



**EXPERT TALKS: SPACE MARKET**  
CHALLENGES OF THERMAL MANAGEMENT APPLICATIONS IN  
SMALL & LARGE SATELLITES

Henkel Adhesive Technologies - Aviation, Space & Rail, April 2021



# AGENDA

- 
- 01 Panel discussion
  - 02 Henkel's Space portfolio overview
  - 03 Q&A

# EXPERT TALKS: SPACE MARKET

## PANELISTS



**Mark Shumbera**  
VP Space Services



**Malik Thompson**  
Aerospace  
Materials Engineer



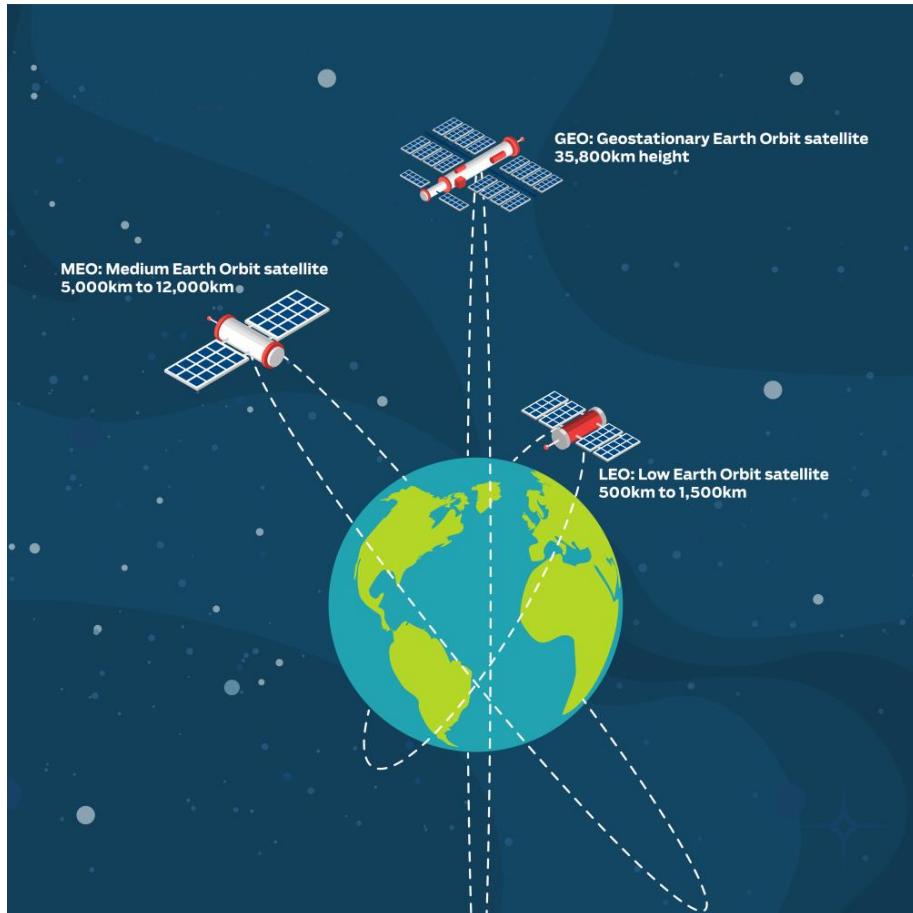
**Ruairi O'Kane**  
Global Head Strategy  
Aviation, Space & Rail



**Douglas Katze**  
Sr. Global Market Manager  
Defense & Aerospace



# ▶ SATELLITE DRIVERS & TRENDS



Source: <https://uk.pcmag.com/software/116630/why-satellite-internet-is-the-new-space-race>

## Large Satellite

- \* GEO orbit
- \* Large size
- \* >500 kg
- \* 30-40 year life span expectancy
- \* 1 satellite every 1-2 years
- \* Government driven

## Small Satellite

- \* LEO orbit
- \* Small size
- \* <500 kg
- \* 3-4 year life span expectancy
- \* 3-4 satellites per day
- \* Private sector driven

