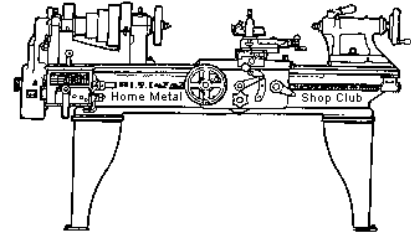




**October 2015**  
Newsletter

Volume 20 - Number 10



<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 **general announcements**, an **extended presentation** with Q&A, a **safety moment**, **show and tell** where attendees share their work and experiences, and **problems and solutions** where attendees can get answers to their questions or describe how they approached a problem. The meeting ends with **free discussion** and a **novice group** activity, where metal working techniques are demonstrated on a small lathe, grinders, and other metal shop equipment.

President <i>Vance Burns</i>	Vice President <i>Norm Berls</i>	Secretary <i>Joe Sybille</i>	Treasurer <i>Emmett Carstens</i>	Librarian <i>Ray Thompson</i>
Webmaster/Editor <i>Dick Kostelnicek</i>	Photographer <i>Jan Rowland</i>	CNC SIG <i>Martin Kennedy</i>	Casting SIG <i>Tom Moore</i>	Novice SIG <i>Unfilled</i>

This newsletter is available as an electronic subscription from the front page of our [website](#). We currently have 905 subscribers located all over the world.

## About the Upcoming November and December 2015 Meetings

The November meeting is cancelled to give members the opportunity to attend the [Maker Faire](#) at the George R. Brown Convention Center, Houston, Texas, [tickets \\$12.54](#). The Maker Faire is scheduled the same day as the club meeting, Saturday, 14 November. The next scheduled general meeting will be held on 12 December at 12:00 PM (Noon) at ["Roll Formers of Texas" \(Gene Rowan's Shop\)](#). Visit our [website](#) for up-to-the-minute details, date, location maps, and presentation topics for future meetings.

## General Announcements

[Videos of recent meetings](#) can be viewed on the HMSC website.

The HMSC has a large library of metal shop related books and videos available for members to check out at each meeting. These books can be quite costly and are not usually available at local public libraries. Access to the library is one of the many benefits of club membership. The club has funds to purchase new books for the library. If you have suggestions, contact the [Librarian Ray Thompson](#).

We need more articles for the monthly newsletter! If you would like to write an article, or would like to discuss writing an article, please contact the [Webmaster / Editor Dick Kostelnicek](#). Think about your last project. Was it a success, with perhaps a few 'uh ohs' along the way? If so, others would like to read about it. And, as a reward for providing an article, you'll receive a free year's membership for the next renewal cycle!

Ideas for programs at our monthly meeting are always welcomed. If you have an idea for a meeting topic, or if you know someone that could make a presentation, please contact [Vice President Norm Berls](#).

The Battleship Texas is looking for docents for the metal shop located inside the ship.

The annual swap meet is scheduled for 5 December 2015 from 9:00 A.M. to noon. [The location is 3119 Jensen Drive, Houston, Texas](#). This is your opportunity to sell or trade items which no longer hold your interest. This is also your opportunity to acquire a tool or two that you have been contemplating. See attached map.

## Recap of the 10 October 2015 General Meeting

By Joe Sybille, with photos by Jan Rowland



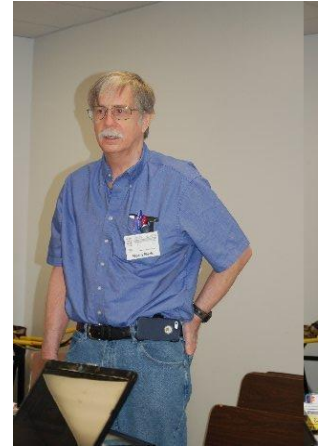
Twenty members attended the meeting at the Parker Williams County Library, 10851 Scarsdale Boulevard, Houston, TX 77089. There was one visitor, Harold Waters.

