

LEGACY & HERITAGE OF THE MATERIALS DIRECTORATE

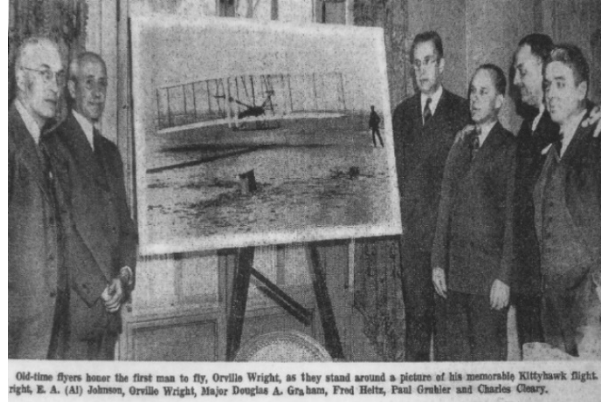
DID YOU KNOW

- **Charles Cleary worked with Orville Wright on Airplane Technologies**

This ML scientist & engineer for whom our 1st & most important award for scientific excellence is named worked with Orville Wright in the early 1940s on technologies for US Air Corp aircraft. These technologies were vital to the nation as it entered WWII

During the work for the 2017 Centennial, the ML/RX history team discovered a photo of them together at the Dayton Engineers Club

Orville Wright, 2nd left, Charles Cleary on the right



- **ABC News Space Consultant and NASA Astronaut (Dr. & Col.) Cady Colman conducted Polymer Research in ML**

Cady logged more than 4,300 hours in space aboard the Space Shuttle and the International Space Station

On one of her Space Station missions she retrieved ML spacecraft materials which had been placed in orbit earlier to evaluate space degradation effects

Cady returned to ML to keynote the Awards Banquet



- **Dr. Karl Strnat Discovered Samarium/Cobalt Rare-Earth Magnetic Materials**

This new family of materials revolutionized the entire arena of the electronics industry where strong powerful magnetic fields are required: e.g., electric motors, magnetic recording, turbomachinery, high power military spacecraft electronic communication devices.

The diversity of commercial applications ranges from high end Fender Stratocaster Guitars, high performance audio headphones, and competitive high-end slot-car racers



- **Twelve ML Researchers have been elected to the National Academy of Engineering**
- **Dr. George Slenski, director of the ML Electronic Failure Analysis Laboratory appeared on national television with the FAA administrator to discuss the Tragic Explosion of TWA 800**

- **General Bernard Schriever at ML**

In July 2021 when the new United States Space Force was created Schriever AF Base was renamed Shriever Space Force Base

Years earlier when Gen. Schriever was directing the creation of the US ICBM System he worked directly with ML. The Laboratory delivered critical new materials and manufacturing technologies for ICBM rockets and missiles

During this period, he visited ML twice:

- *Presenting the Cleary Award to Sid Alinikov*
- *Delivering the keynote address at the national ML conference*



- **ML Director, Col. Dick Saxer, promoted to Lt. General, became Commander of US Ballistic Missile Developments shortly after Gen. Schriever's Retirement**
- **Key Principals of S&T Management and Effective Interpersonal Relationship are the focus of widely attended Seminars developed by two ML leaders: Vince Russo and Jim Mattice**

These entertaining & highly respected seminars have been conducted nationally across the aerospace industry, the Federal Executive Institute, AFRL, AFLCMC and at the leadership level in other Air Force organizations

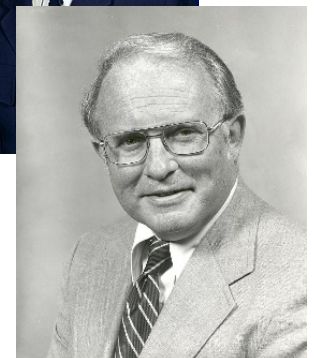
ML pioneered the use of 'Organizational Development' initiatives focusing on the workplace well-being of all its employees. AF system program offices and other AF S&T organizations followed the ML lead in the arena launching similar initiatives focusing on the individual's improved organizational effectiveness

