HIGH COUNTRY FABRICATION

1000 West First Street, Casper WY 82604
www.hicofabrication.com
Email:hico@hicofab.com
307-235-0189

HICO HISTORY

High Country Fabrication Inc. was founded in May of 1978 in Casper Wyoming by Ed Reed and Dennis Polk who were welders for Darenco, a well-known fabricator in Wyoming.

In the beginning HICO operated out of a 3,000 square foot rented shop space and specialized in building air compression packages, vapor recovery systems, and repair work on pipelines and other general welding projects.

Late in 1978 HICO moved to a six acre yard, with offices and larger fabrication bays and by the end of 1980 net sales reached nearly 1.2 Million. HICO made the necessary investments in personnel, plant, equipment and marketing to earn a reputation and finding a niche as a high quality fabricator of custom pressure vessels. By the end of 1986 net sales exceeded 6.0 million.

In 1989 the company relocated to an even larger facility and by 1994 HICO had completed a major expansion and modernization of its production facility including installing a 54’ long by 21’ wide stress relieve oven, the addition of a 422’ long by 78’ wide heavy fabrication bay, a 150’ long paint bay, and a 6” thick steel roller.

Today, 46 years later, High Country Fabrication is owned by local shareholders, averages about 18-20 million in annual revenue and has fabricated projects for a host of energy sources and industries

HEADQUARTERS

- **12.5 total acres**
- **98,000 ft^2 under hook, 78,000 ft^2 shop space**
- **16’OD X 400’L X 240K Lbs. w/ 800,000 lbs.**

Bay #1 80’W x 450’L = (2) 60 Ton & (2) 10 Ton Cranes

Bay #2 70’W x 250’L = (2) 10 T (2) 5 T, (3) 2T Cranes

Bay #3 30’W x 105’ = (1) 10T Crane

RAIL CAPABILITY

A ½ mile internal rail system connected to Burlington Northern Railway spur allows us to ship & receive material by rail.

Max loading approx. 14’ X 46L X 550K LBS depending on route.

HEAT EXCHANGERS

- TEMA Style Shell and Tube Heat Exchangers from 16” to 16’OD
- Welded Tube to Tube Sheet Joint
- Engineered for guaranteed performance

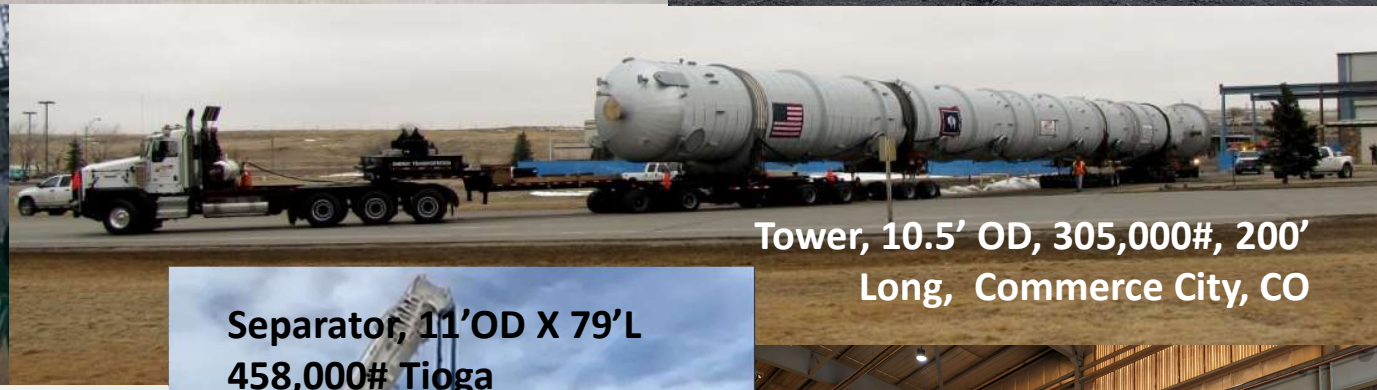
HTRI

PROCESS TOWERS, REACTORS, VESSELS

120’ L X 6’ID X 124,000 Lbs.

Fractionator, 14’ OD, 277,000#, 146.5’
Borger, TX

91’ L X 6’ID X 94,000 Lbs.



