History of the
Analytical Instrumentation Facility (AIF) at NC State

Jacob L. Jones, January 2018

Preface

I was first introduced to the AIF in 2012. At that time, I was told that AIF history dated to 1923. However, I could find only very limited information about its history. In 2017, in response to a request by an administrative unit for some historical information, I started a more active project to identify historical documents and compile a written history of the AIF. As part of this process, I reached out to several individuals who had interacted with the AIF in the past for documents and deeply scoured the university archives of printed materials. I photographed over 200 pages of historical documents in the archives through access provided by the NC State Libraries Special Collections including unit annual reports, memoranda, and letters. The result is this comprehensive historical description of the facility.

I hope that this document serves as a useful historical record and, equally, that it provides an example of how a research and service unit adapted to the evolving needs of the institution and society over nearly a century. As I executed this project, it was interesting to see recurring discussions in the history concerning the mission and challenges of a research service facility, for example the intermixing and demixing of research leadership and research service functions as well as the challenge of recruiting and retaining skilled staff to serve the facility under the constant threat of competitive industrial salaries. This was a fun project and I hope it is useful for its readers.

Acknowledgements

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Historical Overview

In 1923, the Engineering Experiment Station was created by the Board of Trustees of North Carolina State College of Agriculture and Engineering (as it was known then) after appropriations were made by the North Carolina General Assembly in that same year. The Station was the School of Engineering's "research agency" and supported the School's extension mission. The Station leveraged the internal resources of teaching faculty and students to serve engineering and manufacturing industries of the State with a focus on utilization of natural resources of the State (e.g., minerals, wood). Initial projects undertaken by the Station included those focused on roads, houses, furniture, ores, and highways. Projects undertaken in the first few decades of the Station were conducted both independent of other Departments and in cooperation with other Departments. In the 1930's, the industrial research in minerals grew and more work in the Station shifted to this focus.

In 1946, the Station was renamed to Department of Engineering Research and its mission remained mostly the same: to support fundamental research, promote utilization of natural resources, and provide research services to industry. In the years following World War 2, the Department grew substantially, paralleling a national growth in post-war research and facilitated by the creation of the first PhD programs in engineering disciplines of ceramics, electrical engineering, and chemical engineering in 1949. Research expenditures in the Department grew from $145k in 1949 to ~$1M in 1962.

In 1964, the Director wrote to the Dean that faculty and department heads in the school should assume a major responsibility for the research program, signaling a major shift in belief in the College that research leadership should be moved to the academic Departments and that the current Department of Engineering Research should provide research services to those Departments, while continuing to service the industries of the State. This shift was discussed for several years and resulted in a reorganization in 1971. Research faculty in the Department were transferred to academic departments and the unit was renamed to Engineering Research Services Division to emphasize the non-academic and service functions of the unit. The mission of the Division was to provide research services and facilities to: 1) academic departments within the School, 2) other schools within the University, and 3) North Carolina industries and other institutions and governmental agencies. The Division included 10 service units including the electron microscopy facility, x-ray facility, mechanical testing lab, and precision machine shop. It also provided a contracts and grants administrative function to the entire School, a role that would later be transitioned to a different unit.

Since microscopy is a strength of the present-day AIF, it is useful to note that the first evidence for an optical microscope was found in 1935. The first evidence for an electron microscope was found in 1969, with the ordering of a JSM-2 scanning electron microscope (SEM). However, an "electron microscopy laboratory" was established within the unit in 1951, suggesting that such services existed before 1961. In 1979, Larry Monteith, then Dean of Engineering, requests to the Chancellor that an "assistance center" be established to house microscopes and other equipment that is too expensive for individual researchers to maintain. In 1981, the Division therefore became a "research services support unit" by transference of the contract and grant administrative functions to another office. In 1982, the name "Analytical Instrumentation Facility" was adopted for the materials characterization laboratories. The mission was to provide services to academic departments in support of instruction and research, to industry, and to state and federal laboratories. This remains the function of AIF today (2018).

In 2011-2012, NC State invested in a premier aberration-corrected Scanning Transmission Electron Microscope (STEM) and a Focused Ion Beam instrument. These instruments elevated the AIF to a state-of-the-art center for electron microscopy and materials characterization and were followed by NSF Major Research Instrumentation grants acquisition of an extreme-resolution SEM (2013) and STEM with cryogenic capabilities (2018). From 2011 and onwards, the facility enhanced interactions with what is now known as the Office of Research, Innovation, and Economic Development (ORIED). A reorganization in 2012 made AIF more coordinated with the academic activities of the institution, placing a tenured faculty member in the Department of Materials Science and Engineering (MSE) as Director. The AIF continues to report to the College of Engineering, is led by a tenured MSE faculty member, and was named a University Core Research Facility at NC State by ORIED in 2017.

Interesting and Unusual Facts

For 9 years between 1924 and 1933, A. F. Greaves-Walker (Professor of Ceramic Engineering) conducted a personal survey of the entire State to assess clays and shales of North Carolina for potential commercial promise for ceramic industries of the State. This survey was decades before the Interstate Highway System and vehicles had top speeds of ~40 mph.

Ceramic and mineral research started at the genesis of the unit, in 1923.

The first publication in the area of polymeric materials was in 1946 and titled, "Flammability characteristics of plastic materials."

The Engineering Experiment Station purchased a Chevrolet Station Wagon in 1939 and made it available for use by several other Engineering departments.

Professor R. W. Stiemke from the Department of Civil Engineering was Director of the Station for less than a year before being drafted for active military duty as a Sanitary Engineer in World War 2. The Head of the Department of Civil Engineering appealed to the selective service that Stiemke remain at State College to teach sanitary engineering coursework. Nevertheless, he was required to report for duty in July of 1944.

William G. Van Note, Director of the Station from 1946 to 1951, left his position in 1951 to become the President of Clarkson College of Technology (now Clarkson University).

The Minerals Research Laboratory in Asheville reported to this unit starting in 1954 and continuing for several years, at least until 1971.

Between 1956 and 1981, the organized research within the unit was focused mainly on minerals and materials research.

Early X-ray diffractometers, such as that shown later in this document in 1964, did not utilize X-ray shielding. Users were expected to keep body parts out of the X-ray beam. This was common of all X-ray facilities nationwide in these early years of X-ray diffraction experiments.

In 1970, it was recommended that the unit be renamed Division of Engineering and Testing Services (DEATS). This name was never adopted.

In the 1980s, several of the instruments were interfaced to computers. A computerized accounting system was adopted earlier, in 1974.

In 1981, the name Analytical Instruments Laboratory (AIL) was proposed, but never adopted.

Complete Chronological History

1923 – Genesis of the Engineering Experiment Station

In early spring 1923, a report was issued by George F. Zook, a specialist in higher education from the U.S. Bureau of Education in Washington, DC. The report, commissioned at the request of the College President W. C. Riddick, reviewed the structures and functions within the university and made a series of recommendations. The report recommended, among many other actions, that, "the engineering experiment station, which was organized a short time ago, should be given a definite appropriation." The motivation of such a station is that the college address a variety of research problems where the solution is of consequence to the industries of the State. "This is another very important channel through which the college can more effectively serve the State and extend and deepen its influence with the people."

