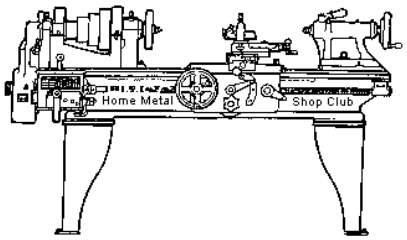
Home Metal Shop Club

April 2012
Newsletter

Volume 17 - Number 4



http://www.homemetalshopclub.org/

The Home Metal Shop Club has brought together metal workers from all over the Southeast Texas area since its founding by John Korman in 1996.

Our members' interests include Model Engineering, Casting, Blacksmithing, Gunsmithing, Sheet Metal Fabrication, Robotics, CNC, Welding, Metal Art, and others. Members enjoy getting together and talking about their craft and shops. Shops range from full machine shops to those limited to a bench vise and hacksaw.

If you like to make things, run metal working machines, or just talk about tools, this is your place. Meetings generally consist of a presentation with Q&A, followed by ***show and tell*** where the members can share their work and experiences.

President *Vance Burns*	Vice President *John Hoff*	Secretary *Martin Kennedy*	Treasurer *Emmett Carstens*	Librarian *Dan Harper*
Webmaster/Editor *Dick Kostelnicek*	Photographer *Jan Rowland*	CNC SIG *Dennis Cranston*	Casting SIG *Tom Moore*	Novice SIG *Rich Pichler*

About the Upcoming May 12 Meeting

General meetings are usually held on the second Saturday of each month at 12:00 noon in the meeting rooms of the Parker Williams County Library, 10851 Scarsdale Boulevard, Houston, TX 77089. The meeting location and time for May has been confirmed. The next meeting will be held on May 12th, 2012.

Visit the HMSC website for up-to-the-minute details and meeting topic.

Recap of the April 14 General Meeting

By Martin Kennedy, with photos by Jan Rowland

Twenty-five members and two guests – Seth Stokes and Don McManus - attended the 12:00 noon meeting at the Parker Williams County Library. President *Vance Burns* led the meeting.

We need articles for the monthly newsletter! If you wish to write an article, or would like to discuss writing one, please contact the Webmaster Dick Kostelnicek.

Ideas for monthly meeting programs are always welcome. If you have a topic in mind, or you know someone who could make a presentation, please contact Vice President John Hoff.

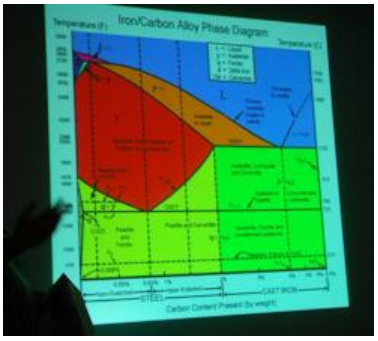
A member asked about TX/RX Labs' offer to host our meetings at their Houston site. He toured their facilities, and said that they would be excellent for our meetings. Vance Burns said that the officers would check into specifics.

Rich Pichler donated a book *The Backyard Blacksmith* by Laurelei Sims to the library. Thanks, Rich!

Presentation

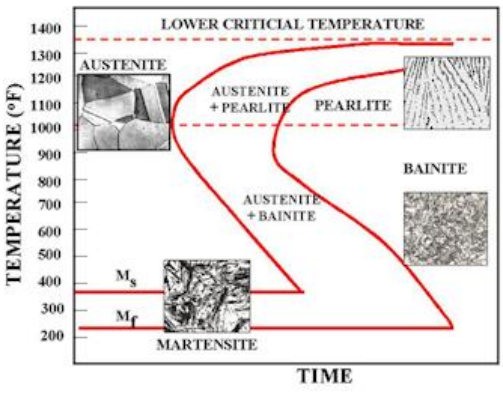
Vance Burns

Vance Burns, club president and resident blacksmith, gave a presentation on metallurgy. Vance stepped up at the last minute as our scheduled speaker had a last minute conflict.



Vance's presentation began with a discussion of the Iron-Carbon Alloy Phase Diagram. Click here for slides. Although appearing complicated at first, diagrams like this are extremely helpful in understanding metallurgy and heat-treating. A phase diagram is used to understand the performance of alloys at various temperatures, but does not show time in process for heat-treating.

Referring to the Phase Diagram, Vance explained how temperatures between 1,400 -1,600 degrees F. are good for mechanically working metal. Steel is very malleable between these temperatures as it is in the Austenitic region. When heating, the temperature can be guessed fairly accurately by two methods. The first is by color – bright cherry red, and the second by using a magnet, as very hot steel becomes non-magnetic. At temperatures below this range, steel takes on a more rigid molecular structure and is not as easy to bend. He noted that 1083 steel is at the bottom cusp of the eutectoid curve, and although hard to find, it is easy to use.



After being heated, the cooling rate of steel affects its ultimate room temperature properties. The properties of interest are generally strength, hardness, and ductility. Each alloy of steel has an Isothermal Transformation Diagram, also known as the Time Temperature Transformation Diagram. This diagram shows the type of metallurgic structure that is produced at various temperatures vs. soak times. It can be used to design a heat-treating program that will yield the desired mechanical properties. In general, for a given alloy, slow cooling yields pearlite, medium rate cooling yields bainite, and fast cooling yields martensite. Pearlite has high hardness and strength, but low ductility and can be brittle. Martensite has high ductility, but lower hardness and strength.

