

Conrad G. ASMUNDSON

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Mr. Conrad Asmundson is a Head E/I & C Engineer with 22 years of experience in a large variety of industrial, mining, utility and municipal projects. He has acted in the capacity of Senior Electrical Engineer in a technical, project manager, supervisor and superintendent role. His experience includes detailed design/management for electrical distribution systems and industrial plant control systems, distributed control systems (DCS) and programmable logic controls (PLC) design/management, industrial maintenance practices, maintenance crew supervision, construction site supervision and project start up/commissioning.

EDUCATION

1994 Bachelor of Science in Engineering - Electrical, University of Manitoba, Winnipeg, Manitoba, Canada

EXPERIENCE

2008-Current AMPS Services Inc., Winnipeg, Canada

President and Head E/I&C Engineer

◆ VALE, Thompson, Manitoba (2009 - Ongoing)

▪ T1 235 Pole Dual Switch Pole Replacement Project Detailed Design (Current)

Supply and installation of 13.8 kV Overhead distribution line and replacement of Dual Switch Pole.

▪ P1 Vale Tailings Pump VFD Replacement Project (Current)

Detailed design of the replacement of the existing Harvest mill tailings 1500 HP Variable Frequency Drives.

▪ T3 Security Building Replacement – Detailed Design Project (Current)

Demolition of existing T3 security building and construction and commissioning of a new guard house.

▪ Load Flow Modeling of Orica loads (Current)

Birchtree Mine T-Line load flow modeling for possible relocation of Orica load fed from Smelter substation. Multiple line configurations and loading conditions simulated in software model.

- **Site Wide Power Factor Correction Assessment (2015)**
 Assessment of prospect PFC requirements based on existing load profile and future expansions of decommissioning of Smelter and Refinery.
- **T-3 378 Substation 3MVAR PFC Review & Commissioning (2015)**
 - Review of de-tuned PFC bank and recommendation of tuning changes and design considerations.
 - Commissioning of the PFC: creation of SEL751 relay settings, PFC controller settings, onsite assistance with general switchgear testing and PFC operation.
- **T-3 2580L Main Breaker Retrofit (2015)**
 Design and commissioning of 5kV main breaker retrofit into existing switchgear and onsite commissioning assistance.
- **Power System Modeling (2015)**
 Update the existing SKM model of various projects completed by AMPS and integration of future projects completed by Vale and others.
- **E-House Commissioning of River Pumphouse (2015)**
 Construction and onsite commissioning of four 1250hp, 4160V pumps for process water & city water supply. Performed coordination, protection, arc flash study, PLC programming and development of protection relay settings (2 x SEL751A, 4 x Multilin 369).
- **Rod & Ball Mill Switchgear (2014-2015)**
 - Design - Electrical equipment specification, layout, protection coordination settings, arc flash hazard settings, implementation of upstream trip logic.
 - Commissioning - Verification of testing procedures and results, troubleshooting arc flash light detection fiber, secondary injection witness testing of SEL 751A and Multilin 369 relay set points. Witness testing of SE-330 NGR protection relay.
- **T3 378 Surface Slurry Plant HMI Upgrade (2015)**
 Installation of new PanelView Plus HMI panel in the 378 slurry building and upgrading HMI system for existing DH+ communication network.
- **T1 Services PLC Replacement Phase 1 Detailed Design (2015)**
 Installation of PLC, Remote I/O s and a Process Control Network (PCN) to run the systems at 4000L feeder and 4080L crusher PLC.
- **T3 Telemecanique PLC Replacement Detailed Design (2015)**
 - Replacement of six Telemecanique PLCs: Topman`s Collarhouse (PLC44), 311 FAR (PLC8), 310 FAR (PLC32), 345 RAR (PLC49), 1403L Potable Water Pumps (PLC46), and 2403L Garage Lunchroom

(PLC47)

- Replacement of the existing dedicated Telemecanique PLCs network by an Ethernet/IP based PCN.
- **Utilities Transformer Fire Separation (2015)**
Feasibility study of using fire separation between outdoor Transformers/ Switch Room Building.
- **310 FAR Electric Heat Deficiencies and Gas Code Compliance Project (2015)**
Modification and upgrades for the existing 310 FAR Electric Heating System, propane gas burner system and the valve train.
- **River Pump House E-House VFD Detailed Design (2015)**
Replacement of Variable Frequency Drive, starters and upgrading of switchgear, construction of electrical room and installation of reliable control and communicating flow data to existing utility substation operator within an existing Foxboro DCS system.
- **T3 Headframe Transformer Yard Upgrade Detailed Design (2015)**
Detailed upgrade of ground grid, 13.8kV overhead distribution line continuation, FOP testing and burying the 13.8KV cable to come across from the hourly parking lot
- **4.16 kV Rack Power Upgrade Detailed Design project (2015)**
 - Detailed engineering design for installation and upgrade of T1 1640L 600V Rack Power.
 - Designing of drawings and providing specifications for 300 kVA, 4160/600 Volt transformer c/w 5A Neutral-Grounding-Resistor, primary protection and secondary protection c/w shunt trip device.
- **Potable Water Tower Replacement – Detailed Engineering (2015)**
The modifications of closed loop potable water circuit of Potable Water Tower for proper pressure control and Replacements of VFD's for existing booster pumps, isolation valve for the water tower and process water wall hydrants for Utilities and Mill east wall.
- **Mill Cable Tray Replacement Detailed Design (2015)**
Detailed design for demolition of the existing cable tray and installation of the new cable tray inside the Mill.
- **Turbo Compressor Replacement (2014 – 2015)**
Detailed design for installation of turbo compressor in the Vale Utilities building.
- **Birchtree NO2 and CO Alarm Design (2014)**
On-site commissioning assistance of ControlLogix PLC program changes and

