SECTOR:
ROCKETS AND MISSILES

OFFERINGS:
BUILD TO SPECIFICATIONS

TECHNOLOGY:
FLUID DYNAMICS AND STRUCTURES

DESIGN AND DEVELOPMENT OF SUPERSONIC ROCKET SLED

Our customer is a defence research laboratory involved in the design and development of facilities are used in the testing of terminal ballistics. The lab uses a rocket launched rail track facility to do high speed measurements on various payloads. The payload is kept on top of the sled and rockets give propulsive power to the sled. Lab required that the sled be aerodynamically and structurally redesigned to increase the maximum speed and decrease the number of rockets consumed for same payload.

Mission was increased from a low subsonic velocity of Mach 0.7 to Mach 1.5 as the top speed. Apart from the aerodynamic design, functional design like storage for electronics was in scope. Since the sled is recoverable, it was desired that efficient braking mechanism was designed for deceleration and recovery. Restriction of width and height was given. Lab wanted Zeus to supervise the manufacturing to realize the design as intended.

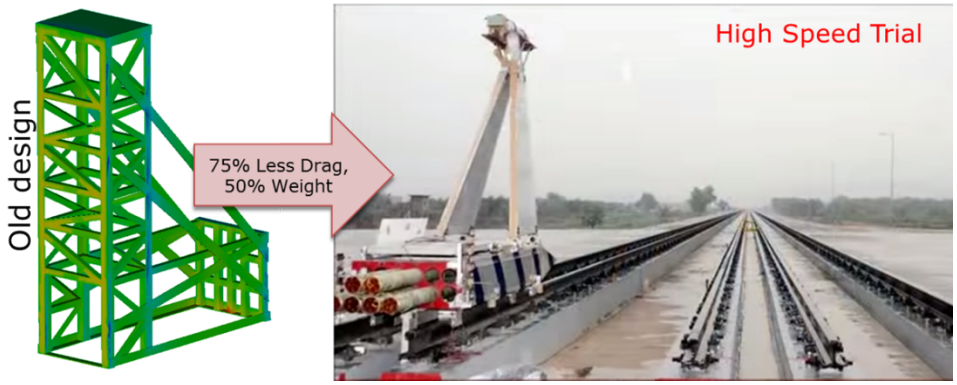

Figure 42: Comparison of previous and current sled

Conceptual aerodynamic design of the sled was done, and three concepts were found to be promising. After extensive review one of them was chosen. Structural design was done using first principles and FEM. Aerospace grade Aluminum was chosen for the construction. A combination of air and sand brakes were designed to stop the vehicle from supersonic speed to zero. Structural design had to be strong enough to bear the load of rocket and transfer the propulsive force. Care was taken in the design to make it light weight and reliable. Shoes for the sled were designed to take the heat loading while traveling at supersonic speeds. More than six numbers have been fabricated and the tests conducted on the new sled have been successful. The results match nicely with the predicted dynamics.

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