

# Latest Advances in Pipeline Renovation with Fiber Reinforced Polymer

Abstract #67

Two decades ago the author introduced the technique of strengthening concrete structures by external bonding Fiber Reinforced Polymer (FRP) products as tension reinforcement. Later that same technique was applied to strengthen pipes. In most cases, fabrics of carbon or glass are saturated with epoxy in the field and applied to the pipe inner surface; once the epoxy cures in, a solid laminate with high tensile strength is created. This approach, known as wet lay-up, is somewhat time-consuming and relies heavily on the experience and workmanship of the installation crew to achieve the desired results.

This paper discusses the development of SuperLaminates which are semi-flexible sheets that are produced in manufacturing plants and include one or more layers of carbon or glass fabrics; they are typically 0.025-inch thick X 50-inch wide X 300-ft long. The laminates are packaged in 15-inch diameter coils so they can be easily sent into pipes through manholes. Once released inside the pipe, the elastic memory of the coiled laminate will force it to snap against the surface of the pipe. Bonding to the pipe surface can be achieved with a thin layer of epoxy applied to the back of the laminate or to the pipe surface.

SuperLaminate can be used for:

- 1) Restoring strength of pressurized concrete or steel pipes
- 2) Spot repair or full-length repair of pipes
- 3) Repair of corrugated metal culverts

The advantages of SuperLaminate include significant improvement in quality and savings in time to repair pipes. A single roll can be used to repair any diameter pipe, making this a very versatile product.