FOUNDRY 4.0 WHAT IS IT?

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ARTICLE TAKEAWAYS:

- Understanding Industrial 4.0
- Key components of Foundry 4.0
- How to begin the process

The first thing to understand about Industry 4.0 is it is not one technology but a combination of modern technologies combined to create a 'SMART factory.' The 4.0 stands for the fourth industrial revolution which at first sounds extreme but when you start to look at the possibilities, it is easy to see how these technologies can become real game-changers. Industry or Foundry 4.0 is the brainchild of the German government, and the train of thought is to create smarter, more efficient manufacturing through the use of SMART factories in the not too distant future. This will be achieved by various technologies communicating in a way that allows autonomous running of the facility and processes.

INTERNET DRIVEN

The high-speed internet of today is allowing a lot more data to be transferred remotely and giving us much more control in industry where we will start to see massive leaps forward in the workplace.

Businesses are starting to utilize this connectivity in many ways, from automatic material ordering through to cloud-based software control. The premise behind Industry 4.0 is to take this one step further by connecting not just one machine, but also the whole factory so that it communicates as one entity.

As an example, machinery in a foundry or die cast facility can already be monitored remotely via cloud-based control systems giving complete access to the data on the machine and if needed remote control of certain elements is possible. Also using technologies like RFID (radio frequency identification) (Fig. 1) we are able to automate control of various machines.

Fig. 1 - Radio Frequency Identification

Foundry 4.0 is integration, communication and usage of data! Integration is everything in the cell communicating to one location for data storage.

Communication – many different kinds:

- Communication with the computer to know when something is about to happen that should not.
- Communication is the supplier being able to talk to the equipment and send you reports on what is happening daily or weekly.
- Communication of the data in such a manner to make sure you can use the information.

WHAT IS A SYSTEMS INTEGRATOR?

Systems integrators take existing equipment and gather information from that equipment to display data on HMI and computer screens. They can capture data such as trend pressure, temperature, flow and any other analog input in different formats for storage and later dissemination. This enables you the customer to track downtimes, maintenance, runtime hours, and waste.

REPRESENT THE REAL WORLD ON A SCREEN

The system integrator uses PLCs to monitor, control and capture data.

- Digital inputs and outputs (AC or DC) – limit switches, push buttons, disconnects, pressure switches, lights, horns, solenoids, and motor-starters.
- Analog inputs and outputs (ma or volts) – thermocouples, pressure transmitters, flow sensors, VFD, RPM, speed, amperage, voltages, and valve position.
- Counters, timers, totalizers, math computing capabilities, along with special control algorithms like PID (closed loop control).
- Each plc communicates on a network, usually ethernet, which connects to an HMI (human machine interface), computers (running SCADA software) and other PLCS.
- Software is used to program each of the PLCs and HMIs to monitor and control the process, monitor the network, and share/store the data.

Fig. 2 - HMI Screen

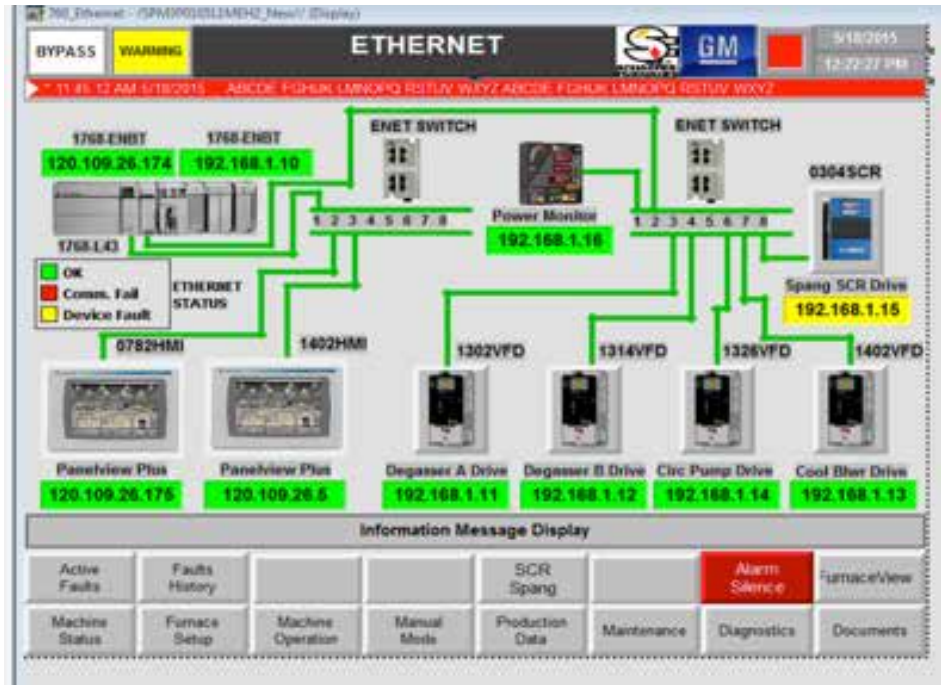

Fig. 3 is an example of ethernet network layout - plc communicating with HMI'S drives, power monitors, and the Spang SCR. green, yellow and red backgrounds indicate status of the network, connected through ethernet switches. There is also a screen shot of the Allen Bradley PanelView development software.