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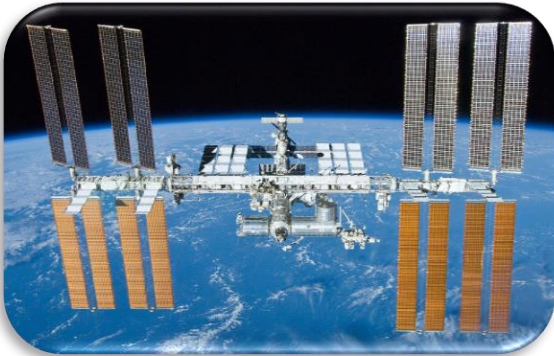




# ▶ HENKEL SOLUTIONS ADDRESSING SPACE INDUSTRY TRENDS

- Mega-satellite constellations massively expanding satellite internet services, communication, media, mapping, navigation and new business ventures.
- Entrance of private companies in an ecosystem previously dominated by well established large conglomerates and government agencies.
- Development of low-cost space exploration activities in pursuit of future tourism, mining, and the colonization of Mars.

## Space Exploration



Source: [https://en.wikipedia.org/wiki/International\\_Space\\_Station](https://en.wikipedia.org/wiki/International_Space_Station)

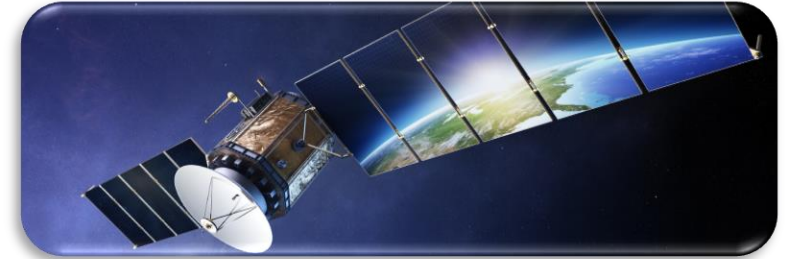
- Thermal management solutions for electronic assemblies
- Materials qualified to NASA outgassing and MIL specifications

## Safe, lower cost, re-usable launch systems



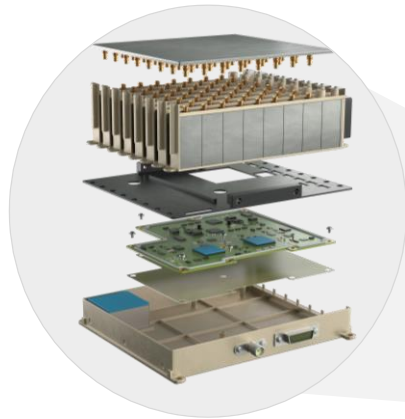
- Composite and multi-substrate bonding
- Automation capable materials
- Thermal management solutions for electronic assemblies

## Growing fleet of smaller satellites

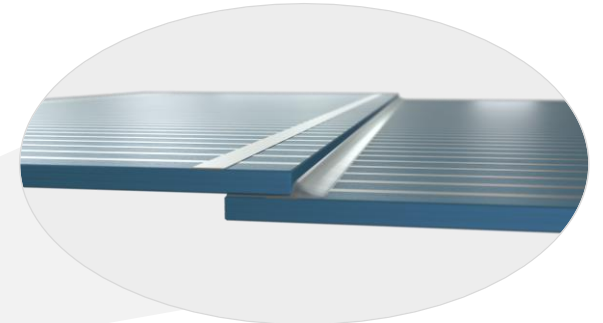
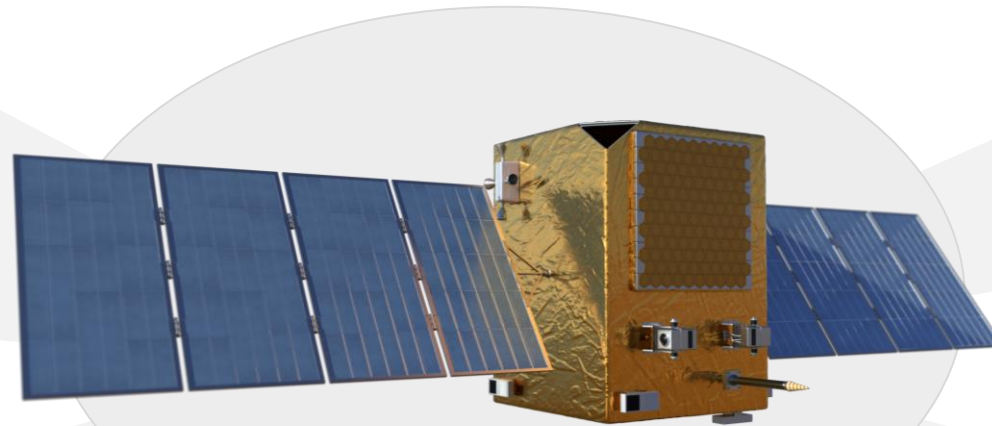


