

Mechanical Pipe Joining System

November 14, 2020

OUR FORCELOK PIPELINE SOLUTION IS
MUCH FASTER AND LOWER COST THAN WELDING



The ForceLok COMPARISON CHALLENGE



ForceLok is **MUCH FASTER** and **LOWER COST** than **WELDING**

Check the below Comparison Challenge. Analysis details available upon request.

SUMMARY Comparison WELDING vs FORCELOK		<u>WELDING</u>	<u>FORCELOK</u>
Revenue		133,333,000	133,333,000
Total Cost		(106,666,400)	(44,344,812)
Profit per Pipeline PROJECT		26,666,600	88,988,188
Profit Percent % per Pipeline Project		20.0%	66.7%
FORCELOK IS MORE PROFITABLE per PROJECT than WELDING by		234%	
Profit per Pipeline Project per DAY		16,000	533,929
FORCELOK IS MORE PROFITABLE per DAY than WELDING by		3237%	
Construction DAYS per Project		1667	167
FORCELOK CONSTRUCTION DAYS IS FASTER per PROJECT by		1000%	

Introduction



The ForceLok Mechanical Pipe Joining System

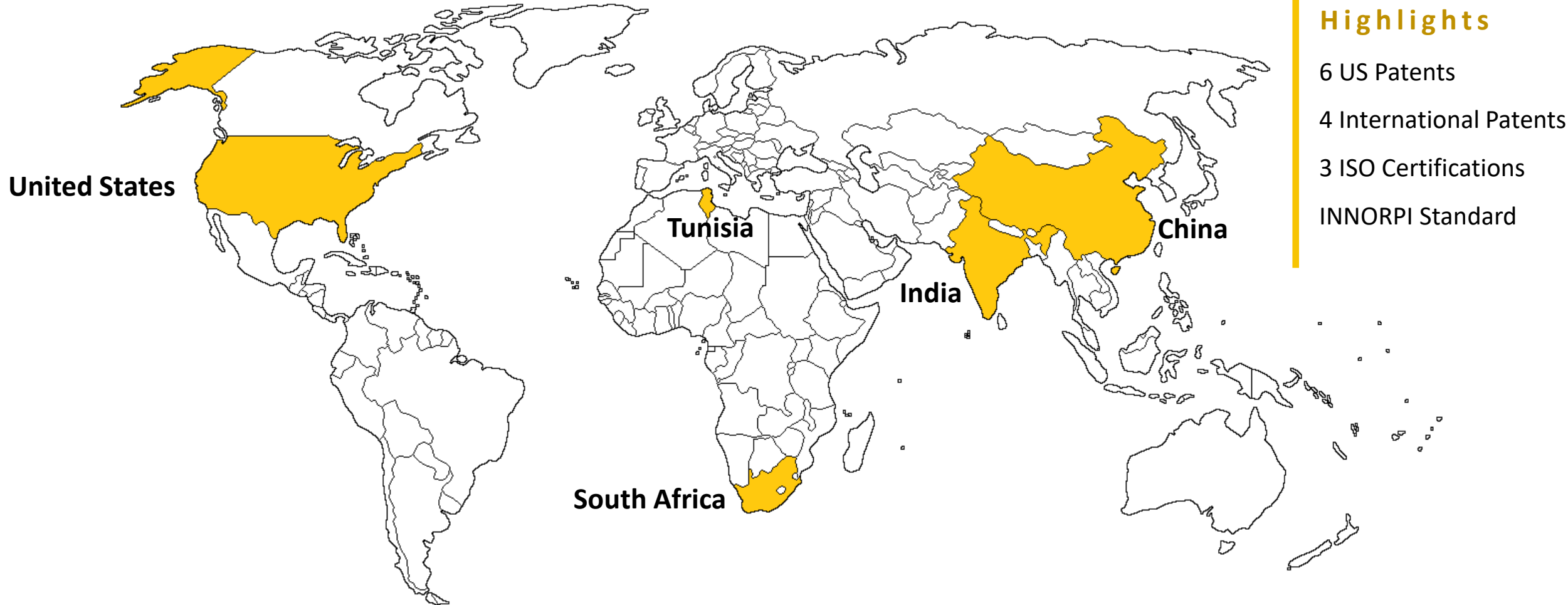
is the first mechanical connection system for line pipe of its kind designed to be reliably measurable, repeatable and fully documented. The joints of the mechanical connection system are formed without welding, threaded pipe ends or separate coupling devices.

The SIX US Issued Patents and FOUR Foreign Patents Issued in Tunisia, South Africa, India and China; and the THREE ISOs based on the ForceLok Computerized Monitoring System was designed to ensure Quality Control in the manufacturing of the End Preparations in the mechanical pipe joining system and also provides monitoring and documentation in the field during the joint Assembly Process of the ForceLok Mechanical Pipe Connection System.

