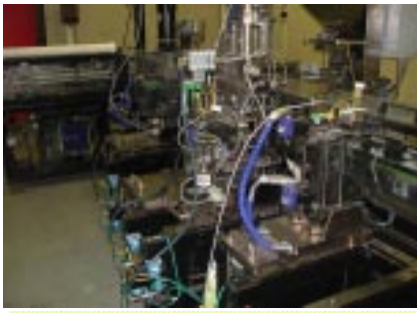


ZIGGY™

ZIGGY LEAN Overview

Lean manufacturing training calls out the five (5) steps leading to Lean:

1. Specify Value
2. Identify the Value Stream
3. Flow
4. Pull
5. Pursue Perfection

But how does one implement Flow? How does one implement Pull? Lean teaches us that the ideal would be a lot size of "1". How does one get to a lot size of "1" without huge expense?

ZIGGY is a manufacturing architecture comprised of rules, concepts, software, and hardware that helps companies economically achieve the ideal.

The building blocks of this architecture are:

- Modular process units
- Modular train units
- Modular conveyance
- Agile Controller
- Mass Customization Controller

The unifying elements include open-architecture controls, communications, and software

Each of these components will be described in more detail in subsequent documents. The objective here is to provide an overview.

An assembly line implemented using ZIGGY can instantaneously change from making one product to another to another without stopping and without setup.

Move from high-volume, high-speed, mass production, to a lot size of "1" and return without interruption. This capability allows companies to build to order, to match inventory tocustomer demand, to personalize their products and services to better serve their customers.

Implement ing ZIGGY guides a company to design in Flow and Pull—even in low-volume, batch production.

Companies implementing ZIGGY will:

- Lower production costs
- Reduce inventory costs
- Improve Cash Flow
- Develop closer relations with their customers
- Achieve dependable delivery schedules

ZIGGY LEAN has a consistent set of components used to build an assembly line from the bottom up.

Modular Process Units

- The lowest level of production. These are fully self-contained single-step production machines designed to your production requirements.
- Each Modular Process Unit is designed to a common set of physical characteristics selected for compatibility with your requirements.
- A WRC HOLOCON™ Controller is used within each Unit to provide the controls necessary for autonomous operation of the unit, but integrated with the balance of the line for coordination and step-wise negotiation. The HOLOCON controller is designed to the open-standard IEC 61499

Western Reserve Controls is an established manufacturer of industrial controls. WRC provides the ZIGGY architecture and components to Machine Builders and Systems Integrators that know your production and process requirements.

ZIGGY is protected by the following US patents:
- 6,615,091
- 6,325,198
- 6,478,134
- 6,681,915

Modular Process Train Units

- Multiple Modular Process Units may be ganged
- together to meet speed, timing, and/or volume requirements.
- In this case, groups of products may be moved together— as in a train.
- A WRC HOLOCON controller provides the control of a train unit.

Modular conveyance

- The conveyance also needs to be designed for the family of products being produced.
- To meet the ZIGGY Architecture requirements, the conveyance and the Process Units must be operated independently and be mechanically independent.
- A wide variety of options are available including conveyors, material handling robots, even direct labor.

AGILE Controller

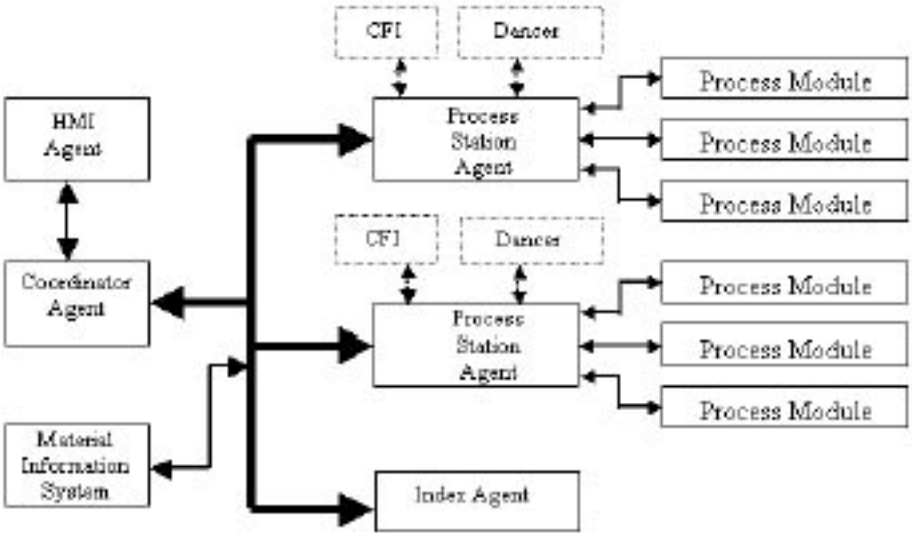
- The AGILE Controller is the heart of the architecture.
- The AGILE Controller communicates with each of the HOLOCON Controllers in the Modular Process
- Units and the Modular Train Units and the Modular Conveyance to provide operational synchronization.
- Additional communications take place for error handling and to negotiate the change or introduction of a new Modular Process Unit.

