Statement of Qualifications for Middough Inc.

Architecture, Engineering and Management
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An Overview of Middough

Middough Inc., a top U.S. architectural, engineering and management firm, provides a full range of traditional and specialized design, technical and management services worldwide.

Middough teams with world-class clients to deliver high-tech processes and facilities to a broad spectrum of commercial, process, institutional, life science and manufacturing industries.

William Vance Middough founded Middough based on his strong personal values. Honesty and trust were his guide. These founding values remain true today and are the cornerstone of Middough’s success.

Many customers who were with us when we first opened our doors in 1950, are still with us today. Many new customers sought us out as the company known for that special talent and expertise at providing innovation and “know-how” beyond traditional architectural, engineering and management services.

We look beyond current practices while embracing technology to give our customers a competitive advantage in today’s marketplace. When our clients become successful, so do we.

Our mission is to be a strategic resource for our clients in this ever-changing, fast-paced environment.

“Top 500 Design Firms”
Engineering News Record, Middough ranked #124

“Giants 300”
Building Design and Construction, Middough ranked #19

Total Services
Planning
Architecture
Interior Design
Civil
Structural
Electrical
Automation & Controls
Mechanical
Industrial Engineering
Machine Design
Process Piping
Packaging Systems
Sanitation & Sanitary Design
Food Process
Chemical Process
Refinery Process
Instrumentation & Controls
Environmental
Project Management
Construction Services
Inspection Services
Energy Management & Conservation
Total Services

Planning
Feasibility Planning
Financial Analysis
Site Selection & Evaluation
Master Planning
Space Planning
Health Care Planning

Architecture
Conceptual Design
Schematic Design
Detail Design
Urban Design
Facility Design
Cleanroom Design
Blast Resistant Design
Codes & Compliance
Life Cycle Cost Analysis

Interior Design
Interior Architecture & Design
Interior Building Evaluations
Project Budget Planning
Finish, Furniture & Equipment
Lighting Design
Ergonomic Design & Assessments
Art Consultation

Energy Management & Conservation
Emergency Generation
Combined Heat and Power
Biomass/Bio-gas
Steam/Gas Turbines
Reciprocating Gas Engines
Microturbines
Fuel Cells
Energy Audits
Metering
Capacity Planning
Utility Rate Analysis
Peak Shaving
Commissioning

Civil
Surveying
Site Planning
Underground Utilities
Grading/Earthwork
Highway/Road Design
Railroad Tracks
Transmission Pipelines

Structural
Buildings - Industrial & Commercial
Foundations
Piling & Caissons
Earth Retaining Structures
Bridges
Dynamic Load Analysis
Conveyors
Cranes

Electrical
Power Distribution
System Modeling & Analysis
Protective Relay Coordination
Energy Audits
Substation Design
Facility Design
Class I Division I Design
Fire & Security Systems
Machine Control
Equipment Specification
Equipment Layout
Lighting & Lighting Controls
Lightning Protection
Energy Management Systems
Start-Up

Mechanical
Ammonia Refrigeration
Sprinklers
Utility Piping
Noise & Vibration
Dust Collection
Industrial Ventilation
Energy Recovery
Pneumatic Conveying
HVAC
Special Environments
Containment
Plumbing
Chillers
Boilers
Utility Distribution
Equipment Specification
Welding & Metallurgical

Industrial Engineering
Planning
Simulation
Total Productive Maintenance
Material Handling Systems
Lean Manufacturing Design

Machine Design
Bulk Material Handling
Hydraulic Controls
Machine Upgrading
Custom Equipment

Packaging Systems
Bulk Systems (IBC)
High Speed Filling
Controlled Atmosphere

Total Services
Planning
Architecture
Interior Design
Energy Management & Conservation
Civil
Structural
Electrical
Mechanical
Industrial Engineering
Machine Design
Process Piping
Packaging Systems
Sanitation & Sanitary Design
Food Process
Chemical Process
Refinery Process
Instrumentation & Controls
Environmental
Project Management
Construction Services
Inspection Services

middough
Total Services (cont’d)

Weighing Systems
Dry & Liquid Handling
Computer Automated Lines
Form-Fill-Seal
Glass, Plastic & Fiber
Packaging
Robotic Systems

Process Piping
CIP Design
Pipe Stress Analysis
Steam & Gas Turbines
Process Plant Layout
Codes & Compliance
Welding
Piping Distribution

Sanitation & Sanitary Design
Facility Layouts
Food Safety
Food Process Systems
Construction Details
Audits/Inspections
Standards Training

Refining Process
Process Flow Sheet
Heat & Material Balance
Process Evaluation
P & ID Development
Safety System Design
Utility System Design
Equipment Specification
Hydraulic System Design
Energy Recovery

Chemical Process
Process Flow Sheet
Heat & Material Balance
Process Evaluation
P & ID Development
Safety System Design
Utility System Design
Equipment Specification
Hydraulic System Design
Energy Recovery

Food Process
Process Flow Sheet
Heat & Material Balance
Process Evaluation
P & ID Development
Safety System Design
Utility System Design
Equipment Specification
Hydraulic System Design
Energy Recovery

Instrumentation & Controls
Process Control Studies
Field Hardware/Specification
All Design Documentation
Distributed Control System
Programmable Logic Controls
Hybrid Control Systems
Human Machine Interface
Supervisory Control and Data Acquisition Systems (SCADA)
Construction Support
Field Commissioning