When other elements are added to steel, such as chrome, nickel, molybdenum, silicon, and lead, the shape of the nose on the Diagram gets much more complicated.

Quenching, using various materials, can be used to set the path through the Diagram. Water quench is generally used as a fast quench. Other commonly used quenches are oil, air, or even furnace cooling.

More exotic quenching materials are used in the industry but not by the home shop machinist. They have high toxicity and may present a handling hazard, such as molten salt and lead.

Vance gave examples of heat treatments, illustrated by phase and transformation diagrams.

Show and Tell

Joe Williams followed up on his discussion last month on repairing four Starrett and Gem indicators. He received a quote of $38 minimum each, just to see if they could be repaired. One of the club members brought in a book on the indicators, and Joe said that he'd see if it had the disassembly information that he needed.

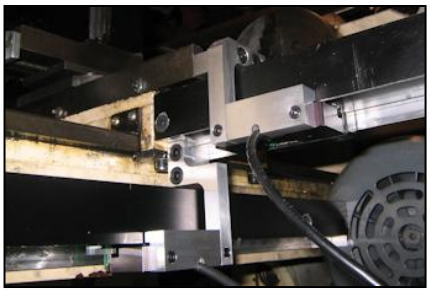
He brought in his homemade tool to remove indicator hands, but found that it was too big for the small indicator gauges (right photo).

He recently acquired a surplus optical flat. This extremely flat piece of glass will show interference bands when illuminated with monochromatic light, such as from a laser. The interference bands are indicative of surface irregularities in the object that it is held in contact with.

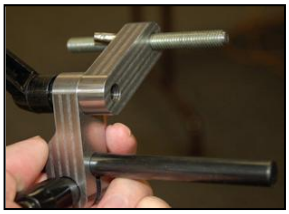
Dick Kostelnicek demonstrated two new types of power hand saws that are on the market. The first was a Porter Cable Oscillating Multi-tool. This tool uses oscillating blades that can cut, grind, sand etc, and is especially good at cutting flush to the floor (left photo).

The second was a Craftsman Twin Cutter, which employs two counter-rotating carbide tipped saw blades (right photo). Because of the counter-rotation, the saw does not walk or pull into the work. Wax is placed between the blades periodically for lubrication.

Rich Pichler brought in an interesting bookend that had moveable gears. He acquired it at a garage sale.



Martin Kennedy made a presentation on his design, fabrication and installation of a ShumaTech DRO-375 and glass scales on his 9 x 20 lathe. Slides from the presentation are here, and plans for building the DRO hardware are at the end of this newsletter.



Dan Harper built a" better stop" for his horizontal band saw (left photo). One feature of this stop is to allow the user to readjust the stop quickly at the end of the cut to prevent the blade for binding. He explained the techniques he used to cut slots in some of the parts, and how he used a clamp to make an extension to allow him to safely cut rounded ends with his manual lathe.

John McMillan recounted how he had replaced the faces on a rawhide mallet with UHMW (Ultra High Molecular Weight) polyethylene plastic. Although he originally did it because of the high cost of replacement rawhide heads, he found that it works better with the plastic, and has held up well to frequent use.

Problems and Solutions

A member followed up on his request for ideas at the February meeting on fixing a hydraulic leak in his 1962 International tractor's rock-shaft arms. He had the worn bearing hole commercially bored out, allowing him to install a repair sleeve. He used his 10-ton press to install the sleeve. It works perfectly now.

A member asked if anyone knew of a local source for Wood's metal in the Houston area. Suggestions made were to try a gunsmith. McMaster Carr And Brownell's were mentioned as a possible mail order source.

Additions to the Website's Library

The Pulley and Belt Calculator applet now allows all combinations of pulley, belt, and center-separation plus cross belt calculations. If you use at least IExplorer-9 or almost any other HTML5 compliant web browser, you'll see an animated graphic as pulley and belt values are selected.

George Carlson's Screw Table in now interactive. You can select a screw size from a drop-down list and all data for the various compatible screw types are updated. A few more items have been added to original table; namely, Regular and Jam Nut thickness, Setscrew Hex Key size, UNF and UNC Tap Drill sizes, and Body Clearance Drill size.

The table also acts as a reverse directory. For example: If you know the head diameter of say a button head screw, select that diameter from the button head drop-down list and all screw data for that size screw will be updated. Also, the screw size last selected will be remembered and selected the next time you visit the web page (See what cookies are good for!).

