

Welspun Tubular LLC, Little Rock, AR AND TransCanada Keystone XL



Welspun Tubular LLC



Welspun Tubular LLC

1. WELSPUN
 - Introduction
 - How We Make Pipe For Keystone XL
2. KEYSTONE XL PIPELINE
3. KEYSTONE XL ECONOMIC IMPACT

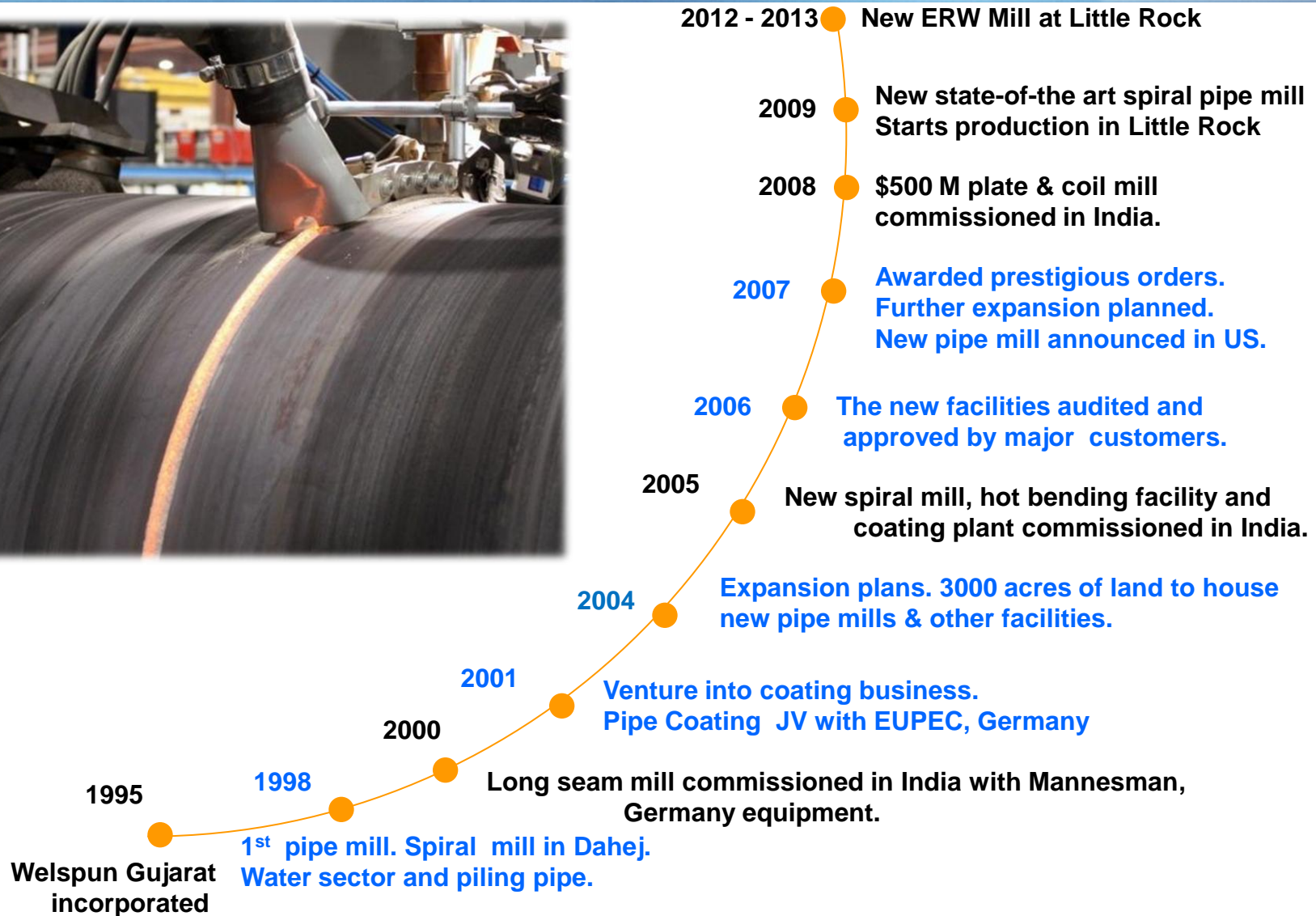


Welspun Group

- Started 1985 as a textile company in India
 - Home Textiles – 3rd largest in the world
 - Line Pipe – 2nd largest in the world (large diameter)
 - Helical (Spiral) mill, Little Rock AR
 - Others in India & Middle East
 - Steel - plate, coils, bars
 - Energy - coal, wind, solar

Welspun Group's History- Pipe

1 Million Tons of Pipe Sold



GLOBAL FOOTPRINTS....



Welspun Group

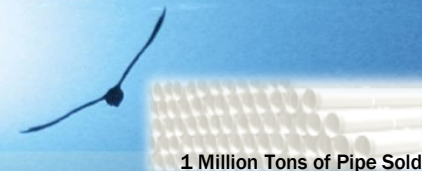
OUR CLIENTS



Group Products



Product Range



Spiral Facility:

Capacity	350,000 MT/Year
Diameter Range	24" – 60" OD
Wall Thickness	0.315" – 1.0"
Length	26 feet – 80 feet
Grades	UP TO API 5L GRADE X80 or equivalent grades as per different international pipe specs.