On June 9, 1923, appropriations were made by the General Assembly for the "Engineering Experiment Station" upon the recommendation from the College's Board of Trustees. The station was to be "the research agency in engineering" to support extension work for the School of Engineering and intended to address engineering issues of local state and regional concern. The Technician (Sept. 28, 1923) reports that an appropriation was made by the State legislature to establish the Station. According to a general information fact sheet put together by Harry Tucker in 1938, $20,000 was allocated by the State for the Station at this time, though "all of these funds never became available." The college's budget report for 1923 (dated May 28, 1923) shows a recommended State allocation through the college of $5,200.

In September 1923, the President and Board of Trustees officially established the Station and appointed Mr. Howard Burton Shaw as its first director, effective September 8, 1923. Shaw was a native of Tarboro, NC, was educated at the University of North Carolina, and received his Master's degree from Harvard University in 1894. For seventeen years, 1896 to 1913, Shaw was connected with the University of Missouri as assistant professor, and dean of the School of Engineering. He served five years in the latter capacity when he was elected for a four-year term as Public Service Commissioner of the State of Missouri. Shaw's appointment as Director lasts until at least 1928, if not longer.

Shaw and a committee composed of Dr. W. C. Riddick, Dean of Engineering, and the heads of the various engineering departments were to have charge of the administration of the station, and the station would keep in close touch with the engineering and manufacturing industries of the State and assist with the solution of their problems. A complete survey was to be made of the natural resources of the State with a view of determining the best methods of their utilization. The results of work in research would be made available to students, and will go out to the public in the form of bulletins, to be issued from time to time, through an engineering extension department. The purpose of the Engineering Experiment Station is as follows:

1. To make, publish, and distribute the results of such studies, tests, investigations, and research as will be of the greatest benefit to the people of the State of North Carolina, to its engineers, to its industries, and to its engineering teachers.
2. To make research upon which to base education in engineering.
3. To adapt and to aid in the use and spread of engineering knowledge, thought, and the best modern practice generally among the citizens of the State.
4. To investigate resources, environs, processes, products, and markets, and in this way join in the progressive development of the State, of its industries, of its engineering works, and particularly in the economic utilization of its resources.
5. To make research which will aid in the extension of the boundaries of engineering knowledge.

Though the official date of establishment was 1923, The Technician (Sept. 28, 1923) reports says that this establishment followed an "agitation lasting for more than six years." Thus, the ideas or activities underpinning an Engineering Experiment Station had initiated in 1917 or earlier. However, no records of this activity could be found.

1924 – Research Projects Undertaken
By 1924, the projects being undertaken by station included:

- "Investigations of the Blank Spaces in the Wave Spectrum"
- "Roofs, Chimneys, and Flues, with Special Reference to Permanency and Fire Protection"
- "Tests of House Heating Plants"
- "Tests of House Electric Lighting Plants"
- "Joints in Furniture Construction"
- "Investigation of the Vegetable Oil Industry"
- "Tests of North Carolina Brick and Tile"
- "Traction on Highways"
- "Reduction and Refining of North Carolina Ores"

Initiated in the summer of 1924 and completed in 1925, Professors McIntyre (Electrical Applications) and Cox (Electrical Engineering) invented, with the aid of student assistants, a "double current and triple current electric furnace for the reduction and electrolysis of metals from native ores."

1927 – Dissemination of Results
The first Bulletin is published by the Experiment Station, which was entitled "County Roads: Organization, Construction, and Maintenance," by Harry Tucker (Professor of Highway Engineering), James Fontaine (Research Assistant), and L. D. Bell (Teaching Fellow). The report was distributed free upon request.

1928 – Research on Building Materials
The second Bulletin is published by the Experiment Station, which was entitled "Tests of Face and Common Brick Manufactured in North Carolina," by A. F. Greaves-Walker (Professor of Ceramic Engineering) and James Fontaine (Research Engineer). For their tests, they used brick representative of those manufactured in North Carolina in 1928. According to the preface written by H. B. Shaw, "This investigation demonstrates that brick are manufactured in North Carolina of quality to satisfactorily meet all requirements." The report was distributed free upon request.

1932 – New Director
Harry Tucker becomes Director of the Experiment Station in July of 1932. No State funds were appropriated for the Station in 1932-1933.

1933 – Growth of Interest in Minerals in North Carolina
Bulletin 5 of the Experiment Station is published, which is entitled "Occurrence and Physical Properties of North Carolina Marble," by Jasper L. Stuckey and James Fontaine. The price of the report was 20 cents and was printed at the State's Prison Printery in Raleigh, NC. According to the report, "A fairly large number of tests were made based on specifications of the United States Bureau of Standards." Physical properties reported include hardness, compressive strength, color, texture, specific gravity, absorption, porosity, and polish. In the 1935-1936 annual report, Bulletin 5 was said to have received "an unusual amount of favorable attention from geologists and others throughout the country," with requests for copies coming from "numerous foreign countries."

Bulletin 6 was published and, which is entitled "The occurrence, properties and uses of the commercial clays and shales of North Carolina," by A. F. Greaves-Walker, N. H. Stolte, and W. L. Fabianic. The price of the report was 50 cents. The work reported in this report was carried out continuously from 1924 to 1933 and included a personal survey of the entire State by Professor Greaves-Walker and preliminary testing to determine which deposits offered the most commercial promise to the ceramic industries of the State. Test reports include physical, chemical, and mineralogical properties measured at the Station.

1935 – Microscopes Acquired

Records from 1945 indicate that a Spencer microscope ($139.50) and a Spencer photomicroscope ($103.50) were purchased in November of 1935. There is no evidence of a microscope in the Station beforehand, though it may have existed.

In Harry Tucker's annual report, some of the projects being pursued at this time include the use of North Carolina gravel in concrete mixtures (funded by the North Carolina Gravel Producers), the development of forsterite refractory from olivine, refractory cement from pyrophyllite, and insulating brick from North Carolina shales.

Regarding strengths and new opportunities, the report states, "Except for several State Departments engaged in special work, this institution is the only place in North Carolina where the facilities are available for making thorough investigations of engineering problems, and, particularly, for determining methods for utilizing the natural resources of the State." The following areas are thought to be opportunistic and were recommended for exploration: economic use of North Carolina materials, better utilization of all materials including steel products, the general field of hydraulics, and engineering economics.

For fiscal year 1935-1936, income consisted of a $1000 appropriation, $81.14 in receipts from sales of the Bulletins, $200 from the North Carolina Institute of Government for printing one of the Bulletins, and $408.12 from North Carolina Gravel Producers for the gravel project. The appropriated funds and funds from sales of the Bulletins were used to purchase $580.01 in equipment, $426.50 in printing expenses, and $74.63 in general office expenses. For the next fiscal year (1936-1937), a request of $8,000 is made for appropriations, a value that is noted as large relative to past funding, but justified by comparison to Engineering Experiment Stations at other institutions. The report also notes that the Director of the Station has carried on the work of the Station in addition to a full teaching load as Professor of Highway Engineering; it is recommended that the position become a full or half-time Director position.

