Flexible Manufacturing System (FMS) -- for Small Batch Customized Production

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Flexible Manufacturing is the Key Feature of I4.0

I4.0: Devices, Manufactures, Customers will be connected closely. **Customized production** is highly demanded.
Classical FMS—Static Scheduling based on Production Sequence

A Digital Factory in Cheng Du

 ✓ Product with same mechanical framesize use one type RFID CAR;
 ✓ The trace of RFID CAR is determined by the scanning results;
 ✓ Up to 100 types of production test and assembly in one line;
 ✓ Static scheduling and configuration, still belongs to mass production;

An Automotive Soldering Factory

 ✓ Station controller distribute car information to Robot Control Box;
 ✓ Robot Control Box select corresponding PLC sub program based on car Info.
 ✓ Three different types of car can be soldered in the same soldering line;
 ✓ Static scheduling and configuration, still belongs to mass production;

ALC(Automation Line Control)

Station 1~3 ... ... Station 22~24

Robot Control Box

Station 1~3 ... ... Station 8~10

Robot/NC/Tool/IO
Advanced FMS—Dynamically Response to Customer Requirement and Market Vibration

Use case 1—Research by Academy

- Online replacement for original module, e.g., Module 2 changed to Module 4
- Online add new module, e.g., Module 7

Use case 2—FMS vision

Different cell from different line can be dynamically connected.
Advanced FMS—
Dynamically Response to Customer Requirement and Market Vibration

- Individual customized;
- Time to market;
- Fast change for production process, such as, reconfiguration every day.
Advanced FMS Potential Requirements on Industrial Network

- Dynamic topology change, plug & plug;
- Dynamic & online reconfiguration;
- Fast response to diverse applications;
- Simplified network configuration; such as, Intent-Driven network interface that is familiar with automation engineer.
Thank you
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