

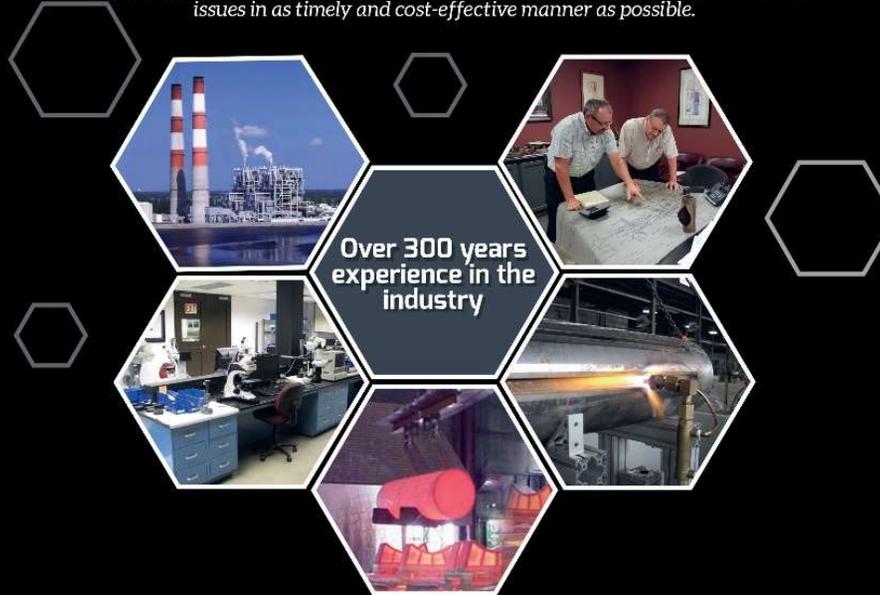


ATC
Applied Thermal Coatings

CE  Combustion
Engineering
Solutions
a Division of ATC

Our Vision

We strive to support the commercial success of our clients by providing superior technical services and problem-solving capabilities covering all materials-related issues in as timely and cost-effective manner as possible.



Over 300 years
experience in the
industry

Office : 423-267-0647

ATC-CES.com

**ATC-CES : A Multi-Faceted Technology Company
Chattanooga, TN, USA**

ATC-CES PROJECT MANAGEMENT

Small minority owned business offering a broad range of engineering services

Patented surface coatings and heat treating services

ISO 9001 Certified

Industry experts in metallurgy, failure analysis, and advanced materials

Metallurgical lab testing and research (Grade 91 material development with ORNL)

Combustion Engineering Solutions, experts in Boiler and HRSG design, retrofit, and material supply

Project Management

Who is ATC-CES?

ATC-CES is a diversified technology company that provides a range of services for US industries

Coatings Division offers a variety of coatings solutions for difficult wear and corrosion problems.

Heat Treatment Division offers heat treatment services covering a range of materials, specializing in advanced engineering alloys, like Grade 91, that require very precise control of temperature.

Combustion Engineering Solutions Division, which includes its full-service metallurgical laboratory, provides basic and advanced engineering assistance for all materials and welding related issues, along with mechanical/structural design, analysis, and material supply for the boiler/HRSG industry.

Coating Division

- **Diffusion**

- Chromizing
- Aluminizing
- Boronizing
- Siliconizing

- **Thermal Spray**

- Electric-Arc
- Combustion/Powder

- **Plasma Transfer Arc**

- Wear Resistance
- Corrosion Resistance



Heat Treatment Division

- **Heat-Treatment Services**
 - Annealing/Normalizing
 - Tempering
 - Quench and Temper
 - Stress Relief
 - Post Weld Heat Treatment
 - Solution Annealing
 - Precipitation Hardening



