

WELDING CONSUMABLES

Flux-Cored (FCAW-G) Welding

Welding on Pipe

Cheyenne Plains Pipeline

Contractor U.S. Pipeline turned to new Lincoln Electric Pipeliner® G80M gas-shielded flux-cored wire to weld the pipe tie-ins for the 380-mile Cheyenne Plains Gas Pipeline project, which used X-80 grade pipe.

- CHALLENGE -

The Cheyenne Plains Gas Pipeline project was the first major pipeline in the U.S. to use high strength X-80 grade pipe. The contractor, U.S. Pipeline, was looking for ways to increase productivity while still creating high quality welds that could pass radiographic inspection.

- SOLUTION -

Lincoln Electric Pipeliner® G80M gas-shielded flux-cored wire for use on the pipe tie-ins at connection points and railroad crossings near populated areas.

- RESULTS -

Using a wire process yielded results that were three to five times faster than the stick welding typically used for pipeline welding. The Pipeliner G80M provided high quality and flawless operation with its smooth arc and low spatter levels.

During the summer and fall of 2004, the plains of the west were busy with the hustle and bustle of cranes, trucks, heavy equipment and supplies to lay pipe for the Cheyenne Plains Gas Pipeline Project. The 380-mile, 36-inch natural gas pipeline runs from the Cheyenne hub in Colorado to existing pipelines near Greensburg, Kan. Once operational in early 2005, the pipeline will export 560 million cubic feet of natural gas per day from Wyoming to growing markets in the mid-continental U.S. and further east.

The \$425 million pipeline, owned by El Paso Corporation, was being constructed in three spreads which were connected in the final phase of the project. Spread one was contracted to Associated Pipelines while spreads two and three were handled by U.S. Pipeline, Inc.

The Cheyenne Plains Gas Pipeline Project was the first major pipeline in the U.S.

to use X-80 grade pipe. Already a standard in other parts of the world, the X-80 pipe provides higher strength with a thinner wall.

As on any pipeline project, welding plays a critical role in the construction process. But what made this project unique was the extensive use of wire welding to provide high productivity. A new consumable from the Lincoln Electric Company, the Pipeliner® G80M gas-shielded flux-cored wire, was selected by the evaluation team at U.S. Pipeline, Inc. for use on the pipe tie-ins at connection points and road crossings near populated areas. These welds, completed manually by independent pipeline contractors, connect the mainline pipe to the thicker walled pipe of the tie-ins.

For the mainline pipe, a CRC-Evans® automated welding system was used in combination with Lincoln's premium SuperArc® L-56 copper coated gas metal arc wire.

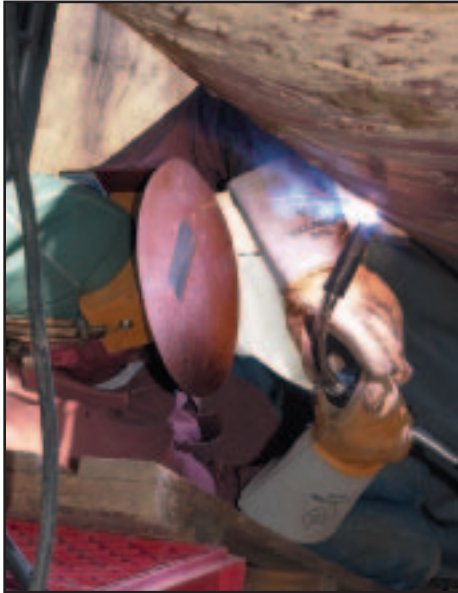


Flux-Cored (FCAW-G) Welding

2/4

Welding on Pipe

Cheyenne Plains Pipeline



“We chose the Lincoln Pipeliner G80M wire for this project for a number of reasons. First, it met the mechanical requirements of the job and also offered a crisper arc,” said Bratcher. “In addition, we felt that the Lincoln product flowed better and was more suitable for outdoor use.”

An Overview of the Pipe Installation Process

More than 140,000 tons of pipe and 25,000 individual sections were used to complete this project. Each section of pipe is 78-feet long and per industry standards, was buried at least 30 inches below the ground through a trenching process.

