



TTI patent pipeline repair and remediation services produce savings for operators.



## Business Profile

**TUBELINING TECHNOLOGY, INC.** (TTI) is a pipeline repair and service company that utilizes patented and proprietary technology to significantly reduce repair (replacement) costs and improve pipeline operations. The field-proven technology:

- Lowers up front capital requirements by up to 90% (based on replacement pipe)
- Improves energy utilization and pipeline throughput by up to 20%
- Provides a corrosion resistant protection barrier
- Accelerates project schedules and ROI by minimizing environmental and safety hazards

TTI has successfully completed over three (3) dozen jobs that ranged from two (2) to twenty (22) miles in length on pipe size ranging from three (3") inch to fourteen (14") in diameter for operators such as El Paso, Ashland, and others. TTI's patented process provides operators with a low-cost and revenue enhancing alternative to pipeline replacement. TTI utilizes an in-situ process to deliver a harden, corrosion resistant **thick-film coating** on the inside of existing buried pipe that allows significant increases in operating pressure and therefore increased throughput. The process has been field demonstrated and proven to add significant strength to heavily corroded/pitted pipelines at capital costs significantly under new construction costs.

## Market

The market for TTI services is huge. The September 2003 report from the National Petroleum Council (NEC) states that there is a major need for revamping the nation's pipeline infrastructure. The study states that just to sustain the existing system using current technology will exceed \$70 BILLION over the next 2 decades. Current methods for addressing this market need are expensive and subject to extensive environmental impact and permitting delays. Despite the need for wide-spread infrastructure repair / replacement, in many instances traditional methods will not be practical due to suburban / urban sprawl and increased sensitivity to environmental resources. TTI's technology presents an extremely attractive option to pipeline replacement with; a) significantly lower capital costs b) enhanced operational performance delivering increased throughput due to lower friction factors on the inside pipewall, and c) environmental friendly in situ process versus open trenching.

**Traditional pipe replacement burdens operators with;**

Long delays for permits



High costs



Environmental issues



## TTI Technology

TTI technology is best suited for application to long-length pipelines (in excess of 10 - 15 miles in one section), for existing and new installations. The environmentally friendly process utilizes patented and proprietary chemical and mechanical cleaning with custom designed pigs to surface prepare the pipe interior to a NACE 1 (white metal) finish that is proven with in-line video inspection. The appropriate coating material is applied in multiple layers that are air-dried between coats and force cured with hot air to create a cross-linked and cured, high-strength uniform lining. Hydrotesting of pipelines after lining application has proven the capability to increase operating pressure from 200 psi to 1500 psi at a fraction of the cost of replacement. Added benefits include a long-term corrosion barrier and up to 20% increase in flow efficiency over bare steel. The system has over 10+ years of successful field service performance in high H2S and saltwater applications

## Competition

To date, wide-spread commercialization of the TTI process has been inhibited due to industry utilization of stop-gap repair tactics. Pipeline owner / operators have commonly addressed infrastructure deterioration issues with an “after the fact” approach of clamping around leaks. After experiencing several leaks, the operator will then typically reduce operating pressure (and correspondingly suffer reduced throughput) in an attempt to delay as long as possible extremely costly and lengthy process of pipe replacement. Regulators have previously accepted the stop-gap approach of clamping as the only practical alternative to replacement.

Recent regulatory requirements will help drive adoption of TTI services. The U.S. Department of Transportation – Office of Pipeline Safety (OPS) has enacted the 2002 Pipeline Safety & Integrity Act (PSIA) which now mandate;

- Regular inspections
- Secretary to demand corrective actions when hazards are identified
- Increased penalties for non-conformance and failures



## Other New Technology

Drilling / tunneling, insert liner (both push and pull through), in-situ spray-on systems, etc. are all examples of “competing” new technology. Each offers its own list of benefits, limitations and risks. While TTI offers overall advantages, there will be niche / sub-markets where the other new technologies may prevail. The overall market is so large, and the traditional solutions so burdensome and costly, operators no doubt will want several ‘new tools’ in their kit along with TTI.