Global Footprint



U.S. and International Patents and ISO Certifications



Highlights

6 US Patents

4 International Patents

3 ISO Certifications

INNORPI Standard

First Industry Revolution



Predecessor to the ForceLok Technology

In 1980, the Vincent brothers developed the first programable, computerized, torque monitoring system to visually show, record and control the “Torque-Turn” make up of threaded, down-hole OCTG pipe. When the Vincent’s demonstrated the system to Mr. Michael O’Rielly, VP of Exxon Production Research, he stated: “Vincent, you have revolutionized the industry.” Vincent’s patented the equipment and process in US Patent No. 4738145, issued June 11, 1982 for Torque Monitoring and later in re-Issue 34063, issued April 17, 1990 for Torque Monitoring of “Premium Connections”; which included a process for monitoring metal to metal sealed OCTG premium connections. It is still the standard by which Premium Connection OCTGs are made-up.

A Record of Innovations



Founders' Earlier Patents

	Patent Product Name	USA Patent Number	Date Filed	Date Published
1	Torque Monitoring	4738145	1982 Jun 1	1988 Apr 19
2	Torque Monitoring of "Premium Connections"	Re-Issue 34063	1990 Apr 17	1992 Sep 15
3	FlexLube Original	4813714	1988 Mar 21	1989 Mar 21
4	FlexLube Compressible	5431831	1993 Sep 27	1995 Jul 11
5	IC 20-20 Rig Ready & Long Haul	5266104	1992 Oct 20	1993 Nov 30
6	IC 20-20 Thread Corrosion Protection	5271141	1992 Jan 10	1993 Dec 21
7	Clear Cap Thread Inspection and Protection System	5303743	1992 Jan 10	1994 Apr 19

ForceLok, the Second Industry Revolution



The First China Patent

In early 2000, Vincent became interested in pipeline connections and researched how to develop and patent a better Mechanical Pipe Joint Connection for line pipe. This resulted in his first Mechanical Pipe Joining patent, which was patented in 2012 in China as Patent No ZL 2012 2 0325612.4, issued 2013 Jan 02, titled “Double Taper Mechanical Pipe Connection”.

Followed by the US Patents and Foreign Patents

Later, the US Patent Application No. 14/880,618 assigned on November 2015; which was divided into SIX US Issued Patents and FOUR PCT Foreign Patents.

Click on a patent to view the complete USPTO patent text and figures.

[10,120,348](#)

[10,732,580](#)

ZA2017/02365

TN 2017700140

[10,684,593](#)

[10,732,581](#)

CN 107002468

IN 201717016336

[10,732,579](#)

[10,795,325](#)

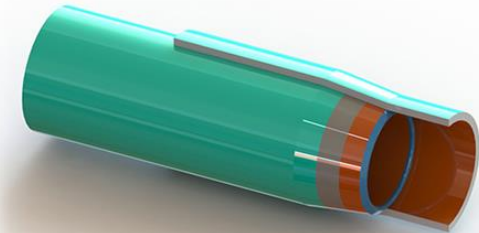
Forcelok Pipeline Connection System



The Technology

ForceLok has developed a revolutionary pipe joining system for the pipeline industry.

- The Patented ForceLok Computerized Mechanical Pipe Joining System is a non-welded, connection that is compatible with corrosion resistant internally or externally coated pipe.
- All ForceLok connection systems were designed for numerous pipeline applications including pipelines transporting oil, gas, water, steam, corrosive liquids, CO₂, and Hydrogen; and are available for pipeline applications in sizes ranging from 4 inch to 24 inch.
- The Forcelok Computer Monitoring System monitors end-pret and field assembly operations in real time and gathers important data for pipeline operators.



INNORPI Standard and ISO Certifications



Mechanical Joining Technology Approved as Standard by Tunisian Standardization Agency

August 2016, SINO-TEX International LLC (STI) aka Darrell Layne Vincent (DLV) formed a Tunisia Joint Venture with Tunisian citizen, Mohamed Hachana; named SINO-TEX AFRICA (STA) to promote and develop the market for ForceLok products.

Immediately STA contacted INNORPI (**Institut National de la Normalisation et de la Propriete Industrielle**) to present the US Patents of Vincent and discuss obtaining a NORM/Standard for STA. The efforts of STA were successful and International (INNORPI) published in March 2020 “[Enquete Publique n 409.25](#)” which established the NORM/Standard for Mechanical Pipeline connection for use in transporting hydrocarbon fluids and gases. This NORM is based on and includes three figures taken from the US Patents of Vincent.

The INNORPI NORM is consistent with three ISO’s which were also published with the NORM and are the pipeline construction standards for all countries, world -wide. The [ISO 13623:2017](#), [ISO 15156-1](#) and [ISO 15156-2](#) are standards for the construction of pipeline to transport hydrocarbon fluids and gases including and those that contain corrosive H₂S.