Tower, 10.5’ OD, 305,000#, 200’
Long, Commerce City, CO

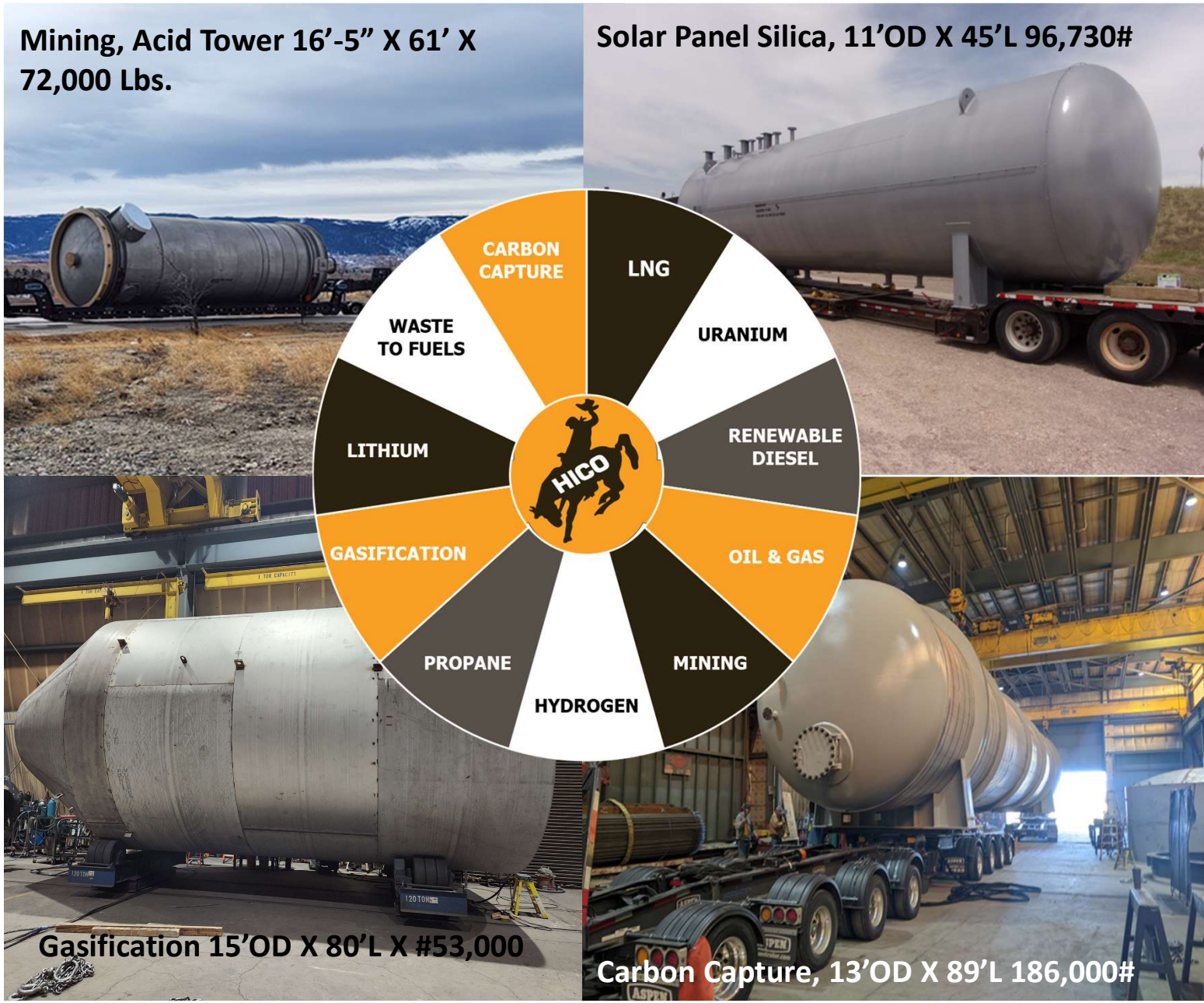
Reactor, 6’OD X 79’L X 95,000# Mandan

Separator, 11’OD X 79’L
458,000# Tioga

Nigeria 11’ X 42’ X 285,000 Lbs.

