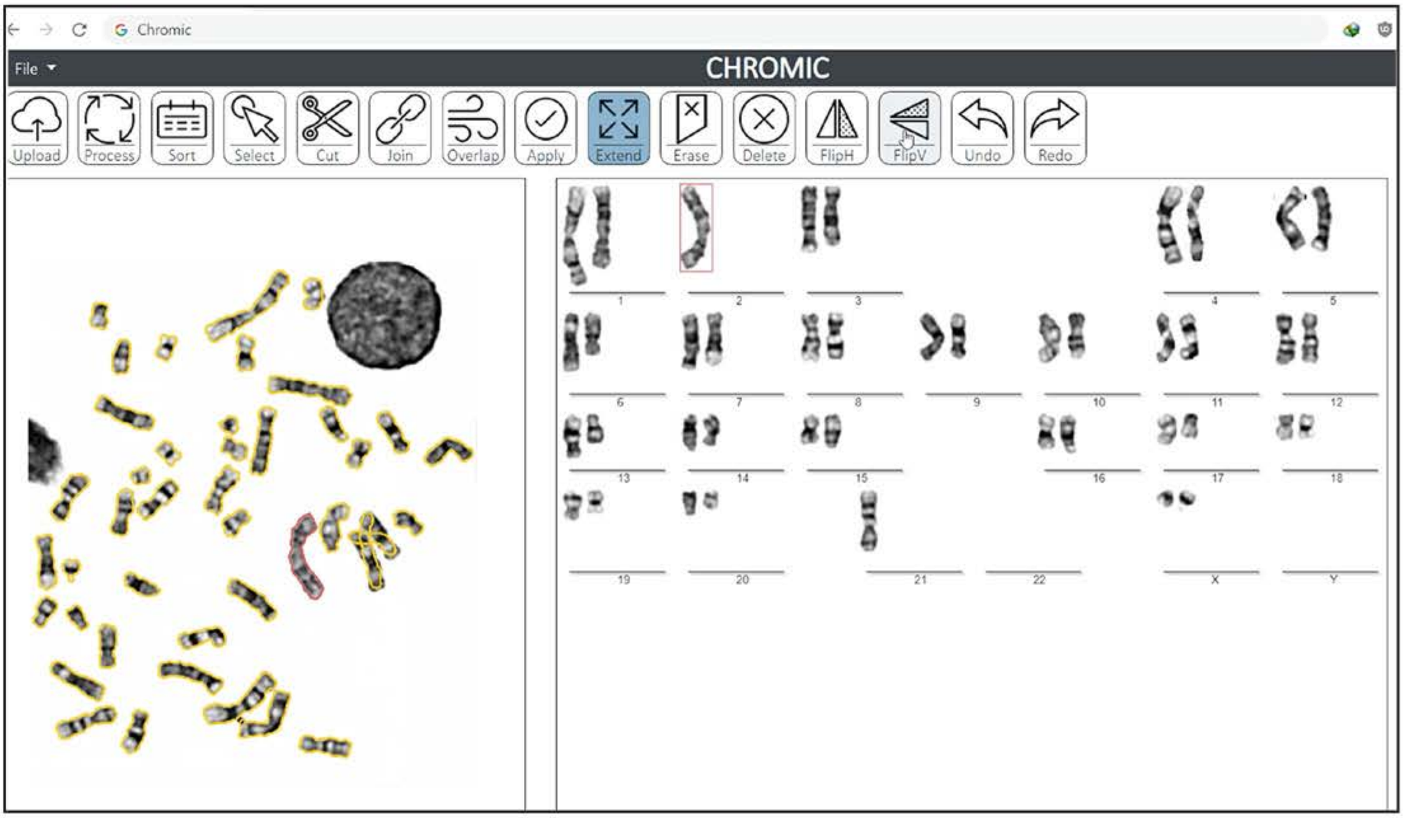
Provides powerful tools for separation of overlapping chromosomes

Exports a report based on examiner's comments on the test results

Optional motorized stage control for metaphase search, and image capture

Competitive advantages of the software:

- One-year free access to latest software upgrades
- Personalization options for labs and users
- High quality and lower cost
- Technical support



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