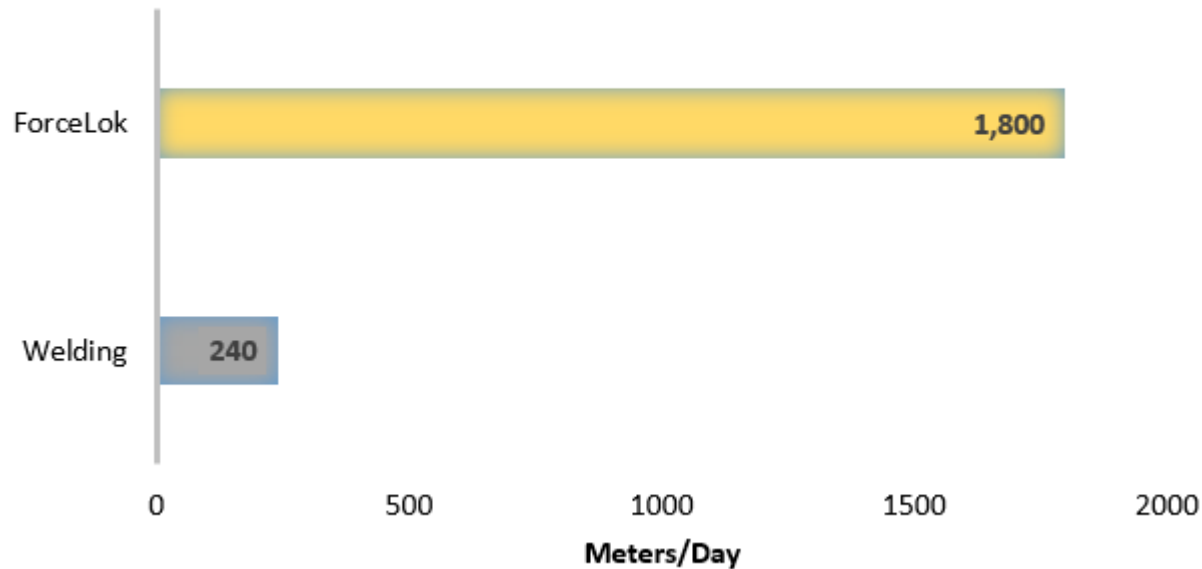
Click on the [underlined](#) link to view the documents mentioned.

Much Faster than Welding



Pipeline Production Rate Comparison between ForceLok and Welding

10-HOUR PRODUCTION



ForceLok Field Assembly unit produces approximately 10 to 15 joints/hour, or up to 1,800 meters per day

**7.5x
Faster**

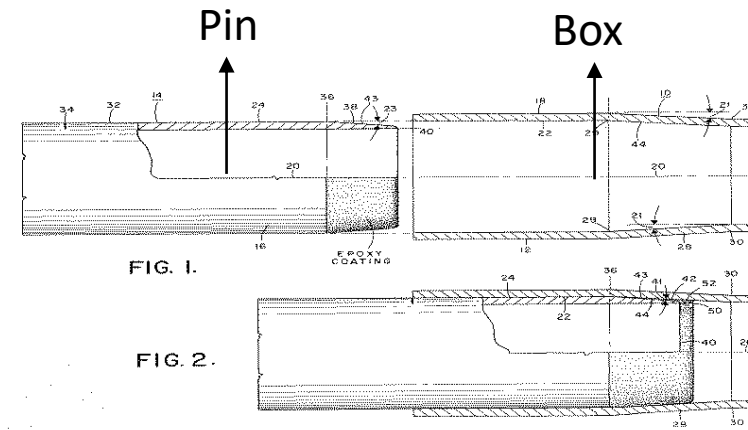
*Welding production rate provided by an experienced Pipeline Construction company.

Advanced Joining Technology



Advantages:

- The ForceLok Mechanical Pipe Joining System Connection is a **patented technology** for mechanically joining metal pipes so as to have uniform pipe interior dimension (ID).
- It consists of forming a "bell" at one end of the pipe, so called "Box", and double tapering the other end of the pipe, called "Pin". The technology then mechanically yielding two similar pipes together to form a connection
- The ForceLok connection has no "lip". Therefore maintains uniform ID, allows "pig" equipment to travel in all directions. This results in no flow disruption, thus increases the flow rate of fluid.
- It does not damage internal coating of pipe, therefore eliminating the need to re-coat pipes.



Advantage over other Systems



- Faster pipeline construction
- Reduces construction cost and investment
- Production revenue starts earlier
- Environmentally friendly
- Compatible with existing pipeline equipment & crew
- No damage to internal coating of the line pipe
- No reduction of the internal diameter of the line pipe
- Forcelok computerized system monitors and records in digital format all data during end forming and field assembly to ensure highest quality assurance.

ForceLok End Preparation Equipment

- **ForceLok End Preparation Equipment** can be used in the pipe mill, pipe coating plant, pipe yard or at the pipe construction staging area.
- Each ForceLok System consists of two pieces of End Prep equipment, each with an electric hydraulic power unit. One to make the Pin End and one to make the Bell End.
 - One End Prep unit processes the Pin End with ForceLok Tooling that Swages the end down. The second End Prep unit with ForceLok Tooling processes the Bell End.
- Each End Prep unit has interchangeable tooling for up to three OD sizes of Line Pipe.
 - Tooling packages are available in sizes ranging from 4" to 18". (Example: 4", 6" and 8" nominal line pipe sizes).
- Each End Prep unit is equipped with **ForceLok Computer Monitoring System** to monitor, measure and record the total process of the End Prep unit.