1936

Records from 1945 indicate that a strength tester ($144) and a hydraulic press ($139.50) were purchased in 1936.

1937

Bulletin 14 was published on the topic of "The Location and Distribution of the Ceramic Mineral Deposits of North Carolina" by A. G. Greaves-Walker and S. G. Riggs, Jr. The price of the Bulletin was 25 cents. There are at least 20 minerals cataloged including quartz, olivine, mica, granite, feldspar, barite, and talc. Maps of most known deposits of these minerals in the State are given. The Bulletin is intended for miners, processors, and manufacturers of mineral products both within and outside of North Carolina.

Inside the front cover of Bulletin 14 (October 1937), the Engineering Experiment Station is said to be "engaged in an organized program of research consisting of individual projects carefully defined and approved, which are carried on by engineering teachers." A. F. Graeves-Walker is the acting director. The purpose of the Station is now said to be:

1. The investigation of resources and processes, through experimentation and tests, with the object of opening and developing wider fields for the use of the natural resources of the State.
2. Cooperation with industrial organizations in the solution of technical problems, which require such facilities and equipment as are available at State College.
3. The coordination of research work undertaken by the Engineering School.
4. The publication of the results of experimental and research projects made by the Engineering Experiment Station and the several engineering departments of State College.

In a Memorandum Concerning Activities of the Engineering Experiment Station, dated November of 1937, it is said that the activities of the Station since its 1923 inception are conducted partly independent of other Departments and partly in cooperation with other Departments. For the past five years (1932-1937), practically all activities have consisted of assistance from one or two other Departments. The report notes that "lack of time for research projects" by teachers in the Engineering

School as probably the biggest difficulty in connecting with Station activities. The have limited time for research due to their high teaching loads. The report also states that, since the Station is only place in the State equipped for testing all classes of materials, it receives and responds to requests from across the State for tests (sometimes without compensation). The hiring of staff is discouraged. “For the present, it is probable that a well-maned staff is not necessary. In fact, it is doubtful whether such a staff is needed.” This philosophy will change a few months later in February 1938, as described below.

For fiscal year 1937-1938, $3100 was appropriated which included $1000 for equipment. In this year, the expenditures show the purchase of a spencer lens ($79) and a microscope from Eimer and Amend, a chemical and microscope supplier ($33). In November of 1937, Dr. Stuckey donates a microscope to the Station at the request the station install a “universal stage.” The stage would be installed by Leitz, a microscope company.

1938

A 9-page information booklet authored by Harry Tucker provided “general information” about the Engineering Experiment Station in the form of Q&A. This is the first known record of promotional materials generated from the Station. Within this document, a case is made for dedicated staff, stating that “one or two full time men could immediately be used advantageously.” These staff could work cooperatively with the teachers in the execution of the research projects.

Appropriations were compared to prior years: for the fiscal year 1932-1933, no appropriations were made for the Station. For the fiscal years of ’34, ’35, ’36, ’37, and ’38, appropriations were made in the amount of $200, $200, $1000, $2110, and $3100, respectively. These values are compared to appropriations for engineering experiment stations available at other leading engineering institutions such as University of Illinois ($237,278), Purdue ($131,930), and Iowa ($65,856). For the fiscal year 1938-1939, a budget request of $19,700 was made.

The Station had a laboratory footprint of 2,700 square feet and the space and equipment was also used for instructional purposes. At least 80 students per week used the equipment. The major equipment included a 150,000 pound testing machine, a 15,000 testing machine, one “high powered microscope,” a cantilever beam testing machine, machines for cutting, grinding, and lapping, a concrete mixer, and tire testing equipment. Some of the equipment was donated by the Highway Engineering Department, State Highway Commission, North Carolina Gravel Producers, and various Departments. A need was stated for a 250,000 pound testing machine, which would cost $6,000.

1939 – Purchase of a University Vehicle

A Chevrolet Station Wagon was purchased by the Engineering Experiment Station. The vehicle was obtained for transportation in connection with several research projects at the Station. However, it was desired that it be available for use by the several Engineering departments for their use in official duties. The vehicle seats ten persons and two rear seats can be removed to haul supplies and equipment.

1940

Records from 1945 indicate that a 300,000 pound compression testing machine was purchased for $1500.

1943 – Ceramic Dielectrics Reported

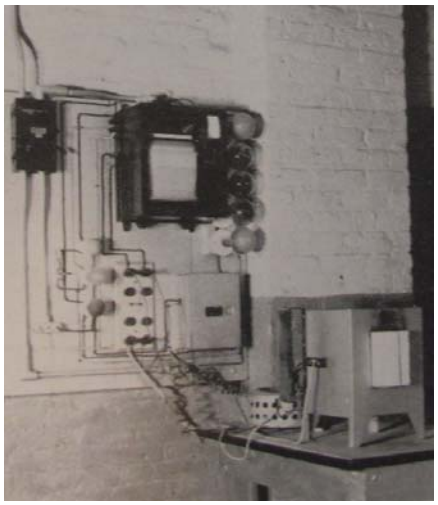
Bulletin 25 was published on, “Ceramic Dielectric and Insulator Materials for Radio and Radar Instruments,” by R. L. Stone, Associate Professor of Ceramic Engineering. The price was 50 cents. The 50+ page bulletin provided the theory of dielectrics, classification of insulators, general survey of properties, processing methods, and the design of parts.

In September 1943, Professor R. W. Stiemke of the Department of Civil Engineering was placed in charge of the Experiment Station. He would keep this position for less than a year before being called for active duty in the Army. The budget for fiscal year 1942-1943 was $3,714, with the two greatest expenses being equipment ($2k) and printing ($550).

Records from 1945 indicate that a metallographic specimen mounting press ($135) and a muffle electric furnace ($85) were purchased in 1943.

1944 – Call for Industrial Research Projects

The Station sent a letter and a mimeographed bulletin to approximately 125 industries that outlined the purposes of the station and the services available to the industries of the State. Several responses were received. Some new requests for testing could not be fulfilled due to personnel and equipment limitations due to the war. In the fall of 1943, the Station also sent an appeal to members of the faculty to stimulate interest in research. However, the faculty were devoted to an army training program and had no time available to engage in any type of research. It was planned that the Station occupy the west wing of the Engineering Laboratories Building.



A small electric furnace equipped with thermostatic controls for use in "expansion tests." The furnace can reach 1,900°F. From Bulletin 24 (1942).

The budget request for fiscal year 1943-1944 included funds for a Rockwell hardness tester ($400) and a three point loading device ($250). A financial statement covering fiscal year 1943-1944 shows appropriations of $6,440 and a residual (unspent) balance of $918.43 at the end of the fiscal year. Approximately $650 was spent on equipment.