- **Dr. Al Lovelace and Gen. Jim Abrahamson at NASA Headquarters**

After ML director Al Lovelace departed the Laboratory, he moved to AF Headquarters to become director of all AF Laboratories also serving as the principal architect of overall AF S&T Strategy

Soon thereafter he became NASA Associate Administrator and, for a period, the NASA Administrator. He was a member of the National Academy of Engineering

During Al's NASA Headquarters tenure, Gen. James Abrahamson became NASA Deputy Administrator and Director of the Space Shuttle Program. ML worked closely with Gen. Abe in joint programs for The Shuttle. When Gen. Abe became the 1st director of the F-16 program and also led the Missile Defense Agency ML worked closely with him on many different technical issues.



- **Over Two Decades Don Schmidt Created & Managed Important Innovative Programs on a new family of Materials: Carbon/Carbon Thermal Protection Composites**

In 1958, Brenden Forsch at Vought Aerospace, discovered (accidentally) that when a plastic/ceramic fiber composite was pyrolyzed it produced a carbonaceous residue with unusual mechanical properties

In 1963, LTV, NASA and the AF under Don's direction substituted newly discovered carbon fibers for the ceramic fibers producing a revolutionary new class thermal protection (TPS) materials: Carbon/Carbon - 'C/C'

These composites revolutionized the thermal protection system arena. Space re-entry and rocket propulsion depend on high performance TPS, including C/C, as does the Space Shuttle and ICBM systems

Don is Considered by many to be a 'Father of C/C'.

C/C technology has found important applications in other arenas as well: large commercial aircraft brakes (e.g., Boeing 747), cooling of spacecraft electronics



- **Dr. Sonny Pierce, assistant MT division Chief Chosen to be 1st Director of Manufacturing for the F-16 Fighter Program**

The program office director, Gen. Jim Abrahamson, chooses Dr. Pierce to be chief of manufacturing for this new DOD production program destined to be the largest in history delivering over 5000 aircraft for US and international partners.

Some years later at the beginning of Desert Storm operations, another ML senior manager was chosen to be F-16 technical director. During this intense operational period ML helped resolve primary structure safety-of-flight issues and turbine engine failures helping assure combat mission capable aircraft

This is the only instance across all AFRL where two ML managers were chosen for SPO leadership positions



- **ML System Support assistant division chief, Maj. Tom Ferguson, promoted to the rank of Lt. General was appointed commander of ASC (later AFLCMC)**

Tom was a command pilot with over 4000 hours flying time who flew many B-52 combat missions in Southeast Asia

His experience in ML lead him to call on the Laboratory frequently. ML technical expertise was of high value to the Center focused on operational aircraft sustainment issues in many different ASC SPOs.

ML also organized a high level international technical interchange forum for Gen. Franch Ferguson with the French Ministry of Defense.



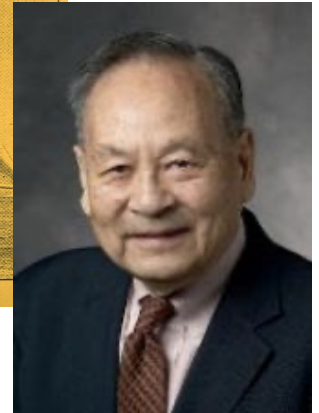
- **ML Chief Scientist, Dr. Steve Tsai, Helps the San Francisco Yacht Club design Revolutionary Composite Dual Rudder's for the America's Cup Challenge**

Dr. Steve Tsai, a member of the National Academy of Engineering is an international authority on advanced composite engineering design. His expertise was one of the most important factors in ML's successful initiatives transitioning this technology into military and commercial aircraft

He and his wife, Iris, both gourmet chefs opened the Mandarin Kitchen in the Dayton Arcade

One of their sons is an internationally known chef and host of the popular PBS program 'Simply Ming'. The James Beard award restaurant, Blue Ginger, near Boston was established by Ming.

Dr. Tsai is Stanford University Emeritus Professor of Aeronautics and Astronautics and founding editor of the Journal of Composites



- **During the Viet Nam War, Air Force Pilots Visited ML seeking Technologies to Eliminate Lethal Combat Threats**

A-10, Gunship & forward observation aircraft pilots in close air support along the Ho Chi Minh Trail and elsewhere reported significant threats from surface to air missiles

ML electro-optical specialists reviewed combat engagement footage and conducted extensive face to face interviews with combat pilots.