Project Management
Executive Leadership
Program Management
Technical Services Powerhouse
High-Tech Process, Facility and Specialty Design
Scheduling
Cost Estimating
Quality Control

Environmental
Air Pollution Control
Hazardous Waste/Materials Management
Site Assessments
Environmental Surveys
Asbestos/Lead and Mold Abatement
EPA Permitting
Wastewater/Storm Water/Waste Minimization
Aboveground/Underground Storage Tanks
Remediation

Construction Services
Construction Administration
Construction Management
Scheduling Controls
Cost Estimating & Controls
Constructability Analysis
Construction Equipment Specifications
Procurement
Field Services
Check-out
Start-up
Training

Inspection Services
Structures, Buildings, Crane Systems, Tanks, Vessels, Equipment
Middough Inc. has broad experience in the design, modification and repair of foundations, structures and buildings. Approaches for foundations include soil supported footings and mats, caissons and piling. Structures and building experience includes structural steel and concrete for commercial, process, refining and heavy industrial clients. Typical types of related foundations, structures and services include:

- Process Chemical Structures
- Refinery Structures
- Commercial Buildings
- Utility Racks
- Equipment Foundations
- Centrifugal and Reciprocating Compressors
- Turbo-blowers
- API Tanks
- Silos, Stacks and Towers
- Cryogenic Tanks and Cold Boxes
- Retaining Structures
- Mill buildings for BOF, EAF and Forging
- Rolling Mills
- Electric Arc Furnaces
- Blast Furnaces and Auxiliaries
- Runways for Cranes, Ore Bridges and Ladle Transfer Cars
- Rotary Car Dumpers
- Conveyor Pits and Tunnels
- Cooling Tower Basins
- Waterfront Retaining Structures
- Fall Protection Special Systems
- Evaluation of Existing Structures
- Structural Inspections

Licensed professionals experienced in static, dynamic and seismic analysis and the application of finite element software are available to lead the design effort for most any type of project.
Mechanical Services

Ammonia Refrigeration
Sprinklers
Utility and Process Piping
Noise and Vibration
Dust Collection
Industrial Ventilation
Energy Recovery
Co-Generation Systems
Pneumatic Conveying
Industrial/Commercial HVAC
Interferometry HVAC
Process Air Conditioning
Plumbing
Chillers
Boilers
Utility Distribution
Equipment Specification
Hazardous Wastewater Treatment
Piping Services

Process/Utility Piping
- Piping Specifications
- Pipe Stress Analysis
- Process Plant Layout
- Codes and Standards
- Welding
- Distribution Networks
- Utility Piping
- CIP Design
- Hydraulic Modeling
- Specialty Items
- Orthographics
- Isometrics
- 3D Modeling
- Bills of Materials
Middough Inc. provides solutions for your challenges by employing a mix of knowledge, industry experience, technology and innovation.

Whether your project involves new or existing facilities, processes or equipment, our industrial engineers are able to take you from concept and initial planning stages through detailed design and start-up.

We design facilities and processes for efficiency, flexibility and future growth.

**Facility Planning**
- Space Adjacency and Allocation
- Material Flow Analysis
- Process Definition
- Warehousing and Distribution
- Site Evaluation
- Consolidation/Decommissioning/Relocation/Commissioning (CDRC)

**System Design**
- Process Development
- Product Development Methods
- Material Handling and Storage Systems Design
- Methods and Labor Analysis
- Ergonomics
- Set-up Reduction
- Cost Reduction
- Reduce Non-value Added Content
- Automation
- Value Engineering
- Safety

**Computer Simulation**
- Improve System Performance
- Identify and Eliminate System Bottlenecks
- Develop Alternate Scheduling Strategies
- Validate System Design
- Perform "What-if" Analysis

**Industries Served**
- Chemicals
- Commercial
- Education
- Energy and Utilities
- Food and Beverage
- Glass
- Health Care
- Manufacturing
- Metals
- Pharma/Biotech
- Refining
- Retail
Electrical Engineering Services

Studies
Power System Computer Modeling
Short Circuit Analysis
Load Flow Analysis
Protective Device Coordination
Arc Flash Protection (PPE)
Power Factor Correction
Harmonic Filtering
PQM, Power Quality Metering
Energy Audits
Economic Evaluations and Planning
Probable Cost of Construction Estimates
Hazardous Area Classification
Lightning Photometrics

Power Systems
High Voltage Transmission and Distribution
Medium Voltage Distribution
Low Voltage Distribution
Substation and Distribution Equipment Specification
Emergency Generators
CHP, Combined Heat and Power/Cogeneration
UPS, Uninterruptible Power Supplies
DC Rectifiers/Substations
Upgrades of Existing Distribution Equipment

System Installation
Conduit & Cable Tray Raceway Systems
Hazardous Area Equipment
Raceway and Cable Systems
Intrinsically Safe Systems
Database Conduit and Cable Schedules
Motor Control Systems
AC Drive Systems
DC Drive Systems
Heat Trace Systems
Grounding
Lightning Protection
Leak Detection Systems
Gas Monitoring Systems
Electrical Engineering Services, (cont’d)