ForceLok Field Assembly Equipment

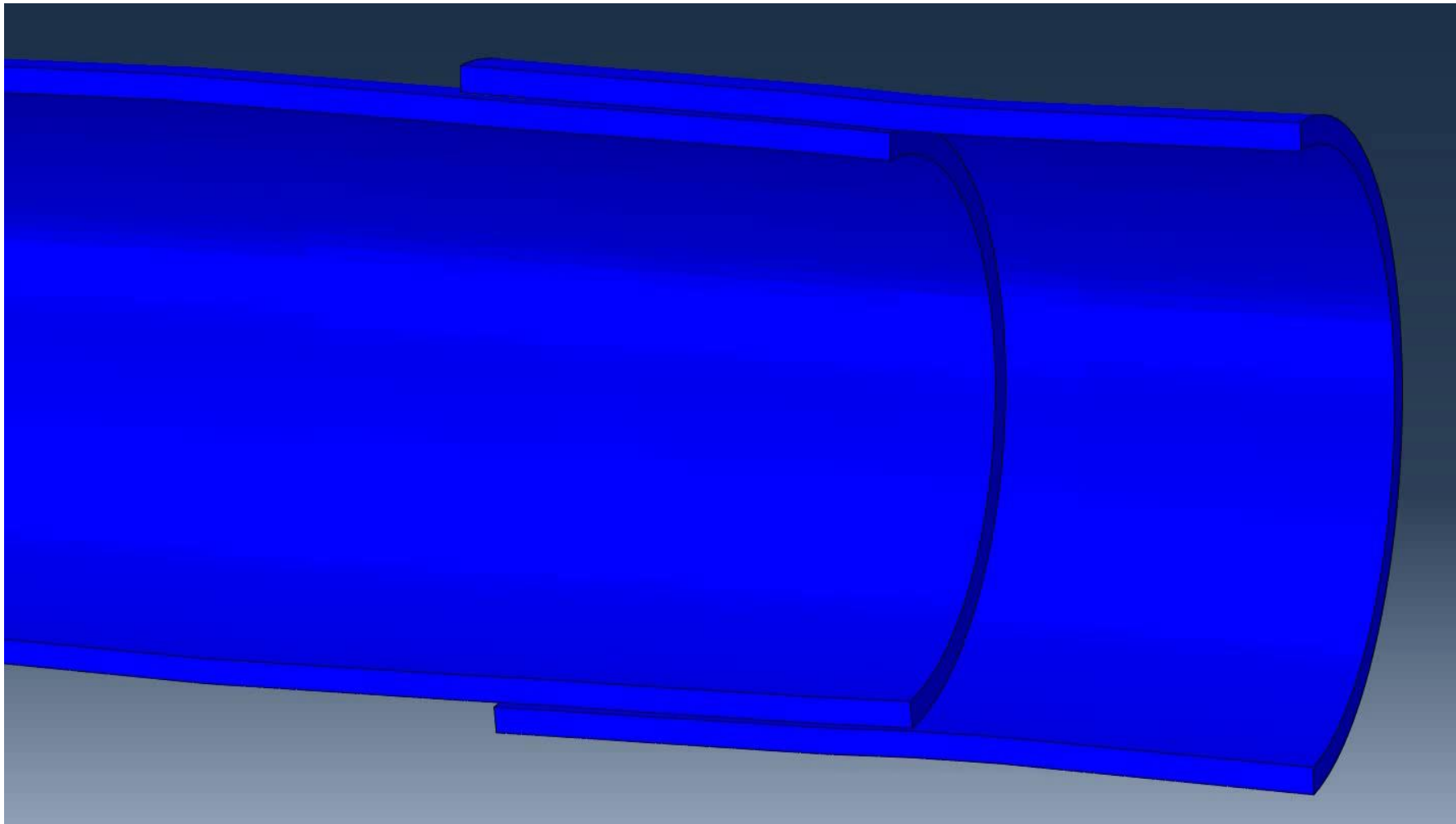
The **ForceLok Field Assembly Unit** consists of:

- A diesel, hydraulic powered unit that can be placed on a trailer pulled behind the side-boom tractor.
- A self contained **ForceLok Field Assembly Unit** hanging from the Side-boom tractor, that creates a mechanical connection Force-Fit by applying a measured rate of force between the pin and bell ends of the connection.
- A **ForceLok Computer Monitoring System** attached to the **ForceLok Field Assembly Unit**.
- The **ForceLok Computer Monitoring Technology**, allows field engineers and technicians to measure, graph and document the amount of travel in the Force-Fit connection makeup and the amount of force applied to each connection, ensuring the highest compliance and quality control standards available.