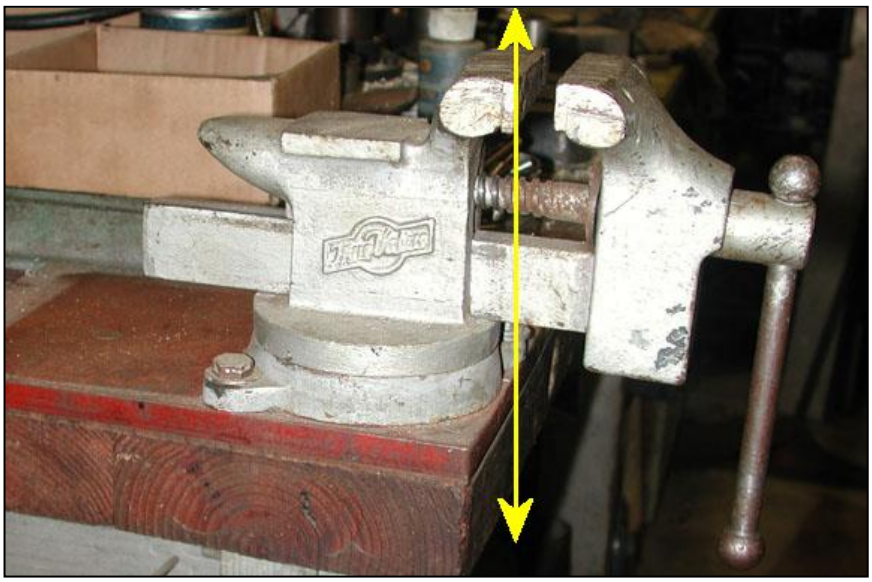
There are also some display features that you can adjust. Press the [F1] key for instructions. Note: You can increase or decrease the scale of any web page in nearly all modern browsers by holding down the [Ctrl] key and tapping the [+] or [-] key located on the right side of the keyboard.

Novice SIG Activities

Rich Pichler and the novice group discussed drilling, reaming and tapping.

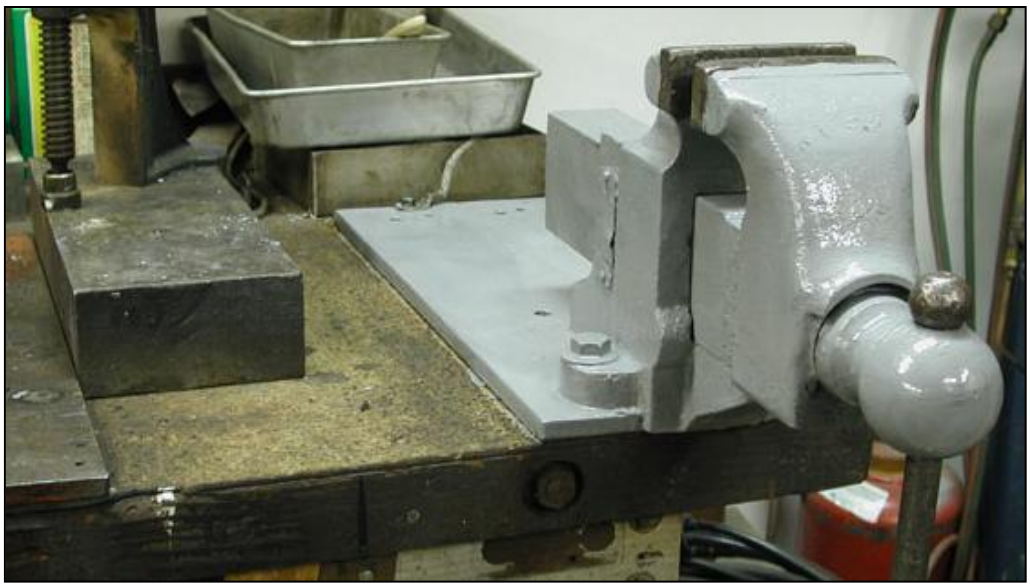
Bench Vise Installation

By J. R. Williams



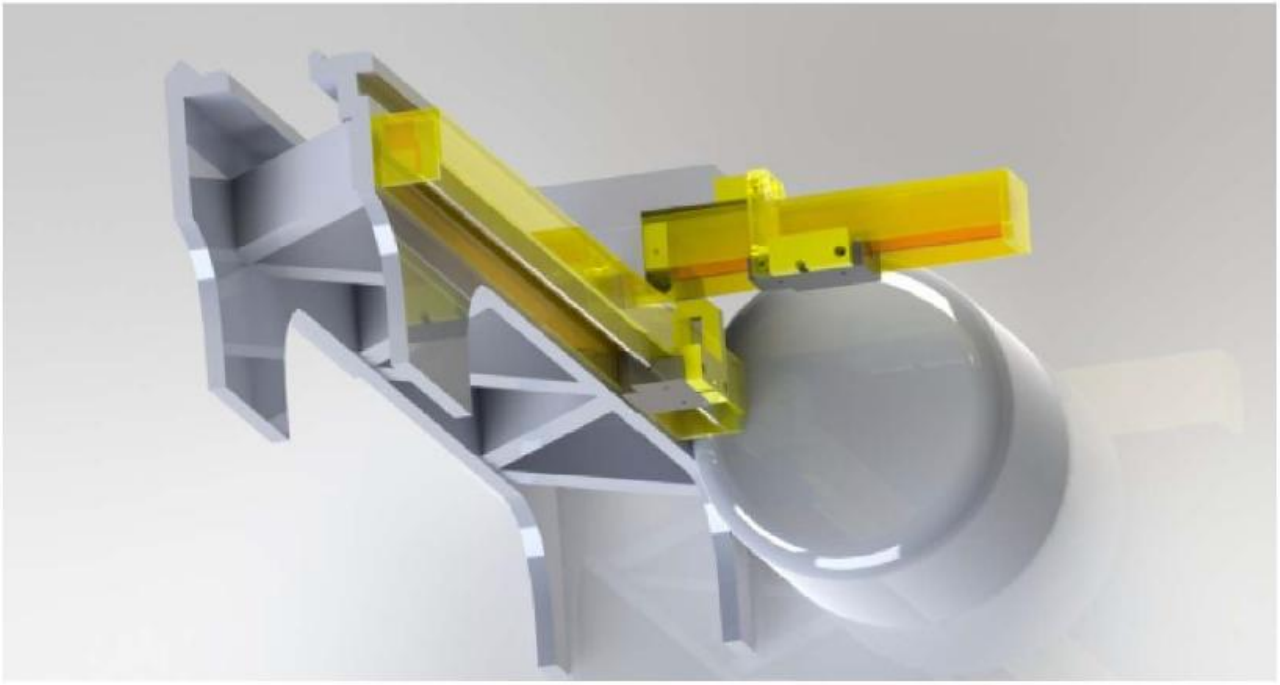
A recent article in Machinist's Workshop magazine prompted me to comment on bench vise installation. That article showed a bolted down vise with the fixed jaw significantly back from the edge of the workbench. A vise should be mounted so that a clamped vertical bar clears the edge of the workbench. Refer to the yellow arrow in the left photo.