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Fig. 4 - Electric Holder

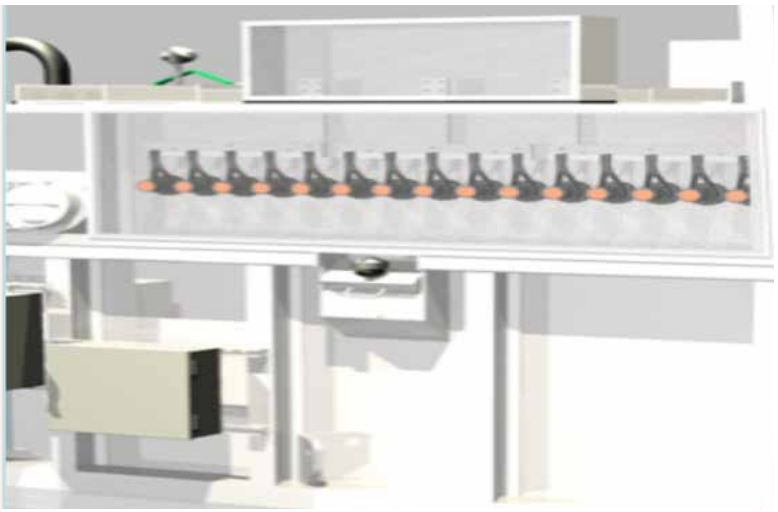


Fig. 5 -Holder in a 3D screen format

We start with an actual picture of a Schaefer holding furnace (Fig. 4). Here is the same furnace represented in a digital format (Fig. 5).

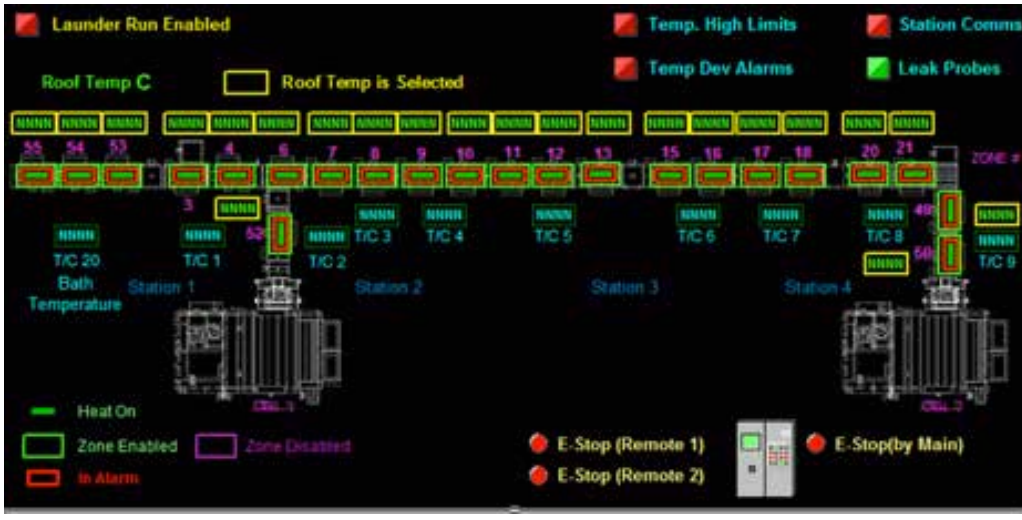
We use the SCADA Software, which stands for Supervisory, Control, Data, Acquisition. What does this do for your foundry or die cast facility?

What do you need the most?

- Quality Control
- Downtime Logging
- Waste Management
- Centralized System Management
- Better, Simplified Control of Your Process

It converts this...

to this!



MAKING YOUR INSTALLATION A SUCCESS

LAUNDER SECTIONS REPRESENT:

1. Disconnect status
2. Zone status control and on/off status
3. Temperature control and status
4. High limit control and status
5. Alarm status and emergency stop

This gives the company the ability to prove the of quality castings, head off problems before they become issues. Area managers can monitor production 24/7. The system can stop production in a cell if there is an issue and the data is collected and stored for your protection.

Additional benefits:

1. Less actual downtime
2. Reduced scrap castings
3. Reduced customer rejects
4. Proof of quality
5. Reliable record keeping
6. Proves the cost of quality
7. Pinpoint unseen bottlenecks in your process

Foundries and die casters of the future that need to be reactive to the changing market place and by investing in Foundry 4.0 will have a competitive edge.