Coating Facility:

Capacity	1000 M ² / Hour
Diameter Range	16" – 60" OD
Type of Coatings	Internal Flow Coating Fusion Bonded Epoxy (FBE) Single Layer Coating FBE/ ARO Dual Layer Coating



1 Million Tons of Pipe Sold

Welspun Little Rock 6" to 60" Pipe

Future Dock

Internal & FBE

Double
Jointing

LSAW
Pipe Mill

Pipe Storage

6" to 20" Pipe Mill
6" to 20" Coating



Line Pipe History



1 Million Tons of Pipe Sold

- Gas for gas lights distributed by pipe in cities during early 1800's
- First oil pipeline 1858
- API 5L 1st Edition 1928
 - Covered pipe grades with yield strength up to 40,000 psi
- DOT established federal regulations for pipelines in 1970
- API 45th Edition 2013
 - Covers pipe grades with yield strength up to 120,000 psi

Coil Feeding And Uncoiler



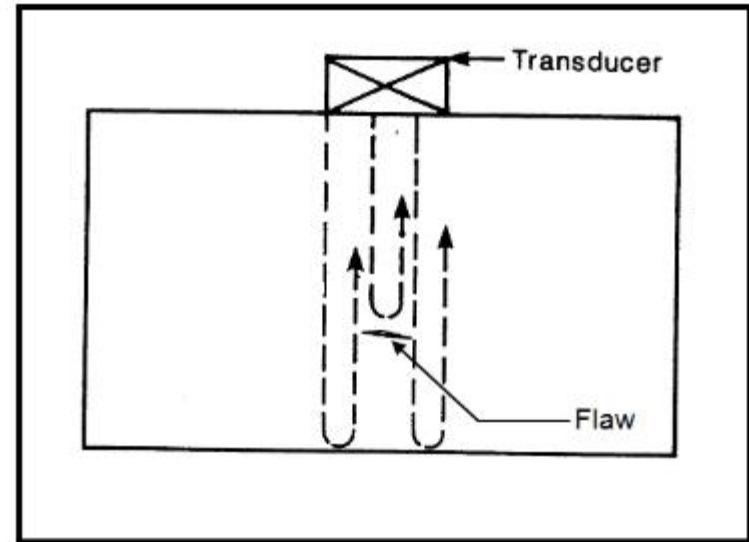
1 Million Tons of Pipe Sold

- First step in making pipe is also the first quality check.
- Coil numbers are compared to list of coils approved for use on the pipe order.
- Coil numbers entered into computer system from tracking.



Coil Ultrasonic Testing

1 Million Tons of Pipe Sold



- Welspun inspects the coil for lamination prior to forming into pipe.
- Straight beam for detection of laminar defects
- State of the art (100% coverage)
- Transducers have 10% overlap to ensure full coverage

Edge Miller

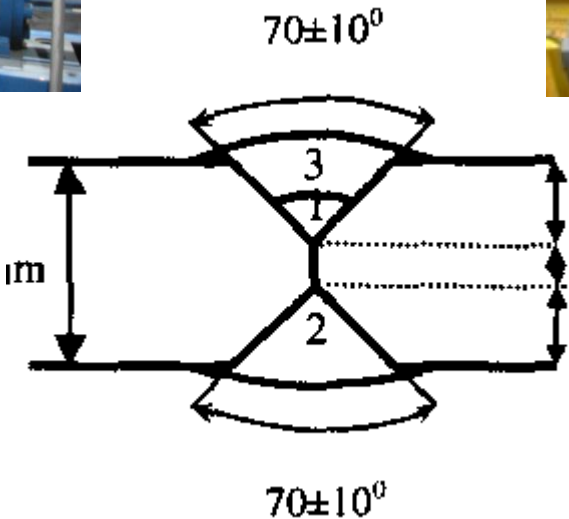


1 Million Tons of Pipe Sold

Provides bevel for DSAW welding of pipe seam. Joint design per approved WPS.