Two of my shop vises are show in this article mounted on the corners of a workbench. The smaller vise, a 3-inch unit (left photo) is bolted to a ½-inch steel plate that is 6 inches wide by 10 inches long. It is bolted down to a 3/8-inch thick backup plate under the bench top. The plates distribute the load farther back on the bench and away from the front edge board.



The larger vise, a 4-inch wide Rockford of WWII vintage (right photo), is bolted to a ½-inch thick steel plate that measures 8 x 18-inches. Both vise and plate are bolted to the workbench with two ½ - inch bolts that pass through a 3/8-inch steel backup plate on the underside of the bench. This vise has a built-in leading ledge aligned to the edge of the bench. Another handy feature is that the plate and vise are permanently attached to my welder's ground system. This eliminates having to connect the ground lead when welding work held in the vise. A large steel block on the bench to the left of the vise has an attached hold down clamp and is electrically connected to the vise's support plate.

The workbench top is made from salvaged wood river pilings with ½-inch diameter steel pump rods bolting the boards together. The vises were attached to the bench when it was fabricated over 50-years ago and have served me well ever since.



9 x 20 Lathe DRO

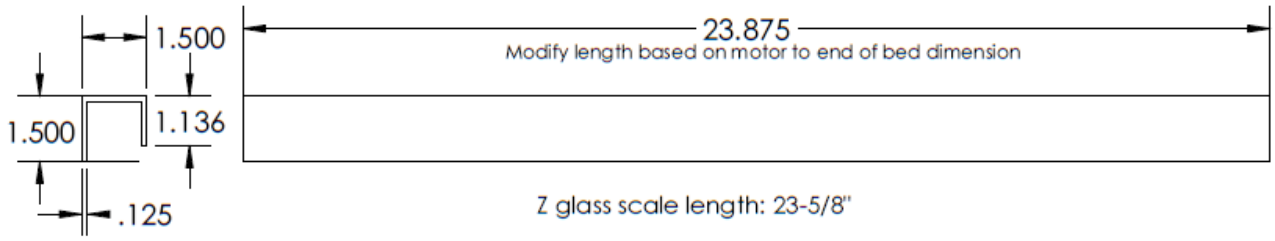
by Martin Kennedy

April, 2012

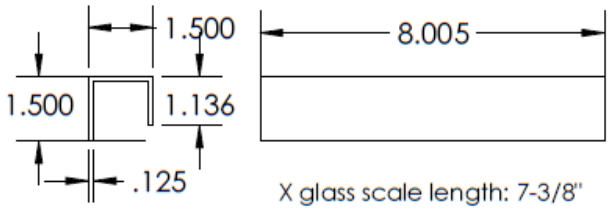
Contains some elements from
DRO design by Dr. Alan Pinkus
www.micro-machine-shop.com

DR-375 electronics from ShumaTech
www.shumatech.com

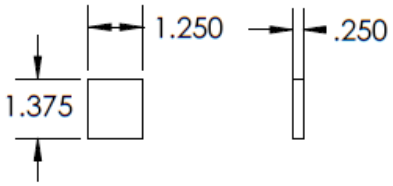
SIZE	FILE NAME	REV.
A	Lathe DRO Hardware Drawing	A
SCALE 1:1	Cover	SHEET 1 OF 8