Since September 1943, Professor R. W. Stiemke of the Department of Civil Engineering was in charge of the Experiment Station. Stiemke received a notice in April of 1944 through the selective service to report to active duty in the Army through the U.S. Public Health Service and assigned to work as a Sanitary Engineer. The Head of the Department of Civil Engineering, C. L. Mann, sent an appeal to the selective service that Stiemke remain at State College to teach sanitary engineering coursework. However, the appeal did not result in a change to his status and, on July 5, 1944, he was required to report for duty.

1945 – Emphasis on North Carolina Minerals

A.F. Greaves-Walker published a 6-part series of bulletins through the Engineering Experiment Station, to outline the need for developing and investing in North Carolina minerals. The bulletins describe "the location of the deposits and enumerate the possible uses of various minerals, with the hope that North Carolinians may be interested in developing new mineral industries during the post-war period." Greaves-Walker points out that North Carolinians "have usually permitted these remarkable deposits either to be rapidly depleted by foreign corporations, which shipped the minerals to other states for processing into manufactured products, or remain undeveloped." The bulletins advocate investing efforts to develop and retain these resources locally, particularly during the years following World War II.

1946 – Renamed to Department of Engineering Research

On June 4, 1946, Engineering Experiment Station was renamed Department of Engineering Research by action of the Board of Trustees. William G. Van Note served as head of the department until 1951, followed by N. W. Conner and R. F. Stoops. This department included staff and faculty members who devoted their full time to research that was oriented to serve the State's industrial needs. The Department continued to serve as the research agency for engineering at NC State College and work closely with the departments of Ceramic, Mining, and Geological Engineering. The Department had three aims: 1. To support fundamental research in the field of applied sciences, 2. To develop new or improved processes that will provide wider utilization of natural resources of the State, and 3. To offer industry, both large and small, research services devoted to the solution of technical problems and the development of new products.

In December of 1946, the first bulletin on polymers was published, "Flammability characteristics of plastic materials," by E. M. Shoenborn (Professor of Chemical Engineering) and D. S. Weaver, Jr. (Research Fellow in Chemical Engineering).

1948

Starting in January 1948, the Department published a news quarterly called Engineering Research News, a journal that disseminated the work of the faculty to the public. The research department was greatly assisted by private support in addition to significant increases in state funding.

In 1947-1948, the Department supported 14 total projects, two in Chemical Engineering, five in Mechanical Engineering, three in Sanitary Engineering, one in Engineering Mechanics, one in Electrical Engineering, and one in Industrial Engineering. Additionally, the Department had eight contracts from outside agencies for major investigations. Some examples include the Wolverine Tube Company, Fostoria Pressed Steel Company, the War Production Board, and the U.S. Bureau of Mines.

The budget from the State was $54,720, which was used to support 11 people. Eight additional full-time staff were supported from outside contracts totaling $79,500.

1949 – PhD Programs Grow Research Emphasis

In NC State College of Engineering, the first PhD programs in ceramic, electrical, and chemical engineering were established by recommendation of a committee formed by John Harold Lampe, Dean of Engineering since 1944. In 1951, additional programs leading to doctoral degrees in nuclear engineering and engineering physics were established. In 1953, the first engineering doctoral degree at State College was awarded in 1953 in electrical engineering.

Staff of the Department of Engineering Research included 11 full-time State-supported personnel, 7 full-time sponsor-supported personnel, 8 part-time State-supported personnel (6 of whom are students), and fifty part-time sponsor-supported personnel (42 of whom are students). 8 Bulletins were published. The budget from State funds was $69,680. The budget from outside contracts was $76,061.30, which included the Navy Department, Watson Laboratories, Brick and Tile Service, and the American Refractories Institute.

1951 – Subdivision into Laboratories

The 1950-1951 annual report states, “in the expansion of services for the school research program, particularly prominent were the development of the precision machine shop, the electron microscopy laboratory, and the x-ray laboratories to high levels of effectiveness.” This was the first year that the Department was in the new Riddick Engineering Laboratories Building.

William G. Van Note resigns as Director on October 1, 1951 to become the President of Clarkson College of Technology (now Clarkson University).

1952

On February 1, 1952, N. W. Conner was appointed Director of the Engineering Research Department. N. W. Conner serves as head of the Engineering Research Department until 1967. For the fiscal year 1951-1952, the amount of outside contracts totaled $118,716.

1953 – External Contracts Grow

The amount of outside contracts increased significantly to approximately $650,000. A total of 108 research projects were undertaken. It was said that the precision machine shop, x-ray diffraction laboratory, electron microscopy laboratory, continue to efficiently serve the school. Reported as a major development is the creation of the high voltage laboratory, a facility operated jointly with the Department of Electrical Engineering.

1954 – Incorporation of Minerals Research Laboratory in Asheville

The State appropriated budget was $116,824 and contracts for work totaled approximately $600,000. The research was carried out by 26 full-time employees of the university and 70 part-time workers. Of the 70 part-time workers, 61 were students, which reflects cooperation between the education and research missions of the institution.

On July 1, 1954, the Minerals Research Laboratory in Asheville came under the administration of the Department of Engineering Research at NC State. This laboratory has a technical staff of 4 persons

and operates a State appropriated budget of $25,664. Between July 1, 1954 and May 16, 1955, 12 major experimental projects were undertaken by the Minerals Research Laboratory dealing with the development and utilization of the State's mineral resources.

1955
The budget from State appropriations is $102,995. $450,000 in external contracts are reported. The "Engineering Research News" continues to be an effective quarterly news journal for the School.

1957
The budget from State appropriations was $103,816. A total of 21 research projects were undertaken, 6 of which are basic research and the other 15 are of industrial interests of the State. The total value of all sponsored contracts was $495,000. Director Conner comments in the annual report that there seems to be a College-wide growing trend of de-emphasizing research and graduate education in favor of the undergraduate programs.

1959
Total research expenditures were approximately $628,000, which included contract research, Minerals Research Laboratory, the Industrial Experimental Program, and the Nuclear Reactor Project. The Minerals Research Laboratory completed 18 experimental projects.

A 500 W nuclear reactor was moved to the Bureau of Mines building and activated July 13, 1959. On July 1, 1959, the State purchased the building neighboring the Minerals Research Laboratory in Asheville for $65,000. It was known as the Brown Building.

X-ray diffraction apparatus is used by metallurgical research team in the search for new compounds. Prof. Hans Stadelmaier is at the left (1964 Summary Brochure).

1960 – Staffing is a Challenge
In March, the Engineering Department sees completion of a 10 kW nuclear reactor in the Burlington Laboratories Building. The first critical experiment was carried out on March 16, 1960. State appropriated budgets and contract research top $730,000.

From 1957-1960, the major problems confronting research in engineering are the difficulties in securing adequate staff for research and adequate compensation for these staff members. Competitive salaries from industry are seen as a constant threat.

1962 – Research Expenditures Approach $1M
Research expenditures from both State appropriations and contract research totaled more than $966,000. This was noted as a substantial increase from the 1951-1952 amount of $129,000.

1964 – Shift in Research Emphasis to Academic Departments
In a confidential letter to Dean Fadum, Director Conner wrote, "the faculty and more importantly the department heads of the school, must assume a major responsibility for the development of a substantial research program."