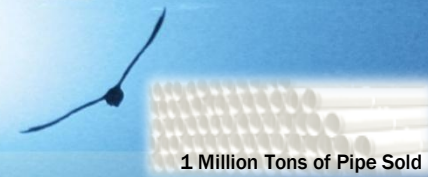


Angle 35°
Root face
Angle 35°

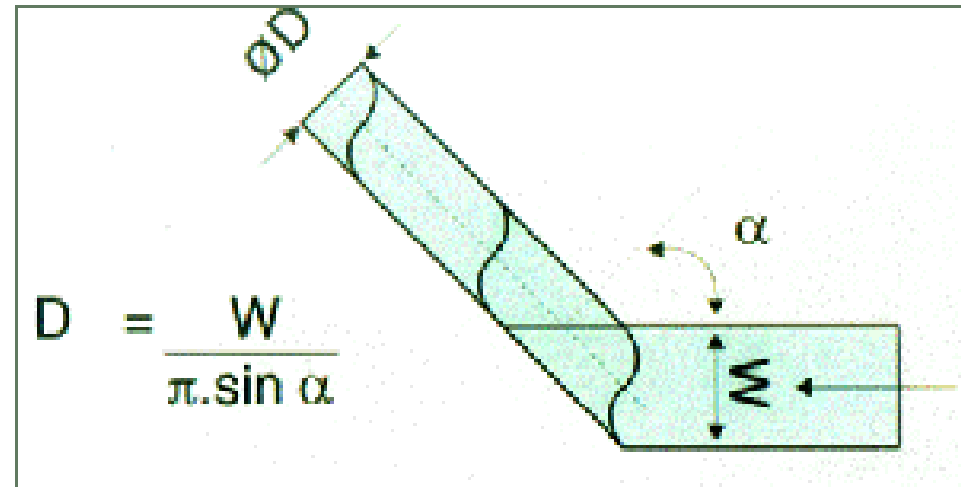


Angle 35°
Root face
Angle 35°

Forming Mill



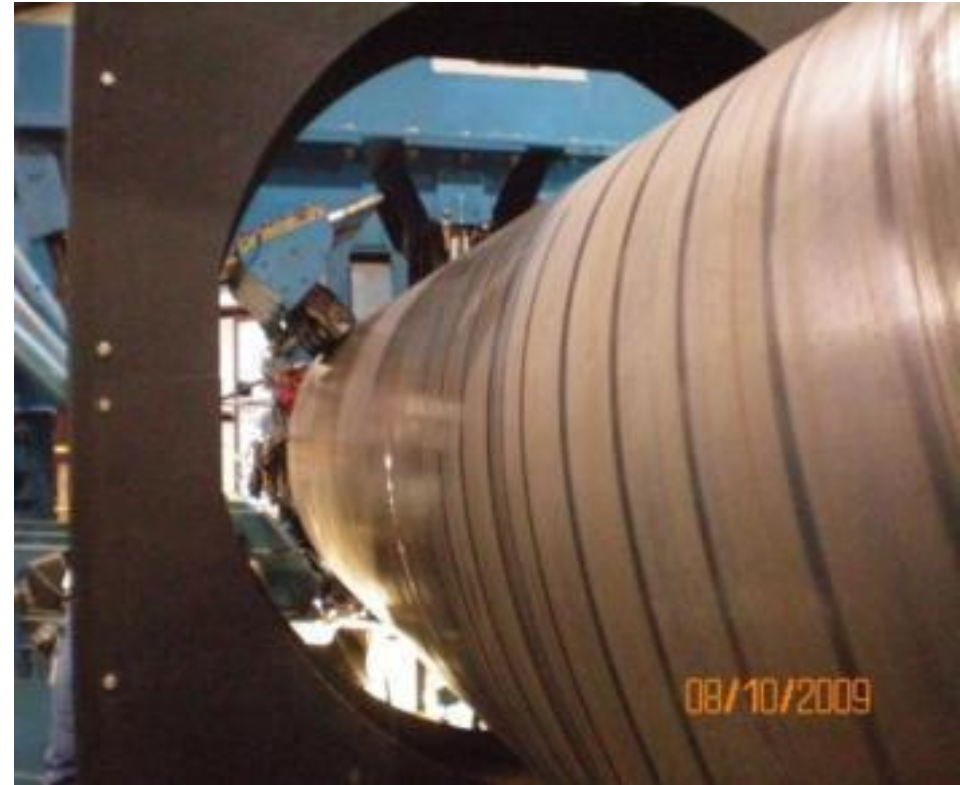
- Helix angle is changed based on coil width to produce pipe with the required diameter.
- First measurement of diameter is performed here.



Tack Welding



- A continuous tack weld is made during pipe forming.
- The tack weld is just to hold the pipe together until it is moved to the main welding stations.
- All welds performed per approved WPS.



Plasma Cutting



1 Million Tons of Pipe Sold

- Cut pipe to length, up to 24 m (80 ft).
- Unique pipe number is assigned to pipe.
- This pipe number is used to track the pipe at each of the manufacturing steps.



Tack Weld Inspection & Attaching Runoff Tabs



1 Million Tons of Pipe Sold

- The continuous tack weld is visually inspected and repaired as needed.
- To attach runoff tabs at the front end and the tail end of the pipe.
- Welding starts and stops on these runoff tabs which are later cut off and discarded. This improves weld quality by eliminating the flaw prone starts and stops from the ends of the pipe.



Inside & Outside Welding (Simultaneous)

(5 Welding Lines)



1 Million Tons of Pipe Sold

- Submerged arc welding (SAW) for ID & OD welding. Both welds are performed at the same time with the ID welding preceding the OD welding.
 - Sometimes called double submerged arc welded (DSAW) pipe since two SAW weld passes are used
 - Official pipe type name is SAWH (submerged arc welded – helical seam)
- Welding lines are digitally controlled with three axis laser tracking
- Flux is delivered at the specified temperature.
- Flux storage is environmentally controlled, delivered through heated lines.
- Welding parameters are monitored and must be within the ranges of the qualified WPS.



Visual Weld Inspection



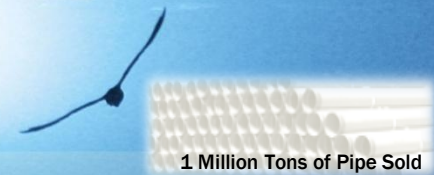
1 Million Tons of Pipe Sold

- All pipes are inspected from outside as well as inside for any visual defect.
- Focus is on the weld, but pipe body flaws are also addressed.
- Visual defects are attended by grinding.
- The repair shall be done in accordance with client specification, approved WPS and API 5L.



