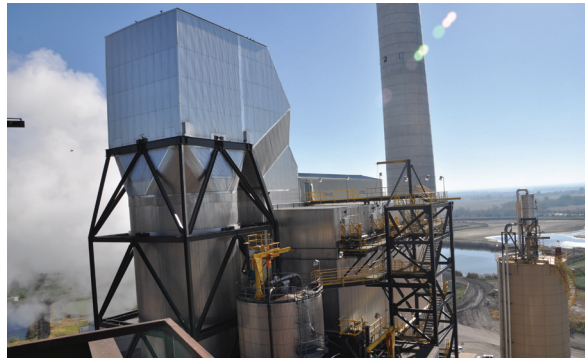


# Power Generation

Full Service Engineering and Design





EAPC Industrial Services offers a full spectrum of services including consulting, engineering, construction, operation, maintenance, startup, and testing solutions provided through flexible work processes tailored to meet your specific needs.

## CONTENTS

EAPC Industrial Services.....	4
Power Generation .....	8
Mechanical Engineering .....	10
Piping Engineering .....	14
Electrical Engineering .....	16
Chemical Engineering .....	18
Structural/Architectural.....	20
Project Management.....	24
3D Laser Scanning.....	26
Program Offerings .....	28
Professional Engineering Support.....	30

# EAPC INDUSTRIAL SERVICES

## ENGINEERING FOR HEAVY INDUSTRY

EAPC Industrial Services is a multi-disciplinary consulting firm with offices in Bismarck, Dickinson, Fargo, Grand Forks, Minot, and Williston, ND; Sioux Falls, SD; Bemidji and St. Paul, MN; and Phoenix, AZ.

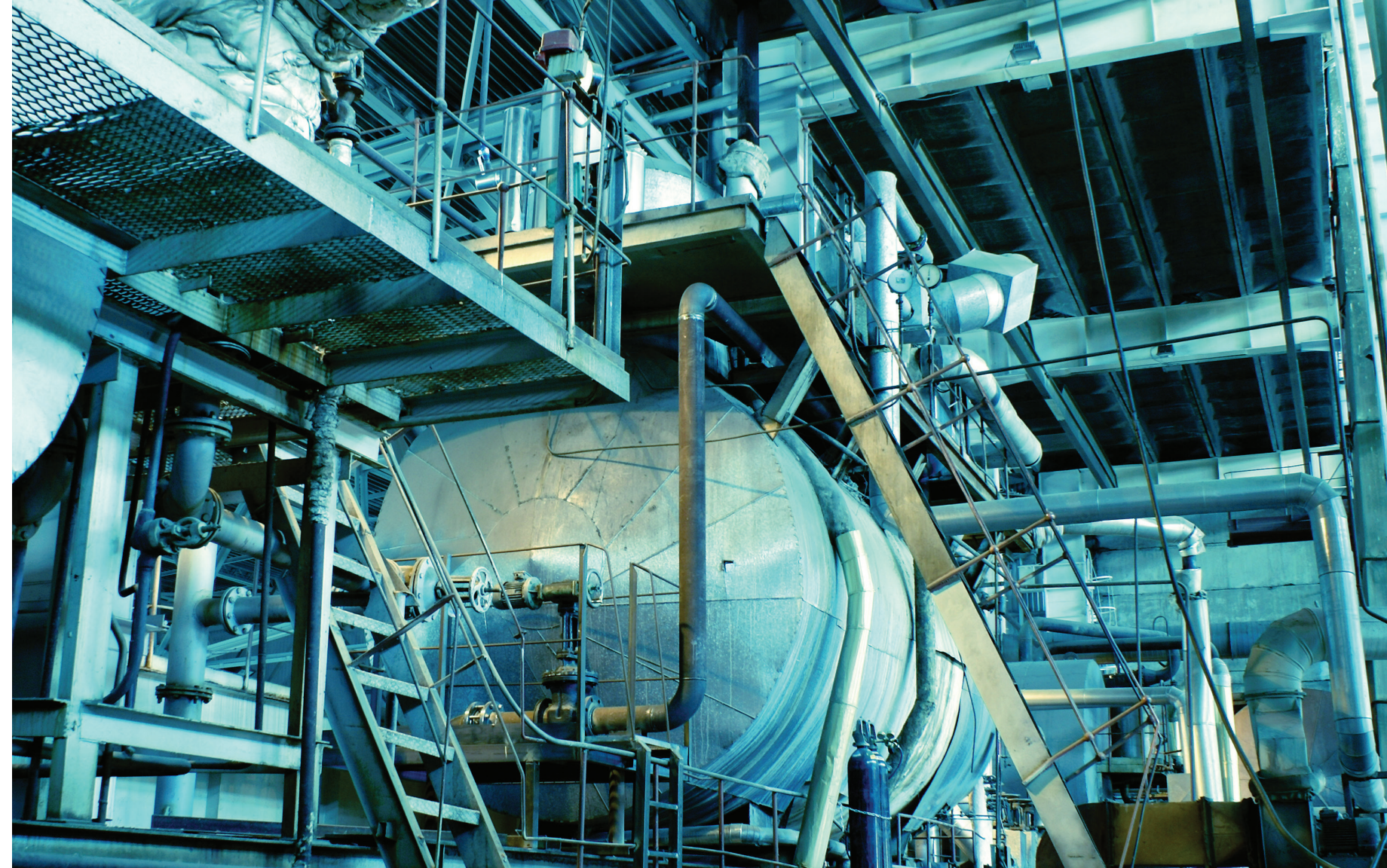
The staff of EAPC has performed hundreds of power generation and process industry projects for a wide breadth of clients nationally.