**Lighting and Communications**
- Indoor and Outdoor
- Commercial and Industrial
- Emergency Lighting
- High Mast Lighting
- Fire Protection Systems
- Security and Alarm Systems
- Communication Systems
- Fiber Optic Networks
- Energy Management Systems

**Start-Up and Commissioning**
- Substation and Motor Control Commissioning
- Protective Device Setting and Calibration
- System Construction Support and Commissioning
- Design Build
Process Control, Automation and Instrumentation Services

Automation & Controls Planning
- Conceptual Design
- R.O.I. Analysis
- Control System Migration
- Reverse Engineering
- Purchasing Strategy
- Independent Vendor Comparisons
- Client Standards
- Installation & Commissioning
- Automation Due Diligence studies
- Codes & Standards

Control Systems Design
- Control System Architecture
- Plant Data Networks
- Functional Description
- Control System Physical Layout
- System Performance Criteria
- Instrumentation
- Energy Monitoring Controls
- Facility Controls
- Machine Controls
- Process Controls
- Data Acquisition, Safety Shutdown Systems & Reporting
- Inspection Controls
- Maintenance Systems
- Quality Systems (SPC)
- Supervisory Control

Control Hardware Design & Fabrication
- Control Panels
- Operator Stations
- Interconnection Panels
- Installation Design
- Installation Drawings
- Hardware Design & Specifications

Programming & Testing
- Machine/Process Control
- Man/Machine Interface
- Recipe Systems
- Batch Systems
- Tracking Systems
- Historical Data Systems
- Plant Supervisory Systems
- Communications
- Firewalls
- Simulation

Field Support
- Contractor Bid Development
- Installation Support
- I/O & Loop Checkout
- Control System Startup
- Loop Tuning
- Process Commissioning
- Training
- Production Support
- Long-Range Support
- Process Change Support
- Maintenance Debug Support
- Remote Support
- Software Revision Upgrade

System Integrator Certifications
- Rockwell Strategic Provider
- GE Solution Provider
- Wonderware System Integrator
- Intellution System Integrator
- Opto 22 System Integrator

Typical System Components
- PLC/DCS
- SCADA/Webserver
- Data Acquisition
- Database
- Shutdown Systems
- Drive Systems
- UPS Systems
- Network/Hubs/Switches
- Field Busses
- Instrumentation

Instrumentation
- Sensor Specification/Calibration
- P&ID Design
- Instrument Specifications

Typical System Components
- PLC/DCS
- SCADA/Webserver
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- Shutdown Systems
- Drive Systems
- UPS Systems
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- Field Busses
- Instrumentation
Middough’s inspectors follow rigorous training to provide state of the art, Preventive and Predictive Maintenance Audits & Safety Services (Hazard Analysis/Assessments) and Facility-wide Infrastructure Inspection, Repair and Construction Management.

Their investigations help to reduce the risk of damage to equipment or injury to workers. They identify the issues for timely repairs or maintenance that can help reduce costly and unnecessary downtimes and injuries.

All inspectors are trained to assist with assessments for compliance with governmental requirements or labor safety agreements.

Training and Safety
Middough’s inspectors follow rigorous safety training for all types of inspection services that has resulted in outstanding safety records including:
- OSHA 10-hr Construction Safety and Health
- OHSA 1910 40 hr. HAZWOPER
- MSHA, Parts 46 & 48, Surface & Deep Mine Work

“Steel is a major component of a variety of mine structures. Corrosion reduces the strength of steel members and can lead to structural failure. Structural failures cost lives and time.” -- U.S. Department of Labor Mine Safety and Health Administration

Middough brings over 50 years of experience with personnel who have the required skills to recognize the “Warning Signs of Failure.” They understand that “It is what you can’t see that can hurt you.”

Certifications
Middough’s inspectors are trained by the following nationally recognized institutions.
- Roof Consultants Institute
- Crane Institute of America
- Ohio Department of Transportation
- American Welding Society
- American Petroleum Institute
- American Society for Nondestructive Testing

Specialty Skills
- Equipment Guarding & Unsafe Access
- Buildings & Roofs
- Structures & Stacks
- Bridges, Roadways & Trackage
- Fall Protection & Safety Systems Design
- Tanks & Containment Dikes
- Confined Space Entry
- Piping & Ductwork
- Cranes & Runways
- Machinery & Gearing
- Non-destructive Testing (NDT)
- Compliance Assessments
- Surveying
- Construction Oversight
- Consumer Safety
- Concrete & Steel
Why Use Middough Inspection Services?

Safety
An inspection by our certified inspection professionals is one step in reducing the risk of damage to equipment or injury to employees.

Cost Avoidance
Early identification and correction of problems can result in significant savings for owners in reduced expense by timely repair and avoidance of costly downtime.

Compliance
Inspections can assess compliance with governmental requirements or labor safety agreements.

Appraisals
Inspections can be part of due diligence investigations for financing or sale of property or equipment.

Engineering and Construction
Our multi-discipline staff of design professionals can provide engineering and construction management services in support of any maintenance repair or upgrade program.

Inspection Reports
- Visual inspection log, complete with photographic documentation.
- Survey data, complete with sketches and statistical analysis
- Ultrasonic thickness testing data, complete with sketches and statistical analysis.
- Report summary, complete with repair recommendations.

