

GROWTH & REVOLUTION

Carlos Davila, Crane Co., USA, explores the evolution and expansion of the pipeline industry in the industrial US.

The year is 1855 and 23 year old Richard Teller Crane has just founded the R.T. Crane Brass & Bell Foundry in Chicago, Illinois. Amidst the backdrop of a rapidly growing industrial US, the future Crane Co. produces valves, fittings and specialty castings for the nation's burgeoning manufacturing and transportation industries.

Within three years, the young R.T. Crane had secured the region's largest contract for steam-heating systems and, by the 1860s, the company had expanded into elevators, steam engines and railroad components. Diversifying the business and establishing the company as a leader of the industrial revolution, Crane pioneered numerous improvements in manufacturing, including the use of multiple-purpose



Figure 1. Crane employee poses by valve.

1925



Figure 2. Crane Employee, 1925.

machines and a conveyor system of moving moulds and pouring metal.

A parallel history

With Crane's business booming in Chicago and expanding throughout the country, a similar revolution was beginning 500 miles away in Titusville, Pennsylvania, where 'Colonel' Edwin Drake had just drilled the nation's first commercial oil well. Transported by Teamsters using whiskey barrels and horses, oil represented new lifeblood for the state of Pennsylvania and the US as a whole, as its commercial potential was just beginning to be realised.¹

As transportation by the Teamsters, who charged more to move a barrel of oil five miles by horse than the entire rail freight charge from Pennsylvania to New York City¹, became increasingly cost-prohibitive, the industry sought alternatives

and the nation's first wooden pipeline was born in 1863. Within 20 years, Pennsylvania oilfields supplied more than 80% of the world's petroleum consumption, and pipeline technology evolved in kind.

By the turn of the century, gushers and refineries were connected by a network of pipelines to Buffalo, Philadelphia, Cleveland and New York, and more oil had been discovered as far west as California.¹

As oil production and transport flowed throughout the country, R.T. Crane's business was likewise expanding, with four manufacturing facilities and 1500 employees nationwide. Officially named Crane Co. in 1885, the company constructed the Midwest's first metallurgical laboratory. Producing steel valves and fittings in its own foundries, Crane Co. served as a model for the modern valve and fitting industry.

With vast advancements in manufacturing and industrial technology sweeping the nation, R.T. Crane Jr. assumed the company's presidency upon his father's death in 1912. Under his leadership, Crane built the nation's first truly modern factory, switching wholly to electricity for power. Personifying the spirit of the time, Crane continued to expand its valve production capabilities and introduce new design innovations to the market, growing alongside the revolution.

Due to the rapid growth of the automobile industry, US pipelines were in proliferation, with nationwide mileage in excess of 115 000 miles by the 1920s.¹ The subsequent westward population shift and eventual outbreak of World War I further contributed to the development of pipelines across the US.

However, by the 1950s and 60s, resource distribution was shifting rapidly and US producers were increasingly gaining supply from overseas and Canada. As a result, major industry systems were constructed from the US Gulf Coast to the Midwest, Western Canada to the Midwest, and California to the US West Coast.¹ To meet the needs of increasingly-demanding industry, the Mission Manufacturing Company introduced wafer check valves to the market in the late 1950s. Now better known as Crane ChemPharma & Energy's high

performance Duo-Chek valves, these non-slam check valves offer superior protection to the pipeline industry, and represent the convergence of Crane's history of innovation with the emergence and explosion of the pipeline industry in the US.

By the 1970s, following the discovery of the Alaskan Prudhoe Bay oilfield, the pipeline industry was in the throes of massive change, as designers were challenged to transport more than 1.6 million bpd of oil across nearly 1000 miles of frozen tundra. Since then, the demands placed on pipelines have continued to intensify as energy demands in the US and abroad increase every year.

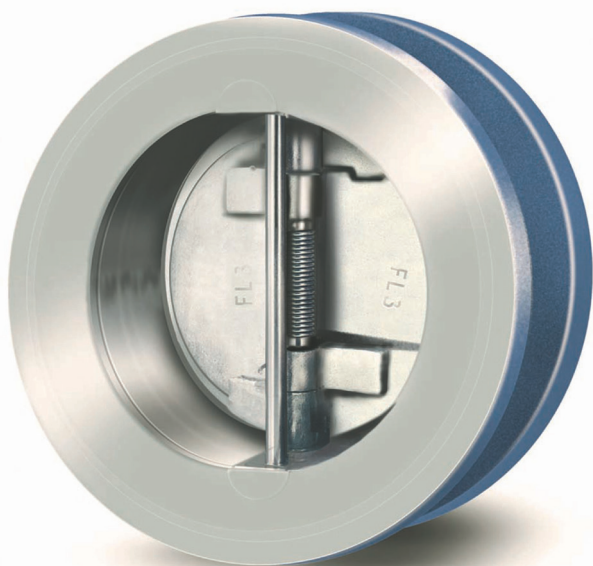


Figure 3. Duo-Chek® dual-plate check valve from Crane ChemPharma & Energy.