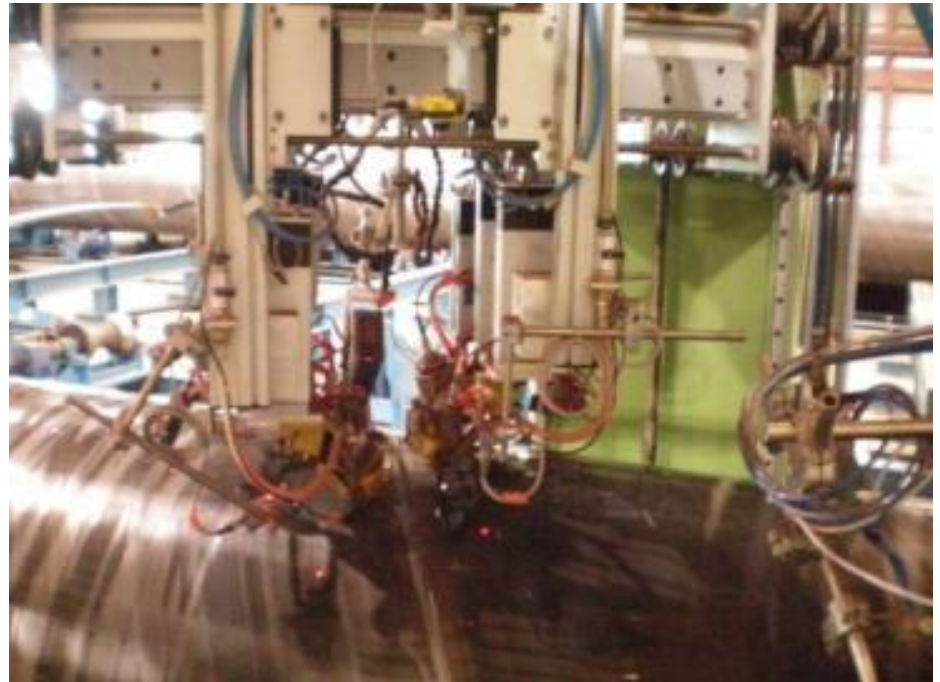
Intermediate Ultrasonic Testing

One Of A Kind Combination IUT & Radioscopic Inspection For Quality Control.



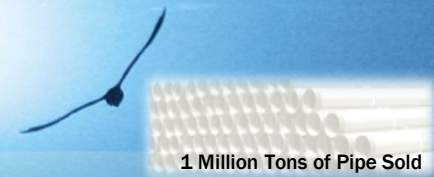
- UT scans of weld seam prior to hydrostatic testing.
- This is mill quality control inspection of the weld.
- RTR, which is in-line with IUT, can verify any indications found through UT scans.
- Provides rapid feedback about weld quality to the welders.

A mill control inspection is one that is not required by the product specification (API 5L) or the customer's specifications. The inspection allows for rapid feedback to the welding station of any weld quality issues. Not all mills perform mill control inspections and very few perform both UT and RT.

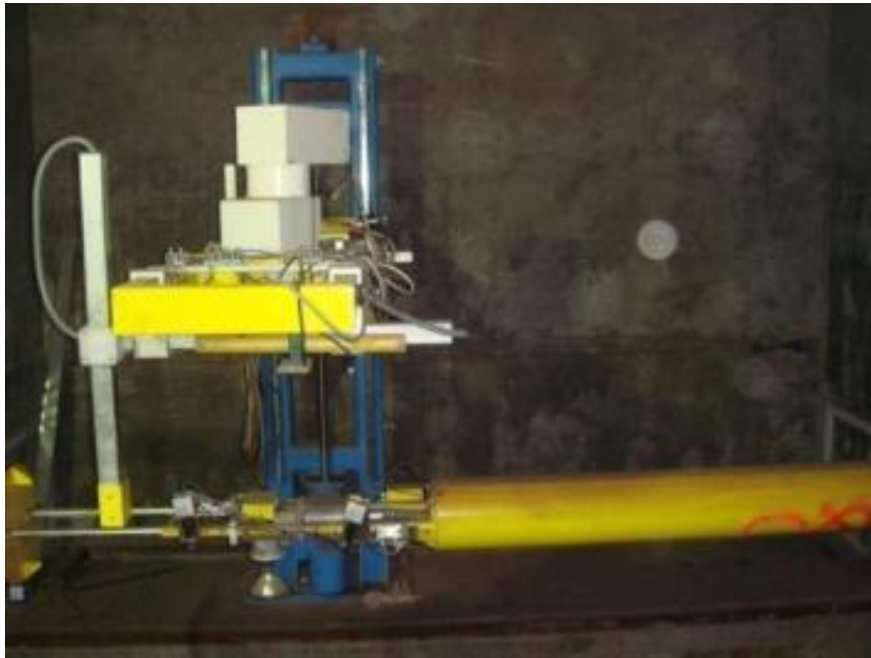


Intermediate Radioscopic Inspection

One of a kind combination IUT & Radioscopic inspection for Quality Control.



- X-Ray and UT will detect slightly different defect types so both can be used to examine flaws.



Mechanical End Sizer



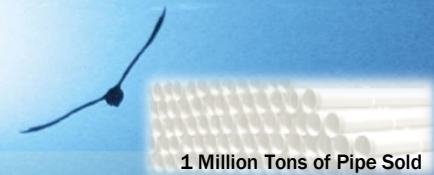
1 Million Tons of Pipe Sold

Mechanical end expander will provide a circular and consistent pipe end, thus easing pipe fit-up and welding in the field.

- Hydraulic pressure 4350 psi
- Approximately 0.2% expansion
- Approximately 10" of pipe end



Hydrostatic Tester



- Every pipe is tested through the hydrostatic tester
- Pressure charts are recorded for each pipe
- Pressure charts are traceable via unique pipe number
- We test each pipe at 100% SMYS including end load factor
- Hold time 10 seconds
- Pressure capacity 5075 psi
- Clamping force 3,000 tons
- Fill pump capacity 12,500 gal/min

