



[www.FortWayneEngineersClub.org](http://www.FortWayneEngineersClub.org)

**Engineers News**

**December 2014 - Vol. LXXVII No. 4**

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### **December Social and Tour**

Mad Anthony Brewing Company  
Thursday, December 11th: 6:00 PM social, 6:30 PM tour  
2002 Broadway, Fort Wayne, IN 46802

The FWEC will once again have their December social at Mad Anthony Brewing Company ([www.madbrew.com](http://www.madbrew.com)). The social will begin at 6:00 and a tour of the production brewery ([www.madbrew.com/brewery](http://www.madbrew.com/brewery)) will begin at 6:30.

The production brewery is located in the parking lot of our restaurant and original brewery. This location produces all bottled beer, draft account beer, and beer for local festivals. The brewery itself is a 15 barrel Bohemian brewery with a copper brew house, two fifteen barrel fermenters and a thirty barrel fermenter. Three fifteen barrel bright tanks give the Mad Anthony beers room for conditioning. All bottling is currently performed on an older model Meheen style bottler with a capacity of 30-50 cases per hour.

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### **2014-2015 FWEC Board Members and Open Position**

The FWEC needs participant from its membership in these leadership positions to continue to function and keep tours planned. **We are in need of a member to fill the 2nd year Board Member position.** Please contact us with interest in helping to fill our opening.

Below are the 2014-2015 FWEC board members. Board positions are crucial to the planning of tours and events for the FWEC. Please consult the FWEC constitution (<http://fortwayneengineersclub.org/constitution.pdf>) or contact us at [info@fortwayneengineersclub.org](mailto:info@fortwayneengineersclub.org) for information on specific duties on board positions.

Board meetings generally last around an hour and are generally held on the first Tuesday of the month during the membership year (September to August).

#### **Current 2014-2015 Membership Year Board Candidates:**

President: Marna Renteria      Vice President: Rod Vargo  
Treasurer: Ryan Stark      Secretary: Elizabeth Garr  
1st Year Board Member: Mike Magsam & Jack Phlipot  
2nd Year Board Member: John Magsam & Open  
3rd Year Board Members: Dan Delaney & David Momoh

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### **FWEC Membership**

The FWEC exists through funding of its membership. Please forward your copy of the Engineers' News to prospective members and encourage their attendance at tours. Remember, the FWEC is the best deal in town with monthly tours at \$10 per membership year. Please be sure to recommend FWEC membership to your colleagues and friends.

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Parker Hydraulic Technology Center  
Ross Controls Lockout & Control Reliable Valves  
Schunk Grippers & Actuators  
Schmalz Vacuum Products  
Tolomatic Automation  
WIKI Pressure Gauges & Instrumentation  
[www.Sidenereng.com](http://www.Sidenereng.com)

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### Advertise in the Engineers' News

New for the 2014-2015 membership year! The FWEC will be selling advertising space within the Engineers' News. Advertisements are \$10 per issue and limited to ½ page of content. For submissions please contact [info@fortwayneengineersclub.org](mailto:info@fortwayneengineersclub.org).

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### November Tour History

The November tour history is provided by FWEC Vice President Rod Vargo:

PHD, Inc., hosted our November 20 tour. They provide pneumatic, hydraulic, and electrical components for industrial and medical robotics. These components include automated grippers (fingers or hands), clamps (act as vices, stamps, and/or molds), cylinders (to power and guide robotic movements), multi-sectional molds, switches, sensors, actuators, escapements, and linear slides (including complex rack and pinion assemblies). PHD has 540 million SKUs (i.e., product variations) which can be manufactured and delivered in 2 to 4 days from the placement of an order, with minimal pre-existing inventory in place. Custom designs or duplication of odd parts are also available as needed. This is the only company willing to custom design or duplicate as little as one piece.

The components are intended for incorporation into industrial robotics worldwide. These are the parts which blow-mold and handle hundreds of millions of plastic drink bottles each year. They stamp and manipulate auto parts including body panels, can assist in construction of subassemblies such as engine blocks, and are critical to automotive welding, paint, and assembly lines. Similar equipment is integral to the manufacture of tires. Snack and many other prepared foods are largely a result of robotics working at speeds far faster than human ability. Components referred to as nurse clamps handle instruments during robotic surgery.

PHD employs about 320 people locally including 39 mechanical engineers and 3 electrical engineers. The mechanical engineers are about evenly divided between new product development and the design or duplication of special items. The Great Recession resulted in many original equipment manufacturers going out of business, so a significant business arose duplicating parts in a variety of metals or plastics for orphaned machines. In many cases, PHD updates their function or durability. Some pieces may be 3-D printed as trials for fit or function but, for now, durable parts must still be made in more traditional ways. PHD's business plan clearly places emphasis on leading the industry in variety and durability of its components in a cost-effective sense.

