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Advanced Positioning System for Pick-and-Place Machines

A leading global technology provider specializing in bearings, bearing units, seals, mechatronics, services and lubrication systems decided to upgrade their discontinued ICS5000L positioning system with PSI Technics' intelligent ARATEC® Positioning Solution System.

The ARATEC® Positioning Solution System is an efficient, reliable system that easily integrates into existing facilities.

Maintaining production continuity represents a big challenge in many manufacturing facilities due to the use of outdated or obsolete positioning systems. At worst, malfunctions or failures lead to warehouse downtimes that can last for several days – a dreadful scenario in terms of “just-in-time” production processes.

The client in Oklahoma was confronted with the same challenge. A pick-and-place machine, referred to as the Baker Line, in the coating plant had previously been controlled solely by an ICS5000L positioning system. The production for this system was discontinued and the client had been looking for a state-of-the-art system that could provide at least an equivalent or better performance and feature set.

The following criteria were vital when it came to choosing a new system:

- >> Long-term reliability
- >> High throughput
- >> Optimum integration into the existing facility

The company selected PSI Technics' ARATEC® Positioning Solution System, since ARATEC® met all of the above requirements.



The ARATEC® Positioning Solution System can be integrated into an existing installation in a short period of time to minimize impacts to production.





Project Brief

Fast and Easy Retrofitting

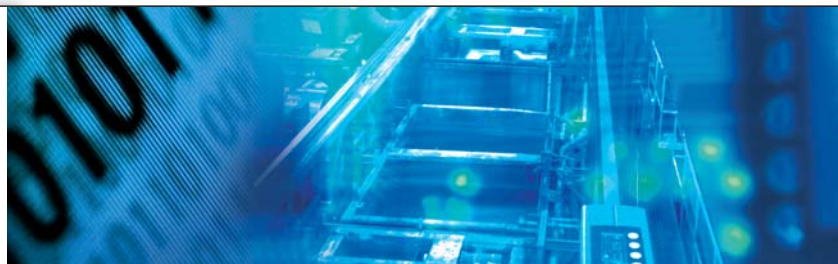
The ARATEC® Positioning Solution System is a stand-alone digital control system that positions vehicles such as stacker cranes or bridge cranes in industrial facilities.

At the client's facility, the ARATEC® was installed in a coating plant, where a small bridge crane, known as the pick-and-place machine, is positioned at several coating baths in a coating line with a length of approximately 100 feet (30 meters). The exact positioning of the pick-and-place machine is crucial, because the barrels containing the seals need to be lowered into the coating baths with utmost precision to prevent product damage and enhance safety.

Project Duration

Since PSI Technics was involved in the modernization analysis and planning early on, the retrofitting was completed very quickly. After all prerequisites for the retrofitting had been agreed upon during an on-site visit, the ARATEC® Positioning Solution was commissioned after a short preparatory period.

Since the retrofitting with the ARATEC® Positioning Solution System, no problems or interferences occurred in the coating line.



The New Positioning System

Fast and easy integration into existing facilities is a major advantage of the ARATEC® Positioning Solution System. The system permits the continued use of existing components such as PLCs, converters and motor drives. ARATEC® interfaces with all major process control computers, controllers and inventory management systems.

At the coating plant, the ARATEC® receives travel commands from a PLC via a serial DF1 communication protocol. The system provides analog converter control within a range of -10V to +10V. A brake and a safety contact that is processed by the PLC provide additional system control.

The ARATEC®'s design and unique features support a fast commissioning. **The ARATEC® Positioning Solution System automatically performs a characterization**, eliminating the need for time-consuming manual control parameter configuration and adjustment. The ARATEC® characterization is completed in minutes, happens only once, and provides an **optimized control loop modeling** based on the system conditions.

The ARATEC® calculates motion profiles, placing particular emphasis on maximum speed and acceleration. During system operation, it uses instantaneous feedback from optical distance meters or other real-time distance measuring devices to continuously monitor the movements of the pick-and-place machine. **The ARATEC® optimizes the motion path of the machine in real time** and completes travel tasks within the shortest possible time. Acceleration and velocity profiles are based solely on linear ramps, irrespective of the load, which completely **eliminates creeping speed** and improves throughput due to **reduced cycle times**.

