VULCAN SPRING

Beyond the Spring™

Crafting New Horizons in Aerospace and Defense

Driving success in challenging environments with Vulcan Spring

Beyond the Spring

A critical supplier and partner to the aerospace and defense industries, delivering high-quality springs that contribute to a wide range of applications, Vulcan Spring has established itself as an innovator. With decades of application experience and a commitment to pushing boundaries, Vulcan Spring is a trusted provider of springs for aircrafts, satellites, telescopes, and firearm magazines. This comprehensive guide explores the famous springs used in the aerospace and defense sector and highlights Vulcan Spring's adventurous expertise in custom-building precise springs for aerospace and defense designs.

Hidden Forces in Aerospace Marvels

James Webb Telescope: Pushing the Frontiers of Space Observation

Vulcan Spring's custom springs play a vital role in the awe-inspiring James Webb Space Telescope (JWST), the most powerful space observatory ever built. With its constant force springs, Vulcan Spring eagerly contributed to the success of this groundbreaking mission. The JWST's intricate sunshield membrane, which protects the telescope from external heat sources, relies on Conforce® Springs, or Constant Force Springs, for precise tension throughout its lifespan. As the JWST captures breathtaking images of distant galaxies and explores uncharted planets, Vulcan Spring parts provide the reliable and consistent force needed to ensure the telescope's exceptional performance in the depths of space.

> I just wanted to drop you a note and say thank you for the amazing MTS springs you delivered to us! Our flight MTS assemblies are being disassembled right now to remove the prior vendor's springs, and we'll be installing your springs shortly. Your MTS springs will provide the flight tensioning force to the JWST Sunshield Membrane for the entire life of the spacecraft, while meeting the critical Sunshield Membrane requirements.
>
> — JWST Sunshield Chief Engineer

Igniting Exploration on the Final Frontier: Playing a Crucial Role in Powering the International Space Station

Vulcan Spring products are instrumental in the International Space Station (ISS), a remarkable collaborative effort of scientific exploration and human presence in space. The ISS relies on Vulcan Spring's expertise for critical applications, including solar array deployment systems. By providing the necessary tensioning and reliability, the springs ensure the proper functioning of the ISS's solar arrays, which harness sunlight to power the station and support scientific experiments that pave the way for future space exploration.

The combination of Vulcan Spring's existing springs on the legacy ISS array and new springs for the new arrays contribute to the station's power supply increase of 20% to 30%. Vulcan Spring's contributions to the ISS highlight its commitment to advancing humanity's understanding of space and enabling groundbreaking discoveries.

Shaping Celestial Destinies:
Paving the Way for the DART Mission's Impactful Asteroid Dimorphus

Vulcan Spring's aerospace contributions extend to the extraordinary Deep Space Asteroid Deflection Mission (DART), a joint effort between NASA and John Hopkins APL — the mission aimed to study the effects of a high-speed impact on the orbit of the asteroid Dimorphos. The hinge spring played an essential role in this ambitious undertaking, built to enable the solar array to grab energy from the sun. It allowed critical power generation for the satellite's operations. Our hinge spring proved indispensable, fueling the success of the DART mission and advancing humankind's understanding of celestial bodies in the depths of space.

