In 1991 TRW Space and Technology Group (TRW) and NASA Lewis Research Center (NASA/LERC) entered into an agreement to establish a cooperative test program. Its objective was to demonstrate the feasibility of operating a TRW Coaxial Pintle Injector Rocket Engine using liquid oxygen (LOx) and liquid hydrogen (LH₂) as propellants. The purpose of this effort was to demonstrate technology that would significantly reduce the cost of launching payloads into space. It was based on studies conducted by the participating parties that also included the McDonnell Space Systems Company (MDSSC).

NASA/LERC had been approached by TRW because of NASA’s expertise in LOx/LH₂ rocket engine development and testing, and expertise in bombing of rocket engine chambers to test for combustion stability (no pressure oscillations). The TRW Coaxial Pintle Pressure – Fed Engine Concept had been tested on storable hypergolic propellants, but not with the cryogenic propellants – LOx and LH₂. Therefore it was necessary to test and demonstrate that the Pintle Injector Concept would display good combustion stability characteristics running on LOx and LH₂ for long burn durations typical of a booster. Other test objectives were to obtain ignition and combustion performance, combustion stability, heat transfer and combustion efficiency data.

The Pintle Injection Program was completed in 3 phases over a 4-year period. The first 2 phases were done with a 16K(thousand) thrust configuration using both LOx/LH₂ and LOx/hydrocarbons as propellants. The third and final phase configuration was at a thrust level of 40K with LOx/LH₂ propellants. All test and development work were very successful and accomplished on schedule.
Pintle Injector Program (PIP)

In 1991 TRW Space and Technology Group (TRW) and NASA Lewis Research Center (NASA) entered into an agreement to establish a cooperative test program, having as its objective the demonstration of the feasibility of operating a TRW coaxial pintle injector rocket engine using liquid oxygen (LOX) and liquid hydrogen (LH2) propellants. The purpose of this effort would be to demonstrate technology that would significantly reduce the cost of launching payloads into space. This effort was based on studies conducted by the participating parties, which also included the McDonnell Space Systems Company (MDSSC).

The TRW coaxial pintle pressure-fed engine concept had been tested on storable hypergolic propellants, but not with cryogenic propellants—LOX and LH2. The need was to test and demonstrate that the pintle injector concept would display good combustion stability (long pressure oscillations) characteristics running on LOX & LH2, and for long burn durations typical of a booster. Other test objectives were to obtain ignition and combustion performance, combustion stability, heat transfer, and combustion efficiency data.
That's why the MCD SSC approached NASA/LERC because of their expertise in LOX/LH₂ rocket engine development and testing, and also our expertise in building of rocket engine chambers to test for combustion stability (no pressure oscillations).

The program was accomplished in 3 phases, over a 4-year period. The first 2 phases were done with a 16k (thousand) thrust configuration, using both LOX/LH₂ and LOX/hydrocarbons as propellants. The third and final phase configuration was at a thrust level of 40k, with LOX/LH₂ propellants. All test and development work were very successful and accomplished on schedule.
In 1991, the Space Technology Group (STG) and NASA Lewis Research Center (NRL) entered into an agreement to establish a cooperative test program having as its objective the demonstration of the feasibility of operating a TRW coaxial pintle injector rocket engine on liquid oxygen (LOX) and liquid hydrogen (LH2) propellants. The purpose of this agreement would be to demonstrate technology that would significantly reduce the cost of launching payloads into space according to studies of the participating parties, which also included McDonnell Space Systems Company.

This TRW coaxial pintle pressure-fed engine concept had been tested on storable hypergolic propellants, but not cryogenic propellants. The need was to test and demonstrate that this pintle injector concept would display good combustion stability characteristics running on LOX/LH2 and for long burn durations, typical of a booster. Other test objectives were to obtain ignition and combustion performance, test stability, and heat transfer data.
That is why TRW + McDonnell approached NASA-LERC because of their expertise in testing LHT/Lox rocket engines, and also our expertise in burning of rocket engines to test the combustion stability.

The project program was accomplished in 3 phases, over a 4 year period. The first phases were done with a 16 K thrust configuration, using both Lox/LH₂ and Lox/Hydrocarbons as propellants. The third and final phase configuration was at a thrust level of 40 K, with Lox/LH₂.

All tests were successful and stable and