WonderWare HMI station.

- **PILC Cable Replacement Project Detailed Design (2015)**
Installation of 15kV Transmission line detailed design and commissioning.
- **Sandfill Equipment Automation (2013 – 2014)**
Detailed design of T1 Mine Sandfill Plant Automation system and commissioning of PLC programming.
- **T-3 310 FAR Electric Heat (5MW) (2014)**
Modification of the existing distribution equipment to meet CEC, changes to Telemecanique TSX PLC logic, coordination study and applying of settings to ABB SACE breaker & Startco SE-325, system commissioning, VAMP 221 arc flash relay commissioning, SKM modeling and applying of arc flash labels.
- **Utility PFC Bank Review FEL 1 & 2 (2014)**
PFC bank recommendation of size, location and design considerations.
- **Emergency Potable Water Supply (2014)**
Provide valve controller and associated modifications to the existing ladder logic, drawings, upgrading of communication network diagram and commissioning.
- **T-1 235 FAR Control Upgrade (2014)**
Provide specifications for purge function burner controller and apply associated modifications to existing ladder logic for burner control, drawing updates.
- **T-3 Shower Upgrade (2014)**
Removal of old control and shower equipment, provide specifications of new shower columns, industrial mixing chamber, and all the of control equipment and provide required modifications and drawing updates.
- **T3 Mine – Surface to Underground Fuel Delivery – Detailed Design (2014)**
Detailed engineering electrical design for installation of new Surface to Underground Fuel Delivery System. Design included construction package, specifications, RSLogix 5 and 500 PLC programs, HMI, Control Philosophy.
- **Mill 2A6 Pump and VFD Installation (2014)**
Detailed design of installation of Mill 2A6 150 Hp Pump and Variable Frequency Drive.
- **MIBC Tank Replacement – T1 Mine (2014)**
Preparation of: construction and demolition drawing package using MicroStation,

scope of work document, cable routing, lighting quotes and installation location.

- **Mill A3 Pump Detailed Design (2014)**

- Mill A3 50 Hp Pump and VFD Installation Detailed Design.

- **4250L Slurry Programming Support – T3 Mine (2014)**

- On-site commissioning, assisted in loading-up updated PLC Ladder Logic program and new Factory Talk View Machine Edition HMI screens for Panel View Plus 6 1000 and performed I/O check tests for Allen Bradley SLC 500 series PLC

- **Birchtree Pump Controls (2014)**

- On-site commissioning, assisted in loading-up new ControlLogix PLC Ladder Logic program additions and WonderWare HMI interface
 - Updating the PLC Ladder Logic program reflecting the newly designed HMI interface, preparation of the Operator Manual for the new WonderWare HMI interface

- ◆ **Thompson Creek Minerals, Mount Milligan, BC (2014 - ongoing)**

- Troubleshooting of 54MVar filter bank, SATEC PFC controller settings and uploading of parameters.
 - Power System Modeling using SKM software based on field data collection and Verification of relay settings.
 - Adjustment of stage timing to minimize plant disturbance and over voltages.
 - Power system coordination review with CIMA+ of multiple issues (equipment specification, configuration).
 - Arc Flash Study certification training

- ◆ **Griffin Wheel, Winnipeg, Manitoba (2015 - ongoing)**

- Site reclamation of fire damage and provide assistance with onsite staff in the construction, sizing, Substation Ground Grid design and protection of new and existing equipment.

- ◆ **Gerdau, Selkirk, Manitoba (2015 - ongoing)**

- 12.47kV Pole mount reclosers
 - Detailed design for arc flash mitigation of downstream 600V switchgear

- ◆ **Louisiana-Pacific, Manitoba (2014)**

- **Power system study**

- Arc flash hazard review of the facility, Data collection of main feeder protection settings and additions to facility since previous study. Report on recommendations and changes in arc flash incident energy.

- ◆ **Swan River Debarker Replacement (2013)**

- Detailed design for installation of new Debarker

◆ **Atomic Energy of Canada Limited (AECL), Pinawa, Manitoba (2013-2014)**

▪ **Standpipe Hydrogen (H₂) & Methane (CH₄) Gas Detection System**

- Provide conceptual design and specification of detection system 4160 Volt, 6x100 kVar Capacitor Bank Connection Design
- Technical Scope of Work Bid Document for power systems studies
- Created bid document which describes the scope of work to updating single line drawing and perform power system studies which includes short circuit study, protection coordination study, equipment evaluation, arc flash hazard analysis, and arc flash mitigation

▪ **AECL Building 100 Battery Bank and Rectifier Replacement (2013–2014)**

Design of Battery Bank and charging equipment replacement. Specification of new equipment, ventilation requirements, configuration options.