Much like an assembly line where each worker is responsible for a certain portion of the job, construction crews in each spread followed after each other along the length of the pipe to complete specialized tasks. Crews at the front staked the area and prepared the right-of-way. Those following behind aligned the pipe, welded and inspected the pipe

and then lowered it into the trench. Finally, the construction crews at the rear were responsible for conducting hydrostatic pressure testing, backfilling the trench and restoring the land as close as possible to its original condition.

Welding Connection Points and Road Crossings

After a lengthy process of evaluating solid and flux-cored electrodes for the job, U.S. Pipeline, Inc. selected a .045-inch diameter Pipeliner G80M wire as the consumable of choice for the vertical up welding of the pipe tie-in fill and cap passes. The Cheyenne Plains Pipeline Project marked the first time this new consumable was used in the field and for many of the pipeline contractors, it was also the first time they had made the switch from a traditional Stick process to complete the tie-ins for the job.

“We chose the Lincoln Pipeliner G80M wire for this project for a number of reasons. First, it met the mechanical requirements of the job and also offered a crisper arc,” said Dana Bratcher, Welding Foreman, U.S. Pipeline, Inc. “In addition, we felt that the Lincoln product flowed better and was more durable for outdoor use. We also were attracted to the fact that the pipe supplied from the manufacturer was welded using a Lincoln consumable.”

This electrode, specifically designed for pipeline welding, is easier for the operator to use and provides a smooth arc, lower spatter levels and less frequent clogging of gun nozzles when compared to other flux-cored wire electrodes.

All tie-in welds were performed manually because of the specialized skills needed to handle fit-up issues between the thinner mainline pipe and thicker tie-ins. Each manual welding team consists of two welders, one on each side of the pipe performing one-half of the welding pass – root, hot, fill

and cap. Each welder also had an assistant who performed tasks such as preheating the joints, setting the clamp to align the two lengths of pipe, setting up the welding equipment and completing the finish wire brushing on the joint.

Every tie-in weld was inspected with a radiographic process and throughout the job the weld quality had been excellent. “We had a low repair rate with the Lincoln wire. It was consistent and worked wonderfully,” noted Bratcher. “Our welding operators liked the fact that they were able to see how the puddle flowed.”

The use of Pipeliner G80M wire to weld the spiral seam pipe’s fill and cap passes provided significantly increased productivity and high quality welds. “The wire is about three to five times faster than stick welding,” said Ray Edwards, an independent pipeline welder from the Pipeliners Union 798 and one of the welders on Spread Two of the project. “The same length of weld bead that would take up to five minutes with stick welding is now taking me about one minute.”

In addition, Lincoln’s Shield-Arc 70+ stick electrode was used to complete the tack welds and vertical down root pass on these tie-ins. This rod was chosen for its ability to accomplish the out-of-position welding required for this job.



Flux-Cored (FCAW-G) Welding

Welding on Pipe

Cheyenne Plains Pipeline

On-Site Support and Equipment

For the pipe tie-in welding, Lincoln fully supported the welding efforts from the initial qualifying of the consumables to on-site assistance to ensure the independent contractors weren't subject to any downtime.

“Every tie-in weld was inspected with a radiographic process and throughout the job the weld quality had been excellent.”

Thomas also described how once the G80M product was selected, Lincoln representatives qualified the procedures for the wire and were close at hand to answer questions and provide technical assistance as U.S. Pipeline qualified their operators.

During initial start-up of the job in the field, Lincoln representatives were at the site three to four days per week, and at least one day a week on an ongoing basis throughout the project's duration.

“The Lincoln consumables ran flawlessly on the job with great operator appeal

angles. On a project of this magnitude, having so few issues was exceptionally good.”

David Fullen, Lincoln Electric Denver District Manager echoed these same words about the Pipeliner G80M electrode. “For many of the welding operators on the job, this was one of the first times they had wire welded. What's remarkable is that they adapted so well and never had any complaints with the wire. The integration of the wire welding has gone smoothly and the job finished ahead of schedule. Most of our time spent on the job site was addressing equipment issues.”



Although a competitive brand of welding equipment was specified for the job, its alarming failure rate and resulting downtime prompted Lincoln to step in and provide equipment. “We received an urgent call about equipment when the contractors were struggling with the competitive wire feeders. We were able to answer the call and overnight equipment to the field,” said Fullen. “We sent Lincoln LN-15 wire feeders with accompanying Magnum welding guns to the job which remedied the situation. We also spent time on site providing technical assistance,

setting up the equipment and installing wire feed CV modules. We were dedicated to keeping the customer up and running.”