1965
An Engineering Research Committee headed by Dr. Warren McCabe published a report containing a recommendation that "scientific research activities in the Department of Engineering Research be transferred to the appropriate academic departments" and that the Engineering Research Department be "reorganized to provide extensive additional research services."

1967
R.F. Stoops became Head of the Engineering Research Department with oversight for research activities within the School of Engineering and the Minerals Research Laboratory in Asheville. Stoops earned a B.S. in Ceramic Engineering at NC State in 1949 before completing his M.S. and Ph.D. at Ohio State University.

1968
The Engineering Research Department now operated: 1. administrative unit for processing of proposals and their administration, 2. machine shop, 3. electronics repair shop, 4. metallurgical research group, 5. ceramic research group, 6. pyrochemical research group. It administers grants and contracts amounting to approximately $1,300,000, a significant growth from 1953 levels. State budget is $173,562.

University faculty and administrators continued to discuss the 1965 committee recommendation to move research into academic departments and expand the service role of the Engineering Research Department, while maintaining a unit that serves the industries of the State for service work. Professors Hans S. Stadelmaier (metallurgy), Hayne Palmour (ceramics), and R. F. Stoops (pyrochemicals) are in the Department of Engineering Research. However, they are considered to be repositioned within the Department of Mineral Industries as a 9-month faculty. They could still use the services of the Engineering Research Department. In the 1981 reorganization documentation, it would again be recommended that their faculty-rank positions transfer from the unit to the Department of Materials Engineering.

1969 – First Electron Microscope Ordered
On July 29, 1969, a new electron microscope is ordered, the JSM-2. It would arrive at least 2 years later. This is the first known electron microscope found in NC State University history.

1970 – Demixing of Service Role, Support for Research, and Independent Research Functions
A report is issued by the NSF Materials Steering Committee on the reorganization of the Engineering Research Department. V. T. Stannett chairs the committee. There are six other members, including H. H. Stadelmeier, H. Palmour, and L. K. Monteith. The report describes how the Engineering Research Department, originally founded to serve the industrial needs of the State, now has both a service and support role for research as well as a strong independent research program in materials. To emphasize the nonacademic and service function of the unit, the committee recommends the name be changed from Engineering Research Department to "Division of Engineering and Testing Services" or DEATS. It is further recommended that "good, sound engineers be employed who would occupy themselves with service functions, short-range industrially oriented research programs, and developmental projects for North Carolina industry. Care should be exercised in the appointment of new people to insure [sic] that DEATS does not evolve another major academic function."

The name DEATS was not adopted, but the university did approve a plan for reorganization of the Department into a new unit of the School to be named the Division of Engineering Research Services. The overall mission of the new Division is to provide research services and facilities to academic departments within the School, to other schools within the University, and to North Carolina industries and other institutions and governmental agencies.

To enable the Division to perform better its technical service function, ten service units were established, which include (with responsible person in parenthesis):

- Electron Microscopy Facility (H. Palmour)
- X-ray Facility (H. H. Stadelmaier)
- Electron Probe Microanalyzer Laboratory (H. H. Stadelmaier)
- Emission Spectrographic Laboratory (J. C. Hurt)
- Precision Machine Shop (W. E. Griffin)
- Electronic Service Shop (K. R. Brose)
- Mechanical Testing Laboratory (K. R. Brose)
- Magnetic Properties Laboratory (H. H. Stadelmeier)
- Thermoanalytical Laboratory (H. Palmour)
- Thermodynamic Properties Laboratory (R. F. Stoops)

1971 – Renamed to Engineering Research Services Division

The former Engineering Research Department is renamed to become the Engineering Research Services Division. The Director also administers the NC State University Minerals Research Laboratory in Asheville. R.F. Stoops remains head of the division until 1981. On March 1, 1972, Chancellor John T. Caldwell authorized the change in name to Engineering Services Division. The Division contains a machine shop, electronics shop, and a number of specialized instruments.

The mission of the Engineering Research Services Division is:

1. To offer to industry, both large and small, engineering services devoted to the solution of technical problems.

2. To develop new or improved products and processes that will provide wider utilization of the resources of the State.

3. To provide to the academic departments research support services such as machine shop, electronics shop, and the provision and servicing of a number of specialized instruments.

4. To administer the research, training, and equipment grants and contracts of the School of Engineering, including fiscal control.

1974 – Exemplary Business Office, Computerized Accounting Systems, and Student Training

The Office of Business Affairs in the Division is doing excellent work and it is recognized across campus. “The Division is very proud of the fact that the personnel in the Office of Business Affairs considers our contracts and grants office to be the best such ‘cost center’ on campus. Currently, we are assisting another school of the University to revise its contract and grant administrative procedures.” The Office of Business Affairs is also undergoing a conversion to a computerized accounting system.

The Division placed much greater emphasis on providing research services. A policy of the Division is to “train students and faculty members to use the instruments.” The Electron Microprobe Facility is said to have reached “full maturity as a service and research facility.

Total expenditures administered by the Division for 1973-1974 were $1,831,613, an 8.5% increase from the previous year.

1977 – X-ray Facilities Improved While Electron Microscopes Age

The x-ray diffraction facility was substantially improved by the acquisition and installation of solid-state electronic data processing equipment. The electrical components that were replaced were 25 years old. Additionally, a local firm donated an x-ray diffraction camera and a Laue camera. An Edax nondispersive x-ray analyzer was acquired a couple years back on a lease-purchase agreement. In 1977, the University purchased the equipment.

A major problem is the age of the two electron microscopes. The TEM was inoperative during most of the year, even though it was covered by a service contract. The annual report recommended that "some means must be found for replacing major items of scientific equipment."

The North Carolina Science and Technology Committee gives $25,000 towards the purchase of a new scanning transmission electron microscope. The additional $75,000 to $100,000 required to purchase the instrument needs to be found.

1979

Budget from State appropriations for fiscal year '78-'79 was $346,837, $230,985 of which is for Exempt from Personnel Act (EPA) staff. The electron microscopes were not state-of-the-art and funds for their replacement were being sought.

Dean of Engineering Larry K. Monteith, requested to Chancellor Joab Thomas the establishment of a "Research and Technical Assistance Center" that would include, "an electron microscope, microprobes, and other expensive equipment which no single department or school can afford to buy or maintain." Monteith notes that these instruments are important to many research faculty and in some instances provide the only opportunity for meaningful research.

1980 – Computers, Statistical Analysis of Data, and Collaboration with RTI

John C. Russ starts interacting with the Division. Russ is an expert in "analytical instrumentation and in interfacing minicomputers to instruments." This expertise came at an ideal time for the Division and had a catalytic effect on the Division's activities. Using only $7,500 in funds, Russ improved the analytical capabilities of the Division that would have otherwise cost $100,000. The Division acquired a used sputtering unit as a gift (which cost $64,000 when it was new) and crystal growing equipment was loaned to the Division (which cost $123,000 when new).