▪ **AECL Standpipe Hydrogen Methane Flammable Gas Detection System (2013)**

- Preparation of building elevation and plan equipment layout drawings for the gas detection system highlighting wiring installation methods and specifications
- Prepared Hydrogen Methane Flammable Gas Detection Design Description and Created a flow diagram for gas detection process and functional block diagram

▪ **AECL Building 300 Stage 4 and Stage 7 Segregation with Minimal Heating Project (2013)**

Prepared material take-off list based on data collected during site visit, provided technical recommendations for emergency lighting replacement, preparation of drawings for electrical arrangement for Building 300's Stage 4 and Stage 7

▪ **AECL Building 300 Annunciation Panel 1-180PL3 Project (2013)**

- Assistance in selection of cooling system design for Annunciation Panel 1-180PL3.
- Preparation of model, drawings, cable and panel schedule for the new cooling system for Annunciation Panel 1-180PL3.
- Preparation of Building 300 Annunciation Panel 180PL3 Design Requirements Report for new Cooling System Electrical Design.

▪ **AECL WMA Power Distribution Reconfiguration (2012-2013)**

Prepared shop drawings and sized all conduit and sweeps for new concrete pads and their associated equipment

◆ **Magellan Aerospace Bus Duct, Manitoba**

- Revision of previous test results and onsite inspection of multiple Bus Duct installations. Recommendation report.

◆ **CFB Shilo, Shilo, Manitoba (2014)**

Maintenance testing of main substation equipment. Transformer (TTR, winding resistance, Capacitance Bridge, oil & wdg temp, oil sample), main breaker (Insulation & contact resistance), circuit switcher (insulation & contact resistance, operational checks), ground switch (contact resistance, operational checks).

◆ **City of Winnipeg, Winnipeg Manitoba, Canada: (2012)**

- Arc Flash Study using SKM software

◆ **Tolko, Winnipeg Manitoba, Canada: (2014)**

- Arc Flash Study using SKM software

◆ **Manitoba Hydro International, Winnipeg, Manitoba (2012)**

- Dunn-Rite Food Ltd. New Addition
- Detailed design for HV electrical upgrade expansion

◆ **Winpak Winnipeg, Manitoba, Canada (2013-Current)**

- Multibarrier 4 Power distribution design (2015)
- Trim baler electrical design (2015)
- Comexi Laminator Electrical design (2014)
- Slitter Arc flash study (2014)
- Arc Flash Study for 2013 Plant Renovation (2013)
- W&H Printing Press (2013)

◆ **Areva Resources Canada Inc., McClean Lake Saskatchewan, (2008)**

JEB Mill Modifications, Electrical, Instrumentation, and Controls Discipline Lead for mine modifications, for \$118 million dollar expansion

◆ **Boeing Canada, Winnipeg, MB (2012 - Ongoing)**

- **Site Arc Flash Analysis**
Data collection, modeling, mitigation, and report of arc flash hazard levels for the Boeing Winnipeg site.
- **Autoclave PLC control upgrade**
Onsite data collection for as-builts of Autoclave starter and VFD wiring.
- **Backup Generator design**
Modification to distribution for backup generators for Autoclave and emergency feeders.
- **Coordination Study**
600V feeder coordination study to determine breaker trip set points of new feeder.

- **MV Air Compressor MCC and Floxal Nitrogen MCC Design Upgrade**
Preparation of detailed design and specification for MCCs and main distribution panel c/w two (2) electronic circuit breaker for the MCCs
- **Participated on preparing bid package document for construction**
 - Correspondence with client to ensure requirements are met and onsite data collection of the existing electrical equipment information for the design.
 - Conducted protection coordination study to ensure there are no miss-coordination between existing upstream protective device and the new electrical system as well downstream loads such as air compressor, booster, and fans

◆ **AMPS Powerline, Winnipeg, Canada**

- Cargill (2015) Detailed design for New 25kV electrical distribution upgrade
- Glacial Aggregates (2014) Detailed design for New 15kV electrical distribution upgrade
- Granny's Poultry MV Power Distribution (2014) Detailed design for New 15kV electrical distribution upgrade

◆ **Mulder Construction, Stonewall Manitoba (2010)**

- **Mulder Quarry (2015)**
 - Detailed design for new 2-15kV mining skids
 - Senior Engineer for Electrical Services Upgrade and Ground Design in a Limestone Quarry for Compliance with Manitoba Mines Branch Grounding Improvement directive.