“Throughout this project I received great service from Lincoln,” explained Bratcher. “With a phone call, I would have what I needed either hand delivered or on site the next day.”

According to Dave Thomas, District Manager in Lincoln's Tulsa Office, he and representatives from the Cleveland headquarters were present while the Pipeliner G80M consumable was being tested for the job against competitive consumables. “We watched as U.S. Pipeline officials welded with each of the consumables. The Pipeliner wire product was much more proficient in operator appeal and also created a better looking weld. In addition, it also came out on top after destructive tests on the plate in the lab,” said Thomas.

“The wire is about three to five times faster than stick welding,” said Edwards. “The same length of weld bead that would take up to five minutes with stick welding is now taking me about one minute.”

and ease of use,” commented Steve Duren, Technical Sales Representative from Lincoln Electric's Denver office. “The only issues we addressed with consumables were questions about techniques and proper drag and push

For this project, Lincoln Electric partnered with distributor Airgas Intermountain to supply select consumables and equipment to the site as well as an 85 percent/15 percent argon blend shielding gas. According to

Flux-Cored (FCAW-G) Welding

4/4

Welding on Pipe

Cheyenne Plains Pipeline

Mark Duncan, General Manager-East for Airgas Intermountain, Airgas provided additional on-site support to augment Lincoln's efforts. "We have a strong relationship with the Lincoln Denver office and worked as a team. I couldn't have asked for better support from them," said Duncan. "I also tip my hat to our field person, Tom McClelland, who did a fantastic job providing technical assistance, process help and service for the equipment when necessary."

Welding Pipe Mainline

For welding the mainline pipe of the Cheyenne Plains Gas Pipeline, Lincoln consumables also played a prominent role. A CRC-Evans® automated pipe welding system was utilized to automatically weld the circumference of the pipe using a gas metal arc process for high productivity.

The system was used in combination with Lincoln's premium SuperArc® L-56 copper-coated gas metal arc wire for welding the pipe's outside diameter, consisting of hot, fill and split cap passes. This .040-inch diameter wire, provided specifically for this project, offers superior



feedability and excellent arc characteristics, a result of Lincoln's manufacturing process which uses a strictly controlled chemistry process. All mainline welds are inspected using automatic ultrasonic tests.

"From a business perspective, it was a good decision for us to work with a domestic consumable supplier such as Lincoln Electric," said Brian Laing, President of CRC-Evans. "From a technical standpoint, the mechanical property requirements for the project were easily met by the SuperArc L-56 wire. Our direct customers, the construction con-

tractors, and ultimately the pipeline owner, were satisfied with the overall quality of the welding and productivity achieved, thanks in part to the Lincoln electrode selected."

According to Peter Nicholson, Manager of Pipeline Products at The Lincoln Electric Company, providing consumables for the Cheyenne Plains Gas

Pipeline required a coordinated effort between many Lincoln entities including its International Division, the Cleveland headquarters, and Lincoln's Houston district office.

"Six months prior to the start of pipeline construction, consumables were tested in the Houston office to ensure the weld procedures with the consumable complied with the strict industry standards for this job. Lincoln engineers worked closely with CRC-Evans personnel to ensure the right consumable for the job was selected," said Nicholson.

Featured Lincoln Products



LN-15 Semiautomatic Wire Feeder

The LN-15 is one of the smallest and most maneuverable wire feeders for the construction, shipbuilding and pipeline industries available on the market today. Through the use of a high temperature, abrasion resistant plastic case, aluminum alloy roll cage and fully encapsulated PC boards, the LN-15 is perhaps the most rugged, portable wire feeder in the world. The LN-15 is available in both Across-The-Arc and Control Cable versions. Both offer outstanding welding performance, including pulse welding, on a wide variety of steel, stainless steel, aluminum and alloy materials.

PIPELINER

Pipeliner G80M is designed to deliver high deposition rates for low hydrogen semiautomatic fill and cap pass welding of high strength pipe up to X80.

AWS Class:
E71T-1MJH8
& E71T-9MJH8

ADVANTAGES

- Smooth, spray type arc transfer and low spatter level.
- Slag system provides excellent puddle support, good wetting and good bead shape in all positions.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.