

## Pratt & Whitney

Modernizing the Middletown, CT jet engine plant to improve reliability, precision and simplicity.



**Pratt & Whitney**

A United Technologies Company

### Pratt & Whitney Middletown, CT

#### About Pratt & Whitney:

Pratt & Whitney, a United Technologies Corp. company, is a world leader in the design, manufacture and service of aircraft engines, industrial gas turbines and space propulsion systems. The Middletown plant manufactures and tests advanced jet engines, including the F119 engine that powers the Lockheed Martin F/A-22 Raptor air dominance fighter.

The plant consists of 25 buildings occupying over 2.3 million sq. ft. located on 1,100 acres. Many parts machined at the plant are huge, measuring as much as 12 ft or more, and are produced to meet the highest aeronautical standards.

#### Business Challenges:

- ▶ Daily maintenance and physical errors were affecting reliability and productivity of existing ASRS. Notably the storage pans were suffering damage from positioning problems and the SRMS would jam when the positioning was off.
- ▶ Outdated computer hardware and software caused severe limitations on the systems capabilities.
- ▶ Upgrades must use “over-the-counter” hardware and source code for software should be readily available.
- ▶ Simplify future maintenance and troubleshooting.
- ▶ Upgrade quickly and remain fully operational.

#### Highlights of the Project:

New components and software needed to be seamlessly integrated within the existing system. As timeliness was an important factor, Retrotech used two crews – a day crew and a night crew – to keep the facility operational.

Pratt & Whitney utilized three Easton-Kenway Mini-Load 750 ASRS machines to handle the wide range of sizes and the heavy weights of parts.

The upgrades included new programmable logic controllers (PLCs) for the storage/retrieval machines and a DeviceNet communications network that provided the link between sensors, actuators and the PLCs.

The on-board controller for each ASRS stacker was replaced with an Allen-Bradley SLC-5/04 PLC. Retrotech developed new software for the SLC-5/04 controller, which fully replicated the original system and then added some enhancements based on input from operators. SLC-5/04 processor communicates across the 1746 back plane to 1746 I/O modules in the same chassis in which the processor resides, with an on-board data highway communications port and DeviceNet scanner module. The scanner is the master and performs data transfer with slave devices by the strobe-and-poll message mode.

DeviceNet is a low-level communication link that connects simple industrial devices such as sensors and actuators to high-level devices such as the controller. The network also provides inter-operability based on standard Controller Area Network (CAN) technology, allowing devices from multiple vendors to be interchangeable, as long as they meet DeviceNet standards.

A SICK Optic DME 5000 optical laser distance-measuring device replaced the encoder/sync bar system. The existing control sub-panel was replaced and all electronic components were updated.

#### Results:

- ▶ State-of-the-art and flexible ASRS at a fraction of the cost of a whole new system.
- ▶ Dramatically improved efficiency, performance and reliability of the material handling operation by modernizing the equipment controls.
- ▶ Improved data collection and fault detection with reduced startup time.
- ▶ Laser distance measuring prevents misaligned positioning errors, reduces motor and gearbox wear, reduces throughput errors and significantly improves accuracy.
- ▶ New controls eliminated jams to improve the overall cycles per hour for delivering parts to the pick stations.
- ▶ The new PLCs opened the controls architecture – allowing for more standard industrial tools to be used by the techs – for a faster, lower cost parts replacement.

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