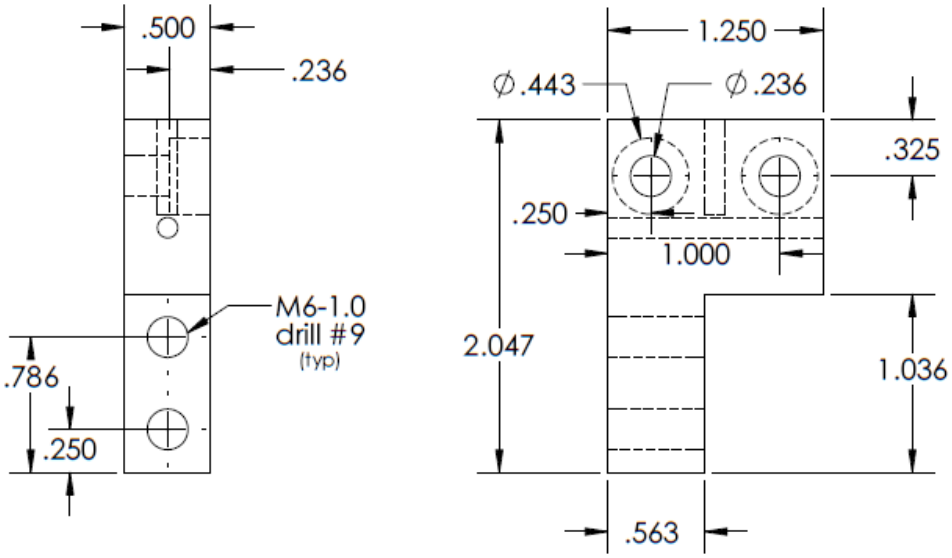
Z Scale Cover



X Scale Cover

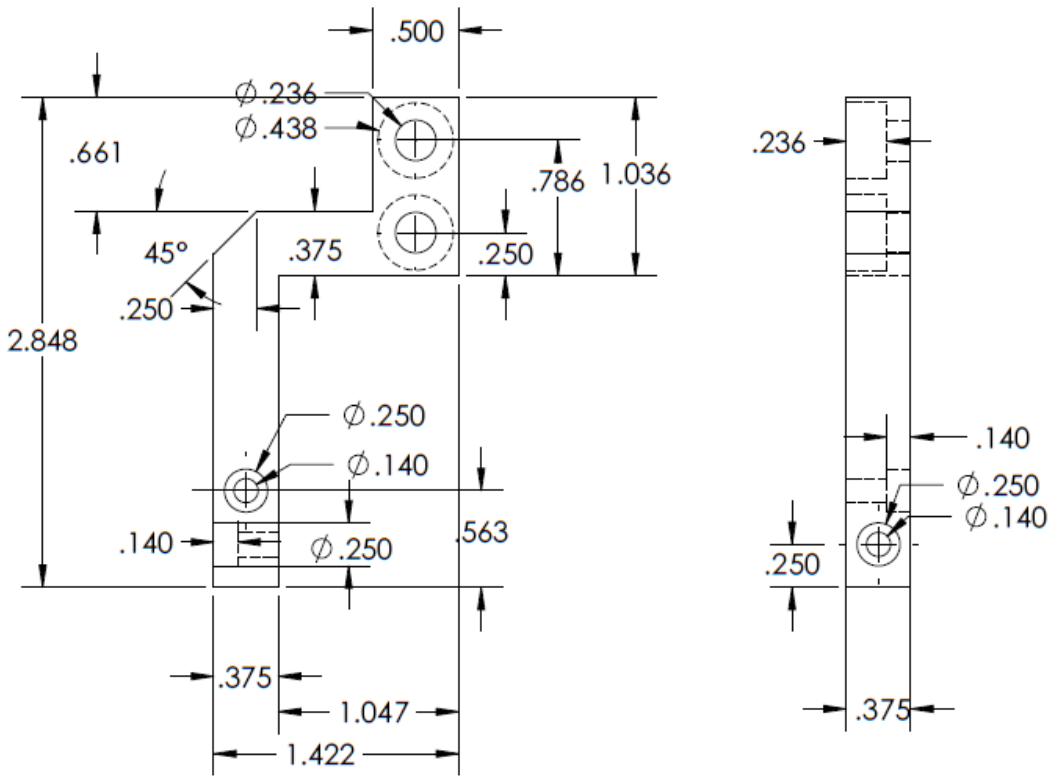


Scale Cover Ends
(3 req'd)

