

SELECTED CRANE & HEAVY MACHINERY EXPERIENCE

WILLIAM G. WESTGARD, P.E.

Professional Summary

William G. Westgard is owner of Automation & Control Engineering and has over thirty years of experience, the majority of that as an independent consultant, providing customers with professional electrical engineering services, turnkey control systems and the design and startup of motion systems and PLC based controls. Areas of expertise include power distribution, PLC and PC based control systems, the design, build and installation of highly accurate and reliable crane control systems located in hazardous locations, hydroelectric plants, aerospace and nuclear facilities. Other relevant projects include ferry loading systems, hydraulic and pneumatic material handling systems and other various machine and motion control systems. Automation & Control Services was founded December 1993 and became A&CE in 2009.

Boeing Charleston Overhead Cranes

Worked with Boeing representatives, structural/mechanical consultants and the crane manufacturer and provided electrical design review services for Boeing Charleston's overhead crane systems. Reviewed design at various levels of completion stages and provided suggestions for breaker coordination, power and controls drawings, PLC programming and equipment usage and selection.

Siload Motion Control System

Designed control system and provided all programming and startup services for an automated storage system at Kenworth's Renton plant using Red Lion operator interface and a new Allen Bradley PLC with serial port cards. The serial cards send ASCII commands to control three existing older two-axes Industrial Devices servo drive systems. ASCII strings are generated and concatenated based on PLC logic. Reusing the existing motion controller/drive units and motors helped Kenworth decrease the cost of the project.

Container Crane Consulting

Container crane engineering oversight included verification of electrical load calculations, control systems design and material selection review for four container (ship to shore) cranes for Westports in the Straights of Malacca. This project included travel to manufacturer's facility in Shanghai to assist the customer in evaluation of the construction progress and installation practices.

Portal Crane Study and Specifications

Performed feasibility study to evaluate generator and shore power options for five U. S. Coast Guard portal cranes. The study provided evaluation of options for repowering the cranes and replacing one of the crane's existing late 60's era Avtek motor-generator controls. Also wrote commercial grade specifications for new AC and DC drive based control systems.

Oil Well Service Rig

Provided electrical engineering services for power distribution design and electrical controls for an oil well service rig in Siberia. Specified a new 569kVA diesel generator and variable frequency drives (VFDs). The generator is designed to supply power for the drives and can also used as a supplementary power source.

Mobile Oil Well Service Rig Controls

Designed electrical controls design for a mobile oil well service rig which includes an engine control unit (ECU), transmission control module (TCM) and an ABS brake controller which share information on a J1939 serial bus. Provided operator controls for use when the power take-off is being used in the operations mode.

Dry Dock Wing-Wall Crane

Provided engineering/design services for constant-potential DC travel controls for a WWII era dry dock wing-wall crane for Marine Industries NW. Supplied new travel control drawings, new compound-wound DC brake motors, resistors, controls equipment and startup assistance.

Aerospace Facility Bridge Crane

Provided electrical engineering, control system design and startup services for rehabilitation of a bridge crane for Washington Crane and The Boeing Company. The controls included a vector drive hoist, open loop VFD bridge and trolley drives and pendant and radio controls.

Powerhouse Bridge Crane

Designed, supplied and commissioned a PLC-based crane monitoring system for a powerhouse crane at the Gorge Dam. The system monitors and records the crane operation and position and displays information to the operator.

Soaking Pit Lid Lifter Crane

Provided electrical engineering, control system design and turnkey control system for a mill-duty Soaking Pit Lid Lifter Crane for Kaiser Aluminum. This crane operates in a high temperature environment and is 250VDC constant-potential magnetic control with dynamic braking and uses no modern electronics. A radio remote pendant is incorporated in its design.