INDUSTRIES SERVING MATERIALS OF CONSTRUCTION

- P1 Carbon Steel
- P3 Low C/ Moly
- P4-5B Chrome
- P6-7 400 Stainless
- P8 Stainless
- P10H 2205 Duplex
- P41-49 Ni 200/400/600
- P43 C276 Hastelloy
- P45 Incoloy 825
- Explosion Bonded Material



STANDARDS, CERTIFICATES, & ORGANIZATIONAL AFFLIATIONS

- **ASME – Section VIII, Div.1**
- **National Board “U” and “R” Stamps**
- **CWB Div.2 CSA Standard W47.1 Certified**
- **HTRI – Heat Transfer Research, Inc.**
- **API – American Petroleum Institute**
- **Association, Inc.**
- **NACE – National Association of Corrosion Engineers**
- **ASNT – American Society for Non-Destructive Testing**
- **DDS – Solid Works Certified Professionals**

ENGINEERING & DESIGN

Engineering Department

- Four Mechanical Engineers
- Three Full Time Designers

Engineering & Design Software

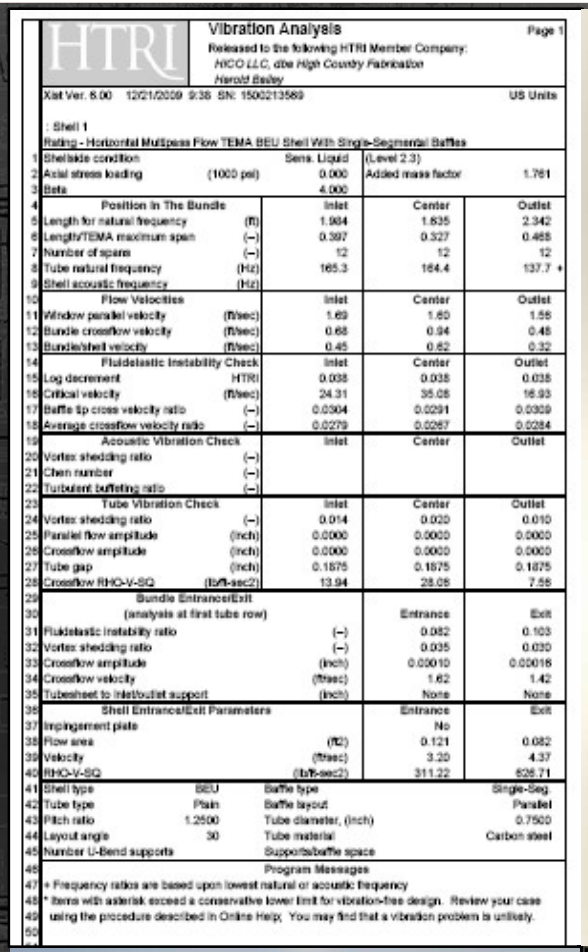
- Codeware – Mechanical
- COMPRESS
- Nozzle Pro (FEA Utility)

- HTRI – Exchanger Rating
- Xchanger Suite
- Xist – Shell and Tube
- Xvib – Vibration

Solidworks 3D Modeling, Drafting, & Simulation

AutoCAD – Drafting

Pronest 2019



HTRI — Vibration Analysis — Page 1

Released to the following HTRI Member Company:
HICO LLC, dba High Country Fabrication
Harold Bailey

Xist Ver. 8.00 12/21/2009 9:38 SN: 1500213589 — US Units

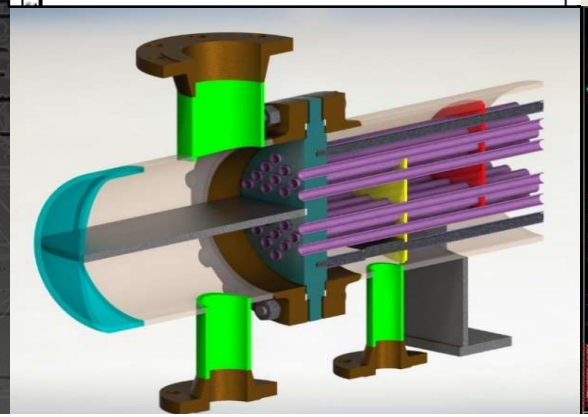
: Shell 1
Rating - Horizontal Multipass Flow TEMA BEU Shell With Single-Segmental Baffles