Effective solutions were quickly identified and introduced in the field.

The specialized facilities established for this effort remain in operation at ML today



- **2 AFRL Leaders Reached the Highest Position in the Air Force for S&T Policy Management – Both were from ML: Dr. Al Lovelace & Jim Mattice**

In the Office of the Secretary of the Air Force, the deputy assistant Secretary has responsibility for developing and implementing overall AF S&T policy and programming.

It is a '3-star' level position which also provides oversight of the Air Force Research Laboratory. These two ML managers are the only leaders from AFRL who have held this position

Special note was made of issues affecting ML especially assuring a robust AF ManTech program which often came under attack.

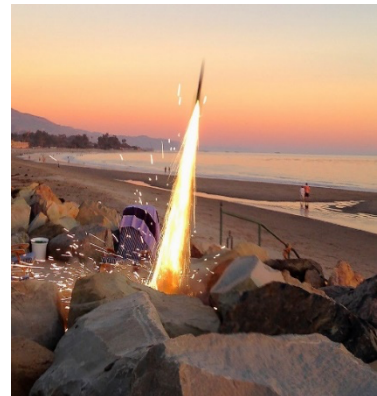


- **Dr. Bill Fredericks ML division Director and Nationally Known Expert on Infra-red Electro-Optics is Chosen Chief Scientist of the Missile Defense Agency**

As chief of the Electromagnetic Materials Division Bill formed a group of electro-optical experimentalists and theoreticians who built unique new ML inhouse measurement facilities

This expertise propelled ML to the forefront in the US and internationally developing revolutionary new infra-red sensor systems. Foremost among these were mercury cadmium telluride for short/mid-wave IR and extrinsic silicon for the far IR.

The ML developments proved vital for USAF strategic surveillance, for tactical surveillance (in partner with the Army Night Vision Laboratory) and for the Missile Defense Agency.



- **ML Director George Peterson Inducted into the Science and Engineering Hall of Fame**

This honor was in recognition of George's career long dedication directing national programs which have brought advanced composites into all Air Force systems. He has been elected to the National Academy of Engineering

These programs were extraordinarily successful not only for the Air Force but for the broader US aviation industry and around the world.

Well after WWII aircraft systems were still built entirely of metals. George's programs offered industry cost effective high performance composite options to replace metallic structures. Today for both the civil & military arenas the percentage of composites in aircraft spacecraft & missiles is well over 50%

His advocacy of this technology early in the 1960s convinced Gen. Schriever to embrace George's vision and aggressively support new ML initiatives



- **Gen. Jim Abrahamson, Director of MDA, Visits ML**

The director of the Missile Defense Agency toured the ML Laser Hardening facility which was undergoing major upgrades to meet new AF and missile defense requirements.

The key information this new facility provided was two-fold:

- 1) *how powerful did laser weapons have to be to destroy enemy laser weapons*
- 2) *how vulnerable were US systems to laser weapons threats*

Quantifying these key laser effects enabled ML to lead the development of new technologies to protect ('harden') AF aircraft, space craft and missiles from these threats

Parallel ML developments in strategic surveillance technologies were vital to MDA and the Air Force as well



- **Dr. Gary Denman, ML director, becomes director of DARPA**

Gary began his ML career In the System Support Division's Thermal Systems Engineering Group making important contributions to the transition of new ML developed C/C composites for the US ICBM system.

Some years later he broadened the focus of this group to apply its ICBM expertise to the newly emerging missile defense arena.

Partnering with other Air Force Laboratories, DARPA & AF Headquarters he established a major new ML in-house facility: The Laser Hardened Materials Evaluation Facility – LHMEF. This laboratory provided key information on laser weapons effectiveness and the threat these devices posed for AF systems.

Gary's successful decade long ML 'laser hardening' program provided technologies to protect AF systems from these threats.

After departing DARPA Gary became President and CEO of GRCI aerospace corporation

