AlphaTech Inc.

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NAT Contracts with AlphaTech to Automate/Support Manufacturing

By Joe Worley – New Business Director

North American Trade (NAT) is a producer of quality ammunition brass. The company manufactures unprimed centerfire ammunition brass cases using a seven-step process to ensure quality and consistency. They are an American-owned company located near Asheville, North Carolina.

NAT contracted with AlphaTech in early 2015. Since that time, we have worked with NAT owner, Neil Myers, and their staff to develop a unique seven-step production process:

- Step One – Annealed brass cups (preformed brass with enough material to be extruded into a final shape) are purchased per NAT specifications and quality standards. All cups are manufactured in the USA.

- Step Two - The cups are loaded into hoppers and run through a caliber-specific transfer die within a 40-ton press. The press runs at a capacity of 240 strokes per minute. That is 14,400 pieces of brass every hour! It is crucial that the transfer dies and all associated tooling be well maintained. ATI takes pride in helping NAT achieve maximum UP time.

- Step Three - Brass cases then enter wash station number one. Here, cases are washed and dried using custom-built machinery with an automated timing and solution system.

- Step Four - The extractor groove is cut on the head turn machines. Cleaned and dried cases are placed in a custom elevator hopper. The elevator hopper feeds two head-turn machines using multiple sensors.

- Step Five - Finished cases are loaded into NAT's proprietary bowl feeder/meter system from an automated elevator hopper for laser and vision inspection. An OPTO 22 PLC monitors and controls each step of the process. Every case is inspected and dimensions are documented and stored by lot number to maintain quality control. Inspection tolerances are derived from MIL-STD-636.

ISO Certification

The ISO Team at AlphaTech is working diligently to become certified with ISO 9001:2015. ATI will recertify with Advantage International Registrar (AIR) for another three-year registration term this summer. This will mark our 9-year anniversary of being an ISO Certified Machine Shop! We are very proud of our ISO Team and our certification through AIR.

NAT's 360-degree laser inspection station ensures every case meets these requirements:

- Overall Length
- Mouth Diameter
- Groove Length
- Groove Diameter
- Rim Thickness
- Head Diameter
- Primer Pocket Diameter
- Flash Hole Diameter
- Head Stamp Presence

- Step Six - Cases that pass inspection to SAAMI specifications are washed, dried and dipped in an inhibitor wash to maintain a bright and clean appearance.

- Step Seven - Cases are placed in various containers to fit customer requirements including; 5 gallon pails, 20 gallon barrels or wooden pallets all lined with 4 mil bags for protection.

AlphaTech has worked alongside NAT staff to automate the various steps listed above. We have built custom bowl feeders and transfer stations, modified elevators, built and designed tooling for transfer presses and developed programming that ties it all together. We also continue to support all NAT production efforts and product development.

It has been a great opportunity to help NAT get established properly and it continues to be our privilege to keep their equipment running smoothly. NAT is at the forefront of brass case production and we are very excited to be part of their success!

For more information about North American Trade, and to view a video of the process, please visit their website at www.natrade.net.

Tech Tip: Arduino Based Industrial Controls

By Deane Potter – Applications Engineer

There are dozens of industrialized PLC control options on the market. To name several you have Allen Bradley, GE Fanuc, ABB, Siemens, Horner, Eaton, Automation Direct and many others. These solutions are all programmed with ladder logic (RLL) and have worked well for 40+ years. This technology is still growing in capabilities and flexibility.

At the same time the SoC (System on a Chip) world is continuing to mature and is now coming to the manufacturing floor. Many SoC devices belong to the IoT (or IIoT) world. Some can be a viable alternative

to PLC based controls. Below is a quick snapshot of a system we developed using an industrialized Arduino.

Recently we were asked to repurpose an existing piece of equipment. Not an uncommon occurrence in most manufacturing environments. The equipment we were working with included an old paddle hopper/elevator purchased dirt cheap from a fish processing plant and two new head turning machines from BRUT. The objective was to build a system to continuously load freshly pressed brass casings into the two head-turning machines and keep their hoppers loaded. See Figure 1.