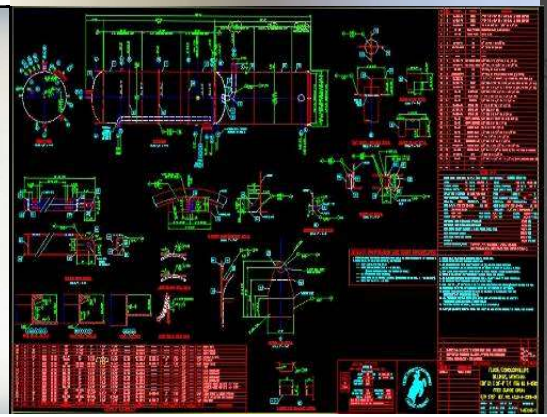
Shellside condition		Sens. Liquid	(Level 2.3)	
Axial stress loading	(1000 psi)	0.000	Added mass factor	1.761
Beta		4.000		
Position In The Bundle		**Inlet**	**Center**	**Outlet**
Length for natural frequency	(ft)	1.984	1.835	2.342
Length/TEMA maximum span	(–)	0.397	0.327	0.468
Number of spans	(–)	12	12	12
Tube natural frequency	(Hz)	165.3	164.4	137.7 +
Shell acoustic frequency	(Hz)			
Flow Velocities		**Inlet**	**Center**	**Outlet**
Window parallel velocity	(ft/sec)	1.69	1.60	1.56
Bundle crossflow velocity	(ft/sec)	0.68	0.94	0.48
Bundle/shell velocity	(ft/sec)	0.45	0.62	0.32
Fluidelastic Instability Check		**Inlet**	**Center**	**Outlet**
Log decrement	HTRI	0.038	0.038	0.038
Critical velocity	(ft/sec)	24.31	35.05	16.93
Baffle tip cross velocity ratio	(–)	0.0304	0.0291	0.0309
Average crossflow velocity ratio	(–)	0.0279	0.0267	0.0284
Acoustic Vibration Check		**Inlet**	**Center**	**Outlet**
Vortex shedding ratio	(–)			
Chen number	(–)			
Turbulent buffeting ratio	(–)			
Tube Vibration Check		**Inlet**	**Center**	**Outlet**
Vortex shedding ratio	(–)	0.014	0.020	0.010
Parallel flow amplitude	(inch)	0.0000	0.0000	0.0000
Crossflow amplitude	(inch)	0.0000	0.0000	0.0000
Tube gap	(inch)	0.1875	0.1875	0.1875
Crossflow RHO-V-SQ	(lb/ft-sec2)	13.94	28.05	7.58
Bundle Entrance/Exit (analysis at first tube row)			**Entrance**	**Exit**
Fluidelastic instability ratio		(–)	0.082	0.103
Vortex shedding ratio		(–)	0.035	0.030
Crossflow amplitude		(inch)	0.00010	0.00018
Crossflow velocity		(ft/sec)	1.62	1.42
Tubesheet to inlet/outlet support		(inch)	None	None
Shell Entrance/Exit Parameters			**Entrance**	**Exit**
Impingement plate			No	
Flow area		(ft2)	0.121	0.082
Velocity		(ft/sec)	3.20	4.37
RHO-V-SQ		(lb/ft-sec2)	311.22	626.71

Shell type	BEU	Baffle type	Single-Seg.
Tube type	Plain	Baffle layout	Parallel
Pitch ratio	1.2500	Tube diameter, (inch)	0.7500
Layout angle	30	Tube material	Carbon steel
Number U-Bend supports		Supports/baffle space	

Program Messages

+ Frequency ratios are based upon lowest natural or acoustic frequency
* Items with asterisk exceed a conservative lower limit for vibration-free design. Review your case using the procedure described in Online Help. You may find that a vibration problem is unlikely.





IN-HOUSE QUALITY CONTROL & NDE

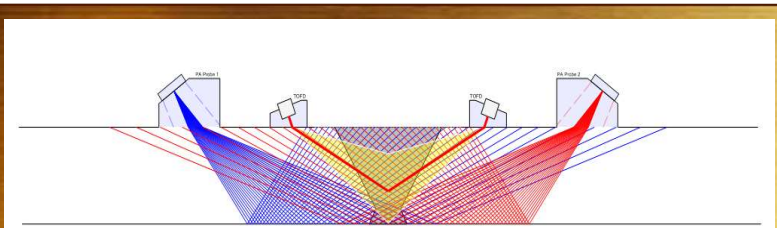
ASME Codes and Standards

- Section II A – D Material Specifications
- Section V – Non-Destructive Examination
- Section VIII, Div 1 – Pressure Vessels
- Section IX – Standard for Welding Procedures

In-House Capabilities and Qualified Technicians

- (AUT, UT) Ultrasonic, Automated & Manual – (1) Level III
- (RT) Radiographic Gamma Ray – (1) Level III, (2)Level II
- (WFMT, CCMT) Magnetic Particle – (1) Level III, (2) Level II
- (CCPT, FPT) Liquid Penetrant– (1) Level III, (2) Level II
- (VT) Visual – (3) Level II VT & (1) CWI
- (BHT) Hardness
- (PMI) Positive Material Identification – (4) Trained Operators
- Ferrite Content

AUTOMATED ULTRASONIC TESTING (AUT)

