Chronological History of the Air Force Materials Laboratory

Evolution of the ML (RX) Organizational Structure

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- 1917 – The U.S. Army Signal Corps established a collection of laboratories for chemistry, metallurgy, textiles, and wood at McCook Field, Dayton, OH.[1](p.349)
- 1919 – The Army created the Army Air Service and the laboratories above became the Materials Section of the Engineering Division in the Army Air Service.[1](p313)[2](p44) (The Army Air Service was the forerunner of the US Air Force). The Materials Section consisted of 6 Branches: Chemical, Metallurgical, Physical Testing, Textile, Wood, and Rubber.[2](p36)
- 1920 - early 1930's - personnel in the Materials Section/Branch barely exceeded 35 people.[1](p.349)
- 1922 – The Materials Section now under J.B. Johnson, remained relatively stable with the Textiles and Rubber Branches combining and a Camouflage Branch added. A Planning Branch was also added at this time. [2](p36)
- 1926 – The Army Air Corps was formed and the Materials Section became the Materials Branch of the Experimental Engineering Section within the Materiel Division.[1](p44,p64,p313) [2] The organization remained the same, except the Camouflage Branch was phased out.[2](p.35)
- 1927 – The Materials Branch moved from McCook Field to the new Wright Field.[1](p59)[2](p40) Thirty people were assigned to the materials group at the time of the relocation.[2](p44)
- 1930 – One significant change occurred in the organizational structure in 1930. The Wood Unit was eliminated and a Metals Unit was

[1] Splendid Vision, Unswerving Purpose: Developing Air Power for the United States Air Force during the First Century of Powered Flight; History Office, Aeronautical Systems Center, Air Fore Material Command, United States Air Force, 2002
[2] History of the Air Force Materials Laboratory, Five Decades of Materials Progress 1917-1967)

created, since by this time metal had replaced wood as the primary aircraft structural material.[2](p.57)

- 1939 - Contracts with industry to conduct research and development programs began in this time period, and grew during WWII.[2]
- 1939 - The Materials Branch became the Materials Laboratory of the Army Air Corps Engineering Division. The Engineering Division at Wright Field had seven laboratories: Aircraft, Propellers, Power Plants, Materials, Equipment, Photography, and Armament.[2](p67)
- 1939 – Research in advancement of materials in the laboratory was a ceaseless struggle against the demands of procurement support and service problems. In 1939, the Laboratory hired 3 PhD's to stimulate the in-house research and separately formed the Service Liaison Group (later Applications Branch and later Systems Support Division) to support service problems.[2(p67)]
- 1939 - A Physics Unit was established. Their research in the early 40's included instrument lighting, optical glass for camera lenses and glass and transparent plastics for window and windshield applications.[2(p62)]
- 1940 - With the war looming on the horizon, activities in the Materials Laboratory rapidly expanded and personnel grew from 40 to 100 by 1941.[2(p67)]
- 1940's – As war funding increased the contract program also grew from $14,083 in 1940 to $147,150 in 1944.[2](p69)
- 1941 – As personnel grew to support the war effort, the Materials Laboratory was reorganized into 11 units. These units were Administration, Chemical, Machine Shop, Metallurgical, Physics, Production Test, Services Liaison, Special Test, Structural and Mechanical Test, Textiles and Rubber, and Welding. [2](p68)
- 1940-1945 – People within the laboratory grew from 100 to 241 and funding within the laboratory grew from $151,000 to $500,000.[2](p71,p69)
- 1946 – But as the war ended personnel strength dropped to 183 and to 120 by 1949. This led to a significant increase in the contract program. Contract funding grew from $219,000 in 1945 to $2,397,000 in 1950 to $26,997,000 in 1960 and $52,596,000 by 1965.[2](p76,80))
- 1949 – As Manpower dropped to 120, there was a need for some consolidation, but with a growing contract program, the consolidation was only from 11 units to 10 Branches. The Branches were: Materials

and Administration, Project Control Records and Process, Packaging, Chemical, Metallurgical, Structure and Mechanical Test, Physics, Textile and Rubber, Machine Shop, and Welding.[2](p79)