President *Vance Burns* led the meeting.

## Presentation

Vice-President *Norm Berls* gave a presentation on the Arduino microcontroller boards. Norm began by giving a short history on the history of the Arduino. What started as a project to help artists has evolved into a global technical revolution to help everyone else understand and apply microcontrollers in various applications.

Art students at the Interaction Design Institute Ivrea ( IDII ) in Italy needed a controller for a kinetic art project. Kinetic art is art that contains movement as realized by the viewer or depends on motion for its effect. The art students designed and built their own digital controller. The success and popularity of the controller convinced the students to pursue the business of making digital controllers. This is the beginning of the Arduino.



As a microcontroller, the Arduino is more than an on/off switch but less capable than a dedicated computer controlled by a microprocessor; however, the microcontroller is ideal for a myriad of useful applications. Examples include humidity monitoring, CO2 detection, motion control, light and sound control, real time clock assessment, and global positioning system (GPS) tracking. Liquid crystal display ( LCD ) control is another application of the Arduino. For those hobbyists interested in 3D printing, Arduino microcontrollers have been adapted to control the stepper motors used to move the control arms.

Computational numerical control ( CNC ) of lathes and milling machines is another application adaptable to the Arduino. A do-it-yourself ( DIY ) digital readout is within the realm of possibilities for the Arduino microcontroller. Since its inception as an open source microcontroller, there has been a proliferation of Arduino clones, for it seems as though there are endless possibilities for the applications of Arduino. Many of the clones have capabilities exceeding those of the original Arduino.



Major components of the Arduino include a USB plug for program development, power plug, reset button, timing crystal, digital input/output (I/O) pins, analog input pins, an 8-bit Atmel AVR microcontroller or 32-bit Atmel ARM processor, and power and ground pins. Some of the digital pins serve as analog output for pulse width modulation ( PWM ). To add versatility to the Arduino board, additional boards may be added. These are called shields and are designed for stacking upon one another. Short circuits caused by inadequate clearance between shields and

conflicts when two shields want to use the same I/O pins are known problems that can occur when using more than one shield.

Among the many available models, four popular ones are the UNO, NANO, Mega 2560 R3, and the Due (see photo above). Each model beyond the UNO offers more capability. To get the Arduino to do anything, one must write a set of instructions to program it. The written instruction set is called a sketch. Programming the Arduino is made easier by the use of the [Arduino integrated development environment](#) ( IDE ). The IDE includes an editor for writing the instructions in the C++ language, and it is capable of compiling and uploading sketches to the Arduino. Third party IDEs employ other [programming languages such as Python](#).

Numerous libraries of sketches are available free on-line. For readers proficient in C or C++ instructions may be developed without using the IDE; however, the instructions will still need to be compiled and uploaded to the microprocessor. Applications using the Arduino are limited only by one's imagination. See Norm's [presentation slides here](#).

## Safety Moment

Vance Burns showed a [video](#) depicting unsafe shop practices resulting in injuries simply because workers failed to take the time to use safe workshop procedures.

## Show and Tell



*Norm Berls* exhibited a knurling tool he made from plans discovered on the internet (photo at left).

*Martin Kennedy* demonstrated the operation of an electric screwdriver manufactured by DeWalt. Unique about this model (DCF 680) is the way the screwdriver operates. After engaging the screw bit with the screw, one must rotate the screwdriver either clockwise or counter-clockwise to start driving the screw (photo at right). It employs an internal gyroscope that detects hand motion and activates the screwdriver's motor with a speed proportional the degree on ones wrist rotation.



*Tom Darraugh* showed an adapter he made to connect his shop vacuum hose to his sand blasting cabinet (photo at left). He placed a length of 2-inch pvc pipe in a lathe chuck. While rotating, it was heated with an electric hot air gun. He forced out the softened pvc with a hand held screwdriver as the softened pipe rotated. The final diameter of the expanded pipe matched the 2-inch vacuum cleaner coupling size.



