Seamless Replacement of a DCS in a Large Wastewater Treatment Plant: Lessons Learned from the City of Fort Worth Village Creek Water Reclamation Plant

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ABSTRACT

Distributed Control Systems (DCSs) installed in the late 1980's and early 1990's have either been incrementally updated over the years or are long due for replacement, depending on the particular DCS product in question. Although the proprietary real-time operating system and programmed algorithms of a legacy DCS may work just fine, the hardware (controllers, workstations, servers, and network components) and general purpose operating systems (UNIX, Windows) that interact with them are likely beyond their commercial lifespan and are no longer supported. Unlike facilities which have regularly scheduled shutdowns that can provide an opportunity for full replacement of a DCS, a wastewater treatment plant runs 24 hours a day, seven days a week, and must meet permit requirements for effluent quality. There are four major areas that must be addressed in order to achieve a successful replacement of a DCS in a wastewater treatment plant; compliance with local, state, and federal regulations, operator acceptance of the modern DCS, stable and seamless transition of process control functionality, and comprehensive documentation.

This paper is a case study on how the four mentioned areas were successfully addressed for the replacement of a DCS in a large North Texas wastewater treatment plant. The project included DCS replacement, control room remodel, and update of the control area electrical infrastructure in the midst of other ongoing construction projects at the plant. Although the project involved replacement of a commercially obsolete proprietary DCS with a modern DCS (proprietary yes, but open to communication with other supplier components), many of the principles followed would apply to any effort to update a legacy control infrastructure. Mistakes and recovery activity will be discussed along with those items that executed as planned.

About the Authors:

Nathan Mogaru, PE graduated from the University of Texas at Arlington with a B.S. Degree in Electrical Engineering. He is an automation engineer at CDM Smith specializing in applications software development. Mr. Mogaru has 6 years experience in project planning, control logic development for Programmable Logic Controllers (PLCs) and Distributed Control Systems (DCSs), HMI graphic development, field commissioning and startups, project documentation, and operator training.

John Robinson has 30 years of experience developing and implementing instrumentation and control systems, 24 of which he has specialized in water and wastewater treatment. Mr. Robinson's experience includes project management, instrumentation specification, control logic development for programmable controller systems (PLC) and distributed control systems (DCS), application programming, field startup, troubleshooting, operator training, and pilot plant operation.

Luke Matus has worked for the City of Fort Worth since May of 1988. His degree and background in Instrumentation has provided an avenue to be involved in the development and implementation of process control systems throughout the City of Fort Worth for both the Water and Wastewater Industries. He’s worked on and maintained both PLC based architectures as well as DCS systems.