

The evolution of pipe by David A. Chasis

It's only when the hunter-gatherers decided to change their nomadic ways and stay put did the idea and solution sprout up on how to quench the population's thirst and water their crops. At first, directional, open-slopped ditches were dug using gravity flow from a nearby water reservoir such as a well or river. Later, when the outside elements made in-soil conveyance difficult to maintain, aqueducts were built using stone and mortar. Examples of this method of water transportation are still visible in Europe and Turkey thanks to the Romans who built these durable engineered structures a few thousand years ago. But due to water evaporation, the ruining of arable land with these massive aboveground structures and the labor to build the aqueducts, pipe was invented.

By definition, pipe is a "tube or hollow cylinder for conveyance of a fluid." It seems the Romans again led the charge by discovering folded-seam lead piping. This product was fairly easy to produce due to its malleability and availability. In fact lead piping was so popular for hundreds of centuries that the Latin word for lead — "plumb" — became the word root for today's installers of water piping — "plumbers." Lead water pipes were used until the early 20th century when the health hazards of lead became more fully understood.

Wood pipe hollowed out of logs came into use in the 1800s in areas of the world where lumber was inexpensive (wood piping was used to a large extent in the Northeast region of the United States and Canada). Next, due to being more cost effective and having better performance, there was an influx of metal piping systems. Cast iron piping started making inroads in the early 1900s and was followed by other ferrous materials as well as bronze, brass, copper and aluminum. Depending on the particular application, these metal piping materials are still in use throughout the world. Other piping materials developed in the 1900s such as clay and cement are still used in many places but mostly for underground, non-pressure applications.

For the same reasons that metal pipe replaced its predecessors — cost and performance — thermoplastic pipe became

the material of choice beginning in earnest in the 1960s. Polyvinyl chloride (PVC) was one of the earliest plastic piping systems to handle fluids and today is one of the most commonly used piping materials in the world. Polyethylene (PE) is the next most voluminous plastic piping material with other commonly used plastic piping materials such as acrylonitrile-butadiene-styrene (ABS), polypropylene (PP), chlorinated polyvinyl chloride (CPVC), and cross-linked polyethylene (PEX). For piping applications requiring higher temperature and broader chemical resistance capabilities, fluoropolymers such as polyvinylidene fluoride (PVDF) and polytetrafluoroethylene (PTFE) are used.

So why have the world's architects, design engineers, installers and end-users embraced plastics? Cost effectiveness and performance. Today's marketplace has recognized that plastic piping systems

are easy and safe to install, reliable and long-lasting and are environmentally sound. As Darwin so rightly predicted, species sustain themselves and rise to the top of their chain by having the ability to adapt to their changing environment. This principle is also true regarding piping materials.

And, in conclusion, although there is no "perfect" piping material, probability favors plastic piping and its constant evolving nature to maintain its place as the preferred piping material today and in the future. ■

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