### HSE QUALIFICATIONS

EAPC is certified under ISNetworkd (ISN# 400-217037)  
NCMS NON-DOT Qualified

EAPC has 180 employees providing services in the following areas:

Engineering: Chemical, Mechanical, Electrical, Structural  
Commissioning  
Architecture  
Procurement  
Construction Management  
Maintenance Planning  
Forensics



## INDUSTRIAL SERVICES TEAM

Our multidisciplinary teams include members who previously worked at operating plants, consulting organizations, and research centers with experience working around the world and close to home.

### MEETING YOUR NEEDS

Our Industrial Services Group provides a full spectrum of services including consulting, engineering, training, construction management, operation, maintenance, startup, and testing solutions that support your organizational goals. We do this through flexible work processes tailored to meet your specific needs with a focus on developing and maintaining a long-term relationship with you.

### INDUSTRY EXPERIENCE

Our experience spans a broad range of industries including Food Processing, Industrial, Power, Process, Commercial, Institutional, and Governmental.

We have completed countless projects in these industries including Sugar Processing, Ethanol, Bio-refining, Oil & Gas, Electric Power Generation, Agriculture & Food Processing, Minerals & Mining, Forest Products, and Manufacturing.

Our expertise covers many technologies, equipment, and systems including Process, Fractionation, Distillation, Bulk Material Handling, Heat Transfer, Fluid Handling Systems, Separation, Filtration Systems, Evaporation Systems, Combustion Systems, Flare Systems, Pollution Control, Explosion Prevention, Pressure Vessel Systems Analysis, and Pressure Piping Systems Analysis.



# POWER GENERATION

## SOLUTIONS

The power generation industry is very complex. EAPC can provide the knowledge and experience to meet those requirements. Our team is made up of a strong mix of experienced, industry tested professionals who provide a consistent and technologically advanced approach to all projects.

We have the breadth and depth of experience needed for Power Station Owners seeking outside engineering service support. Although we have completed greenfield projects, our niche is retrofit projects. Our staff is experienced in engineering, procurement and construction support including engineers who have worked for operating companies at central power generating stations. We also have experience across a wide breath of heavy industries from which we draw applicable experience to the power industry including: Oil & Gas, Minerals and Mining, Petroleum Processing, Agricultural Processing, Biofuels, and Institutional Central Boiler Plants

We have mechanical, electrical, structural, and chemical engineers within our organization to support all disciplines required for a project. Those areas where we don't have specialized expertise, we have developed partnering relationships to provide the necessary services.

EAPC is a successful competitor based upon our ability as a smaller organization to provide responsive, high quality solutions through competent, experienced personnel at typically a lower cost. With multiple locations throughout the region, EAPC is able to meet your needs quickly and efficiently.