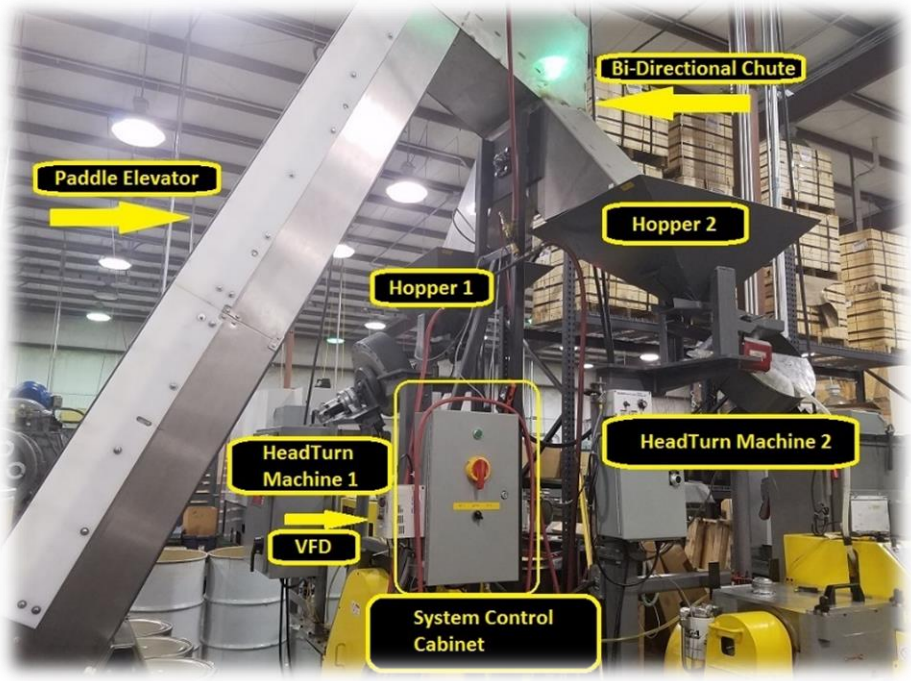

Figure 1.

The solution we chose to implement used the Ardbox from Industrial Shields (http://www.industrialshields.com). This device is based on the Arduino Leonardo SoC. The Arduino platform is programmed in C/C++ and as such does not use ladder logic or RLL. The Arduino is not currently a fully object oriented platform but, at some point it could be. The Ardbox 20 model has 10 inputs and 10 outputs which are very configurable. See the table below.

Model: PLC Arduino ARDBOX 20
Source power: 12 or 24Vdc
Inputs: 10 (software configurable)
9 Analog (0-10Vdc) or Digital (5-12-24Vdc)
1 opto-isolated Digital PNP (5-12-24Vdc)
Outputs: 10 (DIP switch configurable)
10 Isolated Digital (5-12-24Vdc)
6 can be configured for PWM (5-12-24Vdc)
7 can be configured for Analog (0-10Vdc)
Communications: USB, RS485, RS232, I^2C, SPI

For this project, we used eight discrete inputs and two outputs. The inputs are: one Start switch (MOM), A/B/C selector switch (maintained), two hopper proximity sensors and two magnetic position sensors on the pneumatic cylinder. The outputs are: a discrete On/Off to an Automation Direct variable frequency drive, set for a specific speed, that runs the paddle belt motor, and an SMC pneumatic valve that is spring loaded on the return. The air cylinder is used to reposition the director plate inside the exit chute. Our fabrication department mounted a bi-directional chute at the top of the elevator. This allows brass casings to be directed to either of the head turn machine hoppers. See Figure 2.