Finite Element Analysis



Please play video



End Forming in Action



Play Video: Box Forming



Play Video: Pin Forming

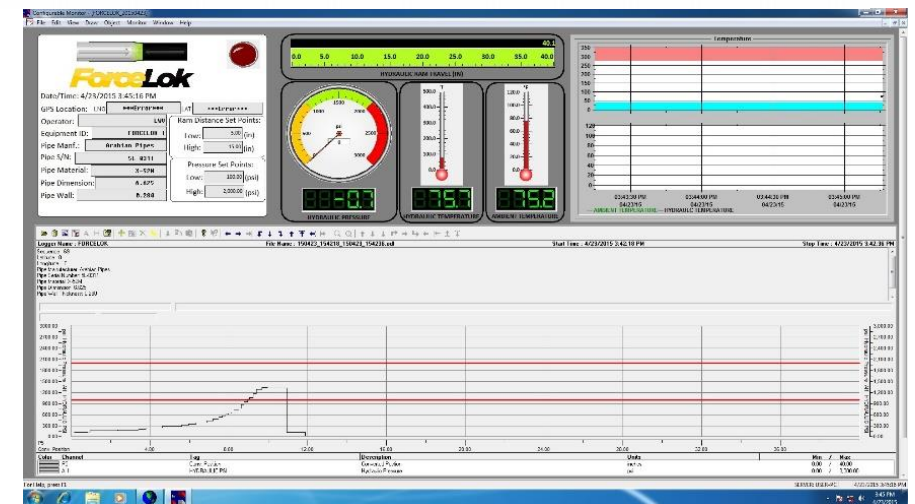
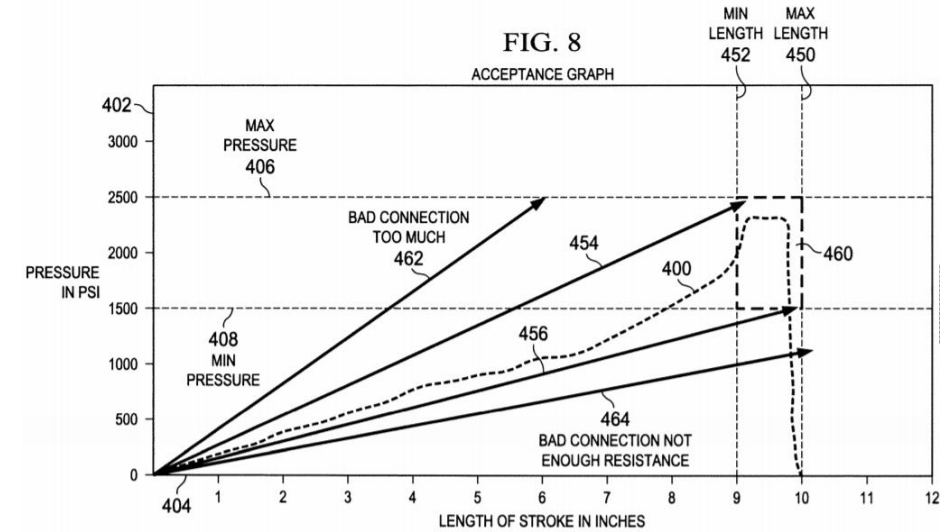


ForceLok Computer Monitoring System



Quality Assurance for all Operations in Real Time

- The [Patented](#) ForceLok Computer Monitoring System was designed to ensure quality control in the manufacturing of the end preparations, in the pipe mill, in the pipe yard or at the construction location.
- This system is easily portable to set-up for operation to provide a monitoring in the field during the joint assembly process.
- Every end formation and every field assembly connection is monitored and recorded to ensure that each event meets the required parameters and visually displayed at the time of the event.
- Cloud-based system enables operators to monitor end processing at the factory and pipeline assembly in the field remotely, in real time.

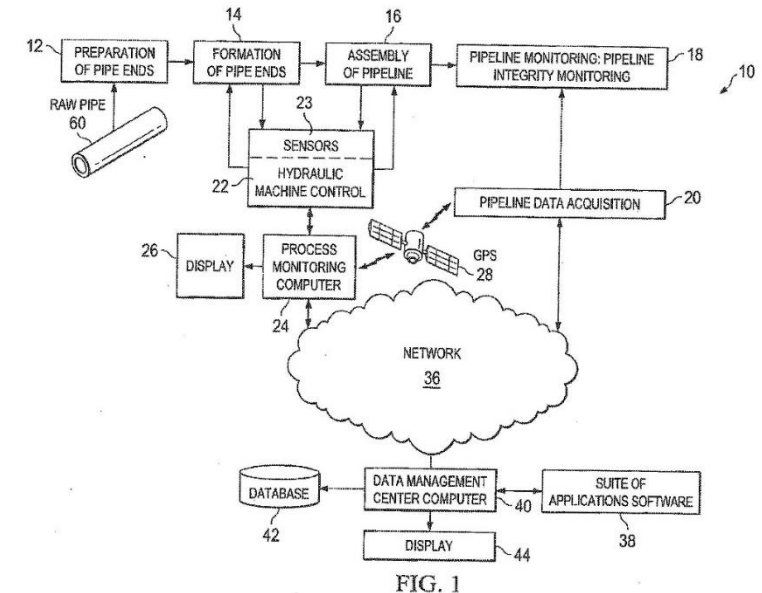


ForceLok Computer Monitoring System



Cloud-Based Pipeline Management and Powerful Data Analytics

- SIT IN YOUR OFFICE and MONITOR the PROGRESS and the OPERATION of YOUR PIPELINE in REAL TIME.
- Utilizing this advanced and patented system, all the data during end formation and field assembly is collected and stored.
- Information is sent to a “cloud” for saving as historical data on every connection, which enables easy research and analytics to further enhance the performance of your operations.
- Detailed job tracking capability of this system provides managers the abilities to easily track progresses and ensure everything is running smoothly.
- The Computerized ForceLok Data Management System, operating 24/7 can identify anomalies in fully constructed and an operating pipeline. The location of said anomalies are given so that repair crews can be sent to the exact location to determine what action to be taken to correct the situation and minimize further damage to the pipeline, the surrounding area and pollution of the environment