◆ **Hutterite Colony in Manitoba**

- Ridgeland Colony: Detailed design of 15kV Electrical service upgrade (2016)
- Grand Colony: Detailed design of 15kV Electrical service upgrade (2015)
- Maxwell Colony: Detailed design of 15kV Electrical service upgrade (2014)
- Ridgeland Colony: Detailed design of 15kV Electrical service upgrade (2013)
- Suncrest Colony: Detailed design of 15kV Electrical service upgrade (2012)
- Meadow View Colony: Detailed design of 15kV Electrical service upgrade (2011)
- Horizon Colony: Detailed design of 25kV Electrical service upgrade (2010)

◆ **Hylife Foods, Neepawa, Manitoba (2013)**

- Power quality measurements (Hioki 3196) of main four distribution feeders. Data collection of facility for power system modeling.

◆ **Kildonan Place Shopping Centre (2012 - Ongoing)**

- **Power Quality Analysis & PFC Replacement**
Onsite harmonic and power factor data sampling. Recommendation report and detailed design for de-tuned PFC units for East and West distributions.

- **Arc Flash Hazard Study**

- Data collection, modelling, analysis, and report for arc flash hazard analysis, short circuit, and equipment evaluation of the distribution system
- Power quality study of the 600V East and West distribution harmonics and power factor. Used a Hioki 3196 PQM to measure each distribution harmonics.
- 600V Power factor correction design, layout, detuning requirements.

- ◆ **Churchill School, Winnipeg, Manitoba (2012)**

Provided detailed design for school site wide heating upgrade.

- ◆ **St. Vital Centre, Winnipeg, Manitoba (2012)**

- Arc Flash Hazard Analysis
- Data collection, modelling, analysis, and report for arc flash hazard analysis of the St. Vital Centre
- Analysis of several operating configurations, generation of TCC Curves, mitigation of high risk areas

- ◆ **Versatile Vista Installation (2014)**

Detailed design for 15kV Vista electrical distribution upgrade.

- ◆ **Hudbay Mineral Snow Lake Manitoba (2012)**

Conceptual electrical design of the 66kV and 15kV substation for the proposed copper Reed Mine.

- ◆ **Stony Mountain Penitentiary Manitoba, Canada (2011-2012)**

- Detailed design for 15kV electrical distribution upgrade Phase 1 including installation of new (3) 15kV Vista switchgear.
- Detailed design of 600V electrical distribution including underground cabling, gang operated switch, transformer and panel board specifications.
- Arc Flash Study using SKM software.

- ◆ **Canexus Brandon Manitoba (2011)**

Detailed design for 15kV Electrical Distribution Upgrade

- ◆ **Border Chemical Manitoba, Canada (2010-Present)**

- Detailed design for 15kV East side electrical distribution upgrade Phase 1 including installation of new (1) 15kV Vista switchgear, 1x1MVA 12.47kV:480V and 1x750kVA 12.47KV:2400V transformers.
- Detailed design for 15kV West side electrical distribution upgrade including installation of new (1) 15kV Pad mounted switchgear, 2x1MVA 12.47kV:480V transformers.
- Arc Flash Study using SKM software

- ◆ **La Farge Cement Plant Manitoba, Canada (2015)**
 - Plant wide arc flash study (2015)
- ◆ **La Farge Stonewall Quarry Manitoba, Canada (2010)**
 - Plant wide grounding study (2010)
- ◆ **KVA Dynamo Facility, Winnipeg Manitoba, Canada (2010)**
 - Plant wide arc flash study (2010)
- ◆ **KVA Dynamo/IPS, Winnipeg Manitoba (2010-Present)**
 - CF Industries Arc Flash Study, Brandon Manitoba (2016)
 - Industrial Metals , Manitoba Canada: Grounding Study (2014)
 - Inland Quarry , Manitoba Canada: Grounding Study (2013)
 - Mulder Quarry , Manitoba Canada: Detailed design for 15kV overhead electrical distribution upgrade (2013)
 - Inland Quarry , Manitoba Canada: Detailed design for 15kV electrical distribution upgrade (2012)
- ◆ **Husky Minnedosa, Manitoba (2016)**
 - New Dust Collector PLC & HMI Upgrade (2016)
 - Preparation of fuel diliHMI for the new dust collector
 - On-site commissioning of server based Factory Talk Site Edition HMI
 - Provided operator training on the new dust collector controls
- ◆ **Village Enterprise Ltd., Winnipeg, Manitoba (2012)**
 - Penn West 25 kV Dip Pole Upgrade
 - Provided short circuit study and protection coordination for 2.5 MVA
 - 24940Y/14400 to 600Y/347 V
- ◆ **Adelaide Mini Storage, Winnipeg, Manitoba (2012)**
 - Adelaide Existing Electrical System Code Review
 - Preparation of electrical drawings for the electrical distribution system
 - Provided recommendation and capital cost estimate to upgrade the existing fire alarm system to bring the existing system up-to code
- ◆ **Diageo Global Supply, Gimili, Manitoba (2012)**
 - Preparation of Grain Handling System Control Philosophy, Specification & Cost Summary
 - Preparation of control philosophy report, specifications and preliminary drawings. The preliminary design includes bucket elevator, pit screw conveyor, electric actuator for diverter, zero speed switches, and GE Fanuc series 90-30 PLC card