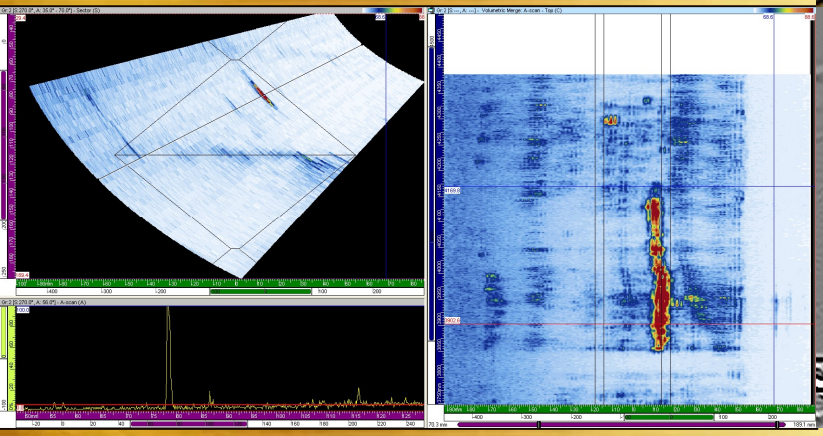


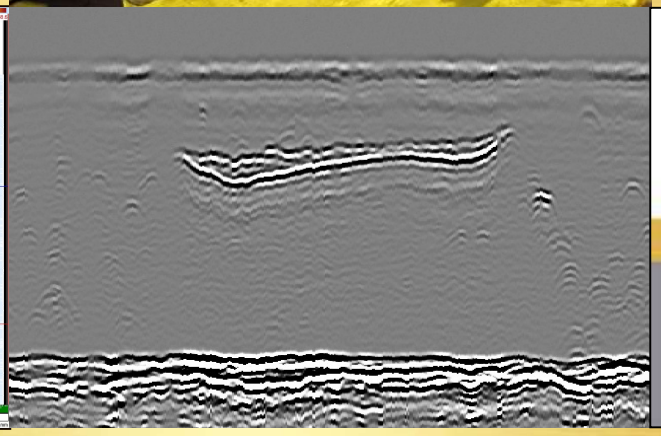
Eclipse Scientific ESBeamTool 3 -
Used to determine probe placement for complete coverage of weld for any type of weld configuration

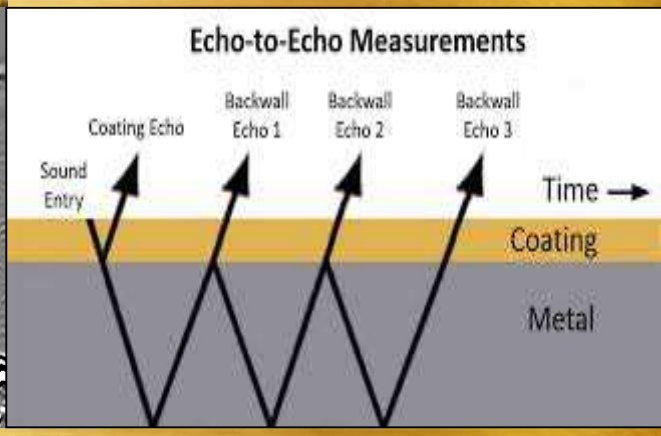
Olympus OmniScan MX3

Olympus Flex Scanner Phased Array and time-of-flight diffraction capabilities

Inspect material > 1” up to 12” thick, carbon and stainless steel







- **Olympus TomoView Data Analysis Software**
- **Ability to easily detect and accurately measure flaws using both phased array and TOFD**
- **All data interpretation is verified by UT Level III technician**
- **(Same defect shown in both views above)**

INDUSTRIAL RADIOGRAPHY (GAMMA RAY)

Survey Meter, Camera

- **Two SPEC 150 Iridium-192 cameras with 150ci capacity for inspection of material up to 3” thick**
- **Licensed for Cobalt-60 source for inspection of material above 3” thick**
- **GE Industries Nova Automatic Processor for fast and consistent development**