ForceLok Equipment Systems



Each ForceLok Equipment System, consist of three OD pipeline Sizes and the Monitoring System

The equipment system sizes are:

FL-234 for OD sizes 2", 3" and 4"

FL-468 for OD sizes 4", 6" and 8"

FL-81012 for OD sizes 8", 10" and 12"

FL-121618 for OD sizes 12", (14"or 16") and 18"



Connection Tested by Stress Engineering





**STRESS
ENGINEERING
SERVICES INC.**

13602 Westland East Blvd.
Houston, Texas 77041-1205
Phone: 281-469-2177
Texas Registered Engineering Firm F-195

Certificate of Test

Client: ForceLok Manufactured Products, LLC
18906 East Industrial Pkwy
New Caney, Texas 77357

Date: 7 July 2016

SES Document No.: 1601707-TS-CT-01 (Rev 2)

Project Manager: Kurt D Vandervort, PhD, PE

Client Contact: Jeff Dickey

Date of Testing: 4 May 2016

PO Number:

Project/Test Description: ForceLok Manufactured Products, LLC contracted SES to perform a series of tests to establish a baseline knowledge of the connections pressure capacity.

Test Sample Identification: Green Coated Sample and Gray Uncoated Sample
6 5/8" x 0.280 Wall X52 Calculated MAOP 3165 psi. (SMYS * (2*t))/OD)*.72
Tested at 1.25 x MAOP

Test Equipment: Pressure Transducers
1 Million Pound Load Frame

Procedure: See Attached. Each Sample was hydrotested to 3950 psi for one hour with both compensation for the pressure end load and without compensation for the end load. The gray sample was pressurized to failure without compensation for the end load and the green sample was pressurized to failure with compensation for the end load. Compensation for the end load was actively controlled during pressurization.

Results: Each sample successfully completed a hydrotest to 3950 for 1 hour both with and without compensation for the pressure end load.
The gray sample failed by slipping apart at the connection at 6,325 psi.
The green sample failed by leaking through the connection at 6,597 psi.

Prepared by: 
Kurt D Vandervort, PhD, PE
Principal

Reviewed by: 
Steven E Kinyon, PhD
Staff Consultant

This certificate and report referenced herein, if any, are intended for the exclusive use of ForceLok Manufactured Products, LLC. In performing this test, SES has relied on information provided by the Client and may not have independently verified such information. The results and any data provided by SES in any format ("Data") apply only to the sample(s) tested and shall not be considered indicative of the qualities of apparently identical or similar samples. The Data summarize results and contain findings only, and SES offers no recommendations, opinions, or conclusions. This certificate does not indicate successful or unsuccessful completion of a test or qualification program. SES disclaims all warranties, express or implied, and liability for the performance of the tested sample(s) and use of any Data.

Certificate of Test – Attachments

7 July 2016

	PN 1601707 ForceLok	Testing Plan	4 May 2016
			Reaction End Load
Green Sample	Pressure		
Test 1	pressurize to 3950 psi	no	hold 60 minutes
Test 2	pressurize to 3950 psi	yes	hold 60 minutes
Test 3	pressurize to failure	yes	
Unpainted Sample			
Test 1	pressurize to 3950 psi	yes	hold 60 minutes
Test 2	pressurize to 3950 psi	no	hold 60 minutes
Test 3	pressurize to failure	no	
Pressure area	28.890 sq in		