Whirley Crane Engineering Study

Prepared engineering study outlining options for upgrading controls for a Clyde Heavy-Lift 200-ton whirley crane with existing DC field-controls in a motor-generator arrangement. This crane has been converted for high speed ship loading use. The study compared the various options, their technical merits, and costs. These options included technical and economic evaluations of a new field-control based system, DC drives, AC drives and motors, common DC bus architecture, new electrification/shore power vs. existing diesel power and line-regen vs reuse of existing braking resistor banks. Provided information gathered from contacts at EPA, Washington Department of Ecology and Puget Sound Clean Air Agency on possible grant money for conversion to shore power. Vendor quotes for equipment and services provided in the report enable accurate assessment of total cost and return on investment for various options.

Clyde Revolver Crane Controls Modifications and Programming

Investigated control system shutdown issues and made necessary programming modifications to a diesel generator-powered Clyde revolver crane at Schnitzer Steel's Tacoma yard. Provided programming for the Allen Bradley PLC along with electrical noise mitigation techniques which have eliminated nuisance control system shutdowns. I provide AB PLC and drive programming assistance for this crane on an ongoing basis.

Baldor Electric Company Crane Drive Specifications

Co-wrote specifications for Baldor Electric Company - Drives Division for their crane drives. Aspects covered included torque-proving, brake monitoring, coordination and control logic and I/O hardware specifications.

Boeing Aircraft Splice Tool

Provided Boeing with two six-axis turnkey splice systems. The scope of these projects included system design and build, power distribution coordination with Boeing, all electrical drawings, and a complete operations & maintenance manual. This system runs Allen Bradley's Graphical Motion Language and is used to splice the two halves of the F/A-18E/F Super Hornet together. Additional programming and hardware modifications provide LVDT position feedback that gives Boeing faster and safer airplane assembly.

Launch Complex Hammerhead Crane

50/15 ton Class I, Div II hazardous location bridge crane for USAF Titan rocket Launch Complex - 41 at Cape Canaveral, FL. This 1991-92 era crane was one of the first to use line regenerative vector drives for hoist control. It had multiple control consoles and used five G.E. 90 series PLCs on a Genius bus network and two co-processors running MegaBASIC on the main CPU backplane.

Crane Failure Mode Effects Analysis (FMEA)

Performed Failure Modes Effects Analysis on 50/15 ton USAF payload assembly crane as a consultant to TRW in Redondo Beach, CA. The outcome of this analysis led to hardware and software modifications that enhanced operational safety. Provided startup services and the programming modifications as a consultant to Brown & Root at Launch Complex - 41 at Cape Canaveral, FL.

Nuclear Containment Building Jib Crane

DC jib crane design and startup. This crane employed DC field weakening/strengthening for speed/torque control and required components, wire and cable appropriate for use inside a Florida Power nuclear reactor containment building.

Canister Rotation Facility Crane

Designed electrical controls for a 100-ton single-failure-proof "canister rotation" crane for NASA. This crane handled the payload canister for the space shuttle. Two speed AC motors controlled hoist motion and a variable speed DC drive controlled the bridge. The variable speed bridge design maintains vertical pull for constant speed hoisting during rotation.

Ferry Terminal Design

Provided electrical engineering consulting services to Washington State Ferries terminal design office on controls and power distribution for passenger and vehicle loading systems. Also provided WSF with peer review of PLC based loading system for Friday Harbor terminal.

Truck Frame Transfer System

Provided Kenworth Truck with a turnkey Allen Bradley PLC based electrical control system for a multi-axis hydraulic system that transfers truck frames to and from a conveyor which is controlled by a variable speed drive. The system is operated by a touch screen and radio remote control pendants.

Tunnel Boring Machines

Provided Allen Bradley PLC5, Mitsubishi PLC, Factory Link and Panelmate programming to control TBM machines for The Robbins Company in Kent, WA which are used in large tunneling construction projects.

Retractable Pontoon Bridge Controls

Provided Manson Construction with on-site PLC control system review and motor control troubleshooting services on the Ford Island Bridge at Pearl Harbor. This retractable pontoon bridge connects Ford Island to Oahu.

