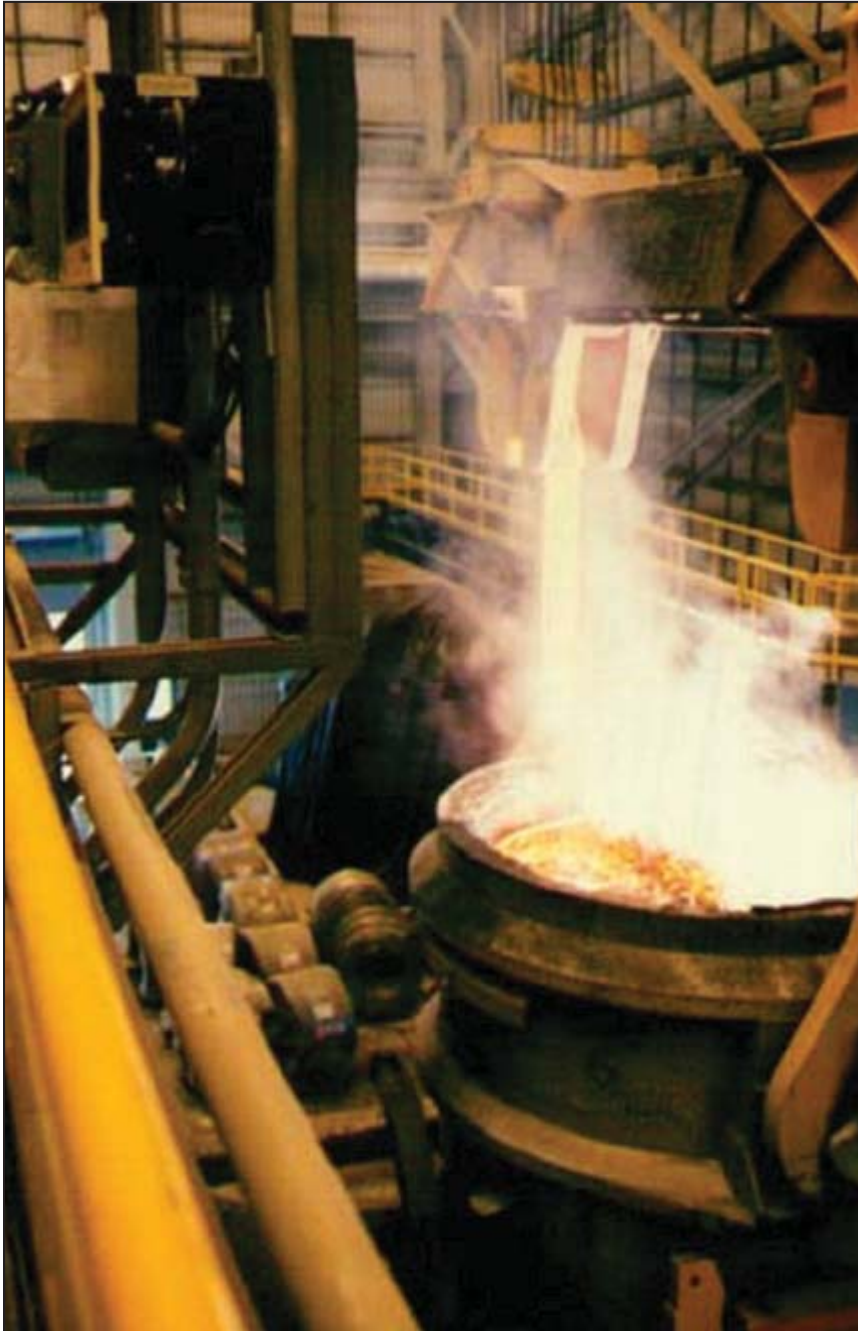


*Statement of Qualifications for Middough Inc.*



**Architecture, Engineering and Management**



# *Table of Contents*



Section I  
*Company Overview*

Section II  
*Technical Services*

Section III  
*Metals Industry Experience*

Section IV  
*Site Selection Experience*

Section V  
*Typical Project Approach*

# 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.

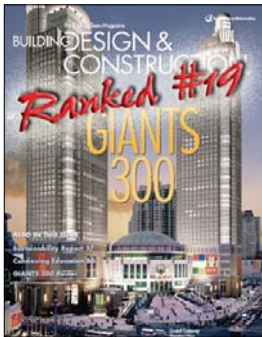
We look beyond current practices while embracing technology to give our customers a competitive advantage in today's marketplace. When our clients become successful, so do we.