- 1950 – The Air Research and Development Command (ARDC) was established to consolidate all USAF R&D and testing and the Materials Laboratory became part of Wright Air Development Center (WADC).[2](p78)
- 1950 – The outbreak of the Korean conflict intensified research and build-up of manpower. Between 1950 and 1952 manpower tripled from 122 to 360.[2](p80)
- 1953 – This growth of personnel led to another reorganization of the Materials Laboratory in 1953. While it still maintained 9 technical branches, 4 administrative level organizations had been added and several technical branches had changed. New branches included Analysis and Measurement; Petroleum Products; and Protective Treatments.[2](p95)
- 1956 – As manpower continued to grow, so did funding. The Laboratory decided to let 6 support contracts to reduce routine work and to reorganize from the 9 technical branches to 6 technical branches: Textiles, Organic Materials, Protection Processes, Metal, Analysis and Measurement, and Technical Services.[2](p103)
- 1956 – ARDC set up committees to formulate long range plans. The Materials Committee's Long Range plan called for a "Materials Central" involving the inseparable functions of materials development and materials application to be a focal point of materials knowledge within the Air Force.[2](p98)
- 1957 - Prior to 1957 most development was to support in-service problems and materials in acquisition development. In 1957, the importance of looking to future requirements was recognized with the formation of a basic research program to pursue long-term R&D.[2](p106)
- 1957 - The Directorate of Research was combined with the Directorate of Development to from the Directorate of Laboratories. This organization took steps to reducing-service engineering program workload. As part of this operation the Materials Laboratory transferred approximately 2000 materials and process specification to the various Air Materiel Areas. Aeronautical materials specifications totaling almost 900 were retained.[2](p104)

- 1959 - Wright Air Development Center was re-designated as the Wright Air Development Division (WADD) and The Materials Laboratory was placed under the Directorate of Advanced Systems Technology and became Materials Central accomplishing a milestone of the Materials Long Range Plan.[2](p110)
- 1960 - The reorganization of Materials Central resulted in 4 sub-laboratories: Nonmetallic Materials Laboratory; Metals & Ceramics Laboratory; Physics Laboratory; and Application Laboratory.[2(p111)]
- 1960 - The Fuels and Lubrication Branch of the Propulsion Laboratory was transferred to Materials Central.[2(p112)]
- 1961 – The dream of a single facility designed specifically for materials research and development originated in this time period. A request for a complete new facility to house Materials Central was submitted for higher headquarters consideration. It was to take 14 years of resubmissions and other battles before the first of these buildings were completed in 1975.[3]
- 1961 - General Schriever transformed ARDC and AMC into two new commands: Air Force Systems Command (AFSC) (that included research through production) and Air Force Logistics Commands (AFLC).[4](p24) The Wright Air Development Division (WADD) became the Aeronautical Systems Division (ASD). A Directorate of Materials and Processes was created under ASD and Materials Central came under this organization. At that time the Manufacturing Methods Unit of the Industrial Planning Division of the Aeronautical Systems Center was transferred to Materials Central and became the fifth laboratory (Manufacturing Technology Laboratory). [2] (p112)
- 1962 – A Research and Technology Division (RTD) was formed under AFSC to support the Secretary of Defense in his desire to strengthen laboratory structure and improve in-house capabilities. From early conceptual planning the Laboratories were to be under RTD. In 1963 organizational changes were made and the Materials Central became the Air Force Materials Laboratory under this Division, along with the Aero Propulsion Laboratory, Avionics Laboratory, and Flight Dynamics Laboratory.[2](p116)

[3]History of th Air Force Materials Laboratory (Vol II, Part I, The Military Construction Program)