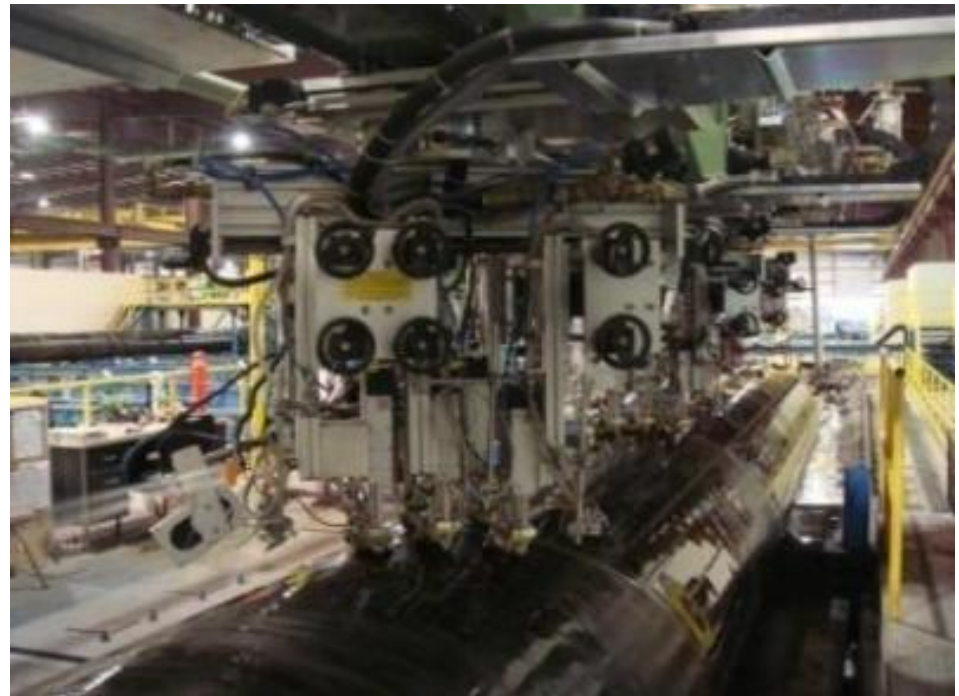


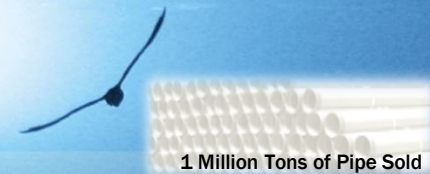
Final Ultrasonic Testing



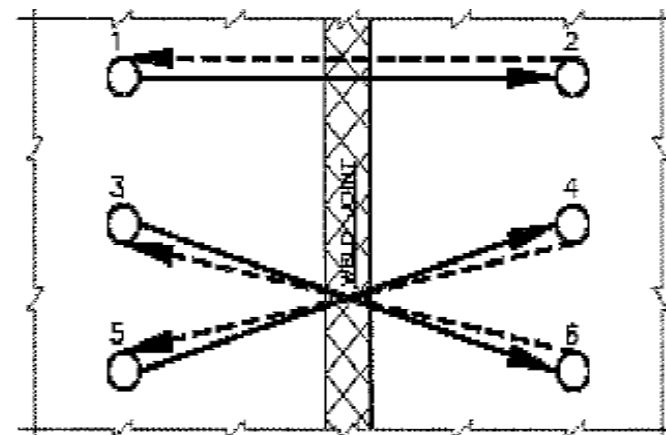
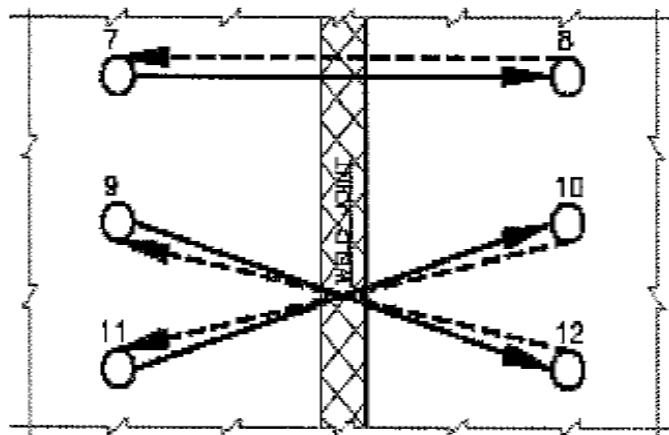
1 Million Tons of Pipe Sold

- Often called AUT (automatic ultrasonic testing)
- Total Probes/Channel: 18 Probes / 24 Channel
- Probe layout (see next slide): (I+X+I+X + HAZ + TANDEM + ON-BEAD)
- Laser tracking of weld seam
- For flaw detection and decoupling detection
- Audio and visual alarm and automatic paint spray marking of indication
- Follow industry standards for testing and technician qualification/certification





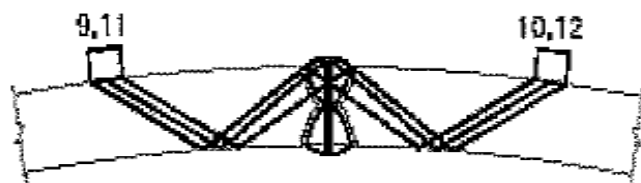
UT Scans for Different Defects



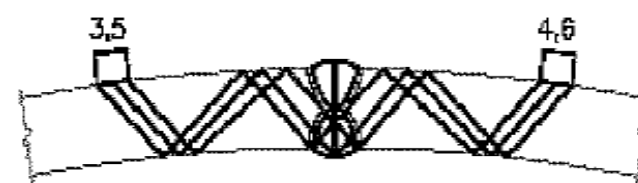
PROBE PAIR FOR OUTER ZONE
(LONGITUDINAL DEFECT)



PROBE PAIR FOR INNER ZONE
(LONGITUDINAL DEFECT)



PROBE PAIR FOR OUTER ZONE
(TRANSVERSE DEFECT)



PROBE PAIR FOR INNER ZONE
(TRANSVERSE DEFECT)



Manual Ultrasonic Testing

- Examines the weld at the very end of the pipe that cannot be inspected by AUT due to equipment limitations (lift off).
- Prove up of indication found by automatic final UT.
- Examines the complete circumference of the pipe ends over band of at least 1" width for lamination.
- Both OD and ID can be inspected by different equipment setups.
- Phased Array currently in process of certification.

