

Project Title: Water Spray Chamber
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Area: Mechanical Engineering
Sponsor: Fill-Rite®, a Gorman-Rupp company

Fill-Rite of Fort Wayne is a leading distributor of high value pumps, meters, and fluid dispensing accessories that pride themselves on manufacturing the ‘most rugged and reliable’ products. To ensure these products truly are the most rugged and reliable, Fill-Rite performs a series of tests for each component. A hydrogen embrittlement test looks for the corrosive resistance of the metallic structures of the components. This is done by coating the parts in a hydrogen-based mixture and placing them into a rain chamber. The parts are then sprayed with water for 3 hours followed by a dry off period of 1.5 hours. This process is then repeated for 42 cycles. The environmental and water ingress tests are for evaluating the integrity of the outer paint coating on the components. Pumps are placed within the rain chamber and subjected to temperature differences from -40 degrees Celsius for the environmental test, to 60 degrees Celsius for the water ingress test. Once at the desired temperature, the rain chamber is then powered on. The current chamber used for these tests is unreliable and inefficient. This inefficiency is caused by the inability to test more than one component at any given time. Additionally, the structural integrity of the current apparatus does not meet Fill-Rite’s standards as it is a crude assembly made of spare parts without preliminary design. Fill-Rite is seeking assistance in creating a durable design that encompasses the ability to perform these tests and have longevity within their facility. The objective of this project is to provide a design that can automatically perform these tests, handle a temperature range of -40 to 60 degrees Celsius, and be capable of integrating itself with existing exterior devices within Fill-Rite’s lab.