Integrity Assessments
Preparation of CFR (EPA, OSHA, MSHA, SPCC) Compliance Programs
Collation and Analysis of Inspection Reports
Integrity Assessment per CFR (EPA, OSHA, MSHA, SPCC) Criteria Performed by Licensed P.E.
Report Summary, Complete with Compliance Statement
Signed by Licensed P.E.
A highly experienced staff of professional engineers and designers with diversified talents in machinery improvements, equipment capability upgrades, and innovative custom design alternatives are available to improve operational performance and productivity.

**Machine Design**
- Load/Stress Analysis
- Modification Design Engineering
- Drive/Torque Analysis
- Process and Production Options
- Equipment Performance Specifications
- Cost Estimating

**Equipment Failure Analysis**
- Existing Design and Operational Analysis
- Metallurgical Analysis

**Material Handling**
- Conveyor Systems (Belt, Chain, Walking Beam, Etc.)
- Transfer Cars, Ladles, Vessels
- Special Lifting Devices
- Unload and Storage
- Weigh/Mix

**Custom Machine Designed Equipment**
- Design-build Coordination
- Installation Coordination
- Inspection
- Assembly
- Product Handling (Shuttles, Walking Beams, Pick-n-place, Conveyors)
- Cutting, Packaging, Palletizing
- Test Benches
- Tooling and Fixturing
- Customization of Purchased Equipment

**Robotics**
- Cell Layouts
- End of Arm Tooling (Handling/Positioning, Welding, Assembly, Applying Sealant, Painting, Palletizing)

**Melting and Forming Equipment**
- Glass Furnaces
- Press and Drawing Equipment
Middough’s five decades of experience in the metals industry has developed seasoned professionals who understand the metal production and finishing processes. We evaluate primary production equipment and explore new methods and innovations to keep mills competitive. We help clients justify, select, integrate, and install systems and modernize existing mills.

Middough’s in-house expertise provides complete design services for auxiliary facilities and support systems to operate primary production equipment.

**Specialties**
- Ferrous and Non-Ferrous
- Installation Design
- Vessel Design and Repairs
- Ladle Design and Repairs
- Inspection Services and Programs
- Electrical and Controls

**Melting and Casting**
- Blast Furnaces
- BOFs
- Electric Furnace Melt Shops (EAF)
- Cupolas
- Vacuum Degassers
- Ladle Metallurgical Facilities
- Continuous Casters – Bar and Strip
- Emission Control Systems
- Materials Handling and Alloy Systems
- Mill Building Design, Inspections, Upgrades and Repair
- Water Treatment
- Coke and By-product Plants
- Car Dumpers
- Railroad Facilities
- Dust Collection/Suppression
- Crane Runway Inspections and Crane Surveys
- Scrap Handling and Processing

**Finishing, Slitting and Cut to Length**
- Strip and Bar Mills
- Galvanizing and Pickle Lines

**As a commitment to the industry, Middough supports active participation with:**

- AIST - Association for Iron and Steel Technology
- The engineering staff participates in technical committees including: Ladle Design Mill Buildings Blast Furnaces BOFs Lubrication and Fluid Power Project Management Health and Safety Power Piping Electric Arc Furnaces Continuous Casting

- AWS - American Welding Society
- ASM - American Society for Metals
- ASCE - American Society for Civil Engineers
- IEEE - Institute of Electrical and Electronic Engineers
- ASME - American Society of Mechanical Engineers
Design Services for the Metals Industry, (cont’d)

Specialized Equipment Design
Coating Lines
Custom Processing and Rolling Equipment Design
Mill Building Design, Inspections, Upgrades and Repair
Reheat Furnaces – Slab and Billet
Cold Rolling, Slitting and Coil Handling
Crane Runway Inspections and Crane Surveys
Seamless and Welded Pipe Mills
Tube Mills

Systems
Alloy Systems
Baghouses/Scrubbers/Precipitators
Conveyors/Material Handling
Cooling Water Systems
Crushing, screening, stacking and reclaiming systems
Truck and Train Loading
Wastewater Treatment Systems
Information and Reporting Systems
Operator Interfaces
Power Distribution

Auxiliary Services
Certified Welding and Metallurgical Expertise
Construction Management
Environmental Studies and Permitting
Equipment Analysis and Machine Design
Ladle Design and Repair
Overhead Crane Inspections and Upgrades
BOF and Blast Furnace Analysis & Repairs
Emergency and Disaster Recovery
Health and Safety
Instrument Selection
Network Planning and Implementation

Facilities
Equipment Maintenance Buildings
Laboratory/Personnel Facilities
Control Rooms and Pulpits

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Middough Inc. has extensive experience in the metals industry.
North Star Steel Company
EAF Melt Shop Expansion
Monroe, MI
- Overall project definition and layout
- Key components sizing
- New furnace evacuation (DEC) system
- Additional baghouse capacity
- New cooling water system
- Upgraded EAF hydraulics system
- Contract administrative services
MidWestern Steel
Mini Mill
• Overall project definition and layout
• Key components sizing
• $500 million project
• Independent Engineer for the Project
• Due Diligence Review of:
  - ProForma
  - Environmental Site Assessments
• Develop Completion Test
• Periodic Site Review and Reporting During Construction
• Post Start-up Periodic Evaluation/Reporting
• Performed Completion Test
• Assisted Lenders with Activities Precedent to Completion
USS/KOBE Steel Company
Lead Fume Collection System
- Determined Plant Operational and EPA Requirements
- Flow Diagram and Baghouse Sizing
- Ductwork Sizing
- Provided Lead-safe Working Environment for Plant Personnel
- Met an Aggressive Project Schedule
- Contract Administrative Services - Bidding, Evaluation and Final Contract Negotiations