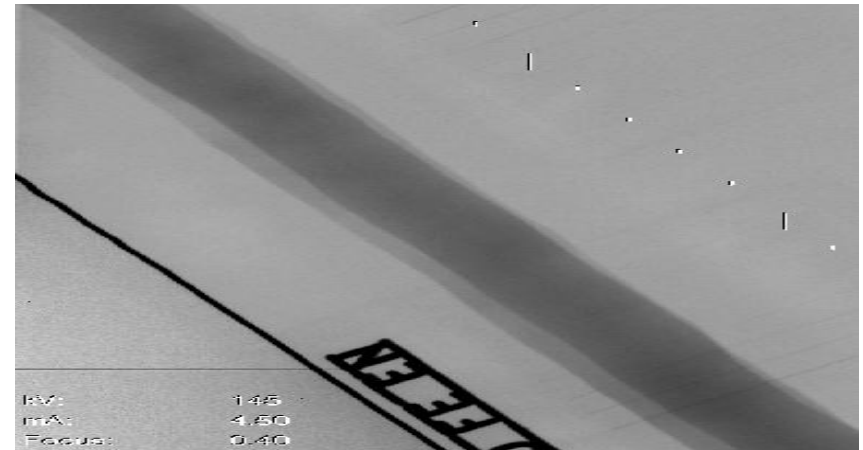


Digital X-Ray Pipe End Inspection



1 Million Tons of Pipe Sold

- X-ray inspection of pipe ends (8") for detection of flaws. Pipe ends containing defects are cut off.
- X-ray image shows lower left and distance markers in upper right.



Film Radiographic Pipe End Inspection



1 Million Tons of Pipe Sold

Film radiography for backup to Digital X-Ray inspection of pipe end
(Some pipe companies don't feel comfortable with digital x-ray inspection.)



Beveling & Pipe Weighing

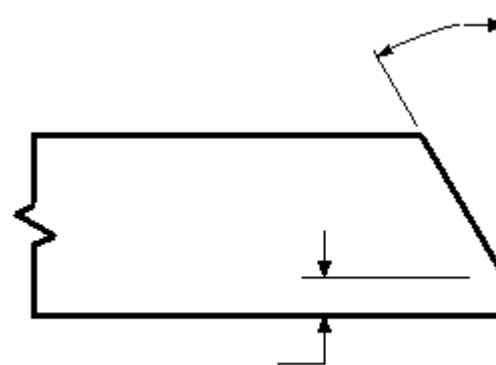
1 Million Tons of Pipe Sold

BEVELING:

- Pipe ends beveled for proper welding in the field (typically 30° bevel, 1/16" land)

PIPE WEIGHING:

- Pipe weighed with certified scale
- This is an inspection since the measured weight has to be within a few percent of the calculated weight.



Magnetic Particle Inspection



1 Million Tons of Pipe Sold

- Magnetic Particle Inspection (MPI) of each pipe end for lamination and cracks
- 3 turn multidirectional coil allows for detection of both laminations and cracks in single inspection
- Wet fluorescent or non-fluorescent powder application
- Automatic demagnetization facility



Final Inspection



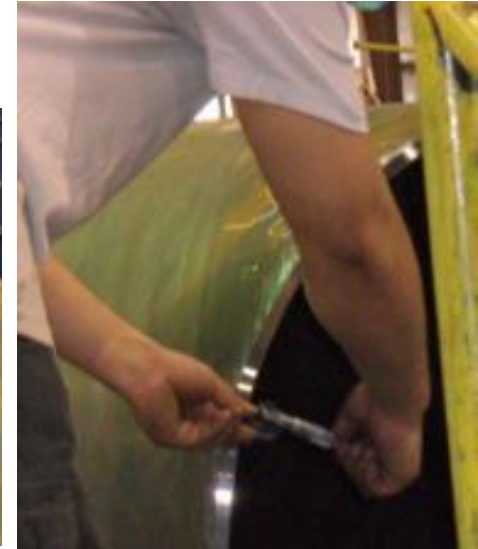
1 Million Tons of Pipe Sold

FINAL INSPECTION INCLUDES:

- Visual inspection
- Outside and inside inspection
- Outside Diameter
- Inside Diameter
- Thickness measurement at body and ends
- Ovality
- Squareness
- Bevel angle and root face
- Straightness
- Weld bead height at ID and OD
- Length

INSTRUMENTS USED:

- *All instruments used are calibrated and traceable to NIST
- Inside and outside pi tape
- Micrometer and ultrasound tester
- Thickness meter and dial gauge
- Root face gauge and bevel protractor
- Measuring tape





Spiral Pipe Mill Testing Laboratory

Laboratory Equipment



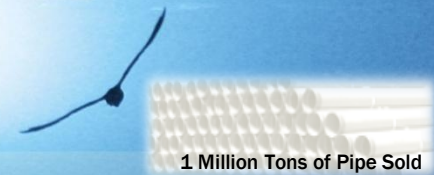
1 Million Tons of Pipe Sold



Universal Testing Machine
200,000 lb load capacity

- Tensile test measures:
 - Yield strength – strength at which it grows noticeably (0.5%).
 - Tensile strength – maximum strength before breaking.
 - Elongation – how much it stretches.
- For steel, the strength is not affected by temperature until you get over 400F, 800F, etc depending on the type of steel. Since pipeline don't usually operate at such high temperatures, tensile tests are performed at ambient temperature.