Those adopting this concept will be more efficient and improve productivity, while at the same time, be able to be more reactive to customer needs because these systems will give flexibility allowing for more affordable short production runs.

An added benefit is that if you allow your suppliers to log into their equipment to see the operating conditions, they can monitor and record the data for you and even troubleshoot a piece of equipment—all over the Internet. It is possible to supply the foundry with daily or weekly reports on the operation of the equipment such as up time, efficiencies, and troubleshooting.

Obviously, this has to be a tightly controlled secure connection with password and security measures in place to prevent hacking. To be a complete SMART foundry or die caster you will need to rely on a safe Internet connection. Therefore, do not attempt this without a reliable and safe Internet connection with an upgraded cyber security system.

END RESULT

The end result is a factory where customer orders are placed via a centralized control system and by using integrated MRP/ERP (Material Requirements Planning & Enterprise Resource Planning) software systems the factory controls its supply chain and production needs automatically.

Machines communicate with each other and the supply chain placing orders for raw materials and planning production needs to meet lead times. The equipment then works together in the most efficient manner to achieve the customer's requirements.

This doesn't mean the end of human involvement, but it does mean you must look for workers with a very different skill set. It is important to have an employee able to understand, embrace, and appreciate this advanced technology.

As a company on the cutting edge of technology we are already using some of this technology in our furnace control panel designs.

Currently, we can monitor our bake-out burners from our cell phones remotely and install communication systems in your furnace that allow us to monitor and troubleshoot and record data every hour of every day over our secure network. We can also send trouble shooting tips to your PLC or cell phone to quickly resolve most issues. Additionally, we are using virtual reality for demonstration of processes and training.

The big question is where do I start?

Think about the changes right now that would benefit your plant, such as adding more automation with communication abilities.This could be accomplished with the retrofit of existing machines with a SCADA system, and to start with one cell at a time. The system can be a plug and play system that you can add to later. It is pretty easy to start with one cell to see how much you like the control and data acquisition.

A global economy with be relying on "smart foundries" moving forward. Early adopters will be rewarded with a production that has higher uptime, and productivity, and reduced waste. The time is now to start learning, seeing it in action, and begin your process.

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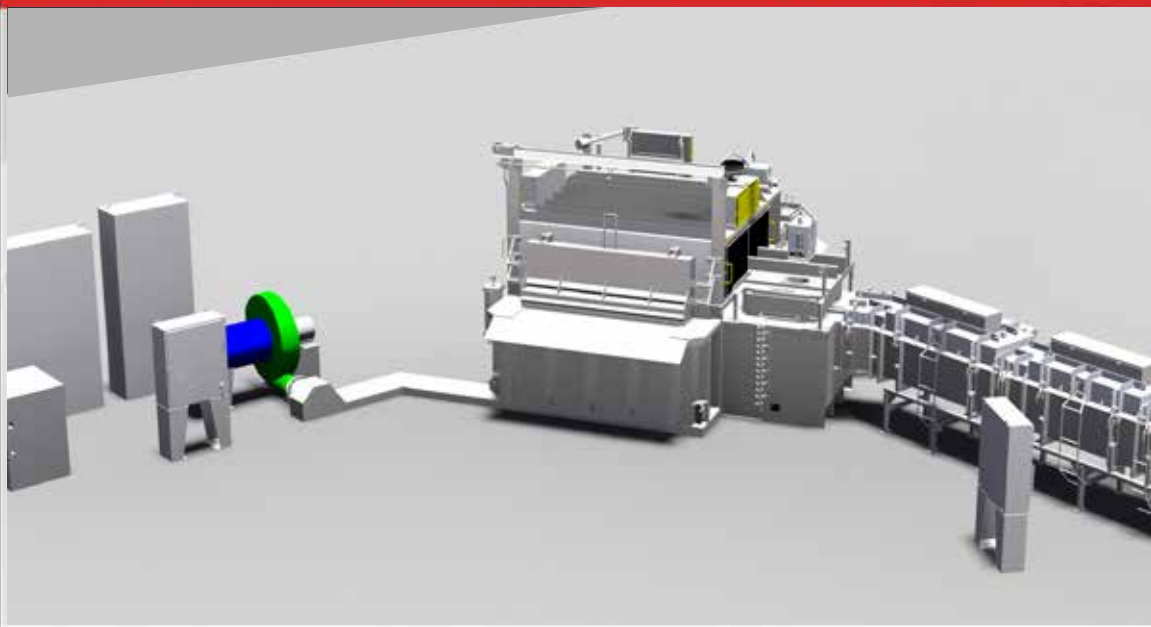

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