Much of the basic research being conducted within the Division is by Dr. Robert F. Davis, Professor of Materials Engineering, who holds a joint appointment with the Division and his academic Department. Dr. Davis had three active grants from three different federal agencies to study diffusion and creep in silicon carbide and niobium carbide and to study single crystal epitaxy and characterization of beta silicon carbide. Dr. Stadelmaier, Research Professor of Metallurgy, completed a study on cobalt lanthanide borides and is now studying magnetic properties of iron lanthanide carbides. He was also collaborating with the Research Triangle Institute on the characterization of vapor phase epitaxial zinc silicon arsenide.

John C. Russ and Thomas M. Hare developed "totally new techniques to measure and describe heterogeneous fine-grained microstructures" using a "microcomputer-controlled scanning electron microscope and x-ray spectrometers coupled with statistical methods to interpret and refine data."

1981 – Division Becomes a Research Services Support Unit

From 1968, if not earlier, the Division had provided administrative grant and contract management support for the entire School. The 1981 report says that fiscal administration of the contracts and grants of the School of Engineering was transferred to a new Office of Administrative Services in the 1980-1981 fiscal year. This transfer allowed Dr. Stoops (Director of the Division) to devote more time to research and technical services.

On July 1, 1981, research faculty in the Engineering Research Services Division were transferred to the Minerals and Materials Program under the direction of Dr. Hans Conrad, Head of the Department of Materials Engineering. With this change, the division became a "research services support unit." According to the 1980-1981 annual report, the remaining personnel were to be organized into two groups

which would report directly to Dean Hart. The two groups were to be the Analytical Instruments Laboratories, to be headed by John C. Russ, and the Electronics and Precision Machine Shops, to be headed by King R. Brose. It was hoped that the new organization structure will help with continuing concerns over adequate funding for operation and equipment replacement and for equitable salaries for professional employees.

1982 – Analytical Instruments Facilities (AIF)

The 1981-1982 annual report evidences that the name Analytical Instruments Facilities (AIF) was adopted instead of Analytical Instruments Laboratories. Services were to be provided to academic departments in support of instructional and research programs, to industry as appropriate and to various state and federal laboratories.

The AIF offered services in electron microscopy, x-ray and metallography, and ion microprobe. One scanning electron microscope (SEM) and one transmission electron microscope (TEM) were available. The SEM saw substantial usage, but TEM usage was generally light. The SEM was now equipped with a backscatter detector which enabled one to discern atomic number or place differences in materials. An X-ray analyzer system (Tracor-Northern TN-2000) was added to the SEM this year. In the X-ray and metallography laboratories, there was an existing x-radiography instrument and an electron probe microanalyzer instrument. Two X-ray diffraction instruments (manufactured by GE) were transferred to the AIF in Burlington Hall from Page Hall. One of the XRD instruments was being computer-automated for high precision scans. Optical microscopy was available with polarized light and interference capability, as is a wide variety of sample preparation equipment (cutting, mounting, polishing, etching), and hardness and microhardness testing.

A CAMECA ion microbe (model IMS-3F) was ordered and site preparation was underway. This new capability would permit surface analysis and depth profiling for all elements, including isotope separation.

1983

The only electron microscope reported this year is a Hitachi H-800 Scanning Transmission Electron Microscope. The electron microscopy laboratory responded to over 53 requests for services, totaling $41,617 in activity. Examples of research projects include calcium distribution in coal by X-ray mapping and gallium arsenide identification by X-ray.

The X-ray diffraction facilities are said to include five X-ray generators, five diffractometers, ten powder cameras, a Guinier-Jagodzinski camera, Weissenberg camera, two Laue cameras, a high temperature powder camera, and assorted attachments for holding and oriented samples. X-ray activities were managed by Professor Stadelmaier. There is a push from across campus for higher resolution diffraction methods including a double-crystal X-ray monochromator. In 1983, eight undergraduate students were put through a rigorous course in X-ray diffraction (MAT 495). The cost of the course was defrayed.

1989 – The AIF Naming is Discussed

A 1989 memorandum from Vice Chancellor Hart to the UNC System President Spangler, officially requests the name change from Engineering Research Services Division to Analytical Instrumentation Facility. The mission, administration, and organization were to remain the same. This name change was approved on June 9, 1989 by President Spangler. Vice Chancellor Hart requested that the name change be revoked on July 25, 1989 due to oversight of the legislature's creation of the entity. President Spangler approved the revoking of the naming on July 28, 1989.

Historical documents show that the original name of the AIF was Analytical Instruments Facilities, though the name of Analytical Instrumentation Facility became adopted sometime between 1982 and 1989. The acronym AIF remains consistent from 1982 to today (2018).

In 1989, the AIF was located in the building known as Burlington Labs. The AIF would later moved to Centennial Campus in the Monteith Research Center (MRC) from its current location in Burlington Engineering Laboratories. Phil E. Russell is the first Director of the AIF and a former student

of Professor John Hren from the Department of Materials Science and Engineering. Russell replaced the former Director of E.R.S.D., John Russ. Russell would serve as Director until 2007, at which time he moved to Appalachian State University.

Dieter Griffis (left) and Phil Russell (right).

1990

The annual report from 1989-1990 says that the AIF was established to provide both state-of-the-art instrumentation and highly trained technical staff in the advanced materials characterization area to the College of Engineering research programs. Equipment in the AIF included a scanning transmission electron microscope, a high resolution field emission electron microscope, Auger electron spectroscope, secondary ion mass spectrometry on an ion imaging microscope, x-ray diffraction, x-ray topography, a darkroom for film development, and a variety of sample preparation tools. A total of 20 research papers were published by AIF staff this year.

A JEOL JSM-6400F was commissioned.

In 1989 or 1990, Professors Jay Narayan and John Hren receive an award from NSF, "Acquisition of Ultra-High Resolution Electron Microscopy Instrumentation." This award was used to purchase two Akashi Topcon EM-002B transmission electron microscopes. Documents from 1990 suggest that the rate for usage was $35 per hour with an estimate of 6400 hours per year of use. These electron microscopes advanced the evolution of electron microscopy at NC State.

1992

In 1992, the AIF provided services to 9 NC State departments, 5 non-profits, and 44 commercial and industrial organizations.

1994

Construction of $35 million Engineering Graduate Research Center began in August. The building would later be renamed Monteith Research Center (MRC).

In the early 1990's, it is reported that the following AIF equipment was located in Burlington Engineering Laboratories: the Auger microprobe, the TOPCON TEMs, and a TEM model 6400F. Other equipment including the Atomic Force Microscopes (AFMs) and another 6400F model was on Centennial Campus.

1995

AIF Director Phil Russell authors a paper on the use of water vapor as a means to enhance focused ion beam micromachining of carbon-based materials [TJ Stark, GM Shedd, J Vitarelli, DP Griffis, PE Russell, "H_2O enhanced focused ion beam micromachining," Journal of Vacuum Science & Technology B, 13, 2565 (1995)]. The method was patented and has been adopted by instrument manufacturers.