North Star Steel Company
Precision Sizing Block Project
Monroe, MI
- Kocks Block Equipment Foundations
- Upgraded Roll Shop for New Equipment and Extension
- New Set-up Shop for Kocks Equipment
- Relocated Stores Facility
Regional Steel Distribution Center
- $100 million project, 600,000 sq. ft.
- Independent Engineer for the Project
- Due diligence review of:
  - ProForma
  - Construction Documents
  - Environmental Site Assessments
- Developed Completion Test
- Construction Monitoring
- Post Start-up Periodic Evaluation/Reporting

Aluminum Strip and Alloys Complex
Due Diligence Assessment Prior to Closing on Sale
- Facility and Equipment
- Organizational Structure
- Operations
- Engineering Support
- Maintenance Capability
- Sales and Marketing
- Information Systems
- Purchasing and Material Management
Metal Manufacturing and Casting

**General Motors**
Defiance, OH
- Sand Core Production Facility
  - 40,000 sq. ft.
  - $10 million
  - Computer simulation of sand core automated storage, retrieval and delivery systems

**J&L Specialties**
Midland, OH
- Anneal and Pickle Line
  - 160,000 sq. ft.
  - $160 million

**Atlantic Steel**
Cartersville, GA
- 254,000 sq. ft.
- $60 million

**Alcoa Inc.**
Cleveland, OH
- Aluminum Wheel Manufacturing Plant
  - 90,000 sq. ft.
  - $24 million
  - Computer simulation of wheel manufacturing line

**USS/KOBE Steel Company**
Lorain, OH
- Tube Mill Modernization Renovation Project
  - $60 million
- Lead Fume Containment
Metals Experience (cont’d)

J&L Specialty Steel
Direct Roll Anneal and Pickle Line
Midland, PA
• 1400 Linear Feet
• Multiple In-line Processes Reducing Handling Cost and Processing Time

Empire Detroit Steel Division, Cyclops Corporation
Slab Yard Expansion
Mansfield, OH
• Expanded Slab Yard from 67 ft. to 100 ft. Crane Runway
• Added 75 ft. Extension to One End - New 100 ft. Bridge Crane Erected in this Extension
• Down Time - One Week Schedule Summer Shut Down with No Recorded Work Stoppage Due to Construction
• Existing Runway Girders, Columns and Building Removed at what was Existing Exterior Wall and New Crane Rolled into Slab Yard
• Site Development - New Railroad Tracks, Road and Pond Reworked to Accommodate Expansion

USS/KOBE Steel Company
No. 4 Seamless Tube Mill Modernization
• Project Scope Included New Bar and Tube Handling, KOCK’s SRM, Transfer Tables, Reheat Furnace, Batch Saws and System Integration
• Engineering Services Supplied Included:
  - Project Definition
  - New Equipment Design
  - Complete Installation Engineering
  - Procurement Assistance
  - Construction Monitoring
Atlantic Steel Company
Cartersville Facility Expansion
• Basic Designs and Budget Development
• Four Bay Addition to Melt Shop and Tow Bays to Billet Yard
• Dust Collection Expansion
• #2 Electric Furnace and Ladle Furnace Canopy Dust Collection System to Two New Baghouses (See Roof Ductwork Photo “A”)
• #2 Electric Furnace 4th Hole Hot; Dry Ductwork; Cyclone, Hot Fans and Ducts to Existing Baghouse (See photo “B”)
• Sub Station Expansion for New #2 Furnace and Ladle Furnace
• #2 Caster Design Review
• Service Water System Expansion
Melt Shop and Related Equipment Experience

Atlantic Steel, Cartersville Plant
- Greenfield Facility Including Melt Shop and Caster
- Melt Shop Expansion (New Furnace, 6 Strand Caster, Water and Facility Modifications and Misc. Equipment Additions)

Atlantic Steel, Atlanta Plant
- Melt Shop Expansion
- Tundish Dump Station Design

AK Steel, Ashland Plant
- Tundish Car Redesign

AK Steel, Butler Plant
- AOD Diverter Stack Trolley Design
- AOD Backpack Design

AK Steel, Mansfield Plant
- Melt Shop Infrastructure Capacity Study for the Melt Shop Expansion
- Melt Shop Equipment Capacity and Expansion From Scrap Handling Through the Slab Reheat Furnace including Dust Collection
- EAF Replacement Including Ladle Car, Transformer and Utilities (110 to 170 Ton)
- Added AOD with Dust Collection
- AOD Ladle Trunnion Ring Design
- Enlarged Slab Yard

AK Steel, Middletown Plant
- Numerous Melt Shop and Caster Upgrades and Modifications
- Designed New Flat Bottom Ladles
- Melt Shop Facility Planning Study Including Computer Modeling Simulation Work

Bethlehem Steel, Steelton
- Designed Scrap Yard Building

Bethlehem Steel, Sparrows Point
- Melt Shop Upgrade and Modifications
- Hood Support Evaluation and Redesign

CSC, LTD., Youngstown
- Pouring Aisle Building Upgrade (125 to 145 ton ladles)
- Redesigned Ingot Table Drive and Runout Table
Florida Steel
- Melt Shop Crane Capacity Upgrade
- Designed Complete New Ladle Turret

Gallitan Steel, Ghent
- Designed New Scrap Yard Building

Gerdau Ameristeel, Jacksonville Steel Mill
- Preliminary Engineering and Probable Cost Development for an ~ $95 million Mill Modernization. Engineering design studies included replacement of scrap yard, melt shop, caster, plant water systems, billet storage and billet reheat furnace.