- ◆ **Stony Mountain Penitentiary, Manitoba (2011)**
 - 15 kV Electrical Distribution Upgrade
- ◆ **Heartland Colony Winnipeg Manitoba (2011)**
 - 15 kV Electrical Distribution Upgrade
- ◆ **Meadowview Colony, Winnipeg Manitoba (2011)**
 - 15 kV Electrical Distribution Upgrade
- ◆ **Border Chemical Ltd, Winnipeg, Manitoba (2011)**
 - Provided the detailed design of 12.47 kV plant upgrade.
- ◆ **11 Evergreen Place, Winnipeg Manitoba (2010)**
 - Boiler Heating and Chiller Plant Replacement AHU Replacement
 - AHU Replacement
 - Chiller and Water pump replacement
- ◆ **WSD 1 – George V High School, Winnipeg Manitoba (2012)**
 - Supervision of the power system study project
 - Coordinate with WSD 1 to meet study requirements
 - Reviewed power system study which includes short circuit study, coordination study, equipment evaluation and arc flash mitigation and recommendation
- ◆ **WSD 1 – St. John High School, Winnipeg, Manitoba (2012)**
 - Supervision of the power system study project
 - Coordinate with WSD 1 to meet study requirements
 - Reviewed power system study which includes short circuit study, coordination
 - Equipment evaluation, arc flash mitigation and provide recommendations
- ◆ **National Research Council of Canada, Winnipeg Manitoba, (2010)**
 - Steam Boiler Replacement
 - Animal Holding HVAC Replacement
- ◆ **R.B. Russell School, Winnipeg, Manitoba (2010)**
 - Boiler Replacement Phase 1
 - Boiler Replacement Phase 2
- ◆ **CG Canada Ltd, Winnipeg, Manitoba (2010)**
 - Provided detailed design for 12.47 kV plant upgrade
 - Provided detailed design for 25kV underground feed and installation of (2)

- new 25kV vista switchgear electrical distribution.
 - Arc Flash Study using SKM software
- ◆ **San Gold Corporation, Bissett, Manitoba, Canada: Senior E/I&C project engineer (2009-2012)**
- **Dust Collection System**
 - Installation of a new 200hp dust collector for the crushing plant, upgrading of existing Crusher MCC and PLC.
 - Programming parameters for Benshaw soft start, and protection relay settings for rotary airlock valve, positive displacement blower, and discharge arm. System commissioning and troubleshooting. Verification of motor sequence start HMI feedback, and required interlocking.
 - **Regrind Mill Replacement**

350Hp Drive procurement, MCC upgrade to accommodate new Regrind Ball Mill Motor, commissioning drive
 - **12.47kV Underground Feeder to 007**

Design, procurement, and onsite management of construction of the surface distribution switchgear and 3MVA portable mining substation and Hi-potting of HV cables.
 - **PLC Audit of Automation Systems**

Site wide audit of all PLC systems Backup of existing programs on PLCs, smart overloads, VFDs, and HMIs.
 - **Mill Low Pressure Compressor**
 - Design, procurement, and managing the construction of a 250Hp compressor addition to the Mill.
 - Updating of the electrical infrastructure to accommodate addition and supply existing loads, re-establishing transformer ground protection and NGR.
 - **Raise Bore Hole Electrical Distribution**

Design, procurement, troubleshooting, and managing the construction of the electrical distribution building servicing the fresh air raise for the Cohiba zone.
 - **5kV Switchgear Upgrade**

Protection coordination, arc flash analysis, programming of protection relays.

- **12.47kV Power Factor Correction**

- Design and procurement of de-tuned 2.4MVAR power factor correction bank. Correspondence with MB Hydro to meet Power Quality Specifications.
- Troubleshooting bank from overheating issues.

- **Power Monitoring of Electrical Distribution**

Real time data collection of metering devices and web reporting service using Ion Enterprise software.

- **12.47kV Main Switchyard**

- Performed ground grid study, commission testing of breakers, cables, voltage regulators, and programming of protection relays.
- Arc flash analysis and coordination study. Procurement of materials for construction.

- **Site Work**

Design and development of electrical infrastructure (Hinge, 007, Maintenance Shop, Crusher upgrades, Old Substation, additional camp installations) and site wide arc flash study.

- ◆ **Farm Genisis Group, Waskada Manitoba (2010)**

E/I&C Engineering lead for a green field \$6 million Hemp Production Facility.

- ◆ **Nelson River Construction, Stonewall Manitoba (2010)**

Senior Engineer for Electrical Services Upgrade and Ground Design in a Limestone Quarry for Compliance with Manitoba Mines Branch Grounding Improvement directive.

- ◆ **Graymont, Faulkner Manitoba, (2009)**

Senior electrical engineer for plant wide arc flash study

- ◆ **Potash Corporation of Saskatchewan Inc. Saskatchewan,(2008-2009)**

- **Rocnaville Expansion Project**

- Principal Electrical Engineer for mine expansions, for \$2.8 billion dollar expansion Rocanville
- Product Expansion Project, Electrical, Instrumentation, and Controls Discipline Lead for mine expansions, for \$1.6 billion dollar expansion Cory.