Heat Treatment Division

Flame Hardening Service



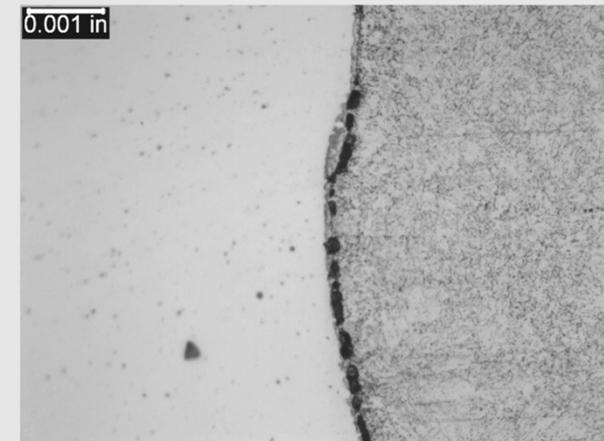
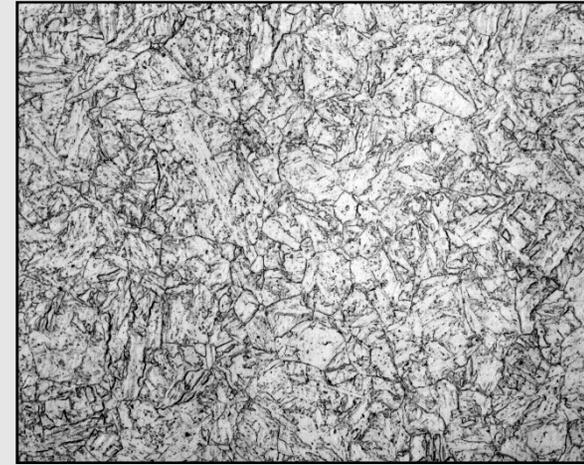
Combustion Engineering Solutions Division

- **Materials Qualification**
 - **Chemical Analysis**
 - **Mechanical Testing**
 - Tensile Testing
 - Charpy V-Notch Testing
 - **Weld Qualification Testing**
 - Bend Testing
 - Metallography/Hardness Testing
 - **Macrostructural and Microstructural Analysis**



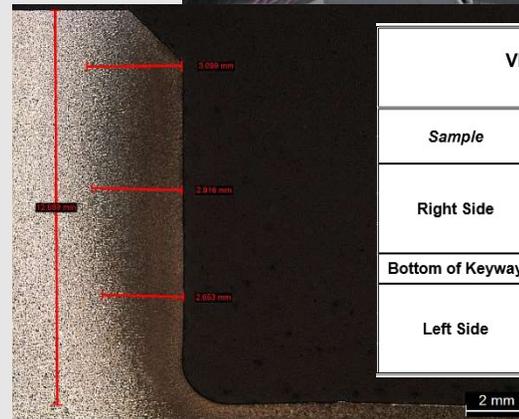
Combustion Engineering Solutions Division

- Assistance with Materials-Related Issues
 - Extensive experience with “difficult” materials, such as CSEF steels (e.g., Grade 91), advanced austenitics (e.g., TP310HCbN) and nickel-base alloys
 - Guidance on:
 - Material selection
 - Quality oversight throughout processing
 - Control of heat treatment
 - Condition assessment
 - Fitness For Service Evaluations



Combustion Engineering Solutions Division

- **Component Qualification**
 - NDE
 - Hardness Testing
 - Microstructure Examination
 - Charpy V-Notch Testing

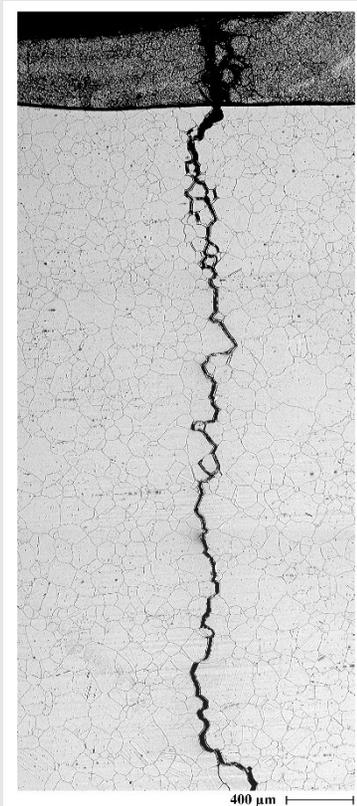
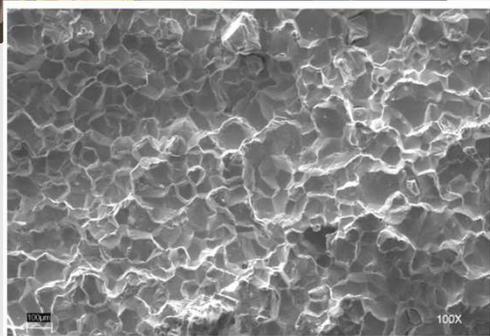