Concrete Technology

Consulting services for several generator-powered revolver cranes and a large outdoor gantry with various wound-rotor and DC controls.

Whiting Services / Vigor

Consulting services for revolver cranes at Vigor shipyards, Portland, OR. Provided power quality analysis using Fluke power monitoring equipment. Also provided troubleshooting of DC crane controls.

Other Projects and Clients:

General Construction Company - Electrical Engineer of Record for a graving dock to be built in Port Angeles, WA. Responsibilities included complete electrical power distribution and control system design. This facility design consists of an Allen Bradley PLC controlled pump system that controls flooding and dewatering of the graving dock and the main gate which is designed to be water ballasted and locked into place in an open or closed position. Only three phase power and Remote I/O communications were taken to the gate so that the amount of festoon-like cabling connecting the dock and gate could be minimized. Responsibilities also included turnkey manufacture, programming and startup of all controls.

Army Corp Pump and Treat Remediation System with SCADA

Electrical Engineer of Record for an environmental pump and treat remediation system for Battelle Labs and the Army. Responsibilities included complete electrical power distribution and control system design. This Allen Bradley soft PLC/PC based "pump & treat" control system pumps water from an underground plume contaminated with solvents. An Ethernet fiber-optic network connects the main control house with the eight pump houses, each of which has local I/O and Allen Bradley Power Flex variable frequency drives that controls the flow rate with a positive displacement pump.

Boeing Pump and Treat Facility Electrical Design and Specifications

Designed power distribution, prepared fault-current calculations, detailed control systems design and wrote related electrical specifications for a new pump and treat facility for Boeing/Landau Associates that removes TCEs from ground water. Deliverables included all electrical design for the facility including conduit and wire schedules for a main control house and field stations and all controls systems design using Allen Bradley "soft" PLC and Power Flex drives. The design allows for future expansion as required. All well stations are connected by fiber-optics and three-phase power only, since all control signals from field stations are communicated to the main control house over the network.

Boeing Pump and Treat Facility Expansion

Provided engineering services to expand the system above, adding new field stations in underground vaults and increasing main control house processing capacity.

Substation Consultation

Provided consultation to Fluor Global Services / Alcoa on a substation contaminated with PCBs that supplies critical power to the Intalco Works rod shop. Worked with Alcoa personnel and vendors and wrote a report for Fluor/Alcoa

outlining options and solutions for their power needs for this part of the plant. Also wrote specifications for the new larger transformer and main service modifications and coordinated electrical work for this project.

Potline Control System

Worked with Fluor Global Services / Alcoa and provided potline control system design services for the Ferndale plant. This Allen Bradley Control Logix PLC based system was designed so that change over to the new system can be done quickly and seamlessly, minimizing disruption to the production process at startup.

Water Jet Controls

As a consultant to Flow International, designed PLC and operator interface software and control system hardware for ultra-high-pressure water jet pumps up to 200HP. Designed hardware and software for a single axis on-the-fly crosscutter that is integrated with a Square D PLC and receives setup data serially from a PC running Wonderware. Hardware and software design of a seven-axis slitter and two axis on-the-fly crosscutter that cuts fiberglass using an Allen Bradley 1394 motion system, an Allen Bradley SLC 5/04 PLC and a Panelmate operator interface. Designed an abrasive monitoring system for water jet cutting using an Allen Bradley PLC and an industrial PC that runs Labview and records abrasive levels to disk in spreadsheet form.

Education - B.S., Electronics Technology from Indiana State University, 1986

Continuing Education – Arctic Regions Engineering Short Course, January, 2005

Licensing - Professional Engineer, Electrical - WA (license # 33298), AK (license # 11167), OR (license # 88870PE), MT (license # 30657PE), ID (license # 15869), CA (license # 22086), NCEES Records facilitate expedient licensing in additional states

Professional Affiliations – Senior Member IEEE, Industrial Applications Society

United States Patent – # 9,484,148 Inductive (wireless) Power Transfer for Ground-Based Machines

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