## Problems and Solutions - *Ask the Blacksmith*

A member requested suggestions on the best way to cut copper bus bars to length without leaving burrs on the cut ends. The use of a friction saw and the use of a thin band saw blade were two suggestions offered.

## Articles

### Soda Blaster

By *Keith Mitchell*

Soda blasting is a good alternative to sandblasting or other abrasive metal prep or cleaning methods for items that are delicate and do not require any significant metal removal to clean up. It will not warp sheet metal and works well for light surface rust. I have a small blast cabinet but keep it loaded with abrasive grit. So, I use the small self contained unit from Harbor Freight for soda blasting.



The blast media is ordinary baking soda. You can recycle the box you keep in the refrigerator when it has reached the end of its use life. It is available at Sam's Wholesale Club in 13 pound bags for less than \$10.

One application I have found is cleaning up the electrical contacts on trailer connectors after they have been exposed to the weather. Saves a bunch of time chasing ghost while servicing trailer lights.

At the left are shown examples of the finish achieved with soda blasting. One on aluminum and one on brass. The finish is a fine matte.

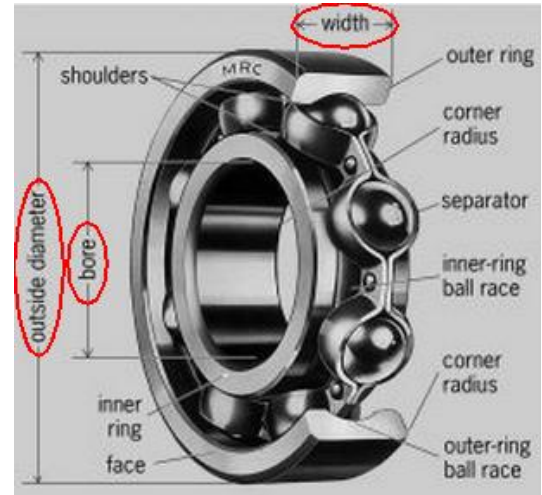


## Bearing in Mind

By Dick Kostelnicek

The numerical designation of a radial ball bearing, such as R6ZZ or 6206-2RS, may seem nonsensical to the home shop machinist. There are, however, a few things worth *bearing in mind*. For the most common imperial sized bearings, the designation begins with the letter 'R', while common metric bearings start with the number '6'. The bore, outside diameter, and width are given in inches for imperial bearings, while they're in millimeters for metric bearings (see right drawing).

The shaft or bore size for imperial bearings is coded in 1/16ths of an inch and directly follows the letter "R". For example: R6 fits a 3/8-inch diameter shaft ( $6 \times 1/16 = 3/8$ ). For metric bearings, the bore is coded in the rightmost two digits. Each unit value represents 5 millimeters. So, a 6206 bearing has a bore of  $5 \times 06 = 30$  millimeters. Metric bearings, whose bore is smaller than 20 mm, do not follow this rule, so you'll need a table to determine the bore (see references at end of this article). However, when the bore is less than 10 mm, the right most 2 digits become just one digit which is the actual bore in millimeters. For example: a 627 bearing fits a 7 mm shaft.



Each different "R#" size imperial bearing ( R2, ..., R8, .. ) comes in a single outside diameter and width. For these specific dimensions you'll need a table. The 3rd number from the right in a metric bearing's designation is the code for both the outside diameter and width and generally increases numerically for increasing size. The 6306 bearing is physically larger than the 6206 which is larger than the 6006. However, they all have a 30 mm bore, given by '06' on the right. Again, a reference table is a must for outside diameter and width.



Now, the last thing to keep in mind is the code for the bearing's protection, open, sealed, or shielded. It applies to both metric and imperial bearings and it directly follows the designation number. It begins with either a letter or dash. For example: a single 'Z' refers to a metal shield on one side of the bearing. 'ZZ' means shielded on both sides (see photo at left). Elastomeric seals are indicated beginning with a dash. For example: '-2RS' for double and '-1RS' for a one sided. Think of the

'RS' as meaning *Rubber Seal*!