The electrical engineers are primarily involved with the slow transition from pneumatic to electrical

actuators, particularly through PHD's subsidiary Yamaha Robotics, as costs plummet for specialized miniature motors and other electrical components. Yamaha Robotics can provide both components and complete machines.

Electrical robots controlled by Programmable Logic Controllers (PLCs) may be switched between different projects much more rapidly than mechanical or pneumatic systems. Electric motors can also allow more planes of movement in a given space. Digital camera eyes allow robots to "see" assemblies, such as precisely where studs or liquid gaskets should be placed within an engine block subassembly. Electronics can provide closer tolerances of movement (4 nanometers) than mechanical systems (0.001 inch).

PHD and Yamaha Robotics had various portable demonstration units which allow working with clients in concepts, design, testing, training, and servicing. These were housed in conjunction with a very pleasant classroom and conference section of a building. Just beyond in the same building were testing, servicing, and related shop facilities.

Three large buildings form a campus north of the airport; the passenger terminal for Fort Wayne International Airport was within walking distance (1.0 mile). The main campus can perform most functions including administration, intricate manufacture and assembly of components, research, testing, and shipping/receiving. A fourth building in Huntington provides additional extensive machine shop functions, allowing PHD to provide 50-80% of its own underlying pieces.

The Huntington facility operates three shifts, essentially working nonstop. The main campus had three shifts until business faltered during the Great Recession, during which it found ways for one or two shifts to still assemble and ship finished product on time. It now has more employees overall as business expanded again. Manufacturing of parts or extrusion of stock for established SKUs can start within minutes of receiving an order. One of the main buildings was retrofitted with a continuously moving overhead monorail for organizing and transferring orders around the facility, particularly to the shipping department. The monorail replaced a traditional roller tramway on the floor which obstructed worker movement, depended on busy workers to move projects along, inherently had problematic turns, and inherently presented potential safety concerns due to being a prominent fixture around the extensive shop floor. Our gracious hosts told a precautionary story about avoiding unnecessarily close tolerances. Most roof assemblies are designed to flex, so the monorail system changed elevation after heavy snowfalls, initially presenting some unexpected conflicts.

PHD and Yamaha Robotics have been steadily adding employees both locally and internationally. They have major design and service facilities in Germany and near Beijing. A sales office is being established in India. Their products and designs are, or can be, compatible with most of the competing parts or systems found worldwide. Yamaha Robotics in Fort Wayne is the only Japanese brand with engineering, service, and manufacturing ability outside of Japan.

About 20 people attended this tour of a complex and growing international business. It started in 1957 by providing a medium-sized Tom Thumb pneumatic cylinder-actuator for General Electric's specific needs in Fort Wayne. For some reason, other contractors were not interested in that low volume medium-sized piecework. From there, the repertoire of paper designs and now computerized SKUs mushroomed but were kept available to customers. Cost-effectiveness, precision, and management had to be steadily honed. Excess land near the airport was purchased years before it was needed, behind an existing main building which was eventually outgrown and sold. The current scale, precision, and administration of PHD, Inc., deeply impressed us.

A special thank you to our PHD tour guides: Gary Murphy, Brian Wallace, and Chris Eleston. Additional thanks to Walt Hessler for helping to make tour arrangements.

Fort Wayne Coder Dojo is a club for students (and adults) interested in Minecraft modification skills. Noel Knox ([noelknox@yahoo.com](mailto:noelknox@yahoo.com)) can be reached for further questions regarding the club and their operations. The club meets on the Indiana Tech campus in the Zollner Engineering Center, Room Z103 (the software engineering lab). Their next meeting is Saturday January 17th.

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### **Northeast Indiana DiscoverE Committee**

The Northeast Indiana DiscoverE Committee now has its new website: [www.discovere.in](http://www.discovere.in). The website is still getting updated with new and relevant information.

The Engineers' Week banquet will be held on Saturday February, 28<sup>th</sup>. The banquet presents Academic Awards to local engineering students. The FWEC website ([www.fortwayneengineersclub.org/donate.html](http://www.fortwayneengineersclub.org/donate.html)) can be used to make academic award donations.

The incorporation of the Northeast Indiana DiscoverE Committee as a standing committee within the FWEC was a result of a 2013-2014 board member vote and corresponding update to the FWEC bylaws (<http://fortwayneengineersclub.org/constitution.pdf>).

The Northeast Indiana Discover Committee will be working to upgrade their website with more information to follow.