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



Published July 2007

## 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  
Bio-mass/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

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## *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

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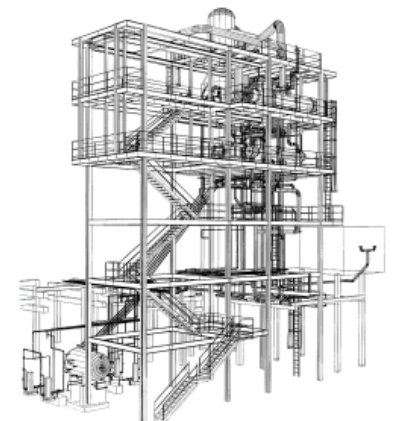
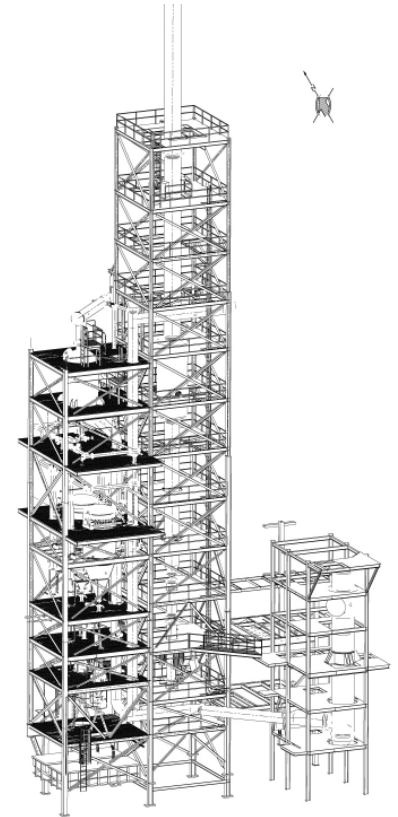
# Structural Engineering Services



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
- APITanks
- 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.



Rendering shown above is 3D model of work as designed.



## *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

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# Industrial Engineering

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

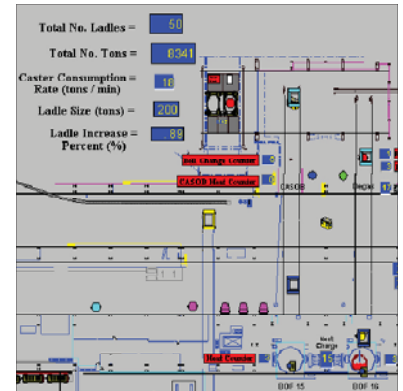
- Process Development
- Product Development Methods
- Material Handling and Storage Systems Design
- Methods and Labor Analysis
- Ergonomics
- Set-up Reduction
- Cost Reduction
- Reduce Non-value Added Content
- Automation
- Value Engineering
- Safety

## Computer Simulation

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

## Industries Served

- Chemicals
- Energy and Utilities
- Health Care
- Pharma/Biotech
- Commercial
- Food and Beverage
- Manufacturing
- Refining
- Education
- Glass
- Metals
- Retail



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# *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



- Studies
- Power Systems
- System Installation
- Lighting and Communications
- Start-Up and Commissioning

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## *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



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# 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

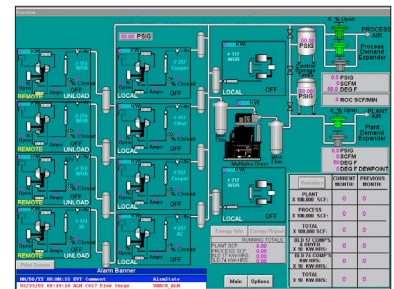
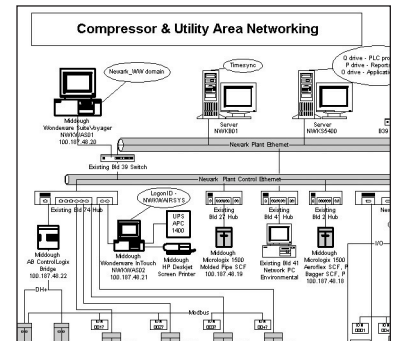
- Rockwell Strategic Provider
- GE Solution Provider
- Wonderware System Integrator
- Intellution System Integrator
- Opto 22 System Integrator