Dark Room, Chemical Mixers, Silver Recovery, Automatic Processor

WELDING PROCESSES

<u>Welding Processes</u>

SMAW – Stick

SAW – Submerged Arc

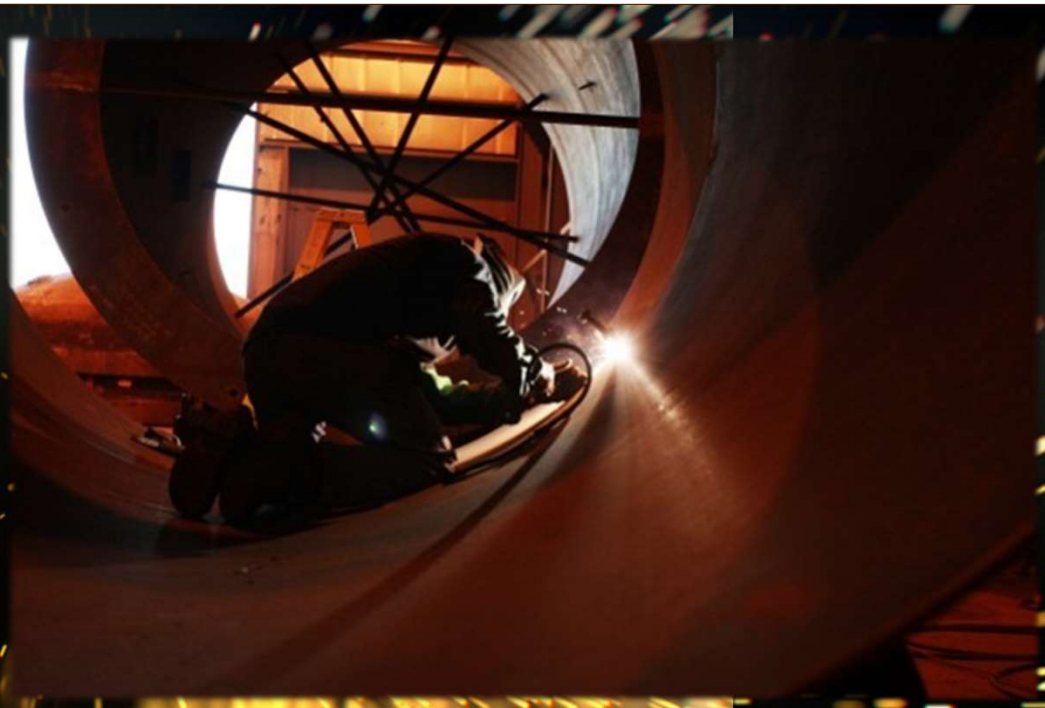
GMAW – MIG

GTAW – TIG

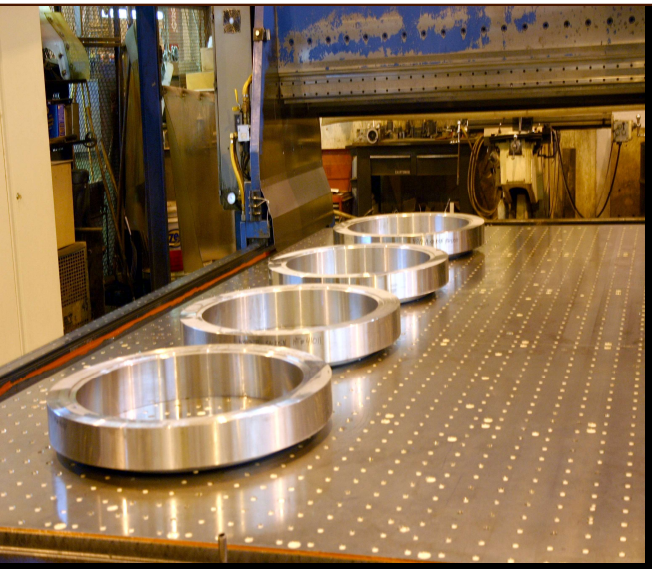
FCAW – Flux Core

ESW – Electro-slag

SW – Stud Welding



MATERIAL PREP - MACHINING



Drilling

- **Quickmill – 8’ X 15’**
- **American - 16’ Dia. X 10” THK**

Vertical Boring Mills

- **Bullard - 42”**
- **Schiess - 96”**

Horizontal Boring Mill

- **Giddings & Lewis 72” X 60” X 36”**

Engine Lathe

- **Lodge & Shipley - 28” X 14’**

Brake