Laboratory Equipment



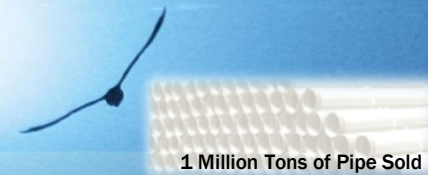
1 Million Tons of Pipe Sold



Charpy Impact Testing Machine
330 ft-lb capacity

- Charpy test measures fracture properties:
 - Impact energy (toughness) – how much energy it takes to break the specimen.
 - Fracture appearance – how much of the broken specimen is shear (ductile fracture) and how much is cleavage (brittle fracture).
- The impact energy (toughness) is a measure of fracture resistance. High toughness means the pipe can tolerate a larger flaw without failing. It also means that if a fracture occurs, it will stop in a shorter distance.
- Companies buying pipe have to specify the impact energy they need based on the pipeline operating characteristics.
- Fracture properties change with temperature for steel. Low temperature promotes brittle fracture which will have lower impact energy than ductile fracture.
- Companies buying pipe have to specify the test temperature for the Charpy testing based on the pipeline service conditions.

Laboratory Equipment



1 Million Tons of Pipe Sold



Drop Weight Impact Testing Machine
22,000 ft-lb capacity

- Drop Weight Tear Test (DWTT) measures fracture appearance using a full thickness specimen rather than a machined specimen like a Charpy specimen which has a maximum thickness of 10 mm (0.394"). For heavy wall thickness pipe, a DWTT may be better than a Charpy test at real world fracture behavior.
- Like a Charpy test, a DWTT measures how much of the broken specimen is shear (ductile fracture) and how much is cleavage (brittle fracture).
- Companies buying pipe have to specify the test temperature for the testing.

Laboratory Equipment

1 Million Tons of Pipe Sold

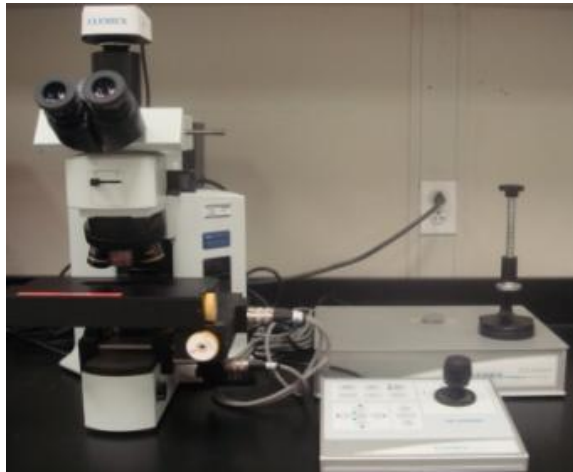


Sample Mounting & Automatic Polishing Machine



Weld cross section

- Weld profile
- Complete penetration
- ID & OD bead offset



Microscope & Image Analyzer

Laboratory Equipment

1 Million Tons of Pipe Sold



Stereo Scope



Digital Vickers Hardness Tester



Optical Emission Spectrometer

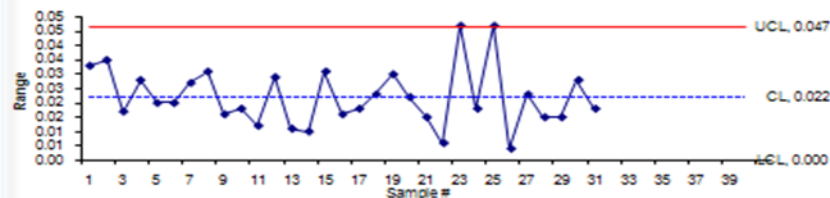
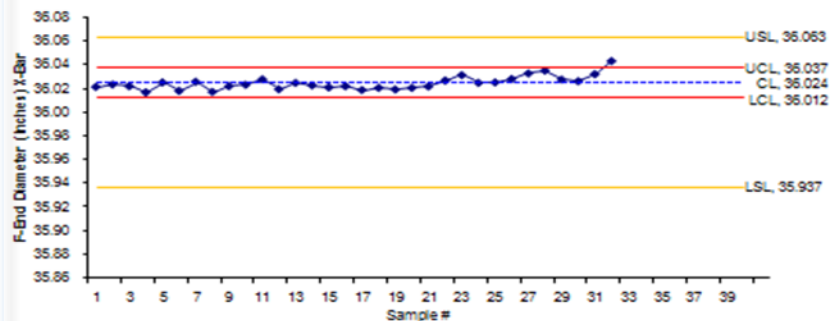
SPC – Statistical Process Control

1 Million Tons of Pipe Sold

Statistical Process Control Charts (Mean & Range)

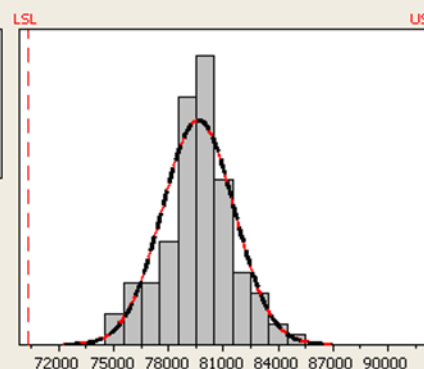
Project - TCPL - KXL
 Station - Final Inspection
 Date - Saturday, September 25, 2010
 Shift - All Shifts

Item Characteristic - F-End Diameter (Inches) X-Bar
 Sample Size, n - 5
 k - 3



Process Capability of YS (PSI) (using 95.0% confidence)

