

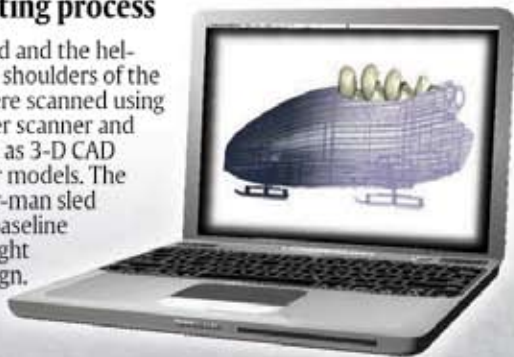
How the USA's four-man bobsled got on the fast track

The USA's four-man bobsled, dubbed the "Night Train," won the 2009 world championships, the first time a U.S. sled won in 50 years. Making the sled fast was the work of the Bo-Dyn Bobsled Project, a collaboration between 1986 Daytona 500

winner Geoff Bodine and Chassis Dynamics. Bo-Dyn turned to Exa Corp., a Massachusetts-based company that makes simulation software for fluids engineering. It used a digital wind tunnel to help design the sled.

The testing process

1 The sled and the helmets and shoulders of the racers were scanned using a 3-D laser scanner and imported as 3-D CAD computer models. The 2008 four-man sled was the baseline for the Night Train design.



2 The model was placed in the digital wind tunnel. Air speed and wind angle were set, and the simulation was run.



3 The digital wind tunnel results were analyzed, and new adjustments were made.



4 Multiple tests were performed, and the results from the computer model were used to build the actual sled.



Photo by Christof Stache, AP

The USA's four-man bobsled, dubbed the Night Train, at the Austria Bob World Cup, on Jan., 24.

Bronze in the blink of an eye

Testing helped reduce the sled's wind resistance by 2% (or two-tenths of a second). In the Torino Olympics, the difference between the gold and bronze medals was four-tenths of a second (the time it takes to blink).

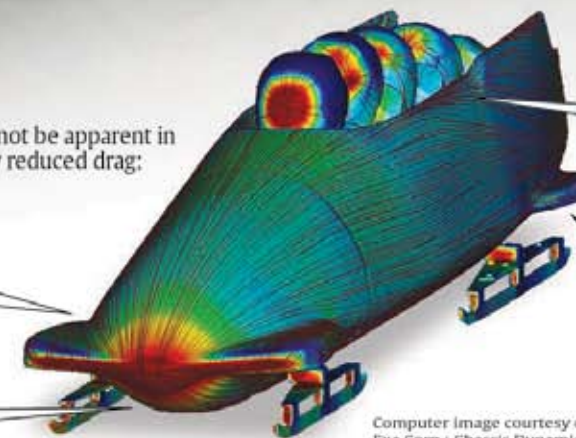
Gold - Germany	3:40.42
Silver - Russia	3:40.55 (+0.13)
Bronze - Switzerland	3:40.83 (+0.41)

The virtual wind tunnel

Shows fine flow details that would not be apparent in a traditional wind tunnel. How they reduced drag:

The front nose and bumper edges are critical for directing the on-coming air. The bobsled design channels the air around the top, bottom and sides of the sled.

The shape under the nose is contoured to reduce the airflow as it hits the rails.



The athletes were studied to find the most favorable positions for them in the sled.

The handles and fins are at optimal positions at the rear of the sled.

Computer image courtesy of, Exa Corp.; Chassis Dynamics