Figure 4. A bronze metal commemorates the 75th anniversary of Crane in 1930. On one side is a bas-relief of founder R.T. Crane, and on the reverse, a picture of the primitive frame foundry in which the company was established appears below the great plant developed from the humble beginning.

From the mid-1930s to modern day, Crane Co.'s business capabilities have likewise expanded. From a lavish US\$1 million showroom in Atlantic City (1930) to railing material for the Golden Gate Bridge (1937), and as far as the moon (Hydro-Aire and Chempump pumps are used in the Gemini and Apollo Space programmes, 1969), Crane's diverse and innovative product portfolio has, like the oil industry in the US, continued to flourish and evolve since its inception more than 150 years ago.

A continuing partnership

Today, Crane ChemPharma & Energy, within Crane's Fluid Handling business segment, marks 160 years of innovation and continues its partnership with the global pipeline industry, delivering highly engineered check valves that protect these complex systems and deliver superior performance in an increasingly-challenging industry.

Modern pipelines have become increasingly versatile as they are now called upon to "gather oil and gas over one mile beneath the ocean surface, transport super critical fluid such as carbon dioxide for oil recovery, carry natural gas liquids for growing regional heating and olefins industries, and transport specialty chemicals between chemical plants and refineries."¹

As such, the investment and care required to keep them functioning properly has also intensified, with pipeline designers seeking the most efficient methods of keeping pipeline fluids flowing and pipeline components safely intact. To protect sensitive and costly mechanical equipment and prevent the damage that can be caused by flow reversal, engineers rely on a variety of flow control equipment – namely, check valves.

While a variety of valve designs exist to prevent flow reversal in piping systems, traditional swing check and tilting disc check designs can present a number of challenges, including chatter, slamming and water hammer. However, highly engineered solutions like dual-plate and nozzle-check valves offer a more reliable solution to the challenges of severe service.

As opposed to non-engineered designs, dual-plate check valves are more compact and lightweight, delivering efficient seating, operation and a lower installation cost for pipelines. Independent springs with long legs prevent seat scrubbing and provide non-slam performance while a retainerless valve design eliminates body penetration for critical service applications. These valves greatly facilitate pipeline operations, as they are much easier to install between standard gaskets and line flanges. The savings compound during installation due to ease of handling and the fact that only one set of flange studs is required. Therefore, dual-plate valves are more cost effective to install as well as maintain.

Another effective alternative to traditional swing or tilting disc check valves are highly engineered nozzle check valves, which rely on the Venturi effect to reduce fluid




Figure 5. Noz-Chek® nozzle-style check valve from Crane ChemPharma & Energy.

pressure and effectively prevent flow reversal in piping systems. Like dual-plate check valves, nozzle-check designs are specially engineered for fast-reversing systems where backflow is a constant concern. They minimise the damaging effects of water hammer in fluid systems, eliminate the chatter associated with conventional valves, protect rotating equipment from damage due to flow reversal, minimise pressure loss in piping systems and provide quick dynamic response to reduce reverse velocity.

Backed by a history of innovation as old as pipelines themselves, Crane ChemPharma & Energy manufactures both dual-plate (Duo-Chek®) and nozzle-check (Noz-Chek®) valves to offer the highest degree of protection to pipeline systems.

A modern enterprise

Today, Crane Co. continues to set the standard in valve technology as a diversified manufacturer of highly engineered industrial products. More than 1000 employees worldwide will mark the company's 160 year anniversary this year, a milestone that speaks as much to the wisdom of its founder and perseverance of his successors as to the quality and performance of its diverse product portfolio.

As written by *Fortune Magazine* in July 1936, "You can't run a railroad or build a dam, operate a paper mill or lay a sewer, dig an oil well or heat a hospital, or launch a battleship or even take a shower without using one of the more than 40 000-odd products that are made by Crane Co." And the idea holds true today. 

References

1. PIPELINE 101. (1 January, 2013). Retrieved 2 January, 2015, from <http://www.pipeline101.com/the-history-of-pipelines/1800>.