### EXPERIENCE

- Boiler Systems
- Stack Additions/Replacements
- Boiler MACT, ESP, CEMS, COMS Systems
- Balance of Plant Systems
- Combined Heat & Power
- Buried and Elevated Steam Condensate Systems
- ASME Section VIII New & Existing Vessel and API Tank Design/Analysis
- ASME B31 Code Piping Engineering Design
- API 650 Tank Design
- Industrial HVAC
- Chiller Systems
- Water Treatment Systems
- Mercury Capture
- Fuel Oil to NG for Startups
- Project Management
- Construction Management
- Energy Studies and Assessments
- Code Studies
- Electrical Area Classifications
- Plant Outage Support
- Startup Support
- Maintenance Planning and Scheduling
- Combustible Dust Explosion Protection/Prevention
- Waste Water Treatment Systems
- Material/Coal Handling Conveying
- Unloading/Storage/Feeding
- Chutes/Transitions/Hoppers/ Grating
- Equipment Structures-Elevated
- Dust Control/Explosion Mitigation
- Buildings/Foundations/ Structures
- Civil/Roads
- Electrical Power Distribution
- Instrumentation and Control Systems
- Interface with Plant Control Systems
- Security and Fire Protection Systems

# MECHANICAL ENGINEERING

## APPLYING ENGINEERING, PHYSICS, AND MATERIALS SCIENCE FOR YOUR MECHANICAL THERMAL AND FLUID SYSTEM NEEDS

Responsive personnel support projects from feasibility studies, design, procurement, construction, start-up and testing, and troubleshooting phases through maintenance planning support. With state-of-the-art technology software applications and informational resources to assist in problem solving and data analysis, we provide efficient, cost effective service to respond to your needs.

### SERVICES AND DELIVERABLES

#### 3D MODEL AND DRAWING PREPARATION

- 3D Laser Scanning and Documentation
- Equipment Design
- General Arrangement Drawings
- Piping and Instrumentation Diagrams (P&IDs)
- Process Flow Diagram (PFD)
- Sheet Metal, Chutes, Transitions, Spouting
- Vessel and Tank