Here are some web links for tables of a bearing's bore, outside diameter, and width:

[Imperial Bearings](#) - [Metric bearings](#) - [Miniature Metric Bearings \(page 37\)](#)

## Electric Screwdriver to Chuck Key Adapter

By *Martin Kennedy*

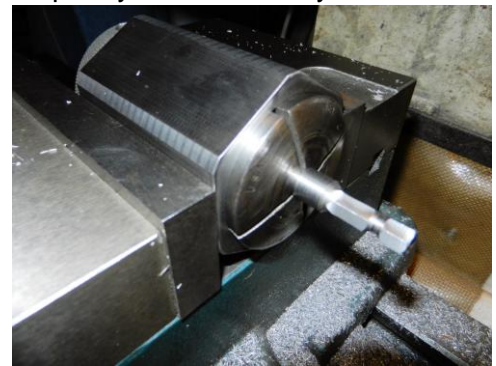


Here's a useful project for those of you with a four jaw chuck with reversible jaws. It is based on an idea by Dick Kostelnicek. This adapter lets you use your electric screwdriver to quickly remove and replace the chuck jaws. This used to be a chore but is now an easy task.

I started with a 1/2-inch stainless steel bar. The easiest way to cut the profiles at the two ends is to use collet block and a 1/2-inch 5C collet to hold the rod. Collet blocks come in square and hex shapes, and allow you to quickly and accurately rotate a part to the side that

you're cutting.

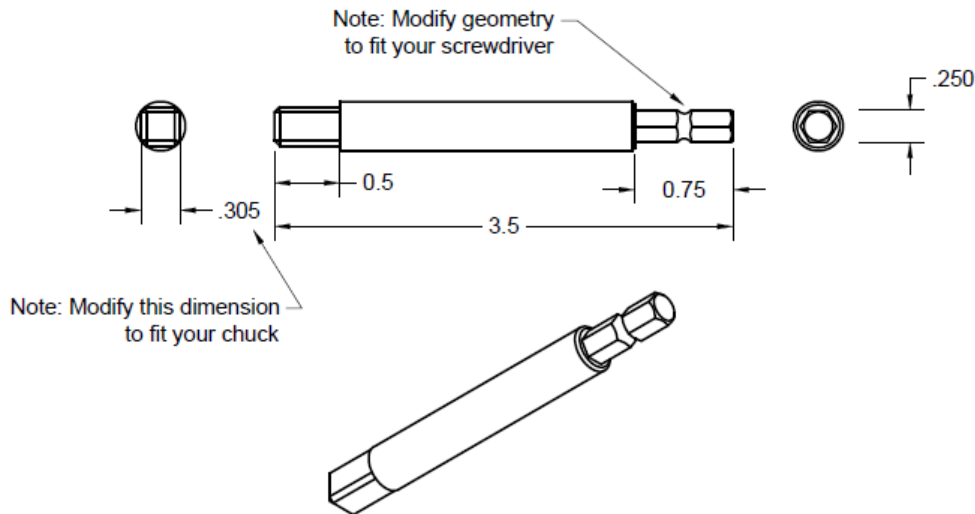
My 4-jaw chucks all use a 5/16-inch key. I made the key adapter slightly smaller, so that it would fit the miter gear recess in the lathe chuck. The key opening had rounded corners, so I had to knock the corners off the square key end with the lathe so that it mated easily.



The adapter's hex end has a circular indentation about 3/8-inch from the end so that my electric screwdriver holds it securely.

This may not be necessary, since some screwdrivers secure the hex drive bit magnetically.

Be sure and make the adapter long enough that the screwdriver clears the chuck jaws when they're fully extended out!



Adapter - Electric Screwdriver to Chuck