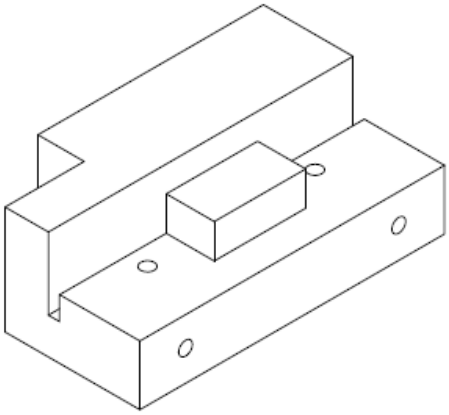


X Scale Cover Mount

SIZE	FILE NAME	REV.
A	Lathe DRO Hardware Drawing	A
SCALE 1:1	Scales	SHEET 2 OF 8



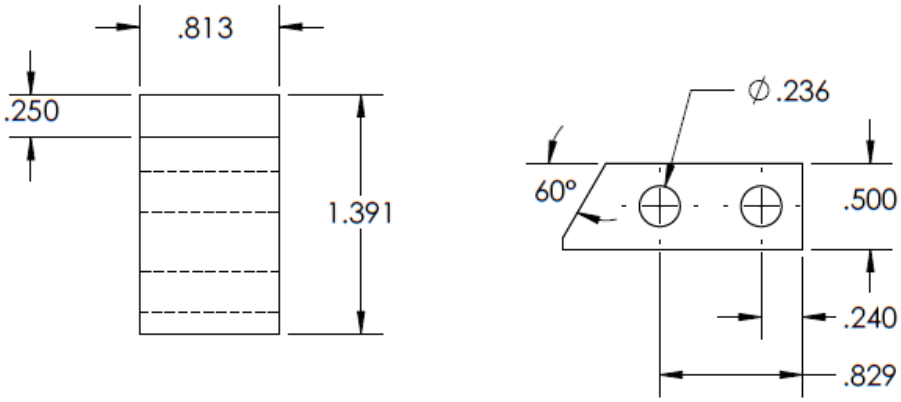
Z Read Head Bracket



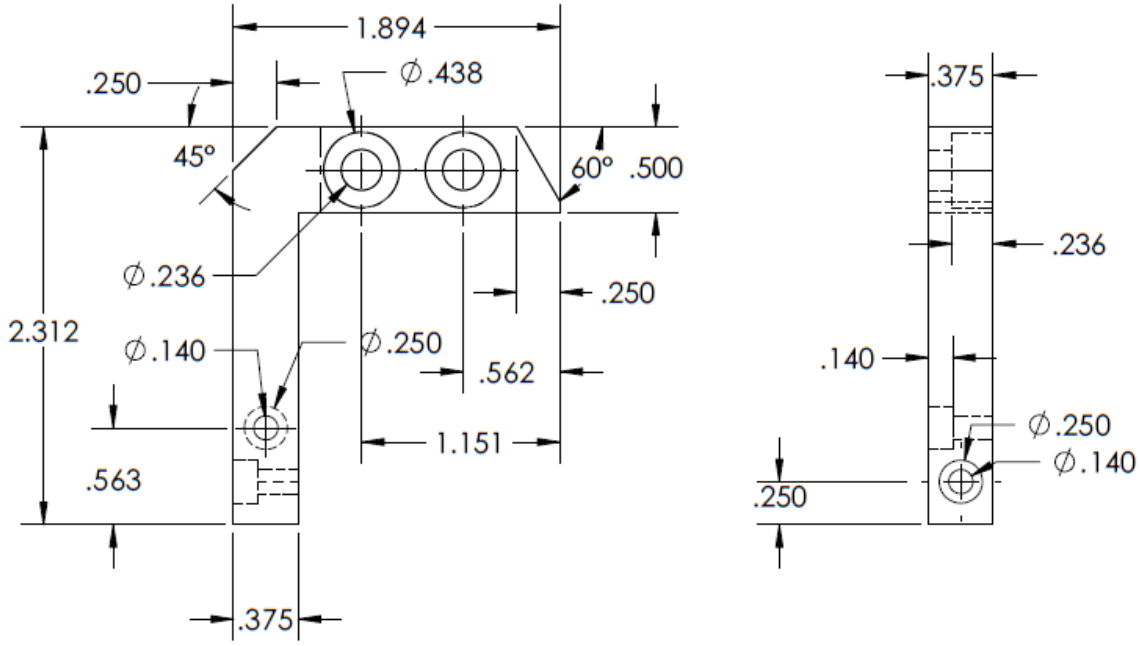
Read Head

MicroE Systems Modular Optical Linear Encoder
LK11B w/ LKS1 Glass Scale (appears to be obsolete)