2004-2008 SNC-LAVALIN INC., Winnipeg, Manitoba, Canada.
2006-2008 Head Electrical Engineer, Commercial-Industrial-Mining

Project services include the design and development of installation requirements for facility electrical distribution systems from the main source of power supply, and control systems architecture development and implementation, including the application of all necessary field instrumentation to satisfy project constraints.

Project management responsibilities include resource allocation, budget reviews, scheduling, cost estimating, and project progress reporting to maintain on-going conformity of activities and objectives.

- ◆ Mosaic Electrical Distribution Plant Wide Upgrade Study, Esterhazy, Saskatchewan, Canada (2008)
- ◆ City of Winnipeg, Baltimore Pumping Station, Installation of electrical service upgrade for Baltimore lift station, Winnipeg, Manitoba, Canada (2007)
- ◆ City of Winnipeg, Installation of natural gas genset, Winnipeg, Manitoba, Canada (2007)
- ◆ Asset Integrity, CVRD Inco Ltd., Thompson, Manitoba, Canada (2007): Assessment of all plant electrical and control infrastructure to extend production life of plant
- ◆ Union Station Boiler Replacement, Via Rail Canada, Winnipeg, Manitoba, Canada (2007)
- ◆ Adele Building, Bridgeman, Winnipeg, Manitoba, Canada (2007): Retrofit of a convent in to a secure adolescent housing facility
- ◆ Arc Flash Study and Harmonic Report, Agricore United, Silver Silos facility in White City, Saskatchewan, Canada (2007): Harmonic filter deficiency study
- ◆ City of Winnipeg, Chlorine Isolation Systems for Railcar and 1 Ton Cylinders, Winnipeg, Manitoba, Canada (2007)
- ◆ Wild Horse Bioenergy, Lucky Lake, Saskatchewan, Canada (2007): Front end Engineering design for new ethanol plant.
- ◆ Fire Alarm System Design, Agricore United, Edmonton, Alberta, Canada (2007): Design, installation tender, and commissioning of new fire alarm system for a feed mill, Hazardous and Non-Hazardous area classification design
- ◆ San Gold Inc., Bissett, Manitoba, Canada (2007): Design of SG#1 FAR heat recovery, ventilation and compressor installation, Design of main mill compressor installation, Hoist DC Drive retrofit study and cost estimate. Conversion of M-G drive to 1250 HP DC drive Mine switchyard and electrical distribution upgrade, Arc Flash study for plant wide electrical distribution
- ◆ San Gold Inc., Bissett, Manitoba, Canada (2006): Design of SG#1 ramp overhead line, new substation, and electrical ground grid
- ◆ Ontario Ministry of Natural Resources, Dorion, Ontario, Canada (2006): Detailed design for fish hatchery
- ◆ Phase 6 Indirect Heating, Canexus Chemicals Canada LP, Brandon, Manitoba, Canada (2006): Installation of a new heat exchange system including all necessary instrumentation, piping, electrical equipment and controls
- ◆ San Gold Inc., Bissett, Manitoba, Canada (2006): Design of SG#1 ramp overhead line, new substation, and electrical ground grid
- ◆ Ontario Ministry of Natural Resources, Dorion, Ontario, Canada (2006): Detailed design for fish hatchery
- ◆ Phase 6 Indirect Heating, Canexus Chemicals Canada LP, Brandon, Manitoba, Canada (2006): Installation of a new heat exchange system including all necessary instrumentation, piping, electrical equipment and controls

- ◆ Winnipeg Airport Authority-Airport Site Redevelopment Groundside, Winnipeg, Manitoba, Canada (2006): Underground infrastructure development for telecommunication and power cabling required for new airport terminal
- ◆ Puratone, Niverville, Manitoba, Canada (2006): Installation of new electrical service for the facility
- ◆ Independent Fire Alarm System Design Review, Manitoba Floodway Authority, Winnipeg, Manitoba, Canada (2006): Independent design review of inlet structure mist fire suppression system
- ◆ City of Winnipeg, Winnipeg, Manitoba, Canada (2006): Installation of new electrical service for the Ash Lift and Pumping Station