#### SPECIFICATION PREPARATION

- Equipment & Device Data Sheets
- Equipment & Materials

#### INSPECTIONS

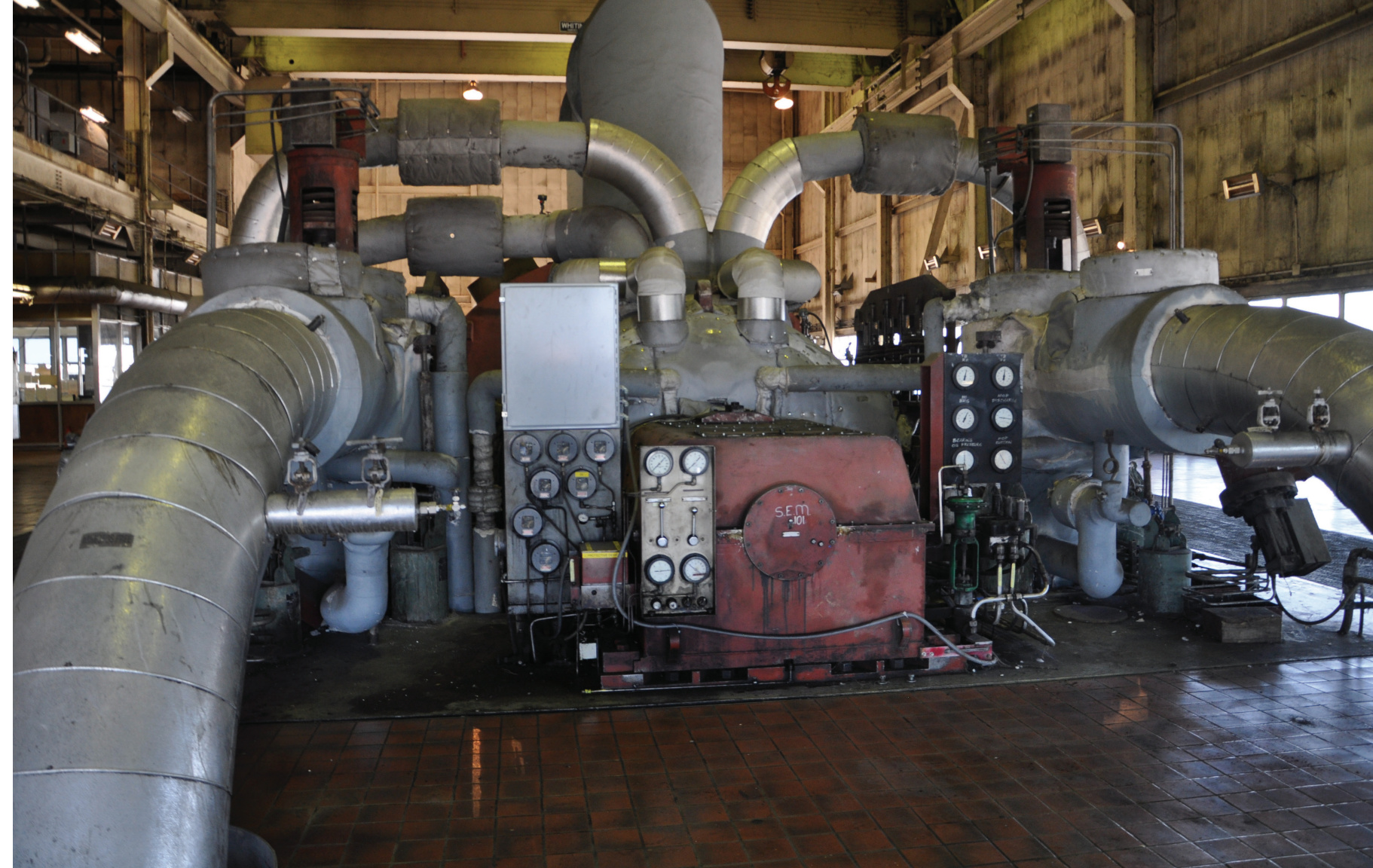
- Ultra Sonic Thickness Testing

#### STUDIES

- AACE Cost Estimate Studies
- API
- Basis of Design
- Business Case Development
- Codes - ASME Boiler & Pressure Vessel Code
- Feasibility Studies
- NFPA
- Preliminary Engineering

#### ANALYSIS

- Fluid Statics/Dynamics
- Heat Transfer
- Mechanics
- Thermodynamics



## APPLICATION EXPERIENCES

Above & Below Ground Tanks - API  
ASME STS-2000 Stack Analysis & Design  
Boiler & Chiller Systems  
Cogeneration Systems  
Combustible Dust/Dust Collection/Pollution Control  
Cooling Towers  
Dewatering Systems - Process/Centrifugal  
Diesel Generator Systems  
Dryers  
Electrostatic Precipitators  
Elevated Cranes  
Evaporators  
Explosion Protection and Suppression  
Fire Protection  
Filters  
Heat Exchangers  
HVAC - Commercial and Industrial  
Material Handling  
    Belt  
    Screw  
    Drag  
    Pneumatic  
    Elevators  
    Storage  
    Vibratory Feeders  
    Conveyors  
    Reclaiming

Machine Design - Process Equipment  
Pelletizing  
Plumbing  
Power Transmission - Hydraulic/Pneumatic  
Pump Systems  
Pressure Vessels - ASME, B&PV, Section VIII  
Product Coolers  
Sampling Systems  
Services and Applications  
Screening  
Scrubbers  
Size Classification  
Tank Installations - API  
Truck and Rail Loading and Unloading Systems  
Underground Storage  
Washing and Dewatering Systems  
Flare Systems



# PIPING ENGINEERING

## DESIGNING SAFE AND COST EFFECTIVE PIPING SYSTEMS

Our full spectrum of services ranges from plant expansions to equipment installations, pressure piping and pressure vessel analysis, code evaluations, and cost estimating. Because of our flexibility, we devote the same level of attention to client concerns for projects all sizes. Our flexibility allows us to assimilate into your organization with a minimal learning curve to maximize your project team's resources. Let us help you reach your goals with any size industrial project.