SIZE	FILE NAME	REV.
A	Lathe DRO Hardware Drawing	A
SCALE 1:1	Z Head	SHEET 3 OF 8



X Read Head Spacer



X Read Head Bracket

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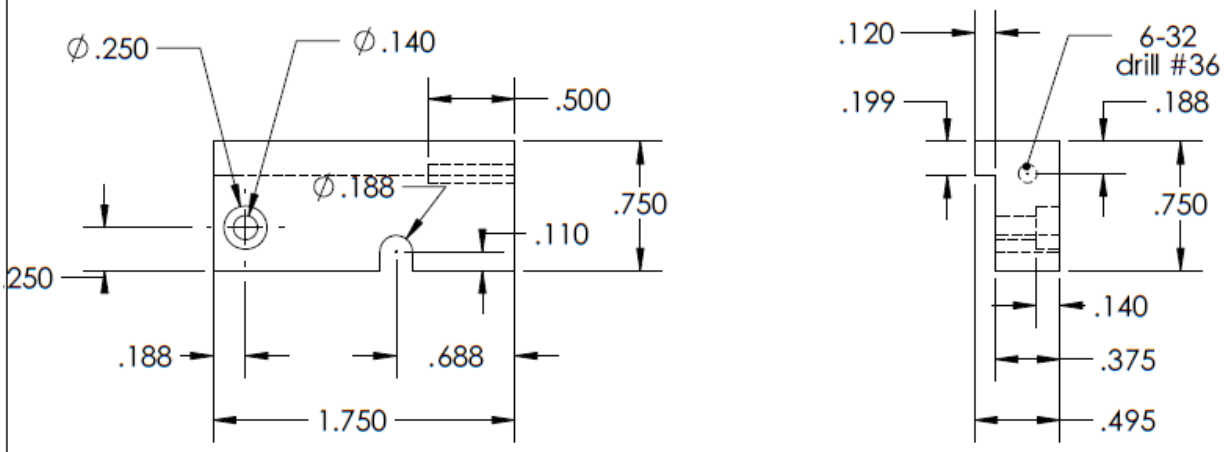
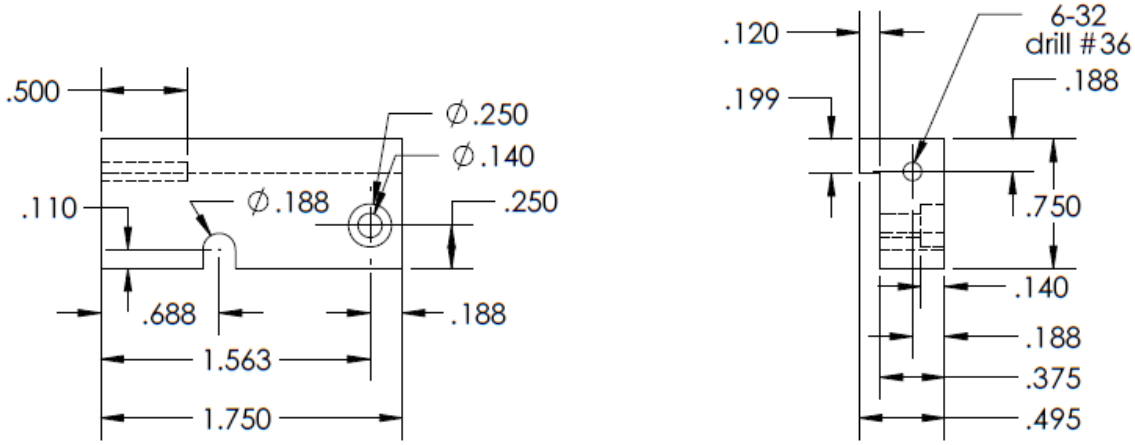
SIZE	FILE NAME	REV.
A	Lathe DRO Hardware Drawing	A
SCALE 1:1	X Head	SHEET 4 OF 8