VICKERS HARDNESS VALUES-HV (HRC)* (500 grams Test Load)			
Sample	Location	Values	
		1 (at surface)	2 (~0.5 mm from surface)
Right Side	Top Corner	486 (48)	444 (45)
	Middle	486 (48)	468 (47)
	Bottom	466 (47)	455 (46)
Bottom of Keyway	Center	468 (46)	441 (44)
Left Side	Top Corner	493 (49)	458 (46)
	Middle	497 (49)	460 (46)
	Bottom	472 (47)	465 (46)

17H110 - Sample L281798-01 - Keyway Evaluation													
Keyways	Flame Hadening Parameters						Tube Length (in)	Keyway Width (in)					
	Nozzle end to Keyway (in)	Travel Speed (in/min.)	Fuel Flow (SCFH)	Oxygen Flow (SCFH)	Water Flow (GPM)	Pre HT			Post HT				
						Mouse Hole ---> Critical			Mouse Hole ---> Critical				
						1		2	3	1	2	3	
1	0.160	4.00	50	100	9.00	53.75	1.018	1.018	1.018	1.003	1.004	1.005	
2	0.154	3.50	50	100	9.00	53.75	1.019	1.020	1.020	1.003	1.006	1.006	
3	0.154	3.06	50	100	8.75	53.75	1.018	1.017	1.018	1.003	1.002	0.986	
4	0.16	3.75	50	100	8.75	53.75	1.019	1.020	1.020	1.007	1.007	1.011	

Combustion Engineering Solutions Division

- **Failure Analysis and Root Cause Investigation**
 - **Damage Mechanism Determination**
 - **Verification of Specification Compliance**
 - **Root Cause Analysis**
 - **Litigation support**