J&L Specialty Steel, Midland Plant
- Upgraded Melt Shop and Caster
- Tundish Car Operation and Capacity Evaluation

LTV Steel Company, Cleveland
- Numerous BOP Shop and Caster Upgrades and Maintenance Projects for Both the East and West Sides
- Continuous Slab Caster Installation (Acted as Owner’s Engineer)
- EAF Melt Shop Automation/Controls Replacement
- LMF Baghouse Dust Collection and Handling System Specification/Replacement
- Designed Desulfurization Lance Injection System
- Complete Electric Furnace Shop and Experimental Ladle Treatment Facility
- Redesign of #8 Slab Reheat Furnace
- Pickle Line Upgrade
- Ammonia Stills - Caustic Addition System
- Coke By-Products Plant
- Automated Coke Thawing and Unloading Facility
- 80" Hot Strip Mill Automation Modernization
- Electrolyte Preparation and Recovery Plant
- Cooling Tower Control System
- Information and Communication Network Modernization
- Assist in Restart of West Side BOF

MacSteel, Monroe, MI
- Plant wide non-contact water system investigation and evaluation.
McLouth Steel, Trenton
• No. 1 Caster Modernization Installation Engineering

National Steel Corporation, Great Lakes Division
• Extended Melt Shop Aisle for No. 2 BOP
• Upgraded Casting Aisle Capacity in No. 2 BOP from 250 to 400 ton
• Ladle turret capacity increase evaluation (340 to 400 ton)
• No. 2 Slab Caster Installation Engineering
• Slab Caster Twinning Project Including Line Equipment Modifications
• Designed Telescoping Boom for Charging
• New Vacuum Degassing Facility
• BOF Shop Dust Collection Upgrades

North Star Steel Company, St. Paul Steel MN
• Ladle turret and tundish replacement study

North Star Steel Company, Monroe, MI
• EAF Melt Shop Expansion (Study and Installation Engineering)
• Extended Melt Shop Charging Aisle
• LMF Wire and Alloy Feed System Design
• Lime and Carbon Storage and Feed Study

North Star Steel Company, Youngstown, OH
• Ladle Transfer and Turret Equipment Design and Installation Study
• Alloy Station Modification Study
• Melt Shop and runway extension

Nucor Corporation, Crawfordsville Plant
• Alloy Handling System Installation (for Decker Industries)

Ohio Steel Tube, Shelby
• Designed Waste Heat Recovery System for Rotary Hearth Billet Heating Furnace
Republic Technologies, Lorain Plant
- Caster Addition Facility Planning and Location Study
- Modifications
  - Caster Cooling Bed Drive and Rake Design Modifications
  - Caster Cross-over Table Design
  - Designed New Flat Bottom Ladle
  - Ladle Car Shaker Design
  - Ladle Car Drive Redesign
  - Caster Oscillator Repairs

Nucor-Yamato Steel, Blytheville
- Alloy Handling System Chute and Structural Designs (for Decker Industries)

Republic Technologies, Canton Plant
- EAF alloy Feed System Design and Installation
AK Steel, Mansfield Plant
- Hot Mill, Rebuild and 5th Stand Addition

AK Steel, Middletown Plant
- Pickle Line and Tandem Mill Equipment Upgrade for Large Coils (~25% Weight Increase)
- Pickle Line Coil Cars and Planet Cars Automation Design

Altos Hornos, Monclova Plant
- Bliss Cold Mill Installation

Atlantic Steel Corporation, Cartersville Plant
- Kocks Rod Mill Installation
- 17 Stand Mueller-Neuman Rod Mill Installation
- 12,000 FPM Morgan Mill Stand Additions to Kocks Mill

Consolidated Aluminum, Madison
- Finishing Mill Rebuild and Installation

HYLSA, Monterrey
- Bliss Cold, Reversing Mill Installation
- Bliss Temper Mill Installation

IPSCO, Regina
- Welded Pipe Mill Upgrade

J&L Specialty Steel, Detroit Plant
- 60” Slitting Line and Packaging Line

J&L Specialty Steel, Louisville Plant
- 54” Slitting and Packaging Line
- SMS 2/4 High Reversing Temper Mill

J&L Specialty Steel, Midland Plant
- DRAP Line (Direct Roll Anneal and Pickle Line)

Kaiser Aluminum, Ravenswood
- Ingot Homogenizing Furnace Electrical Renovation

Kaiser Steel, Fontana Plant
- Bliss Two High Skin Pass Mill Installation
- Galvanizing Line Installation
Rolling Mills, Processing Lines, Pipe Mill Experience (cont’d)

LTV Steel Corporation, Cleveland
• 84” HSM Process Water Capacity Increase Study
• Pickle Line and Tandem Mill Equipment Upgrade for Large Coils (~47% Weight Increase)
• Slitting Line

