

## SELECTED CRANE & HEAVY MACHINERY EXPERIENCE

### WILLIAM G. WESTGARD, P.E.

#### Professional Summary

William G. Westgard is the founder and owner of Automation & Control Services and has over twenty years of experience, including fifteen plus years at Automation & Control Services, 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 and 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 controls. A&CS was founded in December 1993.

#### 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 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 crane monitoring system for a powerhouse crane at the Gorge Dam. The system monitors 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.

#### Clyde Revolver Crane Controls Modifications

Investigated control system shutdown issues and made necessary programming modifications to a diesel generator-powered Clyde revolver crane at Schnitzer Steel's Tacoma yard. The programming changes along with electrical noise mitigation techniques have eliminated nuisance control system shutdowns.

#### 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

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 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 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.

## 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 a 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.

**Battelle, Pacific Northwest National Laboratory** - Electrical Engineer of Record for power distribution and controls design for an environmental remediation system for the Army Corps of Engineers at Fort Lewis. Eight well houses are connected to the main control house through a fiber-optic network. Also built the controls and provided all the necessary programming for this project as a turnkey package under a separate contract.

**Concrete Technology** - Consulting services for generator-powered revolver cranes with wound rotor and DC controls.

**Fluor Global Services/Alcoa** - AB PLC based potline controls design and substation transformer consulting.

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

**Continuing Education** - Arctic Regions Engineering Short Course, January, 2005

**Licensing** - Professional Engineer, Electrical - Washington (license # 33298) and Alaska (license # 11167)

**Professional Affiliations** - Member IEEE, Industrial Applications Society