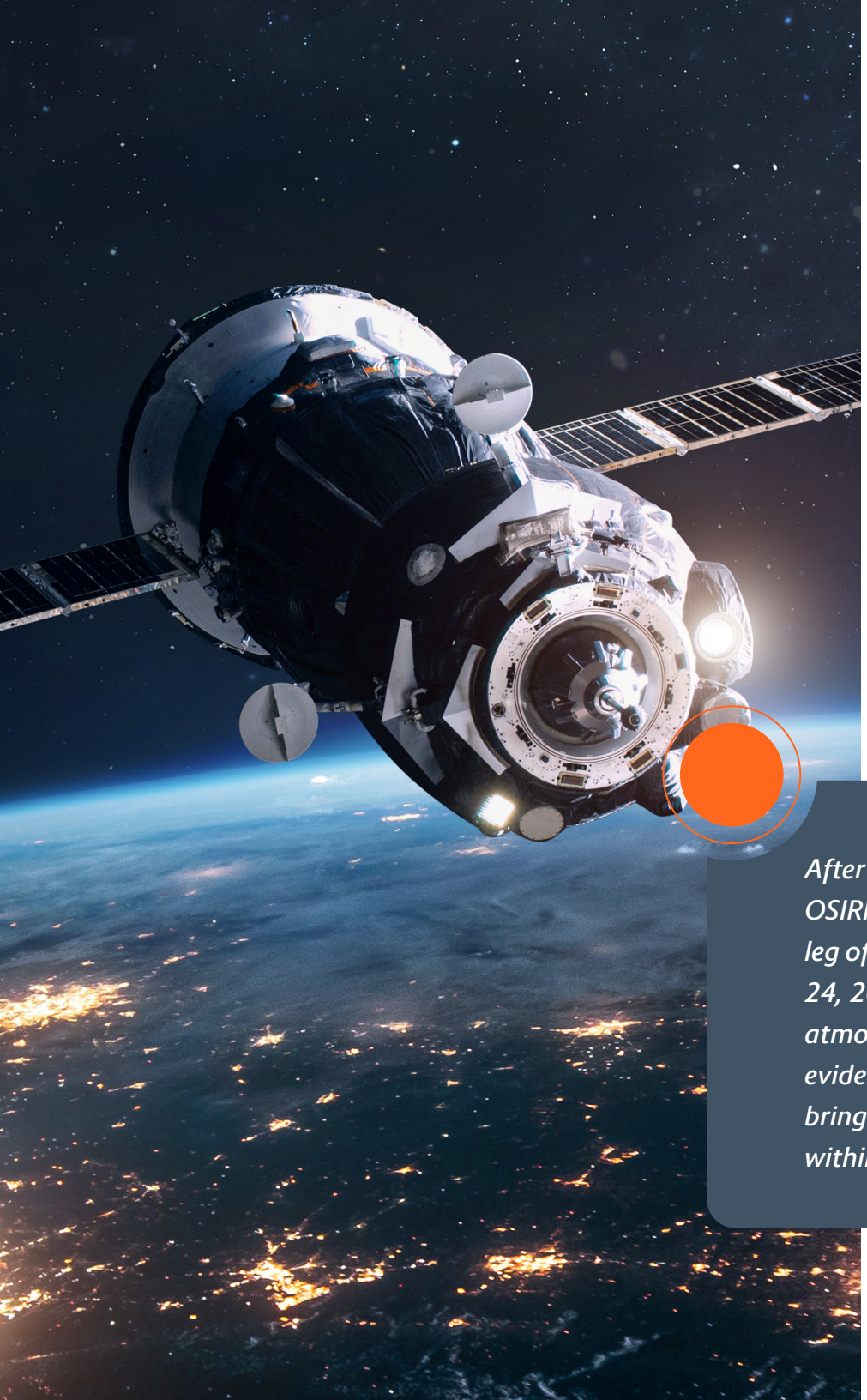
> Vulcan Spring's hinge spring served an important function. When launching the satellite into space, the solar array was positioned against the body of the satellite to keep its size compact. After the launch, the hinge spring actuated, positioning the solar array to be opened so it could gather energy for the satellite.
>
> — Gregory Melanson, Design & Development Engineer II at Vulcan Spring & Manufacturing

Springing Beyond Boundaries: Vulcan Spring's Impact on Mars Exploration

Journeying to Mars has ignited the human imagination since we first became aware of the planet's existence. The Constant Torque, or Contorque® Spring, with its consistent and flat torque curve, played a critical role in deploying the Viking 1 Orbiter's solar panels. With its ability to maintain tension or retraction on cable mechanisms, this innovative spring allowed the solar panels to unfold and position themselves in the open and operational configuration. As a result, the solar panels harnessed the sun's energy, generating 620 W of power at Mars. With Vulcan Spring's Constant Torque Springs ensuring reliable tension and control, the Viking 1 Orbiter circled Mars and captured breathtaking landscape images.

In the case of the Viking 1 Lander, Vulcan Spring's Constant Force Spring became an essential component in the antenna deployment system. This high-force spring, known for its small space requirements and long linear reach, enabled the lander's antennas' precise extension and reliable performance. The Constant Force Spring's ability to store power indefinitely when extended ensured consistent and effective communication between the Mars surface and mission control on Earth. With Vulcan Spring's spring technology at work, the Viking 1 Lander successfully transmitted valuable data and insights from the environment.