- Durable and reliable interconnect & thermal management solutions
- Materials qualified to NASA outgassing and MIL specifications

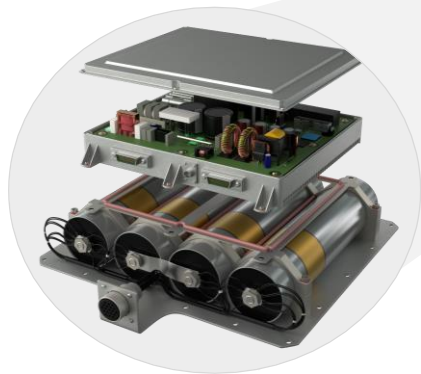
# ▶ HENKEL APPLICATIONS ON SATELLITES



Phased Array



Solar Array



Battery



Optical Sensor



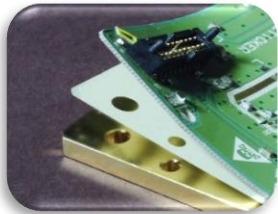
Tank

# HENKEL TECHNOLOGIES

## VALUE ADDED SOLUTIONS FOR SPACE

### Electronic Adhesives

Assembly Film



Electrically Conductive Adhesives



Thermal Management



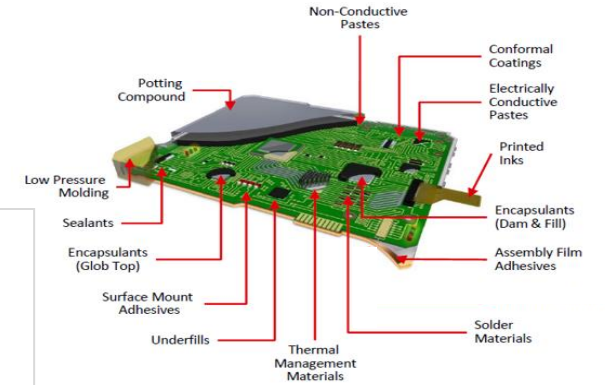
Encapsulation



Printed Electronics



Underfill

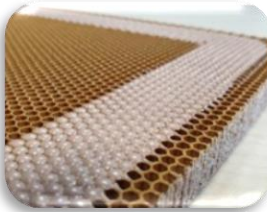


### Structural Adhesives

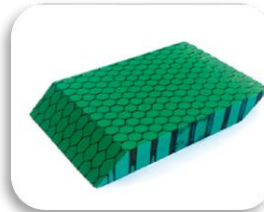
Structural Film



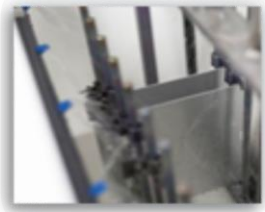
Potting



Syntactic Film



Surface Treatment



### Quality Standards

MIL STD 883  
Method 5011  
Certified

Quality Standards  
AS9100,  
ISO9000,  
TS16949

NASA  
Outgassing  
Certified



# Contact Us



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*\*For additional information,  
please reach out to your local technical representative*

▶ Q&A



AEROSPACE & RAIL

HENKEL WEBINARS - EXPERT TALKS

JOIN US IN THE NEXT EXPERT TALKS!

### Assembly Film: Technical Webinar

**Date:** Wednesday May 19th, 2021

**Time:** 17:00 PM CET | 08:00 AM PDT | 11:00 AM CDT



SCAN ME



Thank you!