

Mount Pleasant Waterworks Case Study

Project Overview:

Star Controls partnered with Mount Pleasant Waterworks (MPW) in system optimization, advisory, programming, and training services; assisting MPW in the on-going improvements of its Motorola 160+ RTU SCADA system, which was experiencing wireless communication and performance problems. Before **Star Controls'** involvement, MPW was considering phasing out Motorola RTUs and replacing them with A/B PLCs, and migrating from a conventional 800 MHz radio system to 450 MHz.

Star Controls provided its **StaRTU** software platform to MPW to replace the existing software in all the Motorola RTUs. The new software has proven to be much more efficient, and advanced than the original system.

Within the period of time that **Star Controls** supported MPW, the Mount Pleasant staff have been able to improve the performance and monitoring of their Motorola RTU based system. MPW now has better tools to operate and maintain their SCADA system.

The efforts put forth by Star Controls resulted in dramatic improvements in wireless communications and performance of the Motorola SCADA system, and an extremely satisfied customer.

*"The new **StaRTU** software is much easier to use, yet much more powerful than our original software. The system provides a complete history audit of all operations, including software version tracking and operation and communication statistics. All these features contribute to a very manageable program for the Mt. Pleasant Waterworks," stated Brian Head, MIS Manager. "In addition, we have seen improved interrogation times, the system offers good troubleshooting tools, historical data is captured locally, and offers flexibility to the PCS technician to configure.*

Challenges:

When tasked with replacing a legacy Motorola RTU based system that was poorly performing, Mount Pleasant Waterworks turned to **Star Controls**. The structure they had in place was experiencing availability and performance issues, including Radio Frequency (RF) and communication problems. Beyond this, MPW, staffed with a self-sufficient IT team, set forth the goal of taking ownership of the system, but the existing system was not equipped with tools that could assist in accomplishing this goal.

Additional challenges included: a majority of their Motorola radios and RTUs are obsolete, thus spare parts were not available or are cost prohibitive, their 800 MHz frequency band was heavily saturated and falling out of favor making cellular more attractive, and their lack of ability to troubleshoot radio communication failures and pinpoint the problem.

Process:

MPW and **Star Controls** addressed the challenge through a multi-phase approach.

Phase 1: **Star Controls** held a brief analysis and simple fix (i.e. “stop bleeding”). This improved speed.

Phase 2: **Star Controls** performed optimization activities and provided educational training to the MPW team on how to use the existing system.

Phase 3: The existing software was replaced with **StaRTU** software.

Phase 4: **Star Controls** performed detailed advisory service, aiming short, mid, and long term steps to improve the availability, performance, and maintainability of MPW’s SCADA system. The outcome of the advisory service was a multi-year multi-step plan. **Star Controls** and MPW have started the implementation of the plan.

Throughout the analysis process, **Star Controls** evaluated different parameters and their impact on the aspects defined in the plan. The project was headed by Ron Zetouni, of **Star Controls**. Zetouni is known as a global expert in MDLC Motorola systems.

The analysis took into consideration the information gathered during discovery, as well as the organizations knowledge base and experience. For each parameter, the teams examined different options with pros-cons for each.

Services, Products, and Recommendations Provided by Star Controls

The following is a breakdown of the services, products and recommendations, presented by **Star Controls**.

- Quick Fix and Optimization of Old System
- Technical Hands-on Education
- **StaRTU** Software – Product Highlights:
 - **Easier to use software**
 - All core and advanced functions are built-in c module and don’t require any programming.