These custom springs played an instrumental role in the Viking 1 Orbiter and Mars Lander missions, advancing our understanding of Mars and setting the stage for future explorations. By powering critical systems and facilitating communication in the challenging environment, the springs have left an indelible mark on the history of Mars exploration.



Revolutionizing Space Exploration: Impacting the OSIRIS-REx Mission

Vulcan Spring helped NASA in the historic OSIRIS-REx mission, using their Constant Force Springs in the spacecraft's robotic arm. These springs demonstrated their versatility and reliability by enabling the arm to retrieve samples from Asteroid Bennu. The innovative springs provided the tension and precision required to maneuver the robotic arm with accuracy and control, ensuring the successful acquisition of valuable samples from the asteroid's surface.

After completing two orbits around the Sun, the OSIRIS-REx spacecraft is set to embark on its final leg of the mission, returning to Earth on September 24, 2023. As the capsule enters the Earth's atmosphere, Vulcan Spring's contributions are evident in the culmination of this amazing mission, bringing us closer to unlocking the secrets held within the samples retrieved from Bennu.

Springing Defenses Into Action With Critical Contributions to Defense Applications

From armaments to interior furnishings and controls, springs are essential components in defense systems. Vulcan Spring's commitment to meeting tough Mil-Spec requirements and government regulations ensures that their springs fulfill the demanding needs of the defense sector.

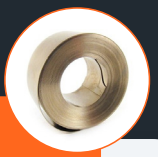
Constant Force and Constant Torque Springs play a crucial role in enhancing the performance and reliability of defense mechanisms, including:

- Armaments
- Aircraft cockpits
- Solar panels
- Firearm magazines
- Interior furnishings and controls
- Seat counterbalances in tanks and Humvees

With our dedication to meet strict Mil-Spec requirements and government regulations, Vulcan Spring continues to provide reliable, high-quality springs that fulfill the demanding needs of the defense sector.

Constant Force Springs

Vulcan Spring's Constant Force, or Conforce® Springs offer a reliable and consistent force output, making them invaluable in defense applications. These springs find use in various mechanisms, such as armaments, where they provide tensioning for components, aiding in accurate firing and recoil control. Additionally, Constant Force Springs are utilized in interior furnishings and controls, ensuring smooth and controlled movement in critical defense equipment.