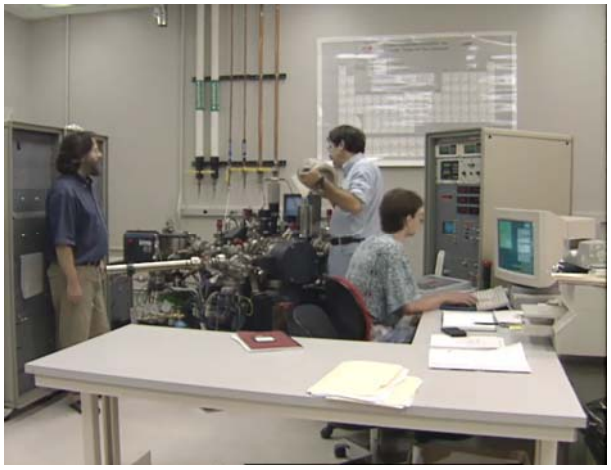
1996

A CAMECA ion microbe (model IMS-6F, serial number 629) was delivered in April 1996 and installed June 1996.

1997

Professors Jay Narayan and John Hren receive an award from NSF, "Field Emission Atomic Resolution Electron Microscope;" $600,000; award number DMR-9724279. This award was used to purchase a JEOL 2010F. This instrument was originally housed within the Department of Materials Science and Engineering and would be folded into AIF in 2012.

A Variable Pressure Scanning Electron Microscope (VPSEM, Hitachi model 3200N) enters service in November of 1997.



Picture of the CAMECA ion microprobe (IMS-6F) located in the MRC building in 1997.

Picture of the SEM (JEOL JSM-6400F) located in the MRC building in 1997.

1998
Engineering Graduate Research Center was dedicated (later renamed Monteith Research Center).

2005
The Engineering Graduate Research Center was renamed after Larry Monteith, Chancellor of NC State from 1989 to 1998.

2007
Dieter Griffis is appointed Director of AIF in 2007. Griffis retains the rank of Research Associate Professor in the Department of Materials Science and Engineering. He remains Director until June 30, 2012.

2009
The ION TOF TOF-SIMS 5 Time-of-Flight Secondary Ion Mass Spectrometer (ToF-SIMS) instrument was commissioned and dedicated. The acquisition of this instrument was made possible by support of numerous research groups and administrators and spearheaded by Dr. Lucian Lucia in the Department of Forest Biomaterials. The ToF-SIMS is much more suited to the study of textiles and biomaterials than earlier AIF instrumentation. The University of North Carolina at Chapel Hill also provided significant financial support for this acquisition.

2010
In the summer of 2010, the AIF was disestablished as a Research Center. The disestablishment was approval by Chancellor W. Randolph Woodson on June 24, 2010. It was considered to be more appropriate as a university service center.

The Rigaku Smartlab X-ray diffractometer was commissioned in May of 2010.

2011 – Seeding of a Premier Microscopy Facility
In response to a UNC General Administration Request for Proposals, the Office of Research and Graduate Studies (RGS), now known as the Office of Research, Innovation, and Economic Development (ORIED), coordinated a university-wide process to rate instrumentation needs. Dr. Terri Lomax, Vice Chancellor for Research at the time, organized this process. At the top of the final list of 10 items was an aberration-corrected Scanning Transmission Electron Microscope (FEI Titan). Other items on the list included a dual-beam Focused Ion Beam and Scanning Electron Microscope (FEI Quanta) and an X-ray Photon Electron Spectrophotometer (SPECS). Though the UNC process did not result in funding of any instruments, several units across NC State contributed $3M to purchase the FEI Titan and FEI Quanta, an

initiative to bring NC State electron microscopy into the 21st century. The funding of these two instruments was spearheaded by Dr. Justin Schwartz, Professor and Head of the Department of Materials Science and Engineering (MSE), and Dr. Terri Lomax. In preparation for the arrival of the Titan, in December of 2011, scanning microscopes in MRC room 122 were moved into rooms 321 and 321A of MRC.

2012 – Reorganization of AIF and Titan Arrival

An external Ad Hoc Committee for the Review of the NCSU Analytical Instrumentation Facility (AIF) was formed by Dean Louis Martin-Vega. The committee was charged to evaluate the facilities, instrumentation, staff, and operation of AIF over the past five year period and examine the development plan for the newly acquired Titan microscope. In May of 2012, the committee reported their recommendations which included that a tenured faculty member in the Department of MSE become appointed Director of the AIF, an action that would increase communication and coordination between AIF and the Department of MSE. On June 1, 2012, Professor Justin Schwartz was appointed Interim Director of AIF and would serve this role through 2013. Schwartz appointed Elizabeth Dickey (Professor of MSE) and James LeBeau (Assistant Professor of MSE) as Associate Director and Titan Project Lead, respectively. Dale Batchelor was appointed as Director of Operations of AIF.

In January of 2012, MRC room 122 underwent major renovations to provide the environment required for optimal operation of the Titan including acoustically isolated space equipped with a dedicated air handling system, radiant panels for control of temperature, and with specially designed electrical service and lighting. The room reservations were completed in March of 2012. The Titan was delivered on March 26, 2012 and became operational in July of 2012. The first paper reporting results from this instrument was published in Applied Physics Letters in February of 2013 (https://doi.org/10.1063/1.4793518).

In late 2012, two transmission electron microscopes that were located in Engineering Building 1 (EB-1) and part of the Department of MSE (JEOL 200FX and 2010F) were folded into the AIF organization. Their location remains in EB-1.

A SPECS X-ray Photoelectron Spectroscopy (XPS) instrument was installed in January 2012 and was made possible by grant awarded to Daniel Dougherty. It replaced a Riber XPS which was about 30 years old and was moved to the Physics Department.

2013 – New Instruments Ordered and Commissioned

Dr. Jon-Paul Maria, Professor of MSE, won an NSF Major Research Instrumentation (MRI) award (DMR-1337694) to acquire an extreme-resolution SEM. The instrument acquired was an FEI Verios, ordered in 2013 at a cost of $1,057,143. The NSF award provided $740,000 of the funds and the remainder were provided by the institution.

Two diffractometers enter the facility, a Bruker AXS GADDS system with 2-D detector is donated to the facility by Dr. Maria's group and a new PANalytical Empyrean unit is ordered by Dr. Jacob L. Jones, an Associate Professor in the Department of MSE. The Empyrean unit is equipped with three non-ambient stages for a variety of in situ experiments.

2014 – Expansion into Cryo-SEM and EBSD

Dr. Jacob L. Jones is appointed Director of AIF, effective January 1, 2014. Dr. Elizabeth Dickey, Professor of MSE, remains an Associate Director of AIF.

In January of 2014, the FEI Verios was made available for use. The Verios instrument, acquired under a 2013 NSF MRI award, is a second-generation extreme high-resolution SEM, providing sub-nanometer resolution from 1 to 30 kV and enhanced contrast needed for precise measurements on insulating materials including advanced semiconductor manufacturing and soft materials.

In October of 2014, a Memorandum of Understanding is signed by AIF, the College of Engineering, and ORIED regarding the acquisition of a cryogenic SEM, or cryo-SEM (JEOL JSM-7600F). In the MOU, ORIED agrees to purchase the instrument and AIF agrees to maintain the instrument as a university service and train users. The instrument would be delivered in 2015 and made

available for use in early 2016. The instrument was promoted widely across campus and drew users from many new research areas, including biomedical engineering and plant and crop sciences.