Graphs of the Tests at Different PSI

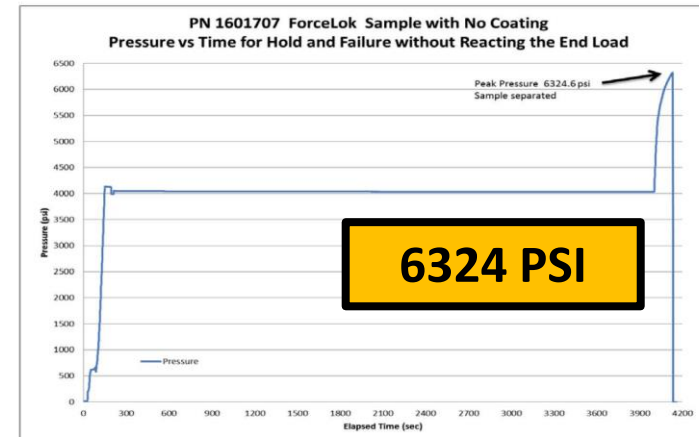
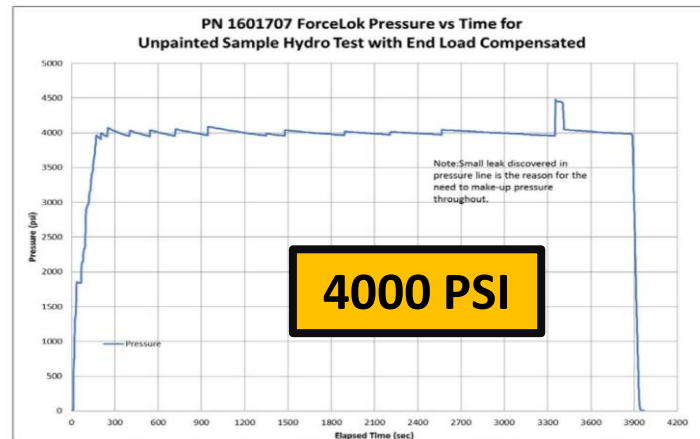
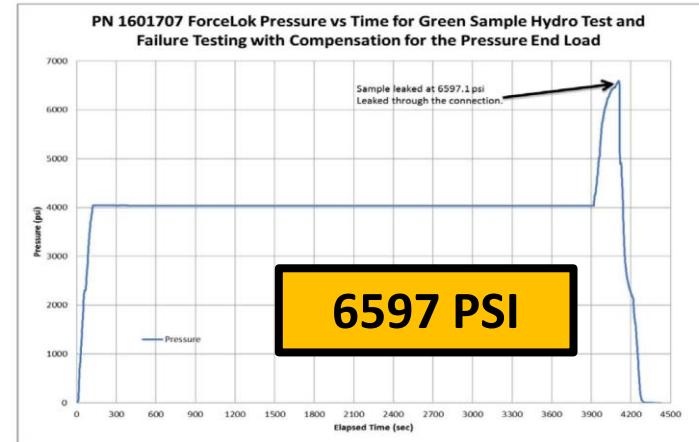
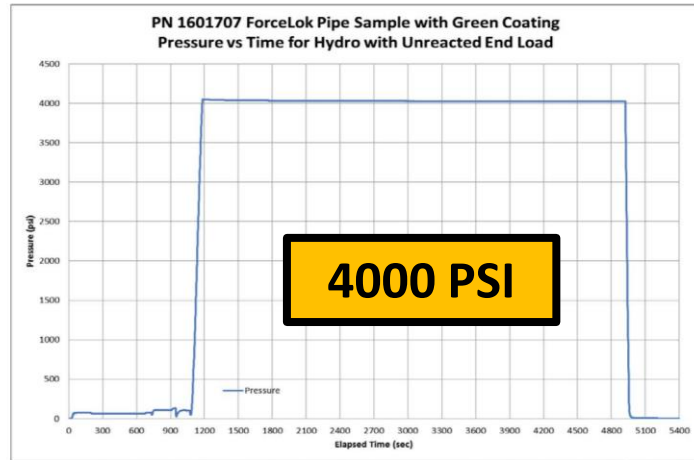


