



for a greener tomorrow

# Industry-Leading Speed Frequency Response of the MR-J3-B Safety Servo Helps M&R Set a World Record

## Case Study

### Solution

- MR-J3-B Safety Servo Drive
- HF-SP Servo Motor

### M&R Product Benefits

- Shorter setting time
- Robust disturbance compensation
- Faster response
- High positioning accuracy

### Mitsubishi Electric Value-added Advantages

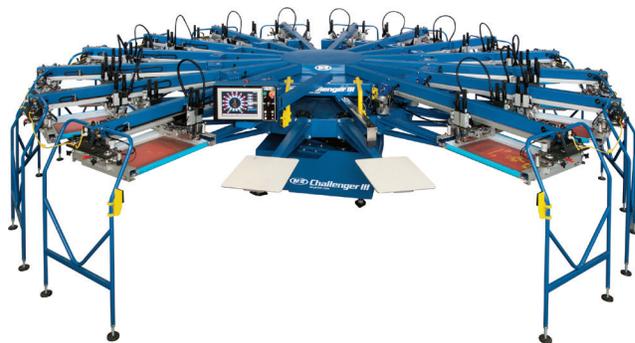
- Industry-leading speed frequency response
- Patented model adaptive control
- High resolution feedback
- Fully closed loop with external encoder

## BACKGROUND

M&R of Glen Ellyn, IL began evaluating servo systems to find one that could handle the difficult task of achieving rapid indexing, short settling time, and high accuracy despite the huge inertia of the system. One system tested was incapable of settling as the index rate was increased, while another system used a drive and motor so large that major mechanical changes would be required to accommodate the bulky equipment.

## CHALLENGE

M&R knew the difficulty of breaking the world record for the most t-shirts printed by a single operator in one hour; they set the previous record in 2005 when they printed 1805 shirts per hour with the Formula press. Their Challenger III press would have to accurately index faster than ever before. To add to the feat, M&R chose to attempt the record in front of a large crowd at the Imprinted Sportswear Show (ISS) in Fort Worth, TX.



*“Mitsubishi Electric is bringing the high accuracy of a CNC system to the general automation market.”*

*– Bo Biel, Chief Electrical Engineer, M&R*

## SOLUTION

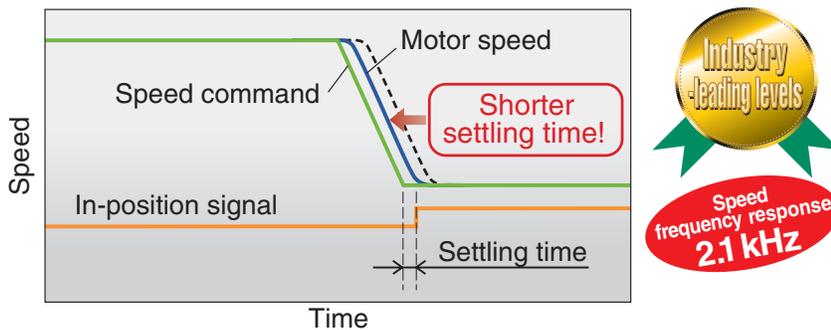
With time running short, M&R turned to Mitsubishi Electric. Robert Ruber, electrical engineer at M&R said “After the evaluation process, we had one month to get it working. Mitsubishi Electric is what I’ve used and what I trust. There was no question; we’re using Mitsubishi.” M&R chose the MR-J3-B Safety servo drive and HF-SP motor. The MR-J3-B Safety has an industry-leading 2.1kHz speed frequency response and patented Model Adaptive Control, which allow the servo to achieve short settling times and robust disturbance compensation despite the low mechanical resonant frequency of just 3.8Hz. The positioning accuracy required for accurate color-to-color registration was attained by using an external encoder to close the position loop at the load, a practice common in the machine tool industry. Bo Biel, chief electrical engineer commented that “Mitsubishi Electric is bringing the high accuracy of a CNC system to the general automation market.”

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Other features of the Mitsubishi solution include the Q170MCPU stand-alone motion controller, which provides motion commands to the servo via the SSCNET III motion network. The Q170MCPU uses the CC-Link network to provide deterministic communications to the numerous remote I/O stations found on the machine, and interfaces to several other components via Modbus RTU and Ethernet. The wide range of connectivity options for the Q170MCPU greatly reduced the wiring complexity.

### RESULTS

On Friday, October 1, 2010, the world record was broken when a single operator printed 1909 shirts in one hour. The Challenger III press with Mitsubishi Electric's MR-J3-B Safety servo drive and HF-SP servo motor can run up to 230 dozen shirts per hour, far exceeding the operator's peak rate of 201 dozen shirts per hour. In an industry where 80 dozen shirts per hour is considered fast, the performance of the Challenger III press and Mitsubishi Electric MR-J3-B Safety servo system is incredible.



The 2.1kHz Speed Frequency Response of the MR-J3-B Safety improves settling time

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