### SERVICES AND DELIVERABLES

#### 3D MODEL AND DRAWING PREPARATION

- Piping & Instrumentation Diagrams (P&ID)
- Orthographic & Isometric Design/Layout
- Hanger, Anchor & Support Design/Layout
- Isometric & Spool Drawings
- 3D Laser Scanning and Documentation

#### SPECIFICATION PREPARATION

- Components and Materials
- International EN Piping Specification Development

#### STUDIES

- Codes - AMSE & API
- Capacity | Remaining Life

#### INSPECTIONS

- Infrared Leak Detection
- Ultrasonic Thickness Testing

#### ANALYSIS

- Fluid Statics/Dynamics
- Heat Transfer
- Piping-Stress/Flexibility



### APPLICATION EXPERIENCES

- Buried Underground Piping
- Cathodic Protection
- Double Containment Systems
- Expansion Joints/Loops
- Heat Tracing
- High Energy Piping
- Network Systems
- Plant Retrofits
- Premanufactured Piping Systems
- Power Piping Systems
- Process Piping Systems
- Refrigeration Piping Systems
- Road & Bridge Crossings
- Tie-ins
- Utility Piping
- Steam & Condensate Distribution Systems



# ELECTRICAL ENGINEERING

## POWER DISTRIBUTION FOR ALL YOUR NEEDS

Our electrical engineers support projects from feasibility studies through design and procurement. We support any need you may have during construction and start-up/testing/troubleshooting. Using state-of-the-art technology software applications and informational resources, we provide efficient, cost effective service to respond to your needs.

### SERVICES AND DELIVERABLES

#### DRAWING PREPARATION

- Feeder Riser Diagrams
- Grounding Plans
- Instrumentation Loop Diagrams
- Motor Connection Diagrams
- Motor with Control Schematic/Logic Diagrams
- System Layouts
- Switchboard & Motor Control Center Designs

#### SPECIFICATION PREPARATION

- Equipment Components & Materials
- Instrumentation & Equipment Data Sheets

#### STUDIES

- Arc Flash
- Area Classification
- Electrical Distribution
- Load Flow
- Utility Power Coordination

#### INSPECTIONS

- Commissioning
- IR Scanning
- Loop Checks



#### ANALYSIS

- Device Coordination
- Field Survey & Analysis
- Load Calculations
- Lighting Calculations
- Voltage Drop

#### APPLICATION EXPERIENCES

- Cable Tray & Rack Systems
- Cogeneration Equipment
- Communication Networks
- Emergency Generation & UPS Systems
- Energy Conservation
- Electric Heating Systems
- Fire Alarm Systems
- Grounding & Bonding
- Ground Fault & Short Circuit Design
- Heat Tracing
- Lighting Controls
- Lightning Protection
- Power Monitoring & Controls
- Power Factor Correction
- Security Systems
- Sound & Paging
- Transient Voltage Suppression
- Industrial/Commercial/Site/Roadway Lighting

# CHEMICAL ENGINEERING

## DESIGN FOR THE PRODUCTION, TRANSFORMATION, TRANSPORTATION, AND PROPER USE OF CHEMICALS, MATERIALS, AND ENERGY

Our Chemical Engineering Group provides process engineering capabilities over a wide range of industries – gas plants, oil refineries, chemical and manufacturing plants, water and wastewater treatment, pollution control, steam and power generation, sugar processing, food industries, and more.

We work with our clients in all phases of project development and provide a full range of engineering services, including: Conceptual engineering, Basic engineering and design, Detailed engineering and design, Procurement, Fabrication, Commissioning and start-up.

We help clients on equipment sizing and specifications, safety concerns, evaluation of alternatives, infrastructure requirements, and modifications of existing facilities to develop engineering solutions that are clear, concise, and appropriate.