Process Data
 LSL 70300
 Target *
 USL 92100
 Sample Mean 79617.6
 Sample N 108
 StDev(Within) 1983.86
 StDev(Overall) 1979.23



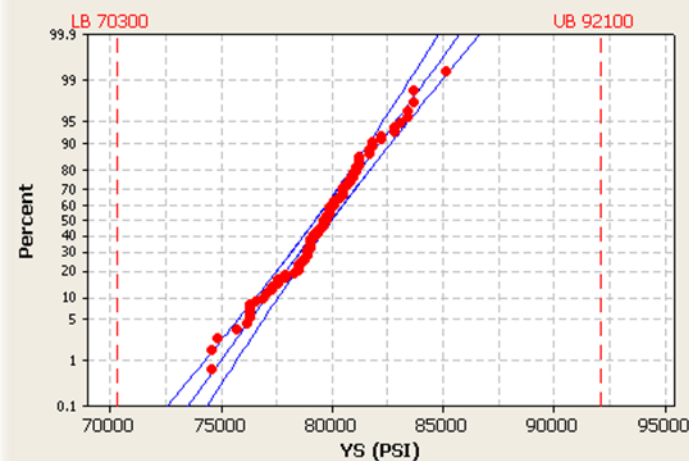
Observed Performance
 PPM < LSL 0.00
 PPM > USL 0.00
 PPM Total 0.00

Exp. Within Performance
 PPM < LSL 1.32
 PPM > USL 0.00
 PPM Total 1.32

Exp. Overall Performance
 PPM < LSL 1.25
 PPM > USL 0.00
 PPM Total 1.25

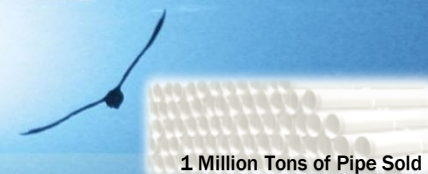
Potential (Within) Capability	
Cp	1.83
Lower CL	1.59
Upper CL	2.08
CPL	1.57
CPU	2.10
Cpk	1.57
Lower CL	1.35
Upper CL	1.78
Overall Capability	
Pp	1.84
Lower CL	1.59
Upper CL	2.08
PPL	1.57
PPLU	2.10
Ppk	1.57
Lower CL	1.35
Upper CL	1.79
Cpm	*
Lower CL	*

Probability Plot of YS (PSI) Normal - 95% CI

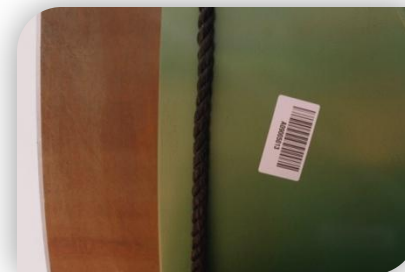
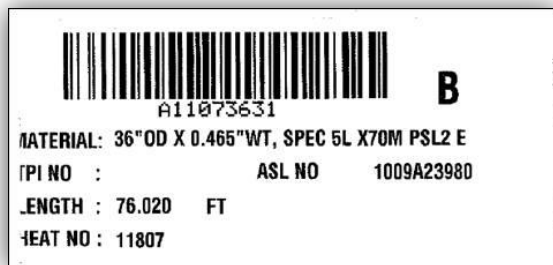


Mean 79618
 StDev 1979
 N 108
 AD 0.728
 P-Value 0.056

Traceability and Pipe Marking



- Bar code generated sequentially from SAP and is put on the pipe at forming and scanned at all stations to maintain complete traceability of the product.
- The test samples are also tracked by barcodes and all testing results get fed into SAP system.





Keystone XL: Welspun Project Details

- Produced Quantity: 703 miles / 3.71 million feet / 303,262 MT /
Approx. 48,470 joints
- Coated Quantity: 830 miles / 4.38 million feet
Approx. 59,900 joints
- Quantity Delivered: 453 miles / 2.39 million feet / 200,000 MT /
Approx. 30,523 joints

Keystone XL: Economic Impact

- INBOUND LOGISTICS:

- Stevedoring and Barging: \$ 4.06 Million
- Local Transportation: \$ 1.15 Million

- PRODUCTION:

- # of days to Produce: 456 days (1.5 Years)
- # of Employees: 600
- Payroll: \$38.00 Million
- Subcontractor: \$ 4.00 Million

Keystone XL: Economic Impact

- Consumables & Utilities:

•Welding:	\$ 5.03 Million
•Coating:	\$13.51 Million
•Stores & Spares:	\$13.10 Million
•Utilities:	\$ 3.00 Million

- OUTBOUND LOGISTICS:

•Rail Freight:	\$18.50 Million
•Off Loading:	\$ 7.78 Million

Keystone XL: Economic Impact - Conclusion

- This indicates we have infused \$108 Million in the economy and we are going to infuse \$28 Million after the project receives Presidential approval aggregating to a total of \$136 Million
- This project has generated 600-700 direct employment and two times more than equal amount of jobs through the supporting businesses.



Keystone XL: Economic Impact - Yet to Happen

- # of Pipes to be Shipped: 26,390
- # of Rail Cars-Approx: 2,500
- # of Days: 120

• OUTBOUND LOGISTICS:

•Additional Manpower (#80-100): \$ 1.00 Million

•Rail Freight: \$18.50 Million

•Off Loading: \$ 8.50 Million

Total \$28 Million

Keystone XL: Economic Impact

42,100 Jobs

Drive US GDP

\$ 5.8 to \$ 7.2 Billion By 2015

\$ 12.9 to \$ 19.3 Billion By 2020

\$ 26.6 to \$ 41.3 Billion By 2025



Thank You

WELSPUN



Dare to Commit