Certificate of Test – Attachments

4 May 2016

Certificate of Test – Attachments

4 May 2016



Summary of Test Results



**PASSED 200% OF MOP
MAXIMUM OPERATING PRESSURE
REQUIRMENTS**

PASSED 3,165 PSI, MOP Requirements

**PASSED 3,959 PSI, MOAP (1.25% of MOP) 1
HOUR**

MAX 6,325 PSI, With out end load

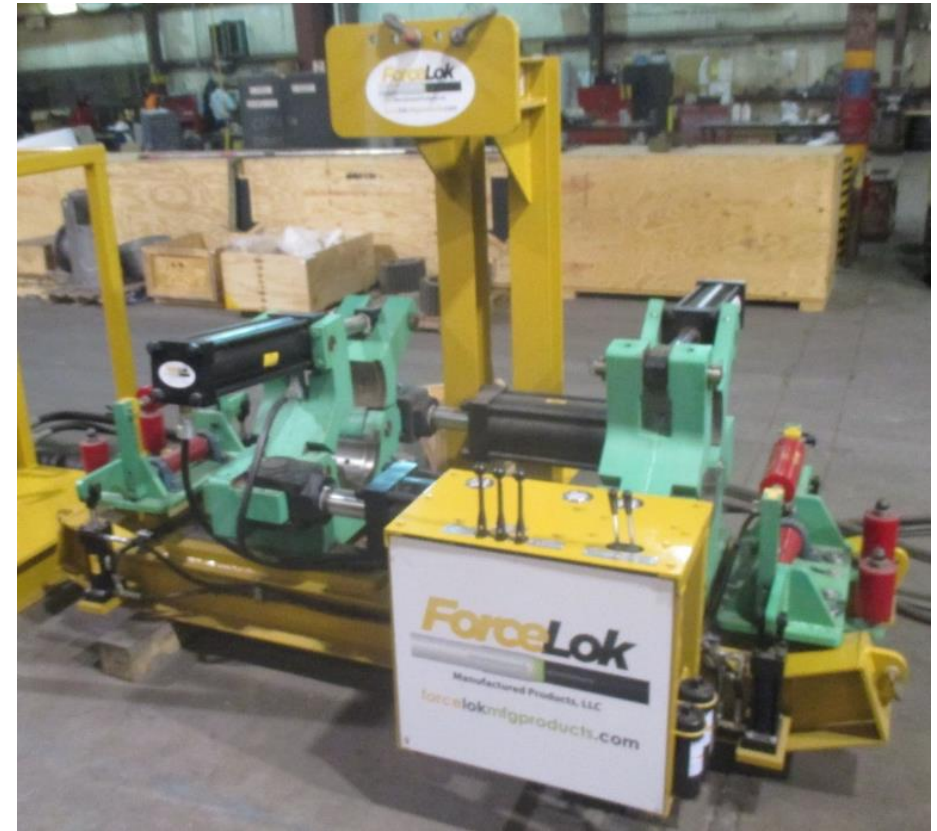
MAX 6,597 PSI With end load

ForceLok for Internal Coated Pipelines



ForceLok Protects the Internal Coating of Pipelines

- Because the system is a non-welded connection, it is compatible with internally plastic, coated pipe because it provides a continuous coating
- The ForceLok System utilizes an engineered, ForceLok Flexible Epoxy to lock and seal the bell and taper connection.
- Combined with the ForceLok Computer Monitoring System, the ForceLok Mechanical Pipe Joining System is the first of its kind application that provides a complete end-to-end system of monitoring and documentation to ensure the highest manufacturing and construction quality control standards from the steel mill or coating plant to the field.



ForceLok for Different Types of Pipe



Applicability:

Can be applied on API or equivalent pipe:

- Seamless pipe and ERW pipe
- Pipe with internal coating and external coating.
- Can be used on pipe sizes from 2” up to 18” with standard equipment.
- Cleaning and Testing “pigs” can be run both ways, because there is no internal lip.
- The internal diameter is not reduced at the connection.
- Custom configurations available for pipe sizes 20” through 24”.

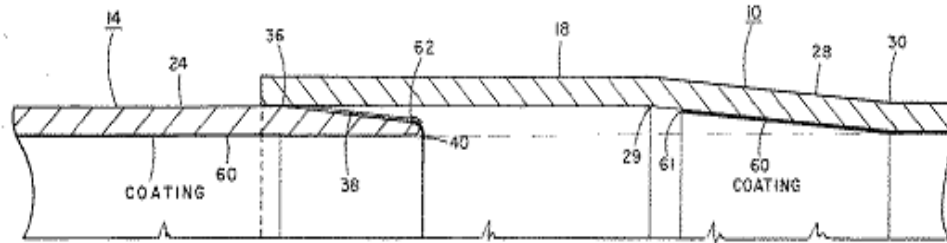


FIG. 3.

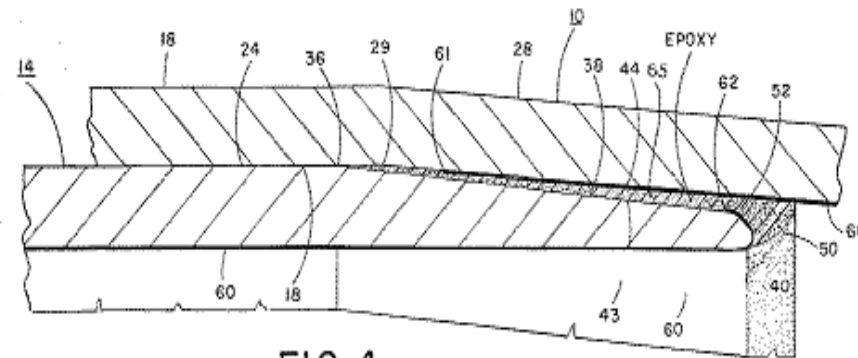


FIG. 4.

The ForceLok Advantage



ForceLok is MUCH FASTER and LOWER COST

- The ForceLok Mechanical Pipe Joining System is FASTER and LOWER COST than welding which means:
- Your company:
 - Will win more contracts – because of your ForceLok Cost Advantage;
 - Can do more jobs per year – because of your ForceLok Faster Construction Advantage;
 - Will increase your revenue per year; and
 - **Increase your profit per year,**
 - **WITHOUT increasing you personal and fixed overhead cost.**
- Plus the ForceLok Computer Monitoring System attached to the ForceLok End Preparation Units and attached to the Field Assembly Unit, allows engineers and technicians to measure, graph and document the amount of travel in the Force-Fit connection makeup and the amount of force applied to each connection, **ensuring the highest compliance and quality control standards available.**

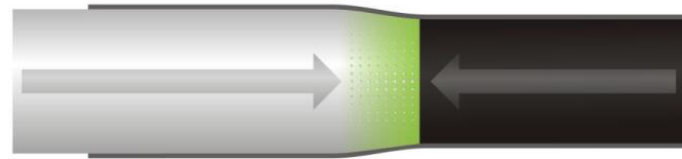
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ForceLok by SINO-TEX International LLC



Thank you for your Time and Consideration of



ForceLok

Contact us for a Quotation
or for Further Information:
mail@sino-texinternational.com