## Management

### **Mr. Bruce Munden, TTI President & Founder**

Technology inventor, 25+ years of engineering and field experience specializing in all aspects of pipeline services and operations.

### **Carlos Buchanan, CFO**

Extensive experience with developing and managing a variety of high IRR projects

### **Mr. Larry Park, TTI, Operations**

Extensive experience with managing field operations & customer interface.

### **Art Schroeder, Business Development**

Energy related technology commercialization. Chairs several industry Boards and committees.

gti, Gas Technology Institute



## Board of Advisors

### **Dr. Martyn Wilmott, General Management & Technology**

Awarded 11 patents, authored 60+ technical papers, numerous R&D contracts with leading industry associations / consortiums.

### **Rod Stanley, PhD. Technology & Regulatory**

Chairs numerous industry committees, participates in agency regulatory review process, authored 50+ technical articles & reference books, awarded 4 patents

### **Bill Haynes, Executive Management,**

Developed and built from ground-level \$200 million valve company and took public. Previously, ran LYONDELL- CITGO Refining Co (\$2.5 billion company). A founder of Lyondell Petrochemical Company; took public in 1989.

### **Melanie Kenderdine, VP Operations and Board of Directors,**

#### **Gas Technology Institute**

Experience in both federal and private energy sectors, expert regarding energy issues and policies, as well as technology trends.

### **David Barrow, Manager Pipelines; BP**

25+ years of operations, domestic and international

### **Tom Manford, Partner, Bracewell Paterson**

General corporate practice with emphasis on M&A, energy and technology.

## Growth Strategy and Business Needs

Executing the next steps of the plan will require additional capital of approximately \$1.5 million which will be drawn down as strategic milestones are met. The round will be utilized to acquire capital equipment (mobile coating units, communications equipment) hire field personnel, and to build out training / demonstration facility to be located in Houston area.

While TTI is expected to be cash flow positive by the second year, it is anticipated that all earnings will be re-invested in the business for the foreseeable future. First-round non-strategic investors may have an early exit option as industry operators or service companies buy-in during subsequent funding rounds. By the fifth year, TTI fully expects to have sufficient market penetration to be attractive for either an initial public offering or more likely, an industry partner buy-out. Examples of both situations abound within the industry.



## Project Case Histories



**PROJECT:** Ashland Oil Flowlines  
**CUSTOMER:** Ashland Oil, Canada  
**LOCATION:** Calgary, Alberta Canada

**SUMMARY:** Crude oil gathering and trunk lines totaling 100,000 ft. and ranging in diameter from 6" to 8" were experiencing severe internal corrosion & leaks from produced oil, gas & saltwater. Primary focus was corrosion protection to stop leaks in older and newly constructed lines. The internal (thin-film) epoxy coating successfully blocked the internal corrosion returning the older lines to leak-free service and preventing internal corrosion leaks from developing in the newly constructed lines. Secondary benefit – insitu internal thin-film epoxy coating of the flowlines created a slick, hard surface that demonstrated a significant resistance to paraffin attachment. The operator observed that that once enough paraffin crystals built up to create flow turbulence in the line the force of the flow tended to break the attachment bond of the paraffin to the slick epoxy surface. Significant cost savings were achieved by reducing the amount of hot oil injection treatment previously required for the lines during the winter operating period to prevent paraffin blockage. This secondary flow assurance benefit observed in Canada lends credible evidence to support theory that the hard, slick internal surface of insitu epoxy coated reeled pipe could play a significant role in inhibiting paraffin blockage in cold, deepwater production pipelines. When combined with the additional benefit of added thermal insulation from thick-film epoxy, the overall flow assurance characteristics of insitu applied thick-film epoxy for reeled pipe becomes more attractive.

## Petrobras Project



Test loop designed for evaluation of different thick film coating material for application to heavily pitted pipeline.



The test spools were flanged in place to allow easy access for inspection during the process.



Custom design pigs and scrapers were developed to clean the pipeline.

Safety is always the #1 priority.



Testing and measurement is a critical part of the process.



Examination of the inspection spool reveals a white metal finish.



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