## 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



**Rockwell Automation**



**OPTO 22**



**CERTIFIED SYSTEM INTEGRATOR**

**Intellution**

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## Inspection Services

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

OSHA 1910 40 hr. HAZWOPER

MSHA, Parts 46 & 48, Surface & Deep Mine Work

### 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

*"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



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# Inspection Services

## 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

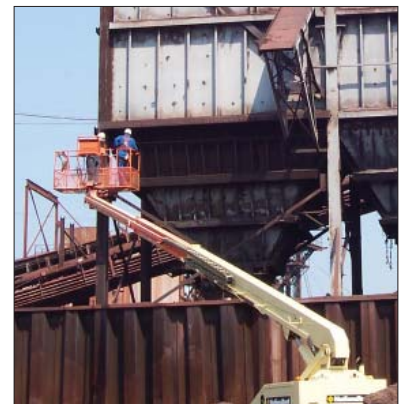
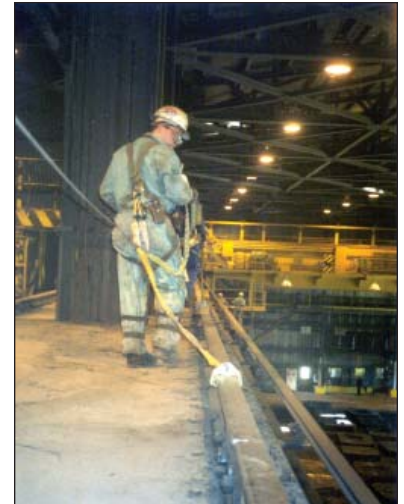
Our multi-discipline staff of design professionals can provide engineering and construction management services in support of any maintenance repair or upgrade program.

### 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.



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# *Machine Design/Automated Systems*



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**

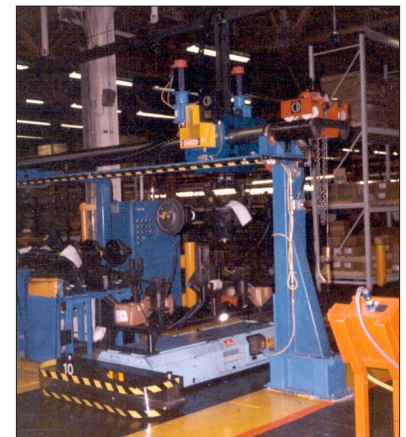
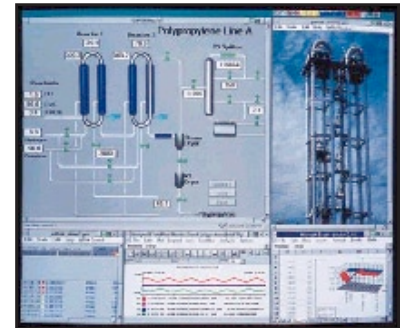
- Design-build Coordination
- Installation Coordination
- Inspection
- Assembly
- Product Handling (Shuttles, Walking Beams, Pick-n-place, Conveyors)
- Cutting, Packaging, Palletizing
- Test Benches
- Tooling and Fixturing
- Customization of Purchased Equipment

## **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



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## Design Services for the Metals Industry



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

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## *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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*Metals Industry Clients*



ArcelorMittal

**EMP** **AK Steel**

 Republic  
ENGINEERED PRODUCTS

 **GERDAU AMERISTEEL**  
TM

**NAF** *FirstEnergy*  
NORTH AMERICAN FORGEMASTERS

 **PRAXAIR**  **SeverStal**

  **SCOT FORGE**  
 **TIMKEN**<sup>®</sup>

 **Allegheny Ludlum**  
An Allegheny Technologies Company

 **SPECIAL METALS**  **CORUS**

 **ALCOA** **noranda**  
**NUCOR**

*Linde* **WCISTEEL**

*Middough Inc. has extensive experience in the metals industry.*

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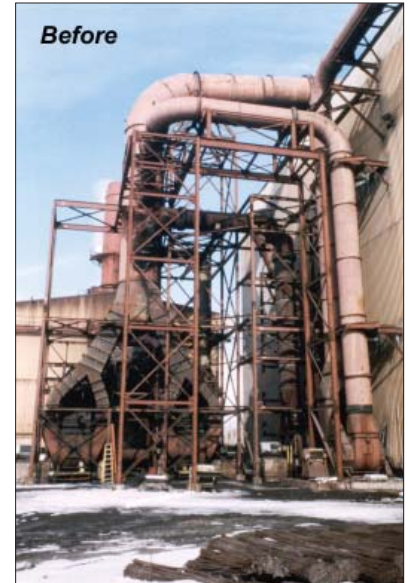
e x p e r i e n c e

## Metals Experience

### 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



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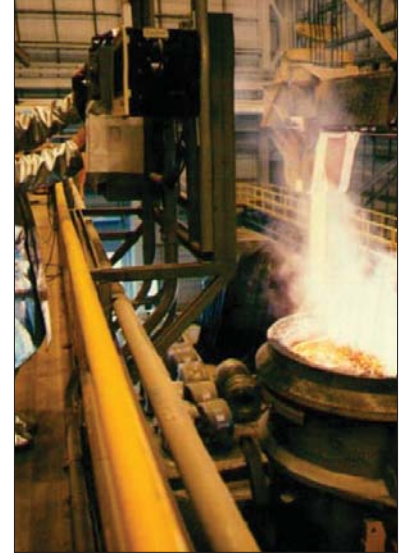
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## *Metals Experience (cont'd)*