Combustion Engineering Solutions Division

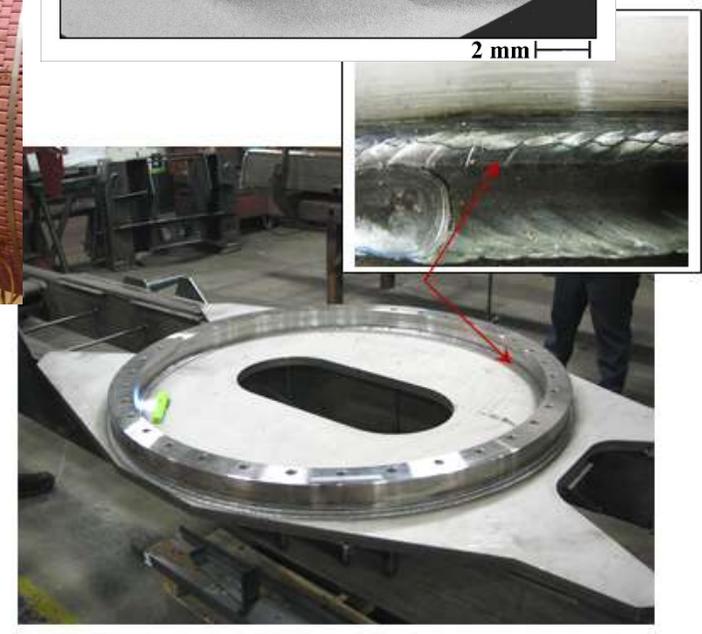
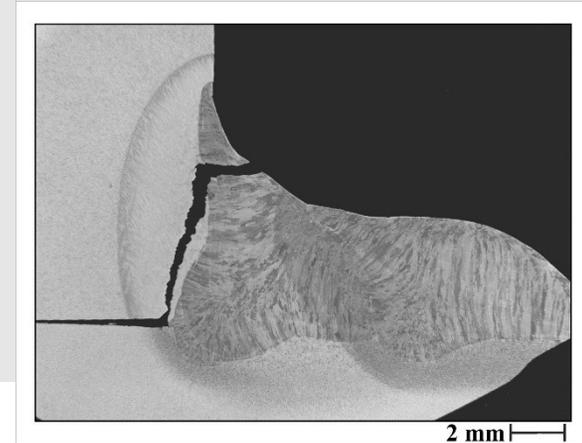
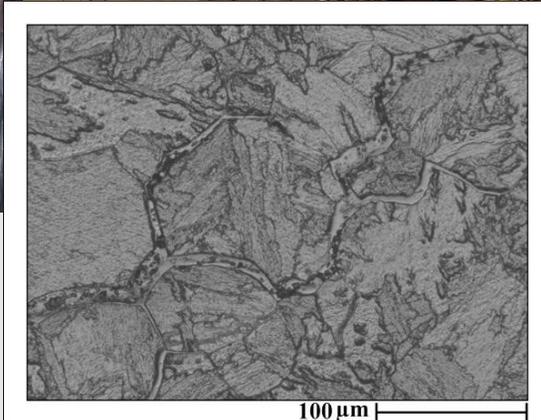
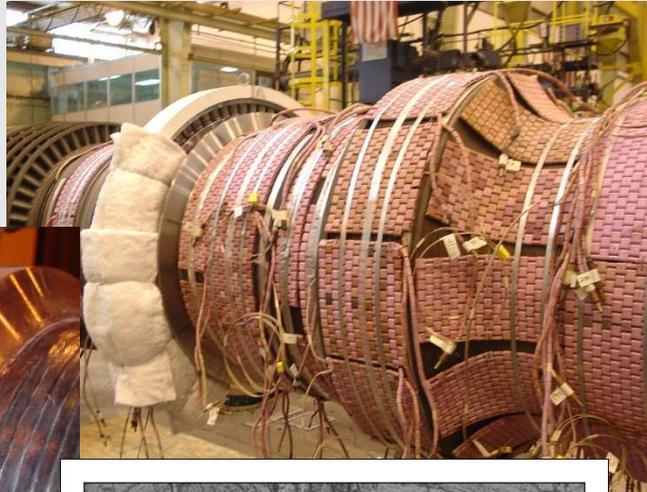
- **Field Inspection Support**
 - Standard NDE
 - Metallographic Replication
 - Hardness Testing



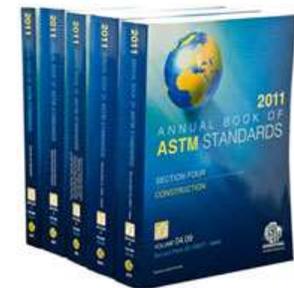
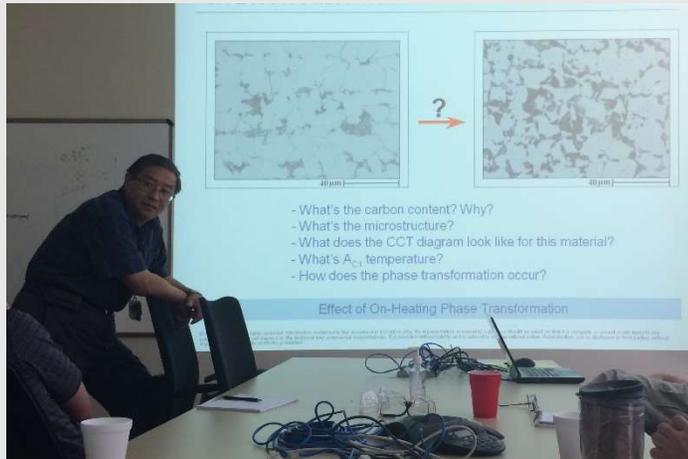
Combustion Engineering Solutions Division

• Welding Engineering and Technology

- Welding metallurgy
- Weld Procedure Development
- Weld Qualification Testing
- Weld cracking behavior
- Weld repair