- **More efficient Communications**
 - Optimized polling mechanism.
- **Operation History Logger** – Helps tremendously in troubleshooting and optimization.
- **Communication History Logger** – Helps tremendously in troubleshooting and optimization.
 - Shows highly reliable hourly statistics for each RTU and the FIU
 - Tracks channel monitor and interference (extended channel monitor signal)
 - Provides graphical RF performance data for creating charts
- **Inventory Management** – FIU automatically gathers comprehensive RTU inventory information including versions of hardware and software. In addition, in most cases, the same program is used for many RTUs despite different I/O layouts.
- **Advisory** - The following are the recommendations that **Star Controls** provided **MPW**:
 - **SCADA and RTU Improvement to Existing Motorola Hardware & Software - Star Controls** evaluated different SCADA protocols that best meet the requirements of modern wireless based SCADA systems. Recommendations included standardizing all wireless data communication on the Motorola MDLC protocol.
 - **Improve System Availability Using Redundant UHF Channel** - Each FIU will be able to cover for the other FIU's channel. The recommendations made include adding a second Viper SC data radio to each Motorola FIU.
 - **Improve System Availability Using Cellular Network** - The suggested solution for improving the system availability included adding redundancy through cellular data link between the operations center to 15 mission critical sites, and any other sites that demonstrate communication failures.
 - **Add to Motorola RTU Local Pump Control to Improve Reliability, Flexibility and Data Retention and Reduce Wireless Data Traffic** - Currently Motorola RTUs do not perform any pump control. All pump control is handled by relay logic using traditional floats or an ultrasonic level instrument. By adding local control to the Motorola RTU, the SCADA system will gain the following benefits:
 - Improved System Reliability
 - Added Flexibility to the Pump Control as well as Remote Control
 - Improved Data Retention
 - Leveraging the Investment in the RTU (instead of it being a dumb terminal)

Results:

During the activities that **Star Controls** held with MPW, the teams have been able to accomplish all initial objects set forth in discovery, and set-up the goals for future improvement.

- **Improve availability and performance of the system.**
 - **Improve SCADA Response Time** – utilizing communications scheme that improve the response time.
 - Improved polling mechanism that prevents sites with problematic communications from holding pooling cycle from progress.
 - Changed FIU communications from Broadcast to RTU-RTU. This eliminated inherent delays that are part of Broadcast.
 - Allowed unscheduled polling of a single RTU without waiting for the entire polling cycle to end.
 - **Improved Availability** – MDLC protocol enables MPW to develop redundant radio paths from the SCADA Control Center to the RTUs.
 - **Migration** - Migrate from Motorola voice grade wireless to IP based wireless network and/or cellular M2M.
- **Transfer knowledge** to MPW SCADA team, to improve self-sufficiency.
- **Improve Maintainability of the System and Productivity of O&M**
 - **Troubleshooting** - Leveraging **StaRTU's** Loggers allows for fast diagnostics, troubleshooting and improvement.
 - **Remote** - O&M staff are able to perform most of the activities remotely, including diagnostics, and upload-download.
- **Cost Reduction**
 - Use Motorola RTUs instead of the expensive A/B PLCs.
 - Increase remote access to RTUs, and reduce on-site visits.

Featured Product:

The **StaRTU** acted as a major vehicle for success in this project. **Star Controls** provided its **StaRTU** platform to MPW to replace the existing software in all the Motorola RTUs. The new software has been proven to be much more effective, efficient, and advanced than the software provided by the original system integrator.

It allowed the O&M team to really pinpoint and isolate issues.

Product Features:

- Reduce size and complexity of typical RTU ladder applications

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- Elimination of I/O link process and I/O module definition
 - Software version tracking
 - Make quick changes on the fly
 - Offers powerful troubleshooting tools
 - Reduces total cost of ownership

Continued Training & Support:

“We know we can always turn to Star Controls as trusted advisors. They are always helpful, responsive and willing to go above and beyond in helping to resolve an issue or make improvements,” stated Brian Head MIS Manager. “They are a good business partner who presents innovative ideas, takes pride in their work, and always keeps our best interest in the fore-front.”

Mt. Pleasant Waterworks continues to turn to **Star Controls** for support. After the project was completed, MPW faced wireless communication failures, which impacted their SCADA operations. Due to the continued commitment of **Star Controls** and the capabilities of the **StaRTU’s** Communication Logger, they were able to log the information, analyze it, and furnish it to the radio service provider.