### **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



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## *Metals Experience (cont'd)*

### **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



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## *Metals Experience (cont'd)*

### **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



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## *Metals Experience (cont'd)*



### **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

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## *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



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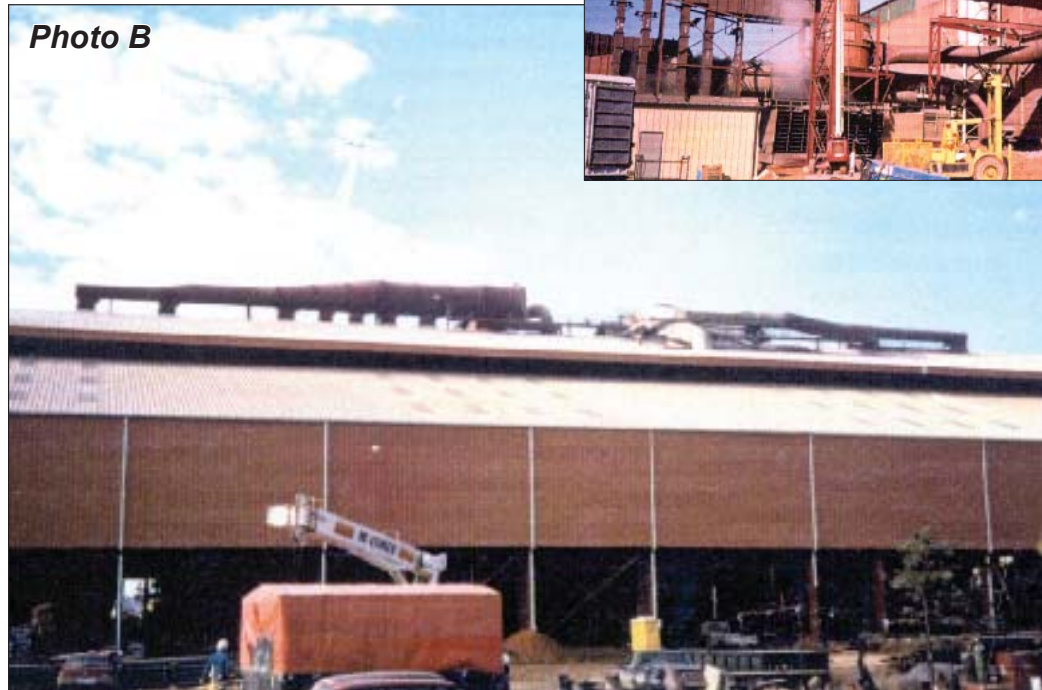
## *Metals Experience (cont'd)*

### **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



*Photo A*



*Photo B*

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## *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

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## *Melt Shop and Related Equipment Experience (cont'd)*

### **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.

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## *Melt Shop and Related Equipment Experience (cont'd)*



### **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)
- Performed Distribution and Capacity Evaluation Study for Melt Shop Upgrade Including Process Water, Baghouse, Ductwork, Natural Gas Oxygen and Air Systems.
- 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

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## *Melt Shop and Related Equipment Experience (cont'd)*



### **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

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## *Rolling Mills, Processing Lines, Pipe Mill Experience*

### **AK Steel, Mansfield Plant**

- Hot Mill, Rebuild and 5<sup>th</sup> 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

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## *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

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## ***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

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## *Direct Roll Anneal And Pickle (DRAP) Line*

J & L Specialty Steel, Midland, PA

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.



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e x p e r i e n c e

## ***BOF Shop Automation***

ISG (LTV) Steel Company, Cleveland, OH

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



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## *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



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s e r v i c e s

# *Planning, Zoning and Permit Services*



## **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

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s e r v i c e s

## 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

APM<sup>2</sup>, 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.



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.



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## Our Approach (cont'd)

### 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

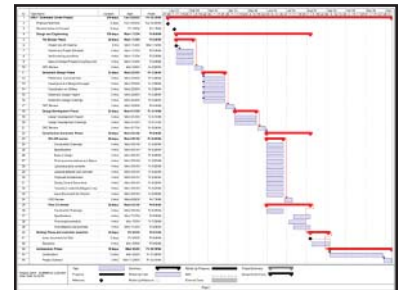
Middough sets the stage for a smooth delivery in construction early in the Design Phase by providing constructability reviews, a safety plan, contract preparation, a subcontracting strategy, labor evaluation, a procurement strategy, an approach to bulk materials, site logistics, and start-up planning.

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.



As the project is defined and the design begins, value engineering offers innovative and creative methods to add value to every dollar.



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## *Our Approach (cont'd)*

### **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.



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