[4] Wright from the Start by James F. Aldridge

- 1963 – General Schriever convened "Project Forecast." This study to forecast post war science and technology needs involved nearly 500 personnel form federal agencies, institutions of higher learning, corporations, and nonprofit organizations. It helped focus both technology and systems development for the next 10-25 years.[2](p125) [4](p35)
- 1965 – The Advanced Filaments and Composites Division was formed and funding was approved for an Advanced Development Program (ADP) for Advanced Composites.[2](p125)
- 1966 - The Laboratories under the Air Force Materials Laboratory became Divisions by this date.[2](p127)
- 1967 – RTD was disestablished and the laboratories transferred to AFSC's Director of Laboratories.[2](p145)
- 1967 – Director Dr. Alan Lovelace initiated a formal organization development program. This was the first such program in the Air Force and possibly DoD. It set the stage for cross-division personnel mobility for career development, expansion of the co-located engineer program, the evolution of the Lead Division/Focal Point System, development of roadmaps of current and planned programs, and other Organization Development initiatives.
- 1970's – The Materials Laboratory implemented new management concepts of corporate goal definition, management by specific technical areas ("Focal Areas"), detailed planning and assessment ("Roadmaps), in house/contract research correlation and technology transfer from R&D to Air Force Systems. The Materials Laboratory further improved its support to customers by emphasizing rapid technology transfer, systems support and location of personnel at key customer facilities.[5](p52)
- 1970 – AFML adopted a Lead Division/Focal Point Concept for the management of materials exploratory research and development.[5](p.63)
- 1971 – The Advanced Structures Advanced Development Program is created in the Flight Dynamics Laboratory as a joint program with the Materials Laboratory. ML is assigned the Deputy Program Manager of this program and assigns scientists and engineers to that office.

[5] History of the Air Force Laboratory (Vol II, Part IIIA, People and Events 1965-1977)

- 1972 – President Nixon signs the FY 72 Military Construction Appropriations Bill, which included $11,335,000 for the first increment of a new Air Force Materials Laboratory complex.[3(p.24)]
- 1972 May 22 – Ground Breaking Ceremonies were held for the first increment of the new AFML laboratory complex.[3(p.25)]
- 1972 – A Laser Hardened Materials Advanced Development Program was proposed and funds were released to develop an in-house laser resistant materials technology capability, which became the Laser Hardened Materials Evaluation Laboratory (LHMEL).[5(p.95)]
- 1975 – The Air Force Materials Laboratory was federated along with 3 other laboratories into the Air Force Wright Aeronautical Laboratories (AFWAL). At this time the Aerospace Research Laboratories (ARL) that was formed in 1948 as the Applied Research Section of the Engineering Division was disbanded, and parts of the staff and facilities were transferred to the Air Force Materials Laboratory.[5(p.129)]
- 1975 May 16 – The first part of the new Materials Laboratory (Buildings 65l, 652, and 653) was completed and dedicated. Building 651 housed the Physics Division. Building 652 housed the Systems Support Division. Building 653 housed the laboratory administrative organizations.[5](p.131)
- 1976 – The LHMEL facility is first opened. It was further upgraded to a 100-kW laser in 1985-1989 and used to support the Space Defense Initiative. Subsequent upgrades have been in fiber lasers (near infrared wavelength vs CO2's long wavelength) with 10-kw capability in 2009, 20-kw in 2014, and 60-kW in 2019.[5](p.146)
- 1977 – A Program Management Directive for "The USAF Program for Integrated Computer Aided Manufacturing (ICAM)" was issued.[5](p.165)
- 1983 Jul 22 – A Ground Breaking Ceremony was held for the start of construction of Building 654.[3](p.29)
- 1985 Mar 29 – the Army Corps of Engineers signed a contract for construction of Building 655 the third and final phase of the Lab's facilities modernization effort.[3](p.29)
- 1985-1993 – The Strategic Defense Initiative (SDI) was created by President Ronald Reagan. The Materials Laboratory played a significant role in this Initiative. Two programs were managed by the Laboratory in High Energy Lasers and in Structural Materials. The first initiative was the Space Survivability Program. To protect space