In the summer of 2014, an Electron Backscatter Diffraction (EBSD) capability is added with the installation of an Aztec HKL detector on the FEI Quanta dual-beam SEM/FIB. The EBSD detector is purchased by Dr. Srikanth Patala, Assistant Professor of MSE.

2015 – Strengthening and Growing

The AIF developed a 4-goal strategic plan in consultation with faculty and staff. The four goals include: (1) Enrich on-campus research by enhancing communication, graduate education and leveraging interdisciplinarity; (2) Strengthen relations with external communities to enhance the North Carolina workforce and economy; (3) Build the next-generation infrastructure that will enable new breakthrough research of tomorrow; (4) Enhance operational and organizational excellence. Strategies, actions, and measures of success are also defined.

In September of 2015, the Research Triangle Nanotechnology Network (RTNN) is formed through a new grant from the National Science Foundation under the National Nanotechnology Coordinated Infrastructure (NNCI) program. The RTNN is a platform through which AIF, the NC State Nanofabrication Facility (NNF), their counterpart facilities at UNC-Chapel Hill and Duke University, and complementary shared research laboratories, work together to serve nanotechnology needs of the public. The $5.5M grant is used to create new education, outreach, and training programs that seek to build external use of shared facilities by 15% per year over a 5-year period. Jacob Jones is Principal Investigator of the RTNN. At NC State, MRC 246 is renovated to serve as the physical entry point to the RTNN and co-locates some staff and Directors of the AIF, NNF, and RTNN.

In October of 2015, Dr. Melissa Pasquinelli, Associate Professor of Textile Engineering, Chemistry, and Science, is appointed as an additional Associate Director of AIF, complementing the leadership team of Jones and Dickey.

2016 – Development of New Management Software

In May of 2016, several entities across campus started discussing the need for a more robust and integrated system for managing shared laboratories. Spearheaded by ORIED, the AIF and other shared laboratories worked with the Office of Information Technology (OIT) to develop this new system, based on the Mendix platform. AIF would be the first laboratory to fully implement this new system on July 1, 2017.

In October of 2016, Dr. James LeBeau, Associate Professor of MSE, is appointed as Associate Director of AIF, replacing Dr. Dickey.

Users of the AIF published over 120 peer-reviewed technical publications in the calendar year 2016 (up from 93 in 2015, 68 in 2014, and 44 in 2013).

2017 – University Initiatives in Core Research Facilities

In June of 2017, AIF acquires a new Horiba XploRA PLUS Confocal Raman Microscope and a new Asylum MFP-3D classic Atomic Force Microscope (AFM) using funds made available through the ORIED. Several additional upgrades were made to electron detectors and ancillary equipment through faculty research grants and funds made available from the university for the RTNN.

In 2017, the AIF advisory board was reorganized from four technical steering committees into a single advisory board. In September of 2017, the AIF advisory board convened. The advisory board noted that, “the facility is on a healthy trajectory with significant growth and enhancement in research impact, instrumentation infrastructure and business operations, in line with the strategic plan developed in 2015.” The board noted that there is “room to impact more substantially the biological and life sciences,” and recommended capitalizing on recent investments and enhancing communications in these areas.

In late 2017, a University Core Research Facilities initiative is announced by Dr. Alan Rebar, Vice Chancellor of Research, Innovation, and Economic Development since 2015. This initiative involved ORIED collaborating with the Provost’s Office and other university leaders to identify, establish and support officially designated University Core Research Facilities. There are five founding core

facilities, including the AIF, the NC State Nanofabrication Facility (NNF), the Cellular and Molecular Imaging Facility (CMIF), the Genomic Sciences Laboratory (GSL), and the Molecular Education, Technology and Research Innovation Center (METRIC). METRIC is a new structural characterization facility that focuses on mass spectrometry, X-ray crystallography and NMR spectroscopy. Dr. Jon Horowitz, Assistant Vice Chancellor for Research, coordinates the Core Research Facilities initiative.

In FY 17, the AIF was accessed by 156 NC State Principal Investigators across campus and 484 users, who are mostly students and postdocs (up from 424 users in FY 16, 369 in FY 15, and 379 in FY 14). These individuals come from the Colleges of Agriculture and Life Sciences, Natural Resources, Engineering, Sciences, Textiles, and Veterinary Medicine. In addition, the AIF supported materials characterization services for 127 external government, industrial, and other academic researchers through managing 256 active contracts (up from 115 contracts in FY 16, 82 in FY 15, and 65 in FY 14). Overall, the AIF provided 16,111 lab user hours in FY 17 (up from 11,330 in FY 14), representing a 3-year increase of >40%. Of all lab use hours, 25% were from external users. The AIF was authorized to work on 253 unique sponsored project accounts in FY17, representing an impact to over $32M in annual research activity on campus (up from $24M in FY16, $21M in FY15, $17.4M in FY14).

The largest award in NC State history from the NSF MRI program was granted to Dr. James LeBeau, Associate Director of the AIF and Associate Professor of MSE (DMR-1726294). The instrument, an FEI Talos Transmission Electron Microscope (TEM) costing over $2M, would be purchased using >$1.4M in funding from NSF and >$600k in support from NC State. The instrument would be suitable for studying both hard and soft matter such as biological materials. The instrument would be located within the AIF and made available to users starting in the summer of 2018.

Sources

Historical State Timelines website, https://historicalstate.lib.ncsu.edu/timelines, accessed November-December 2017

North Carolina State University: A Narrative History, By Alice Elizabeth Reagan, published by Edwards Brothers, 285 pages

North Carolina State University, College of Engineering Publications, 1901-2017, Collection ID UA 105.200, Boxes 1 and 2, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, College of Engineering, Department of Materials Science and Engineering Records 1924-2011, Collection ID UA 105.014, Boxes 7 and 102, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, College of Engineering, Office of the Dean Records 1916-2015, Collection ID UA 105.001, Boxes 1, 3, 4, 17, 69, and 154, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, College of Engineering Annual Reports 1889-2005, 2011-2012, Collection ID UA 105.002, Boxes 1, 18, 19, and 20, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, College of Engineering, Analytical Instrumentation Facility Records 1922-1998, 2017, Collection ID UA 105.030, Boxes 1 and 2, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, Office of the Chancellor Annual Reports, 1889-2006, Collection ID UA 002.002, Box 24, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, Office of the Chancellor, Early Chancellors Records 1891-1934, Collection ID 002.001.001, Box 1, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, Board of Trustees Meeting Minutes 1887-2014, Collection ID UA 001.001, Box 6, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, Office of the Chancellor Annual Reports 1889-2006, Collection ID 002.002, Box 24, Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

North Carolina State University, Research and Graduate Studies – Vice Chancellor's Office, Collection ID 11.1.13, Folder, "Reorganization of Research (Engineering), 1981-1990," Special Collections Research Center, North Carolina State University Libraries, Raleigh, NC

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