More than just a Modernization, ARATEC® Consistently Optimizes Plant Logistics

ARATEC® advantages at a glance:

- >> Reliable operation (99.99998% repeatable, error-free positioning)
- >> Self-learning control algorithm developed from years of experience that provides exceptional positioning year after year
- >> Computer-assisted commissioning
- >> Energy savings
- >> Maintenance cost savings
- >> Intuitive and convenient web-based user interface
- >> Modernizations can be performed during a short production-free period – no production downtimes
- >> Increased throughput
- >> Improved process and performance of the entire logistics system
- >> Fast return on investment
- >> Detailed logging capability for never before seen visibility into the operation of the entire system

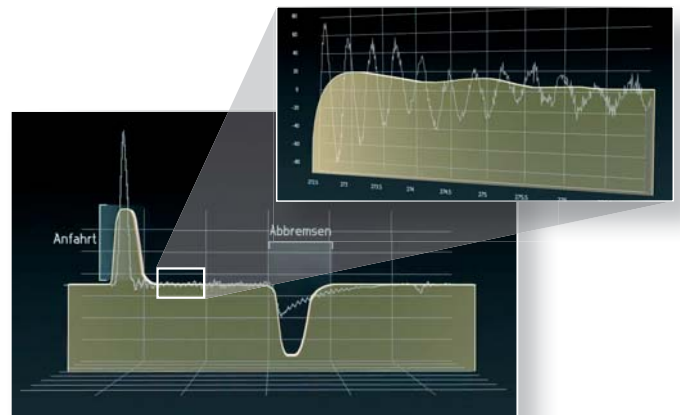
See images below:

A fast installation and a reliable operation are indispensable in production environments.



See graphics below:

ARATEC® provides optimized machine modeling based on the existing conditions.



The **web-based software interface** provides access to all of the system's characterization, control and diagnostic functionalities. The user-friendly software only requires a brief introduction – **no programming skills are needed**.

Failure detection is another innovative feature of the ARATEC®. It recognizes minute travel changes or irregularities and triggers early warnings. If problems occur, the software detects them, so they can be addressed proactively – an important feature that helps to prevent costly downtimes.

The system is also equipped with a 1GB diagnostic memory. Support is based on system error analyses, which can be performed remotely by PSI Technics' service technicians, if required, to eliminate lengthy diagnostic delays or the inability to **identify causes of disturbances** as seen with other positioning approaches.

Thermo Protection Cooling Case (TPCC®)

The client realized the importance of PSI Technics' Thermo Protection Cooling Case (TPCC®) to protect the laser distance sensor used with the ARATEC® for the pick and place system.

The TPCC® is the perfect complement to the ARATEC® Positioning Solution System for sensors that are used at high environmental temperatures (up to 176°F or +80°C) or that are subject to temperature fluctuations or harsh environmental conditions.

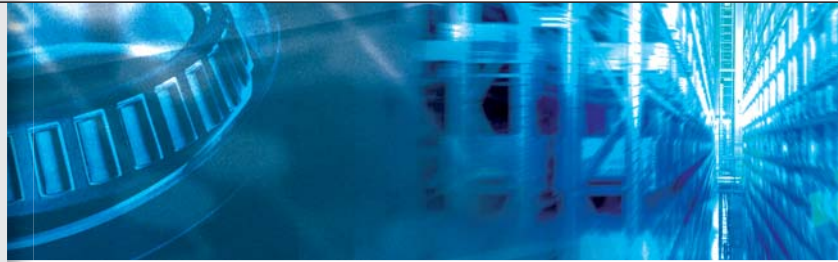
Industrial coating environments are often subject to extreme temperatures. To ensure the measurement accuracy and a safe operation of the SICK DME5000 distance meter, PSI Technics' TPCC® was also integrated into the coating line.

The TPCC® protects the sensor from high environmental temperatures and significantly increases its life-span.

The facility is not air-conditioned and during the summer month, temperatures can reach up to 122°F (+50°C). As a result, the TPCC® creates a considerable cost-benefit advantage for the client.

See images below:

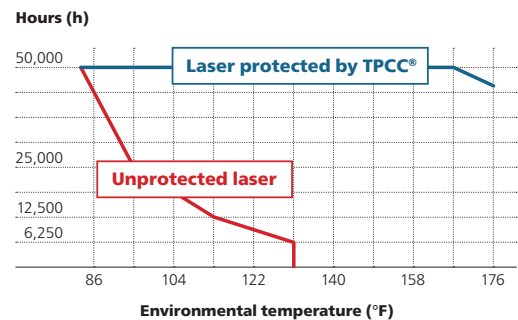
TPCC® at the client's facility. It provides optimum protection for the SICK DME5000 sensor.



Are your distance meters affected by environmental heat? We have a solution – the TPCC®:

- >> The TPCC® increases the sensor's working life by 15% compared to the manufacturer's MTTF of 50,000 hours at 77°F (+25°C).
- >> At an environmental temperature of 113°F (+45°C) the TPCC® increases the sensor life span by almost 440%.
- >> The TPCC® expands the sensors' application range and ensures accurate readings at temperatures of up to 176°F (+80°C).
- >> The TPCC® pays for itself on average after only 2.5 years.

The TPCC® increases the life-span of your laser



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