

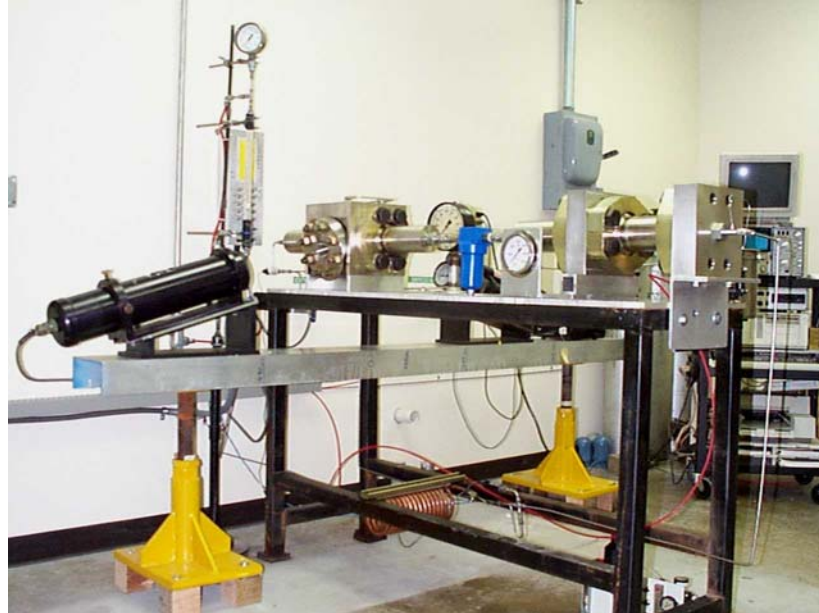
## HYDRAULIC IMPULSE TEST STAND

**SwRI Project:**

**Client:**

**Project Brief**

This stand was designed to conduct hydraulic impulse testing of high pressure hydraulic components used in aircraft application. The focus of the stand was to apply square waves as quickly as possible and at elevated temperatures for a wide range of hoses and tubing with inner diameters as small as 0.18" and as large as 12" and lengths ranging from 1-10'. The wide range of components, fluid volumes, and spring rates required that non-linear flow dynamics be used in order to reduce cycle time by creating a very stiff system on the upramp in order to achieve a very steep-short duration rise time. Further compounding the short cycle time requirement was the need to have a minimal pressure overshoot, which necessitated a very soft system. Using foundations of the Bessel equation and pioneering work performed by Professor Odenberger, SwRI designed and fabricated custom hydraulic valving capable of implementing advanced non-linear flow control. Using multiple gain scheduling techniques, fuzzy logic and closed loop control update rates of 100 Hz with system application pressures of 20,000psi were achieved.



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