### SERVICES AND DELIVERABLES

#### PROCESS MODELS

- Mass, Heat, Energy Balance
- Process Design Criteria Development
- Process Functional Description

#### PREP, DESIGN, AND MANAGEMENT

- Process Design and Flow Diagram Preparation
- Piping and Instrumentation Diagram Preparation
- Process Equipment Specification Preparation
- Process Safety Management

#### STUDIES

- Process Modifications
- Expansions
- Efficiency Improvements
- Financial Returns/Models

#### TROUBLE SHOOTING

- Unit Operation and Plant Troubleshooting
- Operational Analysis and Recommendations
- Start-up Assistance



### APPLICATION EXPERIENCE

- Autoclaves
- Boiler
- Centrifuges
- Chillers
- Classifiers
- Clarification
- Condensate Systems
- Cooling Water System
- Crystallization
- Chromatography
- Decolorization
- Diffusion
- Distillation
- Dryers
- Fermentation
- Filtration
- Fire Water and Protection System
- Flare System
- Ion Exchange
- Instrument Air System
- Scrubbers
- Steam Distribution
- Vacuum System
- Water Treatment
- Wastewater Treatment

# STRUCTURAL/ARCHITECTURAL ENGINEERING & DESIGN

## SPECIALIZING IN THE ANALYSIS AND DESIGN OF FOUNDATIONS AND STRUCTURES

Physical laws and empirical data allow us to understand, predict, and calculate the stability, strength, and rigidity of structures as well as to design, construct, and maintain the built environment.

Using the latest in engineering software, our structural team members can analyze existing as well as design new structures, foundations, and plant facilities/infrastructure. For projects needing architectural work, our staff includes professional architects certified in numerous jurisdictions. Whether it is a plant expansion or a greenfield site, our multidisciplinary team can handle your project from start to finish.

Our structural team takes pride in striving to understand each client's individual goals and objectives as well as the needs of the project. We work with you to provide options to find a solution that works best for you. We have the tools, the experience, and the knowledge to provide safe, efficient, cost effective, buildable structures that perform as intended.

## SERVICES AND DELIVERABLES

### DRAWING PREPARATION

- Architectural Plans Elevations
- Construction Detailing
- Site Layout/Topography
- Structural Plans/Sections

### SPECIFICATION PREPARATION

- Architectural
- Structural

### STUDIES

- Code
- Feasibility/Cost
- Forensic
- Structural

### ANALYSIS/DESIGN

- Dynamic/Vibration
- Steel, Concrete (Cast-In-Place and Precast),  
Masonry, Wood, Aluminum Materials
- Structural Components (Roofs, Walls, Floors, etc.)
- Steel Connections





## EXPERIENCE

Access Platforms and Mezzanines/Stairs/Ladders

Building and Architectural Design (new and remodel)

Catwalks, Platforms, Ladders

Concrete Pump Pads

Construction Detailing

Containment and Dike Design

Earth Retention

Equipment and Machinery Foundations

Equipment and Machinery Structural Steel  
Support and Access

Failure/Stress Analysis

Foundation Design

Lifting Beams

Liquid Containment Structures

Monorails/Hoist Beams and Supports  
for Bridge Cranes

Retaining Walls

Piling, Caissons, and Deep Foundation Systems

Piping Racks and Trestles/ Bridges

Pedestrian Facilities/ Urban Design

Pre-Engineered Buildings

Runoff and Drainage Management

Site Road Design

Site Improvements

Storage Tanks, Bins and Hoppers

Storm Sewer Design

Steel Stacks

Subsurface Utilities

Support Structures for Piping and/or Equipment

Tank and Vessel Support Structures and Foundations

Topographical Surveys

Water-Containing Concrete Structure

# PROJECT MANAGEMENT

## SINGLE-POINT OF CONTACT TO INCREASE YOUR OPTIONS FROM PLANNING THROUGH START-UP

Factors such as plant shutdown dates, equipment delivery, regulatory deadlines, and construction scheduling all affect your budget and completion dates. EAPC will assist you in selecting the most appropriate project delivery method based on our experience with design-bid-build with professional construction management and procurement support or single point design-build services. With this array of options, our clients select the project delivery approach that will result in the most successful project experience through all phases of engineering, procurement, and construction.

