



## PNR Tour

January 6, 2018

*By Event Manager Marty Ellison*

Many of us recall what it was like writing a term paper back in high school or college. After spending countless hours of research writing up notecards with citations, then after fussing with typewriter ribbon, carbon paper and the wheel eraser, we'd begin putting our thoughts and just a few plagiarized passages onto onion skin paper, hoping upon hope we didn't need to edit a sentence or paragraph. Invariably a major error occurred near the bottom of the page requiring us to retype the whole thing again. What a contrast to today where we have instant access to digital knowledge bases and we dictate our thoughts through a transcription app on our laptop or tablet. After all the edits are done, with the push of a button, our term paper is printed out.

Manufacturing has undergone similar advances over the same period and in January about 55 PNR members had a chance to tour the GoEngineer Inc. facility in Algona, WA to learn how "Additive" manufacturing was bringing an entire factory plant to a desk top. GoEngineer is a national company with twenty offices throughout the country. They provide engineering design services relating to 3D modeling and printing of mostly prototype parts for industry. Jason Russell is Territory Account Manager, and was our host and tour leader. Jason explained to the group how CAD/CAM or computer-aided design/manufacturing is progressing. Rather than drawing a part at a drafting table, then sending the drawing to the machine shop where it is turned on a lathe or milled on a milling machine by a skilled machinist, the whole process is done digitally. A CAD file is the digital folder that contains the part's dimensions, tolerances, specifications and shape. CAD has been the standard for many years and when connected to a computer controlled machine, it controls the tool path to cut and form the part in compliance with the digital drawing from a block of material such as aluminum, plastic or steel. This, Jason said, is "Subtractive" manufacturing. By contrast, "Additive" manufacturing makes use of new technology 3D printers to print the part on a moving stage. As the print head moves about, it lays down material heated to its melting point from a long filament strand leading from a spool magazine. Gradually the stage moves away making room for the next layer to be deposited.

Another specialty of GoEngineers is 3D scanning. It's used to "reverse engineer" an existing part making use of a very precise laser scanner. The part is positioned on a rotating stage where the laser can measure every contour and detail of the part, converting all into a digital file. The file then is output to a 3D printer to form a new part with precise dimensions as the original. It can also invert the file to a mirror image to create a left-hand of a right-hand part.

To illustrate this technology Frank Daly provided a rare tool used to insert a lock ring for an early Chrysler fuel quantity sender. The tool is so rare, Frank borrowed the tool after posting a \$500 deposit with its owner. The tool was scanned into a file, then certain modifications were made using a CAD program to reinforce it in areas where needed. The printed part was made of white ASA, a type of ABS plastic that is not as strong as the steel original part. It was also printed out in Ultem 1010 which is much stronger but also much more expensive.



*Photos (top-bottom)*

- *PNR attendees gather for informative tour.*
- *The "Machines"*
- *Discussion of reproducing Frank Daly's wrench.*
- *The completed reproduction in "plastic."*

In this case a plastic part was made from the steel original. However GoEngineer will soon offer direct metal printing. Desktop Metal, a Burlington, MA company has developed technology that sprays a mixture of metal powder and a polymer that holds the shape together as it is deposited in a way similar to the plastic printers. The printed part is then placed in a sintering oven where the polymer is burned away, and where the remaining metal is heated to just below its melting point, fusing the metal particles together.

Member Bill Allard recently dropped in at GoEngineer to discuss scanning a cylinder head. In this case after the head is scanned, it would be printed into plastic, which would then be used to form a sand mold, into which the aluminum is poured. But in addition to the external shape and form of the cylinder head, the internal passages need also to be scanned. One way is to sacrifice a donor head, by cutting it in two to gain access to the internal passages. When these passages are scanned, a pattern is printed that represents the hollow areas or passages where the aluminum won't flow. These are the voids for coolant to circulate to cool the head.

The point of the tour was to introduce PNR members to the potential of this technology. There are countless projects that are dependent on sourcing parts that are much older than any of the members, and some are simply unobtainable. If for example, a member has only a left-hand part but needs the right, the left could be scanned, the file inverted to a mirror image, then printed out as a right. In many cases a reproduction into plastic would not be satisfactory, however the plastic part could be used as a casting pattern for a sand-cast part to be formed from aluminum.

Another application was used last year when a member from an east coast region contacted me for help with a rumble seat fender step. The individual learned that my 1938 Lincoln Model K had one of the few original fender steps. I removed the step, brought it to GoEngineers and had it scanned. The fine people at Go scanned the part, then emailed the file to the member in North Carolina, who then had a local

## Attendees

Bill & Lucy Allard  
Michael & Ildiko Bradley  
Craig Christy  
Renee & Pat Crist  
Tom Crook & Randy Small  
Frank Daly  
Bill & Karel Deibel  
Val & Stan Dickison  
Marty & Linda Ellison  
Peter Gleeson  
Bettye & Bill Gluth  
Jerry & Keenon Greenfield  
Matt & Karla Hackney  
Bruce & Betty Harlow & guest  
Brad & Hyang Cha Ipsen  
Marty Kulina  
Steve Larimer  
Bob LeCoque  
Ralph & Charlotte McCarty  
Phil McCurdy  
Barbara & Terry McMichael  
Paula Morrier & Tom Astrof  
Paul Murray & son Matthew  
& friend  
Lee Noble & Theresa Renico  
Randy & Brian Pollock  
Mark & Rebecca Reutiman\*  
Kim Pierce & Norma Sola-Pierce  
Brian & Jeffrey Rohrbach  
Dixon Smith\*  
Jim Warjone  
\* guest

## Driving Full Classics®



Lou Berquest  
*1935 Pierce-Arrow Convertible Coupe*



Bob LeCoque  
*1947 Cadillac Fleetwood 60S Sedan*



Jon Schoenfeld  
*1937 Cadillac Fleetwood  
70 Sport Coupe*

machine shop cut the step on a computer controlled milling machine. The gentleman spent some time sanding and texturing the part to remove the tool path lines that were present but the result was a near duplicate of the original including the grid-like tread pattern on the top surface.

It is hoped that as more members make use of this technology our Club could build a library of parts that could be shared among other members.