2004-2006 Senior Electrical/Instrumentation Engineer

- ◆ Railcar Chlorine Unloading, Canexus Chemicals Canada LP, Brandon, Manitoba, Canada (2005): Installation of new chlorine handling and safety shutdown system
- ◆ Oxygen Enrichment Converter Aisle, Inco Limited, Thompson, Manitoba, Canada (2005): Installation of new Oxygen Enrichment system for Converter Blast Air Lines
- ◆ High Rate Nickel Thickener, Inco Limited, Thompson, Manitoba, Canada (2005): Installation of new High Rate Thickener
- ◆ Simplot Canada Limited, Brandon, Manitoba, Canada (2005-): Installation of new #1 Nitric Acid Absorption Tower
- ◆ Simplot Canada Limited, Brandon, Manitoba, Canada (2005): Installation of new NOx scrubber
- ◆ Nickel Matte Compaction System, Inco Limited, Thompson, Manitoba, Canada (2004): Installation of new Nickel Matte Compaction System
- ◆ Power Supply and Transmission and Distribution Projects, Manitoba Hydro, Winnipeg, Manitoba, Canada (2004-2005): Detail design of protection and metering systems for various hydro-generating stations and high voltage electrical substations in Manitoba
- ◆ Truck Dump Installation, Inco Limited, Thompson, Manitoba, Canada (2004): Installation of new conveyor system for ore receiving
- ◆ HVAC Upgrade, Inco Limited, Thompson, Manitoba, Canada (2004)
- ◆ Control Room Renovation, Nexen Chemicals, Brandon, Manitoba, Canada (2004): Control room renovation including all electrical and computer networking services
- ◆ H2S Flare Ignition System, Inco Limited, Thompson, Manitoba, Canada (2004): Installation of new flare ignition system and propane bulk handling system
- ◆ Emergency Generator Installation, Nexen Chemicals, Brandon, Manitoba, Canada (2004): 1 MW Emergency Generator Installation

2000-2004 WEYERHAEUSER, Dryden, Ontario, Canada

2003-2004 Electrical Instrumentation Automation Superintendent

- ◆ Electrical Instrumentation and Automation Superintendent for department consisting of 33 electricians and 18 instrument mechanics, 6 E/I apprentices, 4 E/I maintenance supervisors, 2 E/I reliability engineers and 5 automation specialists (2002 – 2003)
- ◆ Site management of consultants and contractors (2000 – 2004)
- ◆ Technical support/supervision of Electrical Instrumentation planners and Electrical Instrumentation reliability engineers (2000 – 2004)
- ◆ Electrical high voltage distribution/switchgear shutdown planning / project management and supervision (2000 – 2004)
- ◆ Mill shutdown project management (2000 – 2004)

- ◆ Electrical Instrumentation project lead for work system restructure of mill towards establishment of a two trade system (2003)

2002-2003 Electrical Instrumentation Maintenance Supervisor

- ◆ Electrical and instrumental supervisor for 20 electricians and 10 instrument mechanics

2000-2002 Reliability Engineer

- ◆ Reliability maintenance project lead for implementation of new mill wide CMMS preventative maintenance program (SAP). Directed two Electrical Instrumentation reliability engineers, four mechanical reliability engineers and 1 lube analyst (2002)
- ◆ Electrical Instrumentation project lead for implementation of new mill wide CMMS platform (SAP) (2002)
- ◆ Commissioning lead for \$7 million mill power distribution upgrade (2002)
- ◆ Electrical Instrumentation Supervisor for maintenance team consisting of 12 electricians and 10 instrument mechanics (2001 – 2002)
- ◆ ISO 9000 Electrical/Instrumentation/Automation Coordinator (2000 – 2002)
- ◆ Administer all E/I preventative/reliability maintenance programs and service contracts (2000 – 2002)
- ◆ Project manager for paper machine drive optimization (2000)

**1997-2000 FLETCHER CHALLENGE (ELK FALLS), Campbell River, British Columbia, Canada
Electrical Instrumentation Maintenance Engineer and Project Engineer**

- ◆ Project management of a drive retrofit conversion, Silpac 3100 to DC 2000 (2000)
- ◆ Capital expenditure request preparation. Maintenance/capital spending budget planning (1997 – 2000)
- ◆ Maintenance of all machine and winder drives and mill electrical distribution equipment (1997 – 2000)
- ◆ Technical support for and supervision of trades personnel and E/I planners (1997 – 2000)
- ◆ Site management of consultants and contractors (1997 – 2000)
- ◆ Project management for the installation of colour and ash control for a paper machine (1999)
- ◆ PLC upgrade installations. PLC's included GE Fanuc, GE Series 6, AB PLC2 and AB PLC5. (1998 – 2000)
- ◆ Winder #5 cycle time reduction resulting in a production increase of twenty tons per day (1998)
- ◆ Project management for blowline consistency control of 4 large TMP refiner motors (1998)
- ◆ Winder #2 slitter position control upgrade. Reduction in winder downtime 2% per month (1997)
- ◆ Soft calendar optimization. Absolute efficiency increase of approximately 5% (1997)

**1996-1997 PINE FALLS PAPER COMPANY, Pine Falls, Manitoba, Canada
Electrical Instrumentation Engineer/DCS System Administrator**

- ◆ Project management for a paper machine approach screening upgrade (1997)
- ◆ Developed the Effluent Plant pH control strategy (1997)
- ◆ Replaced 115 kV wall bushings on incoming line (1997)

- ◆ DCS System Administrator for the Moore (APACS) and Bailey (NET90) DCS systems (1996 – 1997)
- ◆ Implement new/maintain process loops in all areas of the mill Effluent Plant, Deinking Plant, Paper Machines, Groundwood, and Sulphite (1996 – 1997)
- ◆ Site management of consultants and contractors (1996 – 1997)
- ◆ Commissioned a water treatment plant which was converted from manual operation to DCS control (1996)
- ◆ Winder upgrade installation and commissioning (1996)
- ◆ Planned the hydraulic control upgrade of a Bauer 412 refiner (1996)
- ◆ Project management for a wrapline and database order management system upgrade (1996)

