



CASE STUDY /

Apollo Engineering Case Study for Wheeled-Bobsled

“I’ve used a bunch of different engineering software packages, and Ansys is by far the easiest one to use. It has saved me tons of time. Just using Ansys and the interface for a standard CAD program is worth gold to me because I can iterate, iterate, iterate, and Ansys doesn’t blow out my constraints or my connections or anything else. It allows me to iterate, remesh, rerun the analysis, look at it and try it again over and over until I get where I need to be.”

Josh Adams, PE

Founding Principal / Apollo Engineering Design Group / Smithfield, Utah, U.S.A.

Park City, Utah, which hosted the 2002 Winter Olympics, offers visitors a chance to experience the thrill of a bobsled ride on wheels, hurtling down the track at over 60 mph with an experienced driver in control. But the original design of the aging, four-person wheeled-bobsled vehicles made for a rough, uneven ride. Apollo Engineering Design Group was hired to re-engineer the wheeled-bobsleds for a more comfortable customer experience.

/ Company Description

Apollo is an engineering and design firm that provides high-quality engineering services at a reasonable price. Our team has an extensive engineering background in industries ranging from investment casting, design of aircraft landing gear and heavy construction vehicles to the design of autonomous vehicles, robotics systems and amusement rides. Our staff includes Professional Engineers licensed in the state of California for Mechanical Engineering.

/ Challenges

The two-piece (nose and passenger compartment) fiberglass body of the wheeled-bobsled is connected by a steel yoke bolted to both pieces. The body design required a long and poorly supported yoke. Because of significant changes to the wheels and suspension system of the bobsled — including removal of an axle in the middle of the vehicle — to produce a smoother ride, the yoke had to be redesigned and the forces on it had to be re-evaluated to ensure that it could withstand the stress, strain and fatigue for safety purposes.

/ Technology Used

- Ansys Mechanical

/ Engineering Solution

- Perform a strength calculation on the yoke for a particular load case using Ansys Mechanical.
- Compare stress to yield strength.
- Perform structural simulations on the redesigned yoke to determine stress, strain and fatigue for particular load cases.
- Compare fatigue strength obtained by simulation to AWS code for steel.
- Iterate on design of steel yoke connector and run strength and fatigue simulations again on Ansys Mechanical until a viable design is achieved.

/ Benefits

The project timeline was eight weeks, and it would have taken approximately six months to redesign and test the yoke using old build-and-test methods. Using Ansys Mechanical, Apollo Engineering was able to virtually test hundreds of variations of the yoke shape and thickness in one week to arrive at an optimal design. This approximately 95% reduction in development time helped Apollo Engineering to meet the deadline while saving substantial prototyping and testing costs.



Figure 1. Redesigned yoke of wheeled-bobsled.

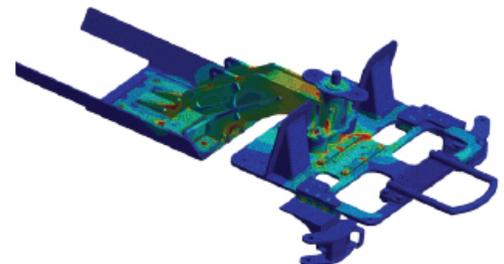


Figure 2. Ansys Mechanical simulation of stress forces on the yoke (center) connecting the two-piece body of the wheeled-bobsled (left and right).

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