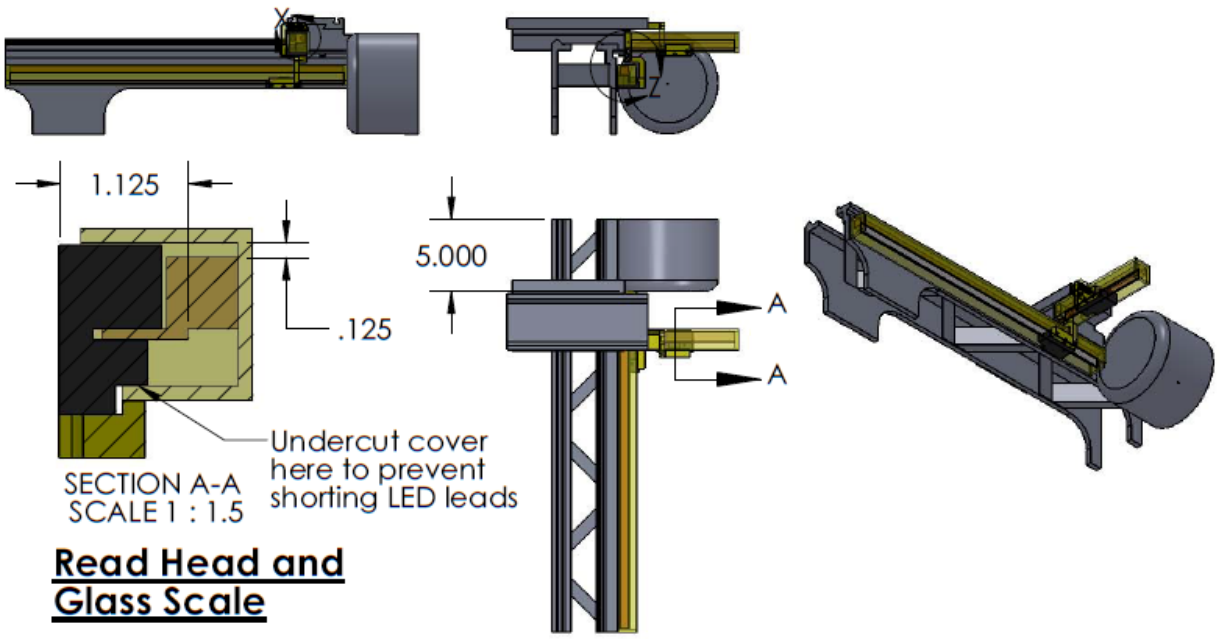


Z Read Head Bracket

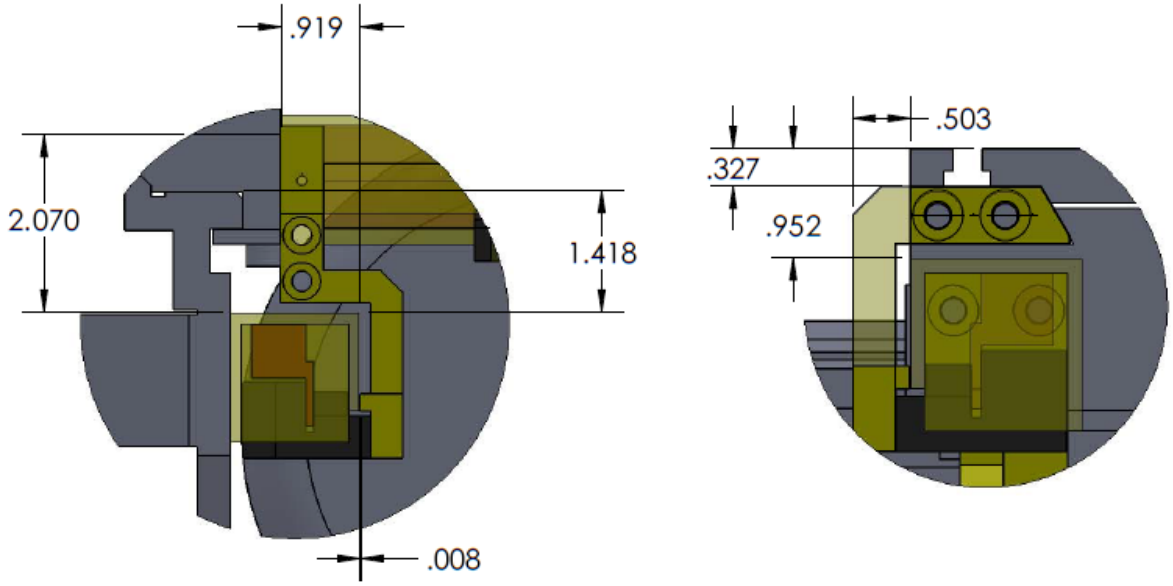


X Read Head Bracket

SIZE	FILE NAME	REV.
A	Lathe DRO Hardware Drawing	A
SCALE 1:1	Head	SHEET 5 OF 8



Read Head and Glass Scale



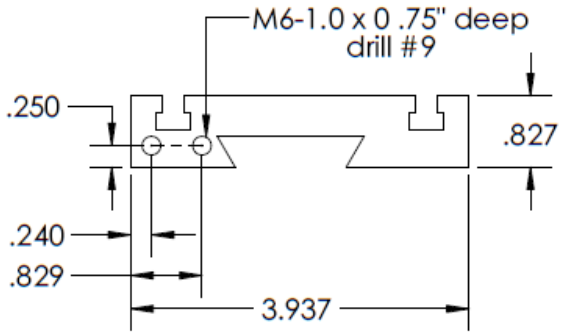
DETAIL Z
SCALE 1 : 2

DETAIL X
SCALE 1 : 1.5

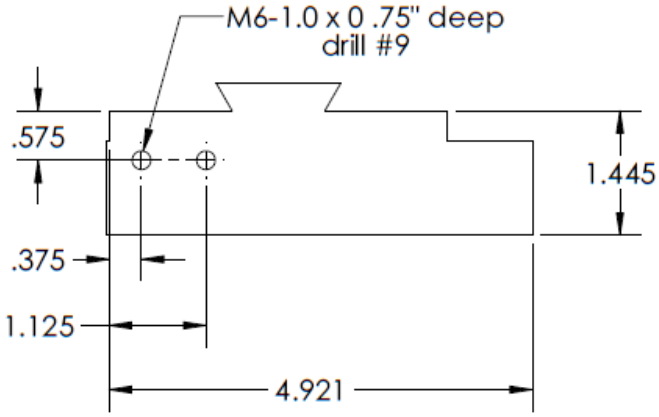
Scale Cover Locations

(Modify X & Z Brackets Based on As-Built Dimensions)

SIZE	FILE NAME	REV.
A	Lathe DRO Hardware Drawing	A
SCALE 1:1	Assembly	SHEET 6 OF 8



Carriage Cross Slide



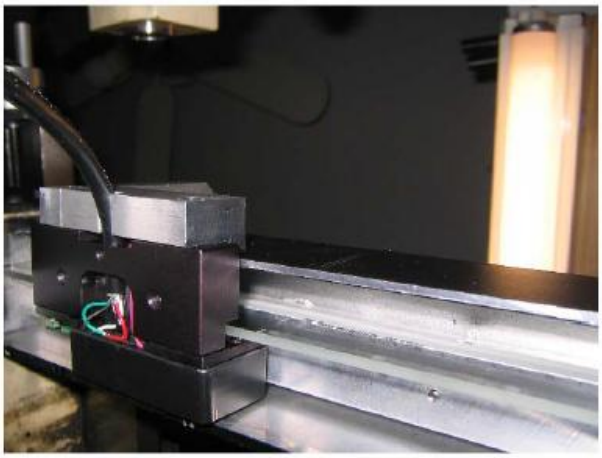
Carriage Saddle

SIZE	FILE NAME	REV.
A	Lathe DRO Hardware Drawing	A
SCALE 1:1	Carriage	SHEET 7 OF 8

Using guide to assure hand drilled hole is perpendicular and in exactly the right place. Ended up being within 0.003"

Z axis cover just touches motor housing

DRO read heads.
Cables are repurposed USB.



Detail of glass scale and reader under cover

Overview of DRO and VFD

View down Z axis. Hole in cover is for access to mounting screw.

SIZE	FILE NAME	REV.
A	Lathe DRO Hardware Drawing	A
SCALE 1:1	Pictures	SHEET 8 OF 8