assets from laser attack with special emphasis on space sensor protection. Another effort with Lethality and Target Hardening program jointly worked with the Phillips Laboratory to provide data on the adversary's potential to harden targets or our lasers. The second initiative in structural materials was managed by the Materials Laboratory across the Materials Laboratory, the Flight Dynamics Laboratory, the Weapons Laboratory, and the Propulsion Laboratory and involved light-weight materials, vibration damping, and other related materials.

- 1987 Aug 13-15 – Finally, Buildings 654 and 655 were completed and dedicated. At that time they housed the Non-metallic Materials Division and the Metals and Ceramics Division.[3](p. 30)
- 1988 – AFWAL was replaced with the Wright Research and Development Center (WRDC) and the Air Force Materials Laboratory became the Materials Laboratory in this Center. The Manufacturing Technology Division became a separate Directorate within WRDC. The Manufacturing Directorate portfolio expanded to include the AF Industrial Base Program and the DoD Defense Production Act Title I and III efforts with the intent to place more emphasis on reducing cost within the AF Industrial Base.
- 1990 – WRDC became Wright Laboratory (one of the four Air Force Super Labs) and the Materials Laboratory became the Materials Directorate. The four super labs were: Phillips Lab, Wright Lab, Rome Lab, and Armstrong Lab.
- 1990 early years – Director Dr Russo initiated a manpower development initiative across the laboratory. It was based on the concept of "Total Quality Management." Training modules were developed to strengthen team building. Other modules included "How to Make Presentations;" "How to Conduct Meetings;" "Management"; and others. (I don't remember official names of these training modules).
- 1992 – The Materials Directorate had 341 people, including 63 with doctorate degrees, 71 with master's degrees, and 79 with bachelor's degrees. The Directorate was managing more than $100 million in science and technology funding.[6](p.5)

[6] Wright Laboratory Materials Directorate, 1992 Brochure

- 1995 – The Coating Technology Integration Office was established to address environmental aspects of Paint stripping, coating application and long-term corrosion control.[7](p.9)
- 1997-1998 – The Air Force Research Laboratory (AFRL) was created and the Materials Directorate and the Manufacturing Technology Directorate were once again united as the Materials and Manufacturing Directorate.
- 1997 – With the formation of AFRL, Environmental and Airbase Technologies at Tyndall AFB, FL were re-assigned to the Materials and Manufacturing Directorate.
- 1997 – With the formation of AFRL, three program offices at the logistic centers (Non-Destructive Evaluation, Corrosion, and Composites) were moved to the Materials and Manufacturing Directorate.
- 2007 Oct 1 – AFRL/ML becomes AFRL/RX
- 2012 – The Divisions in the Materials and Manufacturing Directorate were reorganized from five technical divisions to four, with four mission support divisions. At this time the environmental and airbase technologies functions at Tyndall AFB, FL were divested.
  Technical Divisions:
  Functional Materials Division (RXA)
  Structural Materials Division (RXC)
  Manufacturing and Industrial Technologies Division (RXM)
  Systems Support Division (RXS)
  Mission Support Divisions
  Integration and Operations Division (RXO)
  Financial Management Division (RXF)
  Management Operations Division (RXR)
  Contracting support to RX is provided by the R&D Contracting Division (RQKM) of RQK.
- 2019 – Contracting Support formally became a division of the Laboratory making it very much a part of the RX leadership team, while still reporting through AFRL/PK for supervision.[8]
- 2019 – Financial Management while still a part of the RX leadership team, now reports to AFRL/FM for supervision.[8]

[7] Wright Laboratory Materials Directorate "Providing Materials and Processes to Meet the Challenge." 1996
[8] Personal notes from Mr. Timothy Sakulich