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### **FWEC Board Meetings**

Fort Wayne Engineers' Club board meetings are open to all FWEC members. The next FWEC board meeting will be Tuesday January 6<sup>th</sup> at 7:00 PM. Board meetings are held on the Indiana Tech campus in the Zollner Engineering Center in room Z-203 ([www.indianatech.edu/SiteCollectionDocuments/Campus\\_Life/Campus\\_Map.pdf](http://www.indianatech.edu/SiteCollectionDocuments/Campus_Life/Campus_Map.pdf)).

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### **Engineers' News Past**

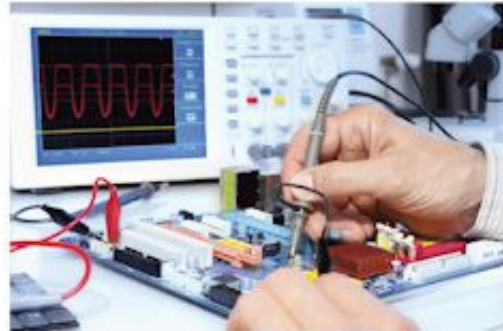
No excerpt from past Engineers' News filings in this newsletter.

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## SIMPLIFY YOUR WORLD

Zuno is an electrical engineering services company. We specialize in the design, build, integration, test & support of systems; from complex to simple and everything in-between. Understanding the objectives that drive a project allows us to create designs that are intuitive and easy to use. Our talented and experienced engineers have a broad range of skills in electrical, mechanical and systems engineering. We focus in industrial control, circuit design, image/signal processing, machine vision, and embedded software solutions.



## SKILLS



### Electrical Engineering

- Microcontroller Circuit Design, Programming and System Integration
  - > Brands
    - Microchip
    - Atmel
    - ST
  - > Development Tools
    - MPLABX
    - Atmel Studio
    - IAR Workbench
- Schematic Capture and PCB Layout
  - > DipTrace
  - > CadSoft Eagle
  - > Altium Designer
  - > Mentor Graphics PADS
- Image and Signal Processing
  - > Digital Signal Processing
  - > Image Correction and Feature Detection
- Control Systems
  - > Opto22 PAC Project Pro
  - > Groov web based industrial HMI

- > EMU (Energy Monitoring Unit)
- > Cognex
- > Machine Vision Systems

- Simulation and Modeling
  - > Using Matlab / Simulink, Python
- System Instrumentation and Testing
  - > Utilizing National Instruments Equipment and LabView
- > Full Suite of Test Equipment

### Mechanical Prototyping

- > 3-D Printing Capability for Rapid Prototyping and Proof of Concept
- > Expert level CAD users
  - AutoCAD

### Contract Manufacturing

- > PCB Assembly and Test
- > Light Mechanical Assembly
- > System wire harness prep and assembly
  - Schleuniger 9500

# SERVICES

## INDUSTRIAL CONTROL

We are a distributor and system integrator for Opto22. We have used Opto22 hardware and software for many industrial control applications. We can integrate Opto22 with most industrial control systems including Allen-Bradley. We also develop intuitive HMIs for easy machine operation.

We provide a multitude of services and roles. We can design a complete control solution from scratch; hardware, control software, HMI and installation of hardware. Or, we can provide just a partial solution if your engineering team would like to tackle some of the design.

We also support and service existing systems. If you have a legacy system that you need serviced, repaired or even redesigned we can provide that service on site or remotely.



## EMBEDDED SOFTWARE

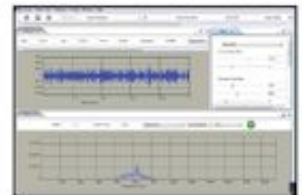
We can implement virtually any embedded software solution. We have had experience ranging from 8-Bit microcontrollers programmed in assembly to 32-Bit ARM processors running embedded Linux, and everything in-between.

The photo to the right is a product we designed for a customer to thermoform high end boot liners for the snow and water sport industry. This design implements an integrated 120/240 VAC power supply, microcontroller, sensors for temperature feedback, and a user interface to control two heater units.



## SIGNAL PROCESSING

Our engineering staff has a strong background in image and signal processing. We have developed many signal processing solutions, from military applications for image processing, to industrial solutions for machine reliability. We typically implement prototype algorithms in Matlab or Python using modeled or captured data. We can then port those solutions over to an embedded solution, or work with our trusted software development provider Ensfire Software to develop a standalone application.



## CIRCUIT DESIGN/PCB LAYOUT

At Zuno we can transform your idea into a final product, starting with basic system requirements we can design your circuit, capture the schematic and layout the PCB. We also can produce the populated PCB and test the product before delivering to you for final review.



We can interface to virtually any sensor, display or other IO device. In fact we have designed sensors for various industries including automotive and military.

[www.zunoengineering.com](http://www.zunoengineering.com)

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