### SERVICES

#### ENGINEERING

- Constructability, Operability, Maintainability Analysis
- Economic Analysis
- Value Engineering
- Cost Estimating and Budget Development
- Budget Control and Reporting
- Execution Planning, Resource Management and Project Scheduling
- Contract and Bid/Construction Document Development
- Contractor Prequalification



#### PROCUREMENT

- Procurement Plan Development, Management and Reporting
- Supplier Prequalification
- Bid Specification Development
- Contract Terms and Conditions Development
- Request For Quotation Development and Issuance
- Bid Process Management
- Bid Receiving and Analysis
- Purchase Award Recommendation
- Spare Parts Definition
- Monitoring Supplier Engineering, Shop Drawing Development, Fabrication and Shipping
- Inspection Support to Verify Contract Compliance and Quality Requirements
- Expediting Plan Development, Monitoring and Reporting
- Receiving Coordination

#### CONSTRUCTION

- Pre-Construction Planning
- Safety Coordination
- Site Facilities Planning
- Contracting Strategy Development
- Cost Management, Monitoring and Reporting
- Construction Schedule Development, Management and Reporting
- Construction Sequence and Logistics Development
- Field Contract Administration and Document Control
- Contractor Coordination Meetings
- On Site Technical Support
- Startup and Commissioning, Operating Procedure Development and Staff Augmentation

# 3D AERIAL & GROUND-BASED LASER SCANNING

## ACCURATE AND PRECISE SITE DOCUMENTATION

We use scanning primarily to increase the accuracy and reduce manpower required to create as-built conditions for retrofits to facilities. A scan can be converted to a working 3D model which designers can use as a starting point for modifications to the facility.

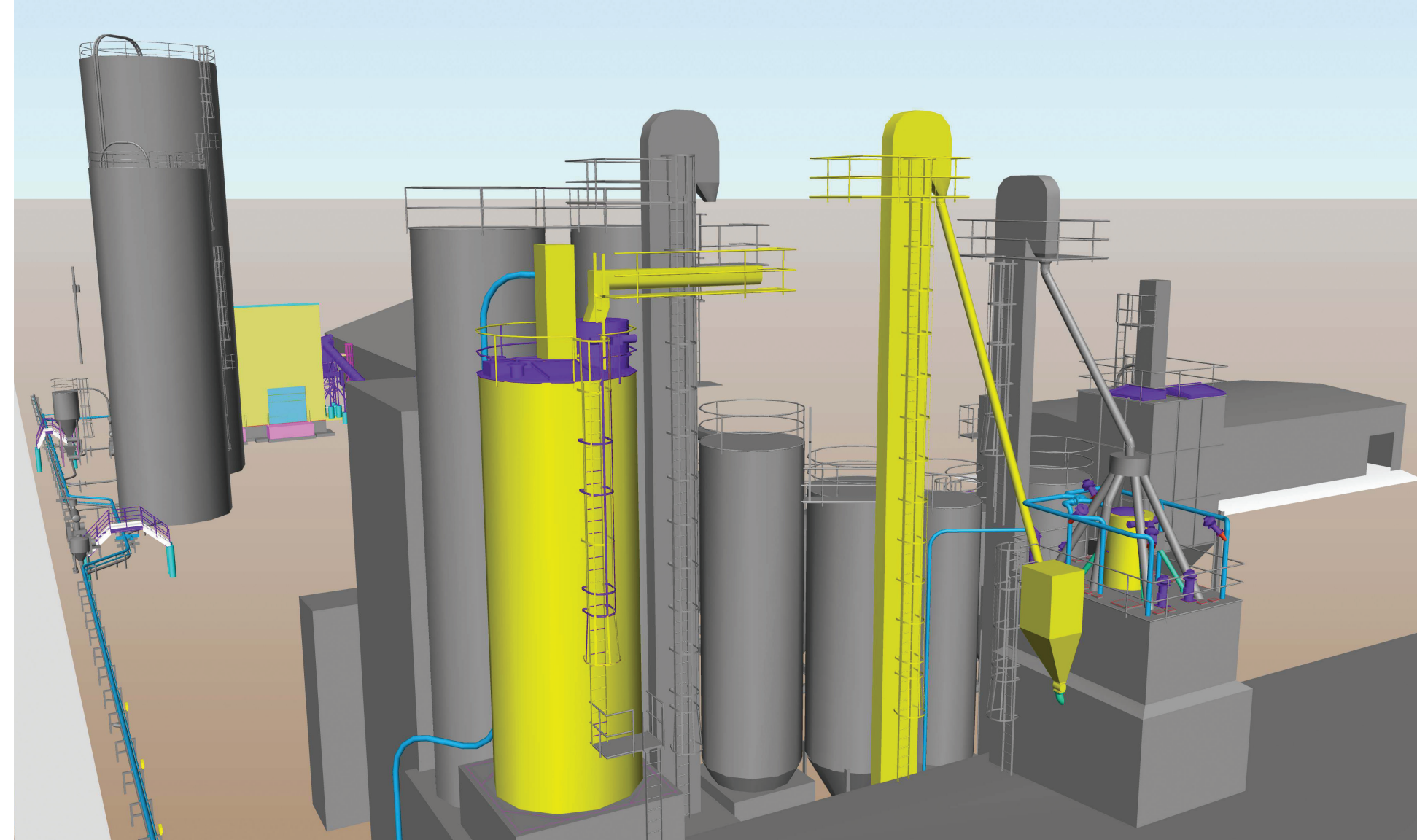
EAPC has also partnered with SkySkopes to offer our clients 3D Aerial Scanning services. SkySkopes utilizes a state-of-the-art LiDAR system, providing customers with cm-level accuracy for their surveying needs. Integrated with the LiDAR unit is a 24 MP camera, allowing simultaneous capture of still imagery for easy asset identification.

