



Mars Rover Components Will Use New Alloy | Product Design and Development

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By Forest City Gears Monday, May 24, 2010

Mars Rover vehicles have been on the Red Planet since January, 2004, sending back a non-stop data stream. Forest City Gear products are used on the Rover wheel drives and deployment actuators.

Mechanical components for the newest Mars Rover, scheduled for launch in late 2011, will use a new titanium-like alloy and, thanks to work by Forest City Gear (Roscoe, IL), will help save the project thousands of dollars per ounce on the final payload.

The components will help execute the mechanical motions for actuators on the rover, including the drive gears, gearboxes, planetary gears and wheel assemblies.

Forest City Gear was selected by Aeroflex, a major contractor on the Rover project, to finish, hob and shape many of the gear designs as well as form gear grind using dozens of CBN wheels built specifically for this project.

One of the pieces, a three-tiered actuator gear used in a drive assembly on the Rover, was made of a titanium-like product, VascoMax. This material was better able to hold the pitch and gear design necessary for the project. VascoMax was also more stable during heat treatments and changed size in a more predictable way than other materials.

“Our relationship with this project began with a modest order from another vendor for some small gears on the first generation Rover wheel drives,” said Fred Young, CEO of Forest City Gear. “The shaping of the high crown design was a problem for the customer’s previous suppliers, who couldn’t get a cutter with enough back-off to successfully cut the crown shape. The crown hobbing had a shorter relief and a different cycle was needed at the back edge.”

To solve the problem, Young suggested modifying the design by shortening the spline face width, widening the relief groove voids and making the acquisition of a smaller diameter hob than could be typically manufactured. In addition, these changes helped reduce the weight of the project, resulting into savings of thousands of dollars per ounce on the final payload.

Manufacturing requirements from Aeroflex also mandated 100 percent inspection of every dimension of every part. Forest City Gear was able to assist with this process by developing software programs able to more easily process the large data files.

For more information visit www.forestcitygear.com/.

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VascoMax is a maraging STEEL, not Titanium. It can be heat treated to extremely high strengths with a yield strength over 300 ksi although it is brittle in this condition.