Metallurgical Consulting, Litigation Support, Training (Metallurgy, Welding Engineering, NDE, Heat Treatment), Engineering Project Management, Assistance with Codes and Standards



ATC's Combustion Engineering Solutions Division

Boiler and HRSG Design/Structural Group

- 300+: Combined Years of Boiler Service Engineering Practice
- Extensive Design Experience with Boiler/HRSG Equipment from Combustion Engineering/Alstom, ABB-CE Services, Foster-Wheeler, B&W
- 10: States in which Our Professional Engineers Are Licensed
- Located in Chattanooga, TN USA

ATC's Combustion Engineering Solutions Division

Analysis, Design, and Material Capabilities

- High Energy Piping
- Pressure Part Components (SH, RH, Econ, Harps, Headers)
- Structural Support and Platforms
- Boiler Framing (Buckstay)
- Duct, Toggle Sections, Expansion Joints
- Construction Engineering
- Drafting Services



ATC's Combustion Engineering Solutions Division

ASME B31.1 Power Piping

ASME B31.3 Process
Piping

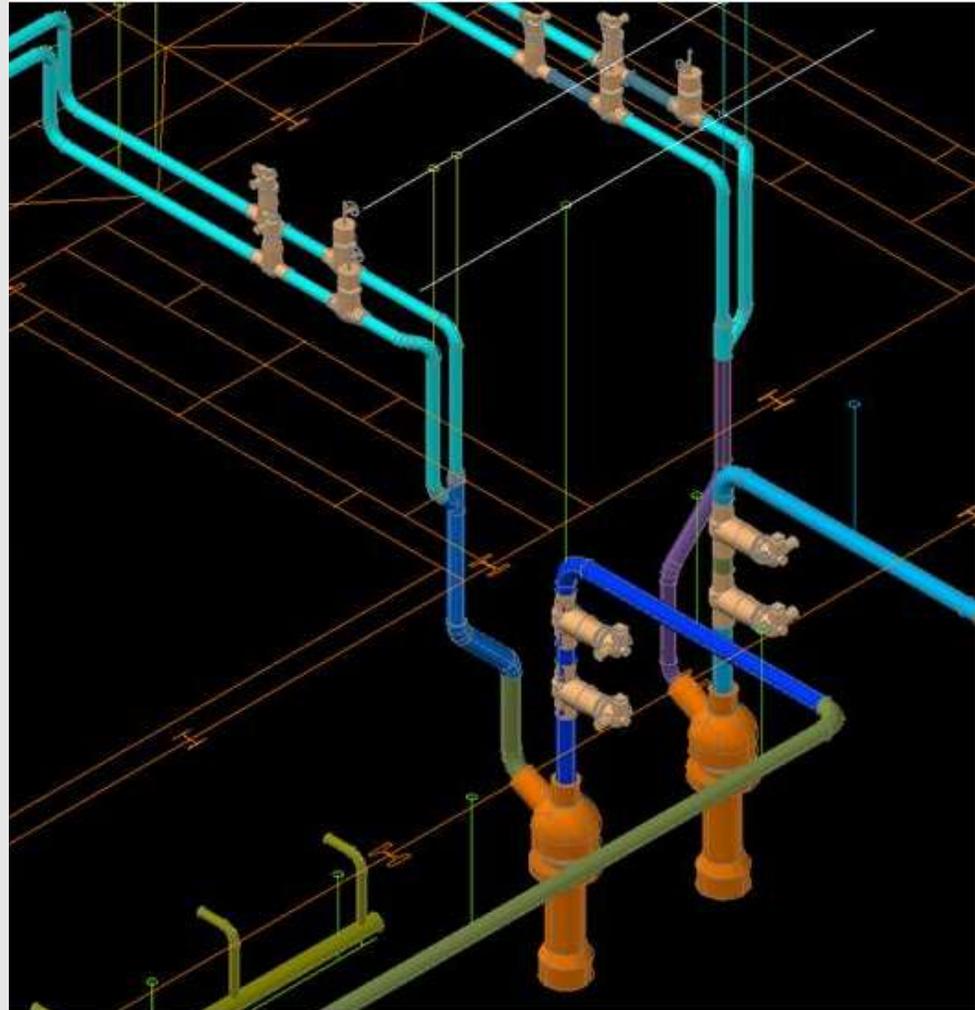
Condition Assessment

Pipe Support Repair

Drain Piping

Pressure Relief Vent Piping

Soot Blower Piping



ATC's Combustion Engineering Solutions Division

Structural Analysis, Design & Material

Main Boiler/HRSG
Support Steel

Press Part Support
Steel

Platform Steel

Boiler Building
Wind/Seismic
Resisting Structure

Duct Support Steel

Pipe Support Steel



ATC's Combustion Engineering Solutions Division

Boiler/HRSG Framing Analysis, Design & Material

Buckstay Systems

Lower Tube & Drum
Supports

Nose Arch Framing

Lower Enclosure Framing