- **Pullmax 1” THK x 12’ W 400 Ton**

CUTTING & BEVELING

5 Axis CSI Kodiak HPR400XD Plasma Cutting System

3.2” Thick Plasma Cutting

8” Thick Oxy Fuel Cutting

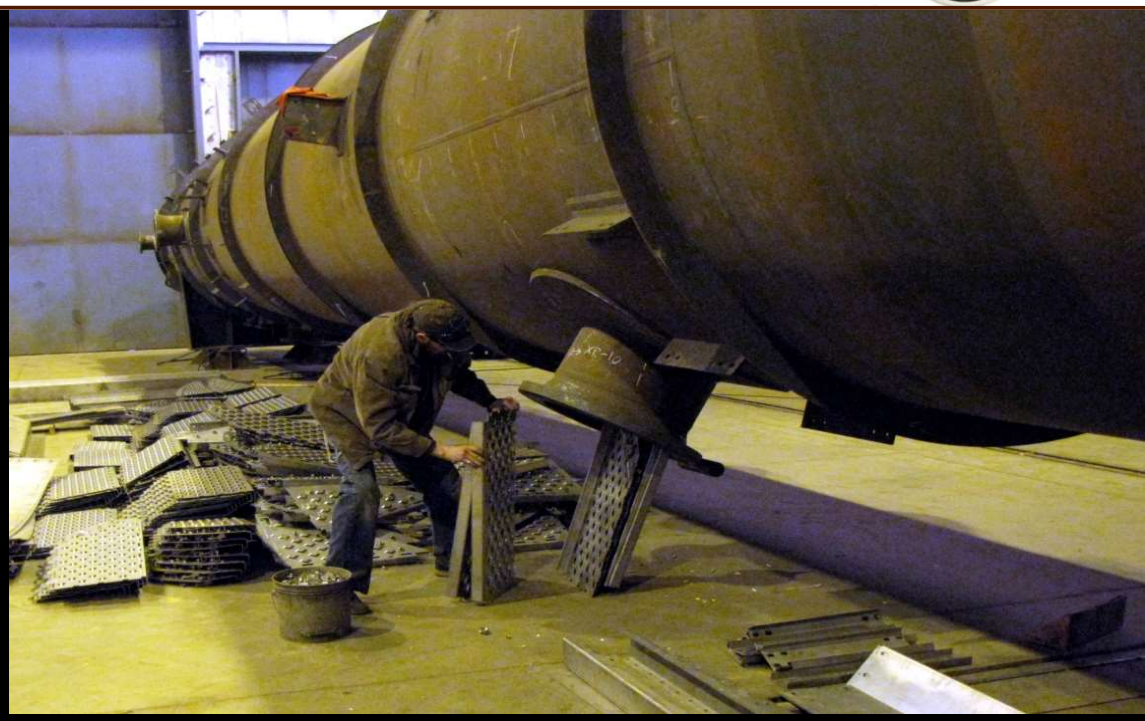
12’-6” Wide x 46’-6” Long Cut Table

ROLLING & STACKING SHELLS

Pullmax Roller
1.75” Thick, 10’ W, 17” to 15’ OD

Hauseler Roller
5.75” Thick, 10’ W, 4’ to 20’OD

INTERNAL/EXTERNAL INSTALLATION LADDERS & PLATFORMS



CLADDED & WELD OVERLAY

Explosion Bonded Metals – 300 Series Stainless, 625 Inconel, Monel 400

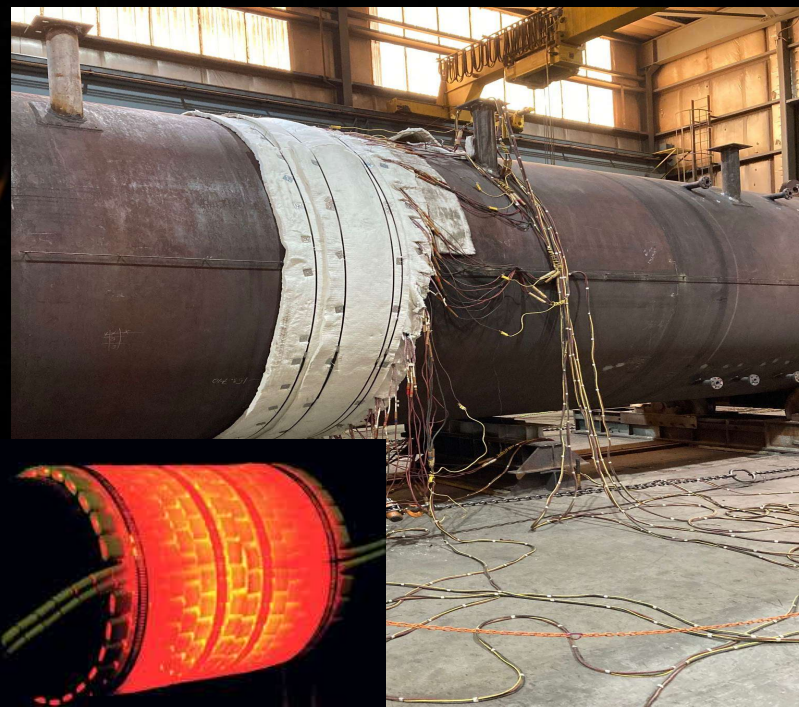
POST WELD HEAT TREAT OVEN & LOCALIZED HEAT TREAT

