

CASE STUDY

SunCoke Energy

Cokemaking Plant

Granite City, IL

A Better Approach to P91 Welding

As mechanical contractor for SunCoke Energy's new cokemaking facility, icon Mechanical delivered extensive process piping, distribution systems, and equipment installation across a large-scale industrial construction project.

When the team identified an opportunity to eliminate internal purging from P91 welding, icon developed and validated an innovative no-purge welding procedure, helping reduce installation time and cost while maintaining stringent quality requirements.

MARKET
Power/Industrial

DELIVERY
Design Build



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CASE STUDY
SUNCOKE ENERGY PLANT

EXECUTIVE SUMMARY

icon Mechanical (icon) served as the mechanical contractor for SunCoke Energy's new coke manufacturing facility in Granite City, Illinois—a large-scale industrial project designed to produce 650,000 tons of blast furnace coke annually. icon delivered comprehensive mechanical construction services, including process and distribution piping and equipment setting, supporting the complex systems required to bring the facility online.

At the center of icon's execution was a significant technical challenge: welding P91 piping without traditional internal purging. Through careful planning, welding expertise and rigorous testing, icon developed and validated a no-purge welding procedure designed to reduce labor, material requirements and installation time while maintaining stringent quality standards. The solution demonstrates icon's ability to apply technical innovation to complex industrial challenges while protecting cost, schedule, and performance.

INTRODUCTION

Building a facility of this scale required the coordination of complex mechanical systems across nearly every stage of the coke production process. From coal and coke handling and high-pressure steam generation to flue gas desulfurization, utility piping, and gas distribution, each system had to perform reliably while integrating into the facility's larger production infrastructure.

For icon, that complexity demanded disciplined planning, close coordination, and technical expertise throughout construction. Engineering, VDC, fabrication, QA/QC, and field teams worked together to address constructability, safety, quality and schedule requirements. The integrated approach enabled the icon team to support the scale of the project and the specialized challenges encountered along the way.



icon Objectives

- ❑ Operational Compliance & Efficiency
- ❑ Effective Execution of P91 No-Purge Welding
- ❑ Infrastructure Durability / Sustainability
- ❑ Safety Compliance in All Project Phases

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METHODOLOGY & DESIGN APPROACH

Executing at Industrial Scale

The SunCoke project required a comprehensive mechanical construction strategy to coordinate major process systems, high-pressure steam generation, coke handling equipment, emissions infrastructure, and extensive underground utilities. Success depended on identifying the right execution strategy early and keeping engineering, QA/QC, fabrication and field teams aligned throughout the work.

Rethinking the P91 Welding Approach

That mindset led to one of the project's defining solutions: welding P91 pipe without internal purging. By challenging the conventional approach, icon developed a procedure that reduced the time, materials and labor typically required for purge setup while protecting weld quality and system performance. The resulting procedure aligned technical requirements with field execution, improving installation efficiency while maintaining the quality standards required for high-performance piping.

Analysis of Initial Design

Early planning was essential to managing the scale and complexity of the SunCoke project. icon aligned engineering, VDC, prefabrication, QA/QC and field installation teams to evaluate constructability, sequencing, safety and project risk before work progressed in the field. This integrated planning helped identify execution strategies tailored to the facility's complex mechanical scope while supporting quality, schedule and cost objectives.



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CHALLENGE

Balancing Weld Integrity, Cost Efficiency, and Schedule Demands

The SunCoke Energy project required high-performance P91 piping systems capable of meeting the demanding operating conditions of a power-generation facility. Maintaining weld integrity, corrosion resistance, and long-term reliability was critical, but conventional welding methods introduced additional labor, material costs, and schedule considerations. icon Mechanical identified an opportunity to eliminate traditional internal purging—a time-intensive process—without compromising the stringent quality standards required for high-energy piping.

icon SOLUTION

Innovative Welding Methods. Proven Performance.

icon implemented an advanced, no-purge welding approach using computer-controlled, modified short-circuit waveform technology to precisely regulate welding parameters and maintain consistent weld quality. By eliminating internal purge dams, argon gas, and associated setup labor, the team reduced material requirements and improved installation efficiency.

To validate this specialized approach, icon's engineering, project management, and QA/QC teams collaborated to develop a Welding Procedure Specification (WPS), supported by rigorous testing and specification compliance. This disciplined process ensured the no-purge method met the project's technical and quality requirements.

The resulting piping system was delivered on time and within budget, meeting stringent quality requirements while improving installation efficiency. The project demonstrated how specialized welding expertise and practical innovation can deliver measurable value on complex industrial projects.

561
Field Welds

231
P91 Prefabricated Piping Spools
1" to 24"

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SUNCOKE ENERGY PLANT



SUNCOKE

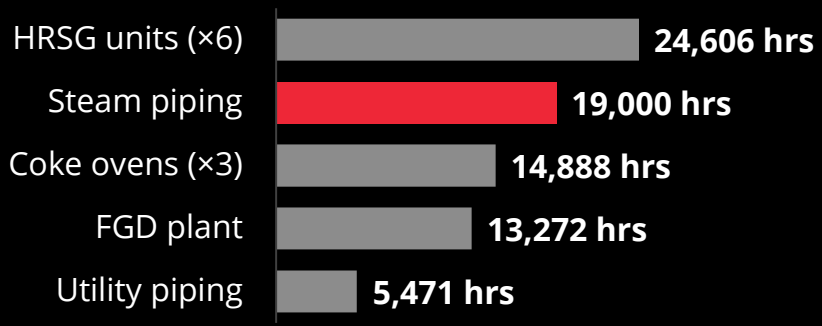
BY THE NUMBERS

120,370

ESTIMATED LABOR HOURS

Engineering, fabrication and field installation, self-performed by icon.

Selected key systems labor hours



$290M
Facility value

6 months
Install window

7,220 LF
Pipe installed

~2%
Weld rejection rate

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