THE 1960s: INTO THE SPACE AGE

Man-in-Space/The Military in Space

Space as a valuable and also potentially dangerous warfighting arena arrived in the 60s with tremendous impact both on the nation and on the military. For the nation, the Russian launch of hardware (Sputnik – 1958) and then man (Uri Gargarin – 1963) spurred a national response which began with the first US man-in-space (Alan Shepard in 1963 and then John Glenn (in1965). President Kennedy announced to the world the US intention of landing on the moon within the decade - a promise fulfilled in 1969. The impacts of these development on the military was profound particularly for the Air Force. Surveillance from space for military purposes could be undertaken in partnership with the civil sector interested in weather. Similarly new navigation and communication capabilities could be undertaken by the military in partnership with the civil sector. Weaponizing space was a new dialogue begun in the 60s but it did not gain much traction initially because of the obvious social/political implications. Lasers were introduced in the 60s and would revolutionize the world of electronics and optics and were sufficiently mature by the 80s to be the principal thrust of the national initiative to weaponized space – President's Reagans 'Star Wars' Initiative.

The ML contributions to the military space program emerged full force in the 60s (ref **4**) and remains very strong today. Exactly what the Air Force role in space should be was evolving dramatically in the 60s so ML's agility and presence on the scene to respond effectively with new M&P technologies was very important. After some false starts in military lifting body space/re-entry systems (DYNASOAR) and manned military-in-space systems (MOL) the

Strategic surveillance is a critical capability proved to the nation by the Air Force and the Missile Defense Agency (SDI). The close partnership between the AF and MDA leverages the application of material technologies of mutual interests for DSP strategic surveillance and its successors

Air Force established its primary roles leading the nation in military space: communication, weather, navigation and strategic surveillance. ML made major contributions to all of these and ML technologies for strategic surveillance, the DSP system, provides one of the best examples. The M&P technologies for DSP were also directly applicable to all the other AF space mission areas and later to missile defense.

The role of NASA as an AF space systems partner also evolved and stabilized in this period. For the space systems themselves the Air Force and NASA went essentially separate ways: NASA focused on manned and interplanetary missions while the AF focused on the military space missions. For 'space access' - the rockets to get to space - the AF and NASA were close partners and remain so today. Thus, ML's contributions to all the specific arenas of military space and space access directly benefited NASA and the commercial space sector as well.

Important examples of ML contributions to military space in this period include these: infra-red detectors, high precision space optics, light weigh spacecraft structures, space-stable lubricants, elastomeric seals, space power materials, radiation-protected electronics and spacecraft thermal control coatings. An especially unique and important contribution was ML's lead role for the Air Force space program offices providing direct space environment performance data on all the new materials listed above. NASA was a vital partner here. Several different Space Shuttle Challenger-launched spacecraft were placed in orbit by NASA to gather long-term space environment materials performance data on Air Force materials. The school bus-sized NASA Long Duration

Paul Propp, director of the ML West Coast Office, was one of many ML co-locates who still today provide dedicated & effective liaison to the AF program offices and war-fighters. The WCO, located at the center of AF space & missiles in Los Angeles, was also a place to relax

Exposure Facility (LDEF) returned to earth by Columbia in 1990 was an important example. There were other important space materials characterization opportunities for ML included some on International Space Station Missions. The ML materials from the Space Station were retrieved and returned from space by the Space Shuttle astronauts including Katie Coleman an ML alumni.

Katie Coleman: ML Polymer Branch/Non-Metallic Division Alumni and NASA Astronaut

The Manufacturing Technologies division launched programs to refine production and establish the industrial base for nickel hydrogen (NiH_2) batteries and gallium arsenide (GaAs) solar cells, both critical power sources for space applications.

The ML 'West Coast Office' established in Los Angeles as part of the ML co-located engineering network was at the center of Air Force space and missile system developments. This ML presence at the focal point of military space was vital to success. Mr. Paul Propp director of the office for several decades noted recently that "having been closely associated with the ML space technology program I can say with reasonable certainty that no government laboratory has contribute more applied technology than ML to Air Force space and missile systems. Some of the highlights I offer as candidates for the 100 year celebration are these: spacecraft contamination and control, C/C composites, advanced structural composites, GaAs solar cells and mercury cadmium telluride (HCT) IR detectors".
(Merrill Minges, Paul Propp, Bob Denison)

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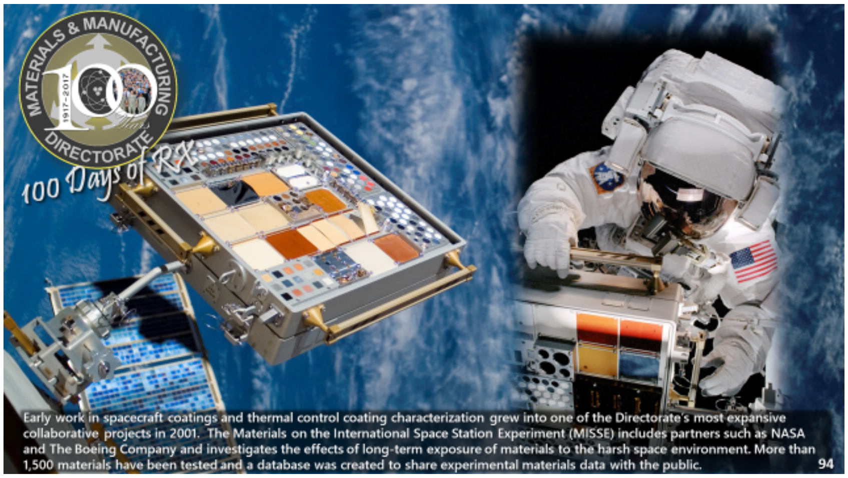
ML in Space Highlights



On orbit Performance of ML Spacecraft Materials & Coatings **(***100 Days # 94***)**

ML Space Craft Solutions for
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ML 'Space Launch' Partnership with
NASA (*100 Days # 83****)***