LTV Steel Corporation, Hennepin
• 76” Slitting and Side Trim Line

LTV Steel Tubular, Cleveland
• #4 Annealing Furnace Modernization
• Welded Pipe Automatic Magnetic Inspection
• #4 Straightener, Cutter, Facer

LTV Steel Tubular, Youngstown
• Youngstown Seamless Tube Mill Upgrade

Michael Krall Industries, Mentor
• Forged Bar and Pipe Manufacturing Facility

National Steel Corporation, Great Lakes Division, Ecorse
• Bliss 4 High Skin Pass Mill Installation
• 80” HSM Electrical Upgrade and Looper Addition
• Tandem Mill Drive and Control System Replacement Installation Engineering
• Pickle Line and Tandem Mill Equipment Upgrade for Large Coils (100% Weight Increase)

National Steel Corporation, Midwest Division, Portage
• 50” Electrolytic Cleaning Line

North Star Steel, Monroe
• Kocks Sizing Mill Installation
• Kocks Reducing Mill Installation
• Bar Finishing Facility - Turner Line #1 Installation
• Flinn Reheat Furnace Installation

Republic Technologies, Cleveland
• Kirby Road ERW Pipe Mill Upgrade

Republic Technologies, Lorain
• #4 Seamless Mill Modernization
• #3 Seamless Mill Modernization
• Mandrel Mill Upgrade
• Bar Mill Upgrade Engineering
Rolling Mills, Processing Lines, Pipe Mill Experience
(cont’d)

Revere Copper and Brass, Brooklyn Plant
• Lead Mill Design and Installation

Revere Copper and Brass, Detroit Plant
• Copper Mill Redesign and Installation

Revere Copper and Brass, Scottsboro Plant
• Bliss 14” X 48” X 86” Aluminum Mill Installation
• Lowey Mill Rebuild and Installation
• Bliss 25” X 56” X 86” Aluminum Mill Installation

Reynolds Metals, Arkadelphia
• 25” X 56” X 84” High Non-reversing Mill Installation

Sharon Steel, Sharon
• Bliss 4 High Temper Mill Installation
• Sendzimir Planetary Mill Installation
• Voss Leveling and Halden Shear Line

Solar Steel, Cleveland
• Steckel Mill Rebuild and Installation

USS, Irwin Works
• Electrolytic Cleaning Line
• Bright Anneal Line
Middough provided services in two phases for this project, including the replacement of a vertical hydrogen annealing furnace and the modification of the furnace support tower.

The first phase included preliminary design feasibility and analysis to determine the ability of the existing 100 ft. tower to be increased by 50 ft. to accommodate the new furnace. The preliminary effort included evaluation of the new furnace configuration and support requirements. Due to strip steering constraints, the towers overall deflection needed to be limited to .75 in. This phase also included a preliminary construction work scope for the actual removal and installation of the annealing furnace.

The second phase included all detail structural engineering for the structural modifications for the increased height of the support tower including demolition of part of the structure. Complex auger cast pile foundations were designed for the support of the modified structure.

Middough also provided full-time construction assistance during the construction of the tower and installation of the furnace. In addition, Middough provided shop visitation during fabrication of the furnace as well as welding evaluation for the fabrication of the furnace muffle tube.
Middough provided total installation engineering services for the installation of a new annealing and pickling line with in-line direct rolling capabilities. The line is capable of processing material up to 60 inches in width and includes a coil prep station, annealing and pickling, as well as an exit end finishing section. The world’s first Direct Roll Anneal And Pickling (DRAP) line is designed to increase plant capacity and to reduce operating costs by reducing material handling requirements.

The DRAP line is 1,400 ft. long and consists of a walking beam conveyor, coil prep station, single payoff station, mig welder, entry end conditioning section, two stand Z-Hi mills, annealing furnace, cooling section, pickling section/chemical processing section, skin pass mill, tension leveler, inspection station, exit tension reel, and horizontal accumulators.

Additional facilities requiring engineering included entry coil storage building, rail and truck unloading, roll storage facility, chemical storage/unloading facility and boiler house, as well as raising the roof 20 ft. for a 300 ft. section.

Middough also provided permitting assistance, commissioning planning assistance, automation interface assistance, project engineering assistance, and operation maintenance manual preparation.
For over 50 years, Middough has supported the LTV (ISG) BOF shop with engineering, automation, and support services. Beginning in 1980, Middough designed, programmed and commissioned one of the first clean steel environmental control systems. Since then we have updated many systems within the BOF shop resulting in a trimmer, more efficient steel making facility. As a result of our Larry car modernization design, LTV reduced the cap slag waste and realized a project payback from saved material in just 4 months. Other project areas in and around the BOF include:

- Oxygen lance control and oxygen flow control
- Automatic vessel blow practices
- Vessel monitoring
- Water flow control for vessel, hoods, and lances
- Larry car automatic material handling and delivery system
- Automated slag splash
- Automated alarming and safety aborting
- Automated precipitator conveyor and fan control
- Precipitator data Monitoring
- Draft control
- Communication to MIS system for process variable exchanges
- Pulpit HMI systems Design and Programming
- Provide start up and commissioning services
- Cooling Tower Pump and Temperature Control
- Clean Steel Hood Spray Control System
Site Selection