Oven Specifications

- 54’ L X 21’ W X 15’ H
- 110 Ton Car Capacity
- 2400 deg. F Max.
- Natural Gas - 25,656,000 BTU/hour

Localized Tiling

- 200 - 500 Amp Power Source
- 12 Zone control
- 24 point digital chart recording



HYDROSTATIC PRESSURE TESTING

Heated 42,000 Gallons Storage Tanks

Access to Low-Chloride City Water

Treated W/ Corrosion Inhibitors

SURFACE PREPARATION & ABRASIVE BLASTING

- SSPC – Society for Protective Coatings
- SP-5 White Metal,
- SP-6 Commercial
- SP-7 Brush
- SP-10 Near White
- Silica Free Blast Media
- 3 Stations, 3/8” – 3/4” Nozzle, 90 psi
- Surface Contaminant Testing Capability

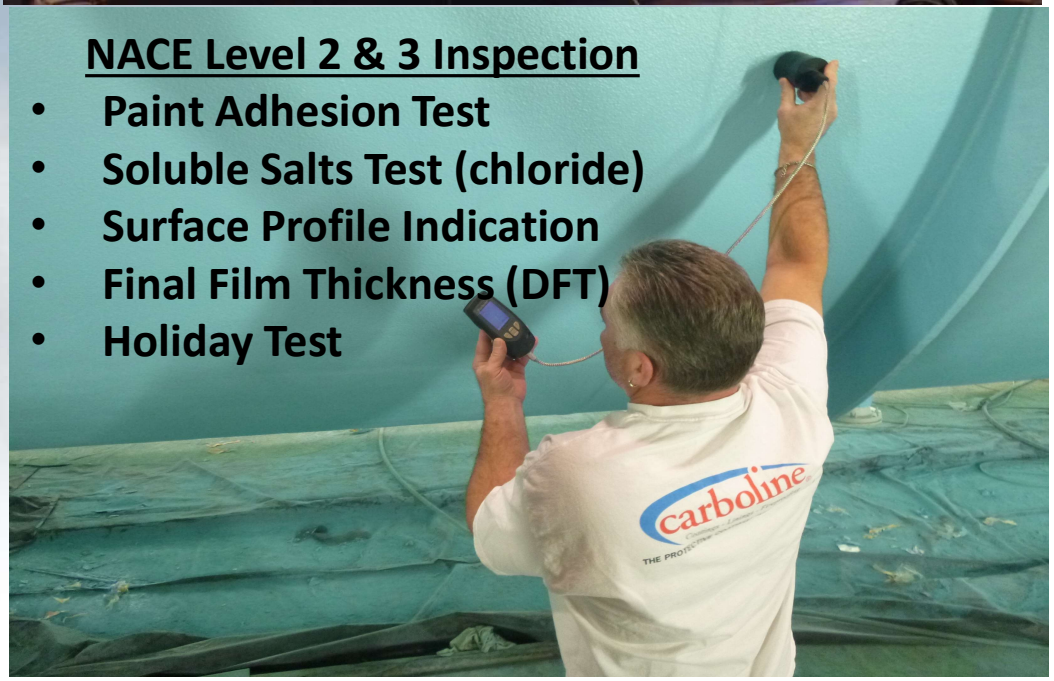
INTERNAL & EXTERNAL COATING

High Performance Coatings

- High Temp Coatings to 1200°F
- Acid Indicating
- Epoxy Mastics, Phenolic, & Novolacs
- Urethanes
- Silicone Alkyd
- Zinc

NACE Level 2 & 3 Inspection

- Paint Adhesion Test
- Soluble Salts Test (chloride)
- Surface Profile Indication
- Final Film Thickness (DFT)
- Holiday Test



INSULATION, FIREPROOFING, HEAT TRACE

Reactor, 12’ OD, 560,000#,
108.75’ Long, Cheyenne, WY

H2S Stripper, 12’OD, 121’L,
132,000# Laurel MT

Styrene Cond.
14’4” OD, 510,000#, Canada

LP Separator 15’OD X 84’L X 270,000#
Dickinson ND

Heat Exchanger, 14’-5” X 59’L X 195,000
Lbs. 304 & 316 SS

Acid Gas Exchanger, 16.5’ OD, 310,000#, 65.5’ Long, Pocatello