



PROJECT BRIEF:

# Heavy Plate Straightening Press System

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# PROJECT BRIEF: HEAVY PLATE STRAIGHTENING PRESS SYSTEM

Macrodyne | Hydraulic Forming Solutions

## APPLICATION

Incremental straightening of ultra-thick, wide steel plates in a high-throughput production environment.

Modern plate mills produce material at extreme sizes and volumes. Steel plates can reach widths up to 14 feet, thicknesses up to 14 inches, and lengths exceeding 50 feet. While rolling processes shape the material efficiently, residual stresses and uneven cooling often introduce curvature that must be corrected before downstream use.

This project involves designing a straightening solution capable of restoring flatness in heavy plate while operating in-line with automated material handling systems and continuous production flow.

# TECHNICAL CHALLENGES

## 1. Extreme Material Dimensions

### Details:

Handling and straightening plates of this scale requires both a high forming force and a structure capable of maintaining rigidity under heavy and uneven loading conditions.

- Up to 14 ft wide
- Up to 14 in thick
- Lengths exceeding 50 ft

## 2. High Force Requirements

### Details:

Correcting deformation in a thick plate demands a substantial force applied with precision and repeatability.

- Maximum force: 8,000 tons
- Hydraulic pressure: 5,000 psi

### 3. Incremental Processing of Long Plates

#### Details:

Due to plate length, straightening cannot be completed in a single stroke. The system must progressively process the plate in sections without compromising accuracy or throughput.

### 4. Integration with Automated Handling Systems

#### Details:

The press needed to operate as part of a continuous production line, synchronizing with upstream and downstream conveying, positioning, and safety systems.

# ENGINEERED SOLUTIONS

Macrodyne developed a custom hydraulic press system designed specifically for incremental straightening of heavy steel plate within an automated production environment.

## Heavy Duty Press Structure

### Details:

- Six-piece, pre-stressed housing-style frame
- Fabricated bed, crosshead, and side housings
- Optimized using finite element analysis for rigidity under high and off-center loads
- Deep down-acting platen with 8-point guidance for stability and accuracy

## Incremental Straightening System

### Details:

- Instead of attempting full-length correction in one operation, the system applies force across an 8-foot straightening bed. Plates are indexed forward in controlled increments, allowing localized correction across the entire length.

## High-Tonnage Hydraulic System

### Details:

- 8,000-ton capacity
- Four single-acting main pressing cylinders
- Two double-acting pull-back cylinders
- Multi-pump hydraulic power unit with servo-proportional control

#### Performance Capabilities Include:

- Operating pressure: 5,000 psi
- Closing/opening speeds up to 300 in/min
- Pressing speed: 20 in/min at 40% tonnage
- Programmable tonnage and motion control
- Real-time position feedback via linear transducer

## Automation & Line Segmentation

### Details:

- The press is engineered to integrate directly with plant-wide automation systems through PLC-based I/O.

#### System Coordination Includes:

- Conveyor systems and plate indexing
- Robotic handling interfaces
- Cooling systems
- Line-level safety interlocks

#### Additional Features:

- Programmable communication with upstream/downstream equipment
- Electrical safety integration
- Perimeter light curtain safeguarding

# PROCESS OVERVIEW

This approach allows consistent flatness control across extremely long and heavy material.

## Step 1 PLATE POSITIONING

Material is conveyed into position using automated handling systems, with alignment managed through integrated controls and sensors.

## Step 2 LOCALIZED STRAIGHTENING

The press applies controlled force to correct curvature within the straightening zone.

## Step 3 PLATE INDEXING

The plate advances along the conveyor system in precise increments.

## Step 4 PROGRESSIVE CONNECTION

The cycle repeats until the full plate length has been processed.



# OUTCOME

The system delivers reliable flatness correction while maintaining compatibility with high-throughput production.

## Key Results Include:

1. Consistent flatness across heavy plates
2. Reduced downstream fabrication issues
3. Improved process control early in production
4. Efficient handling of large-format material
5. Reduced manual intervention and improved safety
6. Flexibility across varying plate sizes and stress conditions



## WHY THIS MATTERS

**Producing heavy steel plate at scale requires more than force; it requires control, repeatability, and integration.**

In many systems, high tonnage alone isn't enough. Without precise guidance and controlled indexing, force is applied unevenly, leading to overcorrection in some areas and missed deformation in others, especially across long, thick plates.

The result is inconsistency, rework, or reduced throughput.

By combining structural rigidity with incremental correction, the system applies force exactly where it's needed, across the full length of the plate. This turns straightening from a single-point-force problem into a controlled, repeatable process that scales with production.





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## LET'S TALK

If your operations demand greater forming capacity, improved flatness control, or better integration with automated production lines, Macrodyne can help design a solution built for long-term performance.

**Contact Jeff Walsh**

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