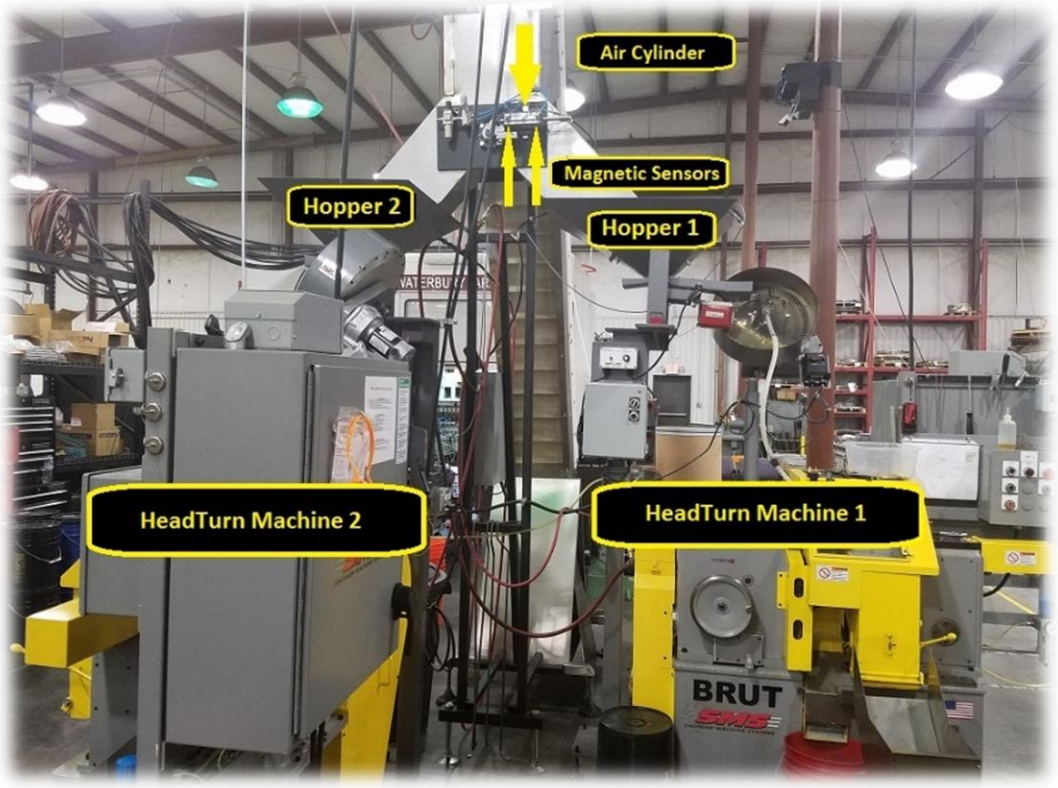

Figure 2.

Operation is simple, as the head turn machines run through the product in their respective hoppers, their sensors turn on signaling for a refilling. The ARDBOX determines which sensor went on first. Then it sends a signal to the pneumatic valve to reposition (if necessary) the director plate. When the plate position sensors verify that the plate is positioned as requested, the paddle belt motor is turned on and brass casings are sent up the chute. As each hopper is loaded, the hopper sensor signals that enough product has been loaded and turns off the motor. This process continues as each hopper requests to be filled. Additional output devices can be easily added such as a light tree to give visual indicators on the system state, analog control of the motor speed based on PID looping, etc. The finished project is shown in Figure 3.

Figure 3.

Controlling industrial machinery is no longer limited to ladder logic programmed devices. We now have a broad range of solutions to choose from and the options are growing each year. This was a fun project to build and is quite functional. The fact that it was written in C++ was an added bonus.

Industry Trends: The IoT Era is Here

By Hilary Mikowicz – Director of Communications

IoT, or Internet of Things, is the "network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment" (Source: https://www.i-scoop.eu/internet-of-things-guide/). The three main industries in terms of IoT spending in 2016 were manufacturing, transportation and utilities. Manufacturing is predicted to keep this number one position across the globe until at least 2020. This top spot is due to reasons including efficiency, automation, customer-centricity, competitive benefits and the benefits of data across the manufacturing value chain. Business Insider Intelligence projects that there will be 34 billion devices connected to the internet by 2020, 24 billion of these being IoT devices. With this projection, IoT

"Roughly 63% of manufacturers believe that applying the IoT to products will increase profitability over the next 5 years" Source: The MPI Group / The Internet of Things Has Finally Arrived

has been referred to as the "next Industrial Revolution" (source: http://www.businessinsider.com/iot-trends-will-shape-the-way-we-interact-2016-1).

The introduction of IoT into manufacturing will help eliminate waste due to production flow being monitored in real time. It is also projected to aid in management's control of the production line status to make quick adjustments and better manage operational cost. Machine maintenance may be tracked to minimize equipment failures and reduce service costs. Research & Development will profit from tracking equipment deterioration enabling the reengineering of products for better performance. For manufacturing, there will also be the added benefit that these "things", in the Internet of Things, need to be created. This will generate increased revenue and market share as well as access to new markets to manufacturers who are contracted to produce the upcoming influx of internet capable products created by the incorporation of IoT. (source: https://www.i-scoop.eu/internet-of-things-guide/internet-of-things-in-manufacturing/).

In executing an IoT manufacturing strategy some important considerations need to be addressed on the company wide level. The first will be to identify what data can be collected and from where will it be collected. It is also equally important to consider whether employees are using the data optimally. Data is vital to manufacturing but colleting *accurate* data and analyzing it properly is crucial. Training must also be addressed as well. Companies should consider the possibility that IoT might be best implemented in conjunction with retraining employees with data collection and the new IoT strategy. (source: https://www.i-scoop.eu/internet-of-things-guide/internet-of-things-in-manufacturing/).

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