### 3D GROUND-BASED LASER SCANNING

EAPC's ground-based scanner is a LiDAR system that quickly and very accurately creates a 3D model of its surroundings. On the job site, we are capable of running multiple scans and using software in our office to join the scans together and create one large 3D model, referred to as a point cloud. We then use the point cloud as a template in AutoCAD to draw solid objects to design around.

Scanning allows us to achieve greater accuracy in our field measurements because it removes the human error inherent in pulling a tape measure. This allows us to more accurately design a project and keeps change orders to a minimum.

It is also much faster than using traditional measuring methods, which saves us and our clients time and money.



# PROGRAM OFFERINGS

## LNG CONVERSION

Liquefied Natural Gas Conversion Systems for Plant Startup and Shutdown and Natural Gas Curtailment at CT Stations

## HEP INSPECTION

High Energy Piping Inspection Program for Power Generation and Process Industries

## LOW LOAD OPERATION OPTIMIZATION

Assisting power generation plants in achieving the lowest load possible, to reduce revenue losses during periods of low power demand and pricing.

LLOO also includes Ramp Rate Improvement, Short-term Shutdown and Startup Program Development, Auxiliary Power/Station Service Reduction, SOP Development/Revision.



# PROFESSIONAL ENGINEERING SUPPORT

## WHERE AND WHEN YOU NEED IT

The power generation industry is experiencing a massive turnover in staff due to attrition and with this turnover, many plants are losing decades of experience. In addition, many are downsizing their staff. With limited resources and time, project support and training can become very challenging.

### ON-SITE ENGINEERING AND SUPPORT SERVICES

EAPC provides on-site engineering and support services to power generation clients. Our team can provide engineers to supplement existing staff for capital projects, plant outages, and project backlog. Our staff will be an extension of your team and provide the services you require. We provide the necessary flexibility to meet your schedule and can provide a combination of on-site and off-site services.

### SERVICES

- Engineering Staff Support
- Capital Projects
- Outage Management/Support
- End of Year Project Closeout
- Planning and Scheduling
- P&ID Red-Lining and Drawing Updates

### TRAINING SERVICES

EAPC's Industrial Services staff comes from a diverse background with many of our team members having several years of direct power generation industry experience. Our knowledge and experience allow us to provide training to plant engineering, operations, and management teams. Although we specialize in some areas of training, we can develop a customized training program based on your specific requirements.

EAPC's on-site training program offers an affordable, time effective method of providing hands-on training to power generation professionals.

### TRAINING PROGRAMS

- Project Management
- Standard Operations Procedure "SOP" Development
- Standard Maintenance Procedure "SMP" Development







**EAPC**  
INDUSTRIAL SERVICES

3100 DeMers Avenue  
Grand Forks, ND 58201  
701.775.3000  
[www.eapc.net/is](http://www.eapc.net/is)

**Cory Vaughn** PE, Principal/Partner  
218.751.0151 | [cory.vaughn@eapc.net](mailto:cory.vaughn@eapc.net)

**Jesse Sandry** PE, Industrial Services Program Director  
701.461.7471 | [jesse.sandry@eapc.net](mailto:jesse.sandry@eapc.net)