Penthouse Enclosure
Framing

Casing Design

Boiler/HRSG Guides



ATC's Combustion Engineering Solutions Division

Duct Analysis & Design

Air Ducts

Gas Ducts

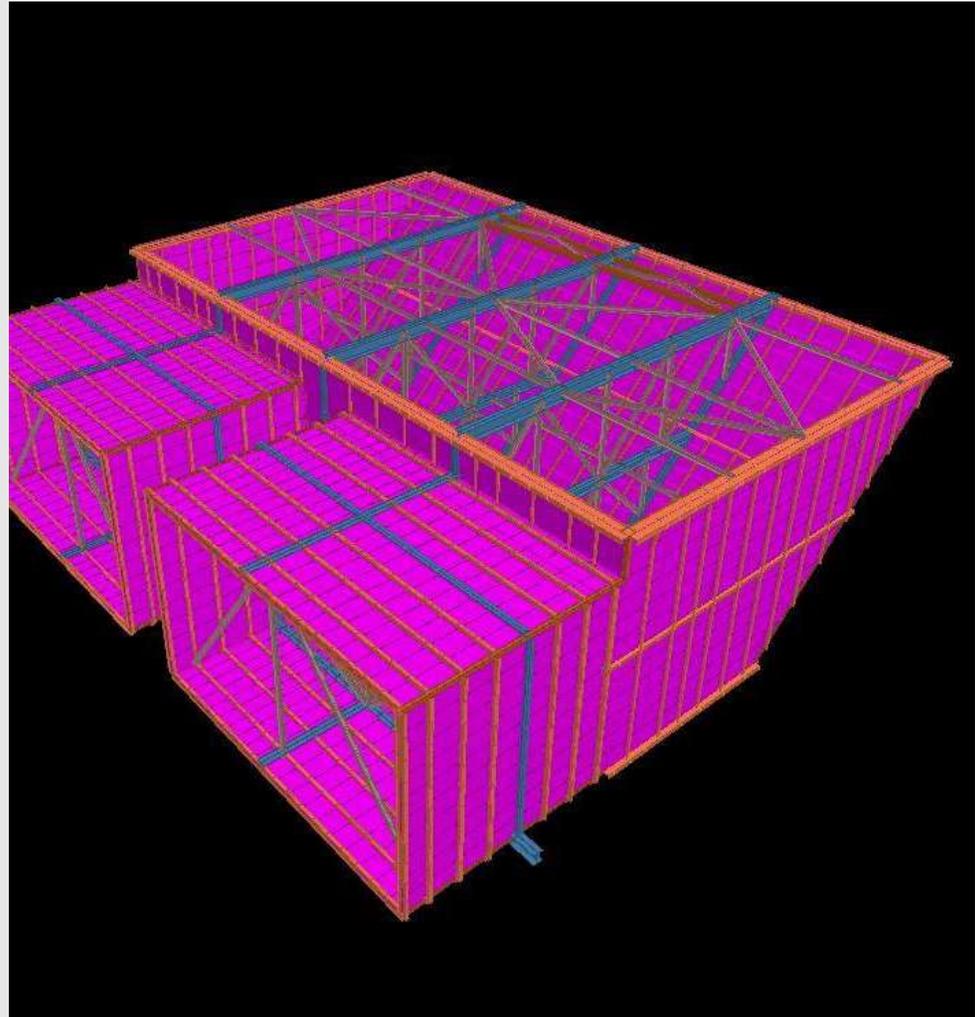
Toggle Sections

Expansion Joints

Hoppers

New Duct Routing

Fabric Joint Specifications

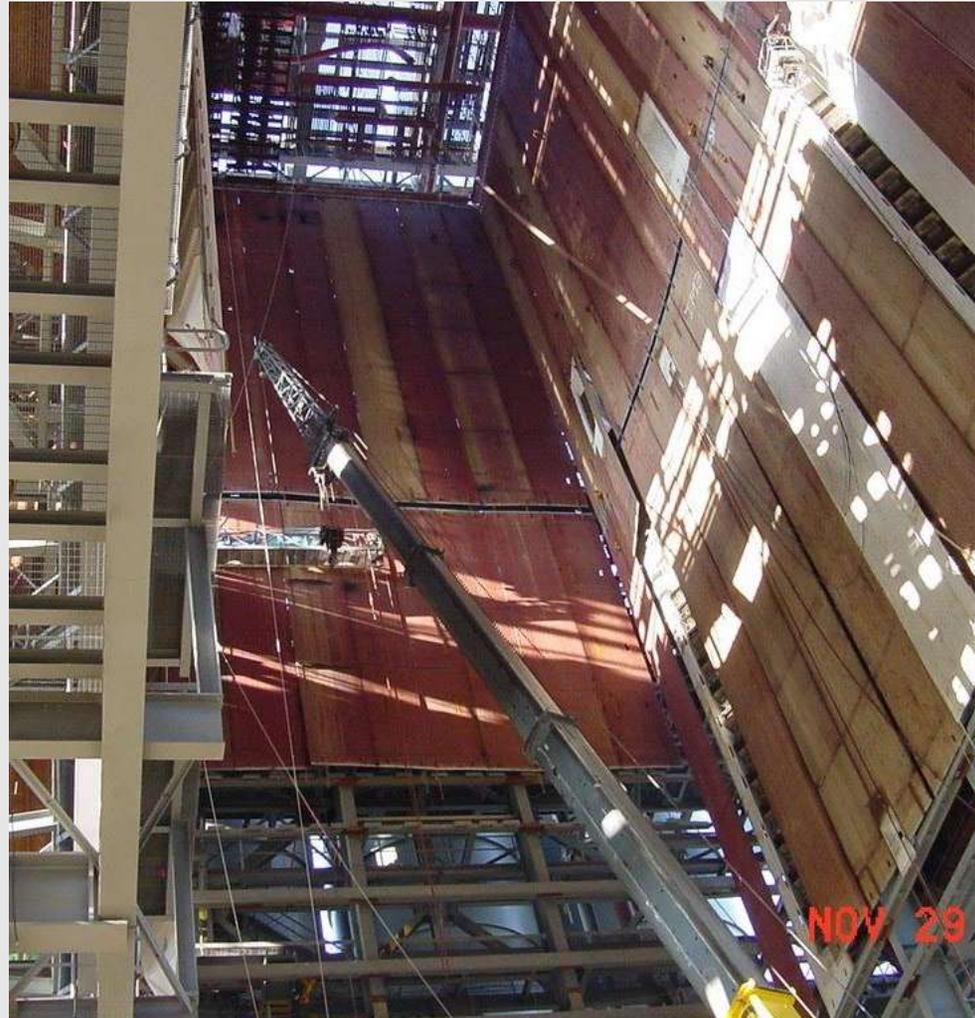


ATC's Combustion Engineering Solutions Division

Construction Engineering

Temporary Support Designs for Replacement:

- Waterwall Panels
- Lower Slope Panels
- Rear Arch Panels
- Headers
- Piping



ATC's Combustion Engineering Solutions Division

Drafting Services

Pipe Arrangements

Pressure Part Arrangements

Steel Arrangements

Duct Arrangements

New Boiler Equipment
Layout

Construction Sequencing





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