Constant Torque Springs

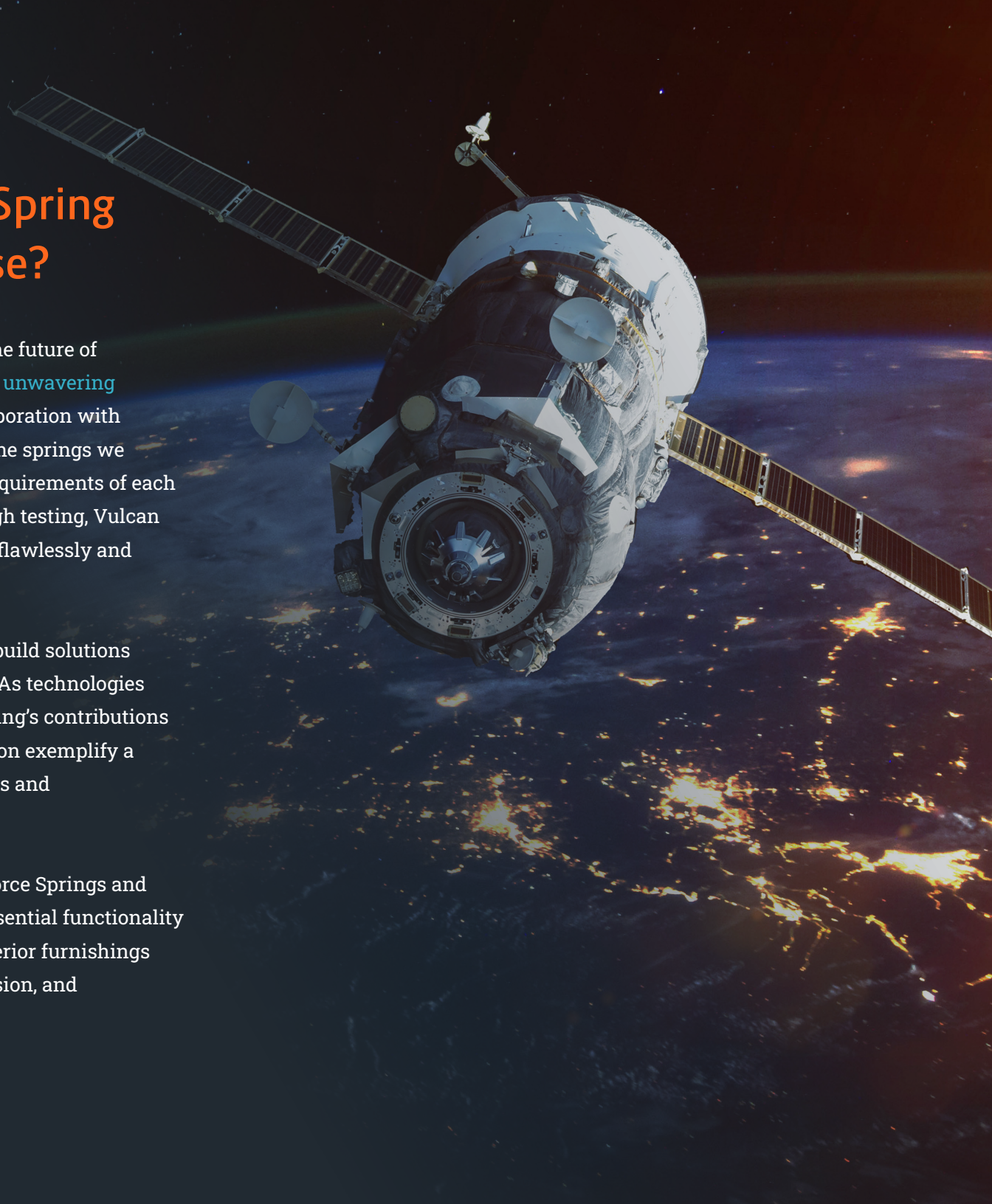
Constant Torque Springs, or Contorque® Springs are designed to provide a consistent and flat torque curve. These springs are utilized in defense applications where precise and controlled movement is essential. They are commonly employed in firearm magazines, enabling smooth feeding of ammunition and reliable performance. Additionally, Constant Torque Springs are integrated into other defense systems, providing tension or retraction control for cable mechanisms, such as those used in communication equipment or vehicle systems.

What's Next for Vulcan Spring in Aerospace and Defense?

Looking ahead, we are poised to continue shaping the future of aerospace and defense with end-to-end support and unwavering dedication to excellence. Taking pride in close collaboration with engineers during the design phase, we ensure that the springs we produce are precisely tailored to meet the specific requirements of each project. By engaging in prototype stages and thorough testing, Vulcan Spring engineers ensure that their springs function flawlessly and deliver optimal performance in critical applications.

In the aerospace realm, Vulcan Spring continues to build solutions playing crucial roles in space exploration missions. As technologies advance and new frontiers are explored, Vulcan Spring's contributions to projects like the JWST, ISS, and OSIRIS-REx mission exemplify a commitment to enabling groundbreaking discoveries and advancements in understanding our universe.

In defense applications, Vulcan Spring's Constant Force Springs and Constant Torque Springs will continue to provide essential functionality in various defense systems. From armaments to interior furnishings and controls, their springs enhance reliability, precision, and performance in critical defense mechanisms.



Empowerers of Aerospace and Defense Success

Partnering with Vulcan Spring means unmatched support ensuring that customers receive tailored solutions meeting their unique needs, from concept to implementation.

By leveraging expertise in spring design and manufacturing, Vulcan Spring contributes to quality. Our ability to meet tough Mil-Spec requirements and government regulations make us a trusted partner in delivering high-volume orders and meeting the stringent demands of the aerospace and defense industries.

As Vulcan Spring continues to provide exceptional springs, we remain an innovator and industry leader at the forefront of advancements. With an unwavering commitment to excellence and the ability to custom-build precise springs for complex applications, Vulcan Spring is poised to shape the future of aerospace and defense, driving progress and enabling remarkable achievements across these dynamic industries.

If you're interested in a custom spring solution to support your next project, reach out to our team of experts with any questions you have.

Contact Us