



# Christian Astorino

## Project Engineer

### Education

BS, Mechanical Engineering  
Clemson University, 2005

### Year Joined AMPHION

2009

### Years of Experience

Since 2007

### Professional Registrations

North Carolina EIT  
API 510, 570, 653 Certified  
Inspector

### Additional Certifications

NDT Level II:  
Digital Ultrasonic Thickness  
Magnetic Particle  
Liquid Penetrant

Mr. Christian Astorino has been a project engineer with Amphion Analytical Engineering, P.A. since 2009. He has experience in Mechanical Integrity, Strain Gaging Services, Load Rating, Spill Prevention and Countermeasure, and Process Safety Management since 2007.

Mr. Astorino has extensive experience in managing and performing mechanical integrity inspections on process and power piping, storage tanks, process vessels, pressure vessels, and boilers at a variety of facilities. For over a decade, he has been providing these services to a wide range of industries including, but not limited to, the tire and rubber industry, various chemical production industries, the paper industry, and the food processing industry.

Mr. Astorino is skilled in performing field inspections, fitness-for-services evaluations, and engineering analyses which conform to diverse guidelines, such as the American Petroleum Institute (API), American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, and The National Board Inspection Code (NBIC). He regularly provides in-depth analyses, including minimum required thickness calculations, maximum allowable working pressure calculations, corrosion rate and allowance calculations, next inspection calculations, and expected life calculations.

Mr. Astorino is an API 510, 570, and 653 Certified Inspector. He is also certified as an ASNT Level II Technician in magnetic particle testing (MT), liquid penetration testing (PT), and ultrasonic thickness testing (UT) methods.

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### Mechanical Integrity

During his time at Amphion, Mr. Astorino has performed mechanical integrity inspections on storage tanks, process vessels, pressure vessels, and boilers at numerous facilities covering a wide range of industries. The industries covered include, but are not limited to, the tire and rubber industry, various chemical production industries, the paper industry, and soy bean processing industry.

These inspections utilized various nondestructive testing (NDT) methods and failure analysis. Mr. Astorino directly maintains the clients' mechanical integrity program, including tracking inventory and scheduling inspections. He has also developed and implemented electronic inspection forms to be used on a portable tablet device in the field.

Mr. Astorino is experienced at performing engineering analyses under various guidelines, such as the American Petroleum Institute (API), American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, and The National Board Inspection Code (NBIC). Following field inspections, performed fitness-for-service (FFS) engineering analysis in accordance with the NBIC, API, and ASME, when applicable. Analyses included minimum required thickness, maximum allowable working pressure, corrosion rate and allowance calculations, as well as next inspection and expected life calculations. In addition, he has performed FFS evaluations based on stresses induced by vessel supports or penetrations, utilizing Zick's, Bijlaard's, or other appropriate methods. Additional analyses include nozzle reinforcement sizing, pressure relief sizing, and rerating calculations.

He has also designed and supervised the implementation of a wide range of weld repairs for storage tanks, process vessels, and pressure vessels. This included coordination between repair contractors and plant personnel, and ensuring final approval by the Authorized Inspector (AI).

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### **Piping Inspections**

Performed initial site reconnaissance to evaluate factors such as piping circuit complexity, access for testing, and an initial determination of number and location of test areas based on ASME and API 570. Utilized a Risk Based Inspection (RBI) approach to evaluate the piping, considering various failure modes, the likelihood of failure of each mode, and the consequences of failure to provide guidelines for number of test points and locations, and testing methodologies. The types of piping mediums encountered include steam, process chemical, natural gas, fuel and process oil, and various types of water.

Utilized various NDT methods including, but not limited to, ultrasonic thickness measurements, magnetic particle testing, and bubble leak detection. During the inspection, produced field isometric drawings of the piping systems, some of which were used for generating electronic versions at the clients' request. Analyzed the piping inspection results in accordance with ASME and/or API, as applicable. In addition, evaluated pipe support adequacy per ASME.

Co-authored and updated client mechanical integrity documents in order to the latest applicable codes.

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### **Lock Out Tag Out (LOTO) Procedures**

#### Wastewater Treatment Plants and Combined Sewer Overflow (CSO) Plants

Drafted, organized, and finalized Energy Control Procedures (ECPs) for 14 wastewater treatment plants and two CSO plants. Acted as lead member of a three- to five-person LOTO team to manage daily work activities for data collection and ECP production in accordance with client approval. Planned and participated as lead role in plant procedure implementation and final deliverable presentations. Organized and participated in training of plant personnel in LOTO program.

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### **Strain Gaging Services**

Planned and participated in various projects involving the installation of strain gages, set-up of the data acquisition system, and collecting real time strain data. After the completion of the data collection, analyzed the data for the stress and fatigue analyses. This data was then either used to design an improved system or was compared with Finite Element Analysis (FEA) stress results to ascertain their validity.

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### **Load Rating**

Performed field inspection of and engineering analyses pertaining to tire inspection machines in order to determine their maximum load capabilities. This entailed performing load analysis of the shafts, the main structure, and the anchoring system.

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### **Spill Prevention Control and Countermeasure (SPCC)**

Co-authored specifications for multiple clients to provide requirements that would be utilized for the inspection and evaluation of existing, atmospheric vented storage tanks for SPCC plan compliance. This entailed review of and compliance with local, state, and federal rules and regulations.

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### **Process Safety Management (PSM)**

Assisted client in their PSM program to ensure full compliance in preparation for the facility's successful OSHA Voluntary Protection Program (VPP) re-certification audit. Activities included: comprehensive review of plant operating procedures for PSM-covered processes, development of a strategy to resolve open action items resulting from Process Hazard Analyses (PHA), Incident investigations, Compliance Audits, and Management of Change (MOC) reviews, as well as the assessment of the facility's Process Safety Information (PSI), with a complete revision to the PSI location matrix.

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### **Drafting of Mechanical Integrity Manuals**

Drafted and co-authored numerous corporate mechanical integrity manuals to be utilized companywide for multiple clients across varying industries. The process included multiple corporate reviews and revisions and synergy of the latest applicable codes and standards. Updating of existing outdated manuals and generation of new ones from scratch was accomplished.