Protect Client and Ensure Cost Stability
Determine Key Operating Costs
Incentive Negotiations
Identify/Evaluate Available Existing Buildings and Sites
Assess Local Labor Market (Availability, Cost, Labor Climate)
Evaluate Transportation Services/Infrastructure
Assess Water/Wastewater Services and Cost
Assess Electric Power and Natural Gas Services/Cost/Reliability
Evaluate State and Local Development Incentives
Determine Cost to Develop Site
Assist with Pre-acquisition Due Diligence
Zoning/Building Code Reviews
Coordination of Environmental Assessment, Soils Testing
Assist with Permitting Approvals
Develop Comparative Site Plans, Schedules, Costs
Description of Services
Architectural Review Board Presentations
Planning and Zoning Meetings
Committees and Neighborhood Meetings
Re-zoning by Referendum
Variances - Zoning Codes
Variances - Building Codes
Life Safety Reviews

Skills/Tools
Presentations
Oral
Graphic
Computer-generated

Benefits to Client
Project Feasibility
Cost savings with Building Code Variances
Time Savings
Operations Improvement
Our Approach

The Project Executive
The Project Executive, a member of senior management, works with your organization to select the professional skills and talent needed to match the specialized needs of your business. He provides the commitment and resources from Middough to meet your objectives.

The Senior Project Manager
The Senior Project Manager oversees a project from beginning to end using a systematic approach to planning, scheduling and controlling all vital elements needed for success.

The Senior Project Manager leads the team and cultivates effective communication, cooperation and trust. Meetings are productive. Problems are identified early and solved quickly. Progress is measured on a continual basis focusing on costs and schedule, enabling rapid responses to changing conditions.

Planning for a Successful Project
Goals, objectives and work requirements are clearly defined up-front, in a project work plan with resources allocated. Time schedules, budgets, and performance are planned with status-reporting procedures. All responsibilities, costs, and time frames are defined early in the design with the entire team taking ownership. The team mutually works together to meet the goals of the owner with increased productivity and innovation.

On-time Scheduling
APM², the “Advanced Project Management Method,” is initiated early in the life cycle of a project to encourage innovation and creativity. This early input establishes mutual goals, provides milestones, summaries and detailed schedules for all architecture, engineering, licensing, permitting, procurement and construction activities. These activities are defined, planned for and tracked to make sure all critical paths needed for a successful completion are achieved.

Quality Management
Quality has been taken to the highest level in a customized procedure manual that establishes and pushes for consistent and continual improvement. Quality, an integral part of our process, filters through every discipline and every department, with a scheduled series of internal and client reviews throughout the life of the project.
Controlling Costs
The Project Manager and Project Executive control costs throughout a project with an Oracle structure. This coordinated system emphasizes a single point of entry, maintaining the integrity of the information while providing detailed tracking including committed costs and a forecast of future expenditures. These accurate reports can be sorted in multiple ways to suit different owners and team members. This is critical in providing the most effective use of capital while maintaining a budget.

Innovation and Creativity through Value Engineering
As the project is defined and begins, value engineering offers innovative and creative methods and materials to add value to every dollar. Many advanced technologies are used including 3-dimensional drawings to provide owners, architects, engineers and contractors with added visual data to evaluate methods and systems before a project is built. Value engineering continues throughout the life of the project.

Meeting Regulatory Standards and Compliance
We provide a project that meets all regulatory, zoning, permitting, and safety compliance, standards and requirements.

Pre-Construction Activities
Middough sets the stage for a smooth delivery in construction early in the Design Phase by providing constructability reviews, a safety plan, contract preparation, a subcontracting strategy, labor evaluation, a procurement strategy, an approach to bulk materials, site logistics, and start-up planning.

There are many advantages to a client when they maintain the services of a design team throughout construction including a guaranteed maximum price. Other services include safety management, quality assurance, budget and schedule compliance, and experienced superintendents in the field.

We understand that the choice you make is often dependent upon the availability, expertise and time constraints of your personnel. This is why we are flexible and can offer as little or as much support as you desire throughout the construction process.
**Construction Administration**

Construction Administration services allow us to remain involved on the project throughout the construction. We monitor and ensure that all design requirements and specifications are being met in the field. The Middough design team is available to answer any questions that arise in the field by the contractor, subcontractors, suppliers and vendors. Working as an advisor and confidant to the Owner, the construction administrator helps establish and maintain quality, cost and schedules throughout the construction activity.

**Construction Management**

A Construction Manager is a field engineer who is on-site daily to coordinate and supervise all construction activities until the keys are turned over to the owner. As an extension of the design team, long-lead items are ordered early in the design to save valuable time and money during construction. Our familiarity with the project adds value to the Owner by preparing a subcontracting strategy and a positive environment for competitive bidding with contractors, suppliers and vendors. Bids are reviewed to make sure they are complete. The Construction Manager leads the team, controls budget and schedule and takes advantage of increased equipment utilization, quality, manpower, performance, and efficiency. He is the communicator, coordinator and the leader of productivity in the field on a day to day basis.

**Our Team**

Our Middough team is flexible, adaptable, and provides strong leadership skills. We are aggressive and confident as effective communicators and integrators. We are enthusiastic, have great imaginations and spontaneity but are able to balance the technical solutions with time, cost and human factors.