By Ed Kammerer

The Underground Fuel Transfer Evolution Revolution

When I got in the fueling business over 20 years ago, the underground environmental protection "movement" was just at its tipping point. The industry was transforming, and not only did I have to learn how things were currently being done, but also why they were about to change. At the forefront of the movement was the U.S. EPA-mandated UST upgrade compliance requirements and the Canadian Environmental Protection Act (CEPA 1999), and both drove the creative and innovative solutions that found new ways to prevent leaks, spills, overfills, and to conduct safer fuel transfer from the transport truck to the UST and, finally, to the consumer point of fueling.

In fact, this new movement ultimately challenged everything marketers were doing. The common practices of before were no longer good enough for protecting the environmental integrity of fueling sites. And, although the mandates focused on protecting the environment, there were several unintentional benefits that resulted in better, more economical ways to install, maintain and improve performance of fuel sites. Let's explore this underground fuel transfer evolution.

Looking Back

For nearly 100 years, steel was "how it was done"–steel tanks, steel fuel transfer pipe. Yet, as durable as steel certainly is, over time, steel is subject to corrosion, ground movement stress, line shock, vibration and many other physical forces of nature. Add to the fact that steel fuel transfer piping requires threaded joints, the likelihood of failure increases as these potential leak points are not only subject to nature but also to installer error.

The point is, after 100 years it was rightfully assumed that technology must certainly have progressed to a point beyond the limitations of steel. It didn't take long to see that composite materials and fiber reinforced plastic were

replacing archaic steel products. Naturally, getting fuel safely and efficiently from the storage tank to the point of dispensing is the need and mission of every marketer, so it seemed logical to extend the fiberglass technology to the task of fuel transfer, in the form of pipe.

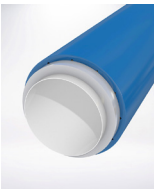
Non-corroding, durable, and with a seemingly infinite lifespan, fiberglass became the standard in underground fuel storage and transfer, as well as the standard in secondary containment. When compared to steel pipe, fiberglass pipe was definitely an evolutionary improvement, but fiberglass technology was still plagued with a major drawback – it still required joints to make all the necessary turns to get the fuel from the tank to the point of consumption. Every joint is a potential leak point due to the same issues that plagued steel pipe, minus the corrosion issue. And, just like steel, you still had to bury the pipe under backfill and concrete, so when something went wrong, it all had to be dug up. Therefore, it was not a perfect solution, but fiberglass provided an excellent stopgap in the evolutionary journey to fuel transfer perfection.

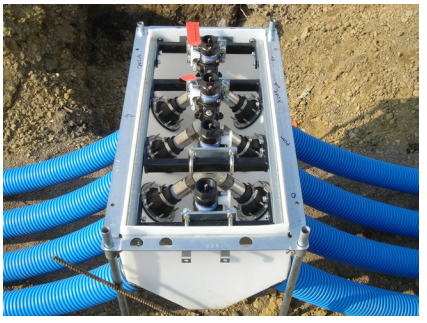
Time for Innovation

It was at this moment that I realized great companies and creative minds never accept "it's good enough." So while the fiberglass fuel transfer pipe solution met the minimum UL listing requirements, EPA and CEPA compliance needs, it did not provide the optimum solution relative to marketer economics, nor did it really provide the environmental protection that we as an industry were truly capable of delivering.

To that end, solutions-driven, brilliant-minded individuals were hard at work striving to create something better. They were seeking a seamless (i.e., no joints) fuel transfer pipe solution with minimum connection points and, preferably, one where all connection points were situated safely inside a containment vessel.

Several pipe companies experimented with plastics, urethanes and various nylons, but the materials of construction they selected were less than stellar. However,





like most inventions, creativity is fueled by failure. And every experiment, every failed attempt provided more data points, more possibilities, more "what ifs" that all worked to attract the best and the brightest engineering and scientific minds to the challenge. The race to create the perfect joint-free, flexible fuel transfer pipe had begun.

As leading companies across the industry began testing flexible piping, early adopter marketers quickly recognized the benefits and helped drive development by making sites available. This provided the real-world laboratory needed, but like all worthwhile explorations, pioneering new technology is laced with significant risks. These risks turned into one environmental disaster after another for marketers, flexible pipe pioneering manufacturers, and advocates.

Most manufacturers lacked the scientific understanding of how various plastics and nylons–the essential raw materials of flexible pipe–would respond to soil composition, water and, most importantly, to hydrocarbons. As a result, some of these pipe manufacturers prematurely rushed to market with inferior flex pipe solutions. Before long, due to product malfunctions, most of these early flex pipe pioneers found themselves in deep financial trouble and were forced to abandon their mission. Others, such as OPW, were more patient, methodical and fortunate, having invested heavily in first learning the necessary science before rolling out a flexible pipe solution. In fact, very early on, OPW joined forces with Arkema, the world's leader in plastics technology. For almost 50 years, Arkema had been providing their innovative Kynar® PVDF to plastic-based pipes utilized in the chemical industry. This special, patented formula was the much sought-after secret sauce that quickly became the primary pipe liner in OPW's flexible pipe solution. This highly specialized pipe was named PISCES (Primary Integrated Secondarily Contained Environmental System).

OPW's piping system continued to evolve and kept pace with advancements in technology and installation techniques. However, even as OPW's piping system evolved, the one constant was the use of Kynar PVDF as its primary pipe material and in 2007 rolled out its next generation of piping called FlexWorks. This revolutionary new pipe combined proven science with state-of-the-art manufacturing and leading edge engineering expertise. Throughout the last 20 years, Kynar has proven itself as an effective ingredient in the fight against fuel's corrosive nature and has been a staple ingredient of OPW pipe solutions.

Today

As a result of the flexible pipe born out of the OPW/Arkema partnership, underground fuel transfer is better than ever and flex pipe is the preferred choice of marketers worldwide. Because today's flex pipe is based on an impressive combination of proven chemistry, science, leading-edge engineering and state-of-the-art manufacturing processes, it not only enhances environmental protection and fuel transfer performance, but it also provides astounding economic benefits to marketers, and an ease of installation that is simply not possible with rigid fiberglass pipe.

Flexible pipe is now part of an integrated fuel transfer system – meaning that it is designed as an integral part of the total transfer and containment solution. For instance, the Loop System®, by OPW, offers marketers an entirely accessible fuel transfer solution, all the time. Marketers reap the benefits of fast and easy installation, and once the flex pipe is installed, the marketer never has to worry about digging up their site to access their fuel transfer pipe for any reason. All connections are 100% contained inside specially designed fiberglass or polyethylene tank and dispenser sumps. There are no potential leak joints exposed to the environment. Entry fittings and riser pipes are no longer fabricated and installed in the field because they are now installed in a controlled factory environment, which helps eliminate the potential for contractor errors.

It is quite impressive to see how this initial "evolution" kick-started an incredible "revolution" in fuel site environmental management, performance and economic improvement. Today, flex pipe systems are supported by testable, replaceable double-wall spill containers and testable positive shut-off overfill valves, leak indicating double-poppeted under dispenser emergency shear valves and highly reliable hose breakaways. From end-to-end, the fuel transfer process has been vastly improved over the past 20 years, and I've been here to witness it. I am anxious to see where we go from here, but one thing I know for sure is that many driven and brilliant people are behind the scenes right now working on ways to take where we are today to the next the level. Hopefully, I'll report back to you in another 20 years as these accomplishments reach their fruition and I continue to be a catalyst in helping make these improvements happen.

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