Mass Customization Controller

The optional Mass Customi z a t ion Controller communicates with the AGILE Controller and the HOLOCON Controllers to direct them when it is their turn to operate on a production piece.

Using a combination of recipes and itineraries the Mass Customization Controller controls the operations per - formed during assembly thus allowing each piece to be processed differently resulting in a batch size potential of "1".

The unifying elements include open-architecture controls, communications, and software.

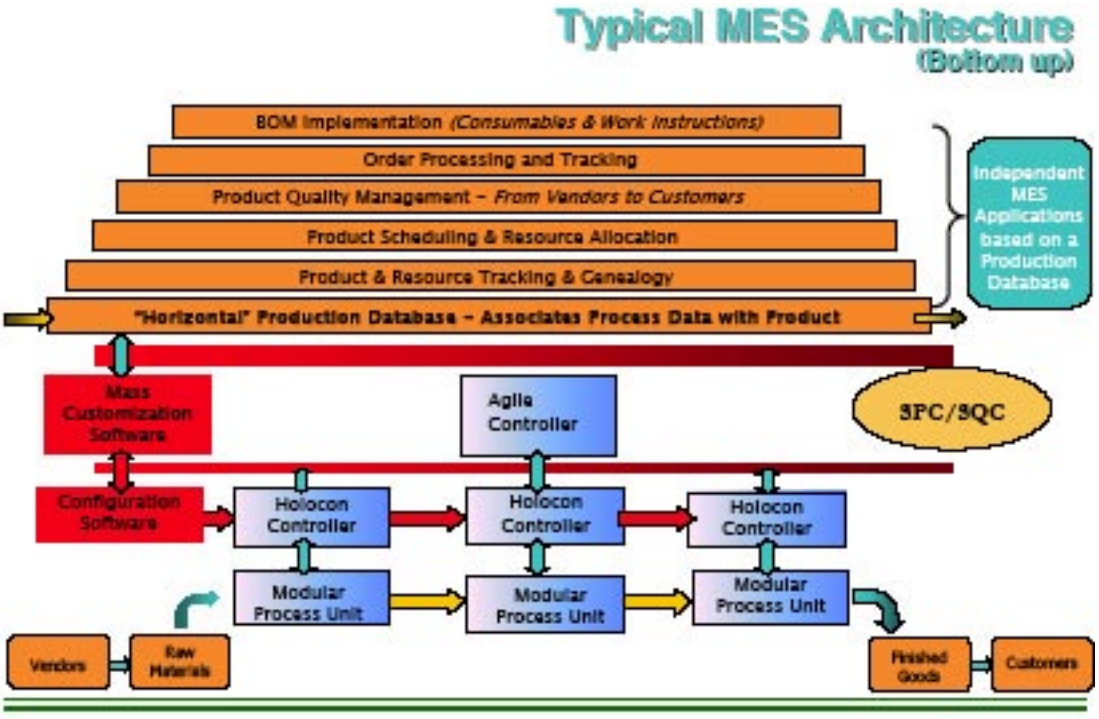


Open-Architecture Controls: The HOLOCON Controllers are designed to the Open-Architecture standard IEC 61499. This standard was generated for the express purpose of highly distributed controls—the primary and unique characteristic of the ZIGGY architecture.
Control development uses graphical pointand- click funct ion blocks with interco nections and data flow provided graphically. The program is then downloaded to the HOLOCON Controller where it is embedded for fast, reliable startup.

Open-Architecture Communications: Communications follow the Ethernet-IP standard to enable easy integration with external software and other plant controls. This standard is maintained by the ODVA, Open DeviceNet Vendors Association.

Open-Architecture Software:

- The AGILE Software and the Mass Customization software are patented.
- The software is written in the open standard programming language of JAVA. One of the



many features of JAVA is that it is highly transportable between operating systems. This provides a foundation of stability and long-term confidence.

- However, as with all software, improvements are continually being provided. Accordingly, an option for a software maintenance contract is available.

ZIGGY LEAN is unique.

- It is a proven architecture and product suite
- The principles behind ZIGGY can be applied to most manufacturing/ assembly operations
- The AGILE software and the Mass Customization software are standard, off-the-shelf packages
- The teaming of a controls company specializing in AGILE Manufacturing and Mass Customization with a machine builder or systems integrator knowledgeable in your production processes provides the best of both worlds. ZIGGY LEAN advantages:
- An off-the-shelf solution costs less to implement
- An off-the-shelf solution takes less time to implement thus getting you to market sooner
- An off-the-shelf solution carries less risk
- An open-architecture solution is easier for your staff to support
- An open-architecture solution means futureenhancements will be easier to implement
- Teaming between the controls supplier and the integrator we know means a shorter project cycle with an easier hand-off to production personnel.
- Browsers can be utilized to access the status of the production line from any secure internet connection providing greater management visibility.
- Utilizing open - architecture software standards, ZIGGY can be seamlessly integrated with most Manufacturing Execution Software (MES) provided by companies such as SAP, Oracle, and Rockwell Automation.

Find more on IEC 61499 Compliant Controllers
at http://www.wrcakron.com/holocon.html