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The space industry is one of today's most influential technology innovation drivers. New programs such as space missions to the moon and Mars push the boundaries of technology development even more.

Space is a much wider field now and no longer confined to government and military agencies like NASA and its contractors, but expanding rapidly via private commercial companies such as SpaceX, Blue Origin, Cloud Constellation Corporation, and more. Combining novel technologies, emerging operating models, and other innovative ideas, these organizations make the space technology diffusion across multiple economies and sectors, possible. The intelligent interfaces incorporate launch-range data into the National Airspace System; blockchain systems validate remote sensing data; AI and machine learning are applied to space science missions. These and other innovations will together generate substantial value that extends beyond any organization.

In the face of the changes ahead, it is not enough to plan for digital transformation and assume that success will follow. Organizations should look beyond the digital frontier—toward a future state in which change occurs across all mission portfolios and operating organizations.

To help organizations select the most effective space tech solution provider for their business-specific needs to achieve their long-term business goals, we are glad to present the "Top 10 Space Tech Solution Providers - 2020."

Company:
Thermal Management Technologies

Description:
Thermal Management Technologies (TMT) is an engineering and development company focused on satellite thermal control and structures. TMT provides subsystem design and thermal control components including thermal straps, thermal storage units, radiators, small spacecraft structures, and release mechanisms.

Key Person:
Scott Schick, President

Website:
tmt-ipe.com

Thermal Management Technologies

Packing Large Technology into Small Satellites

Outer space, one of the harshest environments known to humankind, requires a satellite to be built with equipment that can dissipate and control temperatures at desired levels in the extreme conditions. Sophisticated thermal engineering is crucial for a satellite to remain reliable and achieve mission success. However, as opposed to their predecessors, many modern satellites are not only power-intensive but also compact, posing challenges in maintaining the satellite's thermal equilibrium. Thermal Management Technologies (TMT), an engineering and development company, provides cutting-edge thermal solutions to help satellites resist temperature fluctuations during its tumultuous flight and while in orbit. "We strive to offer hardware solutions that give our clients higher mission reliability," says Scott Schick, President of TMT.

TMT uses specialized hardware solutions to regulate temperatures during operation. This often includes solutions to spread or absorb heat to maintain the ideal component temperatures. Under an SBIR contract sponsored by the Air Force Research Laboratory, TMT has developed heat spreading multi-functional and near isothermal structures for future missions. These heat spreading structures help control the temperature and disperse heat away from electronic components. Since its initial development, TMT has evolved these heat spreading structures to multiple standard sizes that can be accommodated in various satellite designs. "Our technology saves engineers' time and resources by not having to continuously redesign spacecraft structures for every new design or instrument layout change," continues Schick.

As a spinoff of its heat spreading structural technology, TMT also fabricates deployable thermal radiators. Combined with high thermal conductance hinges, the thermal radiators provide satellites with a large surface area to efficiently reject heat, in turn providing smoother operations and enhanced performance. TMT has used its engineering prowess to create heat sinks or thermal storage units utilizing Phase Change Materials (PCM) to absorb heat from materials during transient heat loads and then dissipate that heat over longer periods of time. The high energy-storing PCM in the storage unit changes phase to absorb the immense heat generated during the operation of power-intensive devices, thereby limiting detrimental temperature rises within the spacecraft. PCM heat sinks are particularly useful in creating compact heat rejection devices that can be fitted into small, high-power satellites. Using licensed technology from NASA, TMT has also developed release mechanisms to provide support for deployable devices such as solar arrays and antennas during the launch sequence.

> **"We strive to offer hardware solutions that give our clients higher mission reliability**

While manufacturing standard thermal management components like thermal straps, TMT provides effective engineering solutions that extend to customized solutions as well. TMT enjoys working with customers right from the start to support their mission success by working with their engineers to develop requirements, perform design and analysis, and hardware fabrication. A client, for example, needed TMT's help in creating a small yet complicated spacecraft packed with electronics, which also posed a significant challenge in controlling component temperatures. TMT worked in collaboration with the client's design team to not only devise a multi-functional thermal solution but also fabricate, test, and deliver flight hardware, all in a year.


Scott Schick

Going forward, TMT aims to acquire more government and commercial contracts as well as push further into the booming international markets for small satellites while maintaining customers at the heart of these developments. With a goal to always stay at the pole position in the market, TMT embraces newer technological developments that align the company with the latest thermal advancements in the industry. "TMT is not just an engineering organization; it is also a firm that takes pride in the customer relations being built when working toward mission success," concludes Schick. AD