**1994-1996 ACRES INTERNATIONAL LTD., Winnipeg, Manitoba, Canada
Junior Electrical Engineer**

- ◆ Planned an underground residential distribution network conversion (5 kV to 25 kV) (1996)
- ◆ Prepared a residential fire safety upgrade report to ensure various high rise buildings comply with City of Winnipeg fire by-laws and safety codes (1996)
- ◆ Bid document preparation and contract administration for a new Generating Station (1994 – 1996)
- ◆ Designed gate guide heater failure detection for a generating station spillway gate (1995)
- ◆ Prepared preliminary cost estimate studies for two proposed generating stations (1995)
- ◆ Prepared commissioning procedures for 12.47 kV switchgear and 600 V load centres (1995)
- ◆ Prepared dam safety inspection report pertaining to the equipment and operating procedures for two hydroelectric generating stations (1995)
- ◆ Involved with the preparation of an oil spill containment technical specification and an overhead gantry crane technical specification to be used as tender documents (1994)
- ◆ Assembled cost estimate data for major electrical equipment for a Phase II engineering study to upgrade electrical service to a pulp and paper mill from 138kV to 230 kV (1994).

AWARDS AND SCHOLARSHIPS

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|------|---|
| 2001 | Award for paper machine speed increase of 9% by optimizing Silpac 3100 drives, Weyerhaeuser, Dryden, Ontario, Canada |
| 1999 | Fletcher Challenge (Elk Falls) Most Valuable Maintenance Employee, Campbell River, British Columbia, Canada |
| 1994 | Manitoba Hydro Award for best graduation thesis, fourth year electrical Engineering Thesis titled: "Synchronous Motor Fuzzy Logic Synchronizing and Protection Controller", Winnipeg, Manitoba, Canada. |

PROFESSIONAL DEVELOPMENT

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|------|--|
| 2002 | North West Training Leadership Training, Dryden, Ontario, Canada |
| 1999 | DNV Introduction to and Implementation of Modern Safety Management, Campbell River, British Columbia, Canada |
| 1998 | Canscott Level One Supervisory Training, Campbell River, British Columbia, Canada |

ADDITIONAL TRAINING

2013	Low-Voltage Arch Flash Awareness Training
2003	High Voltage Switchgear Safety and Protection Training, Dryden, Ontario, Canada
2002	Preventative/Predictive Maintenance Technologies, Dryden, Ontario, Canada
1999	Reliance Automax Drive Maintenance and Troubleshooting, Campbell River, British Columbia, Canada
1999	Allen-Bradley 1557M Medium Voltage AC Drive Maintenance and Troubleshooting, Campbell River, British Columbia, Canada
1998	PLC-5 Maintenance/Troubleshooting, Campbell River, British Columbia, Canada
1998	Allen-Bradley 1336 Plus Low Voltage AC Drives, Campbell River, British Columbia, Canada
1998	Supporting, Troubleshooting and Optimizing Windows NT, Campbell River, British Columbia, Canada
1997	Series 90/70 PLC Maintenance, Campbell River, British Columbia, Canada
1997	GE Silpac 3200 Drive and Series Six PLC Maintenance and troubleshooting, Campbell River, British Columbia, Canada
	Elevator Maintenance Training for the M.R. License, Campbell River, British Columbia, Canada
1996	High Voltage Termination/Splicing Seminar, Pine Falls, Manitoba, Canada
1996	Fibre Optic Seminar, Pine Falls, Manitoba, Canada
1996	Moore APACS DCS Configuration and Operation, Pine Falls, Manitoba, Canada
	DCS: Moore, Bailey, Pine Falls, Manitoba, Canada
1995	Advanced Electrical Code, Red River Community College, Winnipeg, Manitoba, Canada
1995	Programmable Logic Controllers, South Winnipeg Technical Centre, Winnipeg, MB, Canada
1994 - 2003	PLC: GE, Allen-Bradley, Telemecanique, Reliance, Siemens, various locations
1994 - 2003	Software: SAP, Indus EMPAC, Autocad, MS Office, various locations

PROFESSIONAL ASSOCIATIONS

2006-Present	Association of Professional Engineers, Geologists and Geophysicists of Alberta - Member
1996-Present	Association of Professional Engineers and Geoscientists of Manitoba – Member
2000-Present	Association of Professional Engineers of Ontario – Member
2007-Present	Association of Professional Engineers of Saskatchewan – Member
2013-Present	Association of Professional Engineers of British Columbia – Member

LANGUAGES

English and French

CORPORATION

AMPS SERVICES INC.

Automation, Maintenance, Project & Supervision Services

C.G. (Conrad) Asmundson,

President - **AMPS SERVICES INC.**

Head E/I&C Engineer, P. Eng.

Industrial-Mining-Utility-Municipal Canada

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Controls Engineering Service Provider

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