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DIRECTOR’S MESSAGE

This annual report would ordinarily reflect on our advancements and growth, but this is not an ordinary year. The past year has brought challenges, change and a deeply renewed commitment to our mission throughout NCAT and across Auburn University. Although we are continuing to conduct innovative research led by exceptional researchers and operational staff, there has been an impact on our operations and finances due to the COVID-19 pandemic.

As a research and training center focused on the practical, we continually push ourselves to be creative in outreach and education and to discover new ways to produce findings that make a difference. We completed a comprehensive strategic planning effort and now, with COVID-19, we continue to explore new ways to share findings with stakeholders. Webinars and virtual training will be a significant focus moving forward.

Working from home became the norm for several members of our team — about a quarter of our staff made this an effective way to be productive and safe. Test Track and lab operations were slowed during the spring as numerous employees missed a few days of work out of an abundance of caution. However, we have followed guidelines from the university’s leadership and health experts and have limited the impact of the virus so far.

As the pandemic and its impacts continuously evolve, there have been swings in uncertainty and optimism. Over the course of 34 years, we have weathered many challenging moments. I am proud and inspired by the way NCAT has risen to this challenge and am convinced that we will overcome this one too.

Through these challenging times, our primary goal is to ensure that NCAT remains distinct in its operational expertise and services to improve pavement performance — for the benefit of our sponsors, partners, collaborators and the traveling public.

Randy C. West, Ph.D., P.E.
NCAT Director and Research Professor
MISSION
NCAT’s mission is to provide innovative, relevant and implementable research, technology development and education that advances safe, durable and sustainable asphalt pavements.

VISION
NCAT will maintain its prominence as a world leader in asphalt pavement technology. Central to all its functions will be NCAT’s historic partnerships with NAPA, state transportation departments, the FHWA and all stakeholders involved in the asphalt pavement industry. NCAT will continue to be recognized for the quality of its research, training, education and technology transfer. NCAT will ensure the quality of its programs through a careful focus of its resources with emphasis in areas of national and economic need.

VALUES
Provide for the well-being of team members and visitors by ensuring a culture of safety consciousness through our attitude and actions.
Provide an environment where all employees feel welcomed into an NCAT family that respects our differences and works together to accomplish the task at hand, where members have our full support and the value of the home family is recognized.
Conduct ourselves with integrity by acting with honesty and fairness without compromising the truth, cutting corners or adding intentional bias.
Conduct and pursue deployable and valuable research and technical services that result in positive change for agencies, innovation for industry and an improved traveling experience for the public.
STRATEGIC PLAN

Operational Excellence

STRATEGIC OBJECTIVE: Build NCAT's reputation as the most operationally effective asphalt pavement research center, turning research dollars into implementable advances in asphalt pavements.

- Strengthen the culture of safety
- Build and develop staff with diverse capabilities and expertise to support NCAT’s mission
- Seek and adapt to feedback and input from stakeholders
- Continue to improve cost effectiveness and output of operations
- Maintain existing and develop new long-term technical capabilities and advantages
- Serve clients’ needs such that they will view NCAT as essential for technical support

Outreach & Education

STRATEGIC OBJECTIVE: Work closely with allies and partners to support issues that benefit all organizations

- Assist all stakeholder organizations to implement high value research findings
- Expand training and outreach as an enhanced revenue stream
- Deliver high quality training on the most needed topics
- Adapt to the evolving training landscape to meet the growing demand for mobile delivery
- Grow the Auburn pavements and materials graduate and certificate programs

Innovation & Influence

STRATEGIC OBJECTIVE: Grow NCAT into the preeminent research center and technical advocate for the asphalt industry.

- Strengthen capabilities that differentiate NCAT from other asphalt research organizations
- Continue to build the NCAT Test Track's reputation as the world's best accelerated pavement testing facility and proving ground for evaluating innovative technologies
- Develop CAPRI as a means to better prioritize research needs and facilitate implementation
- Identify emerging research needs and quickly mobilize resources to initiate tasks that will enable future development and implementation
- Pursue commercialization revenue opportunities aligned with NCAT’s mission
- Collaborate with Auburn and external researchers as needed to expand research
- Raise the visibility of NCAT and strengthen the ability to compete for federally funded research through the Auburn Transportation Research Institute
RESEARCH DRIVEN

STRENGTH IN NUMBERS

25 NEW CONTRACTS AWARDED

$40 MILLION ACTIVE CONTRACTS

LARGEST NEW CONTRACTS

$800,000
National Academy of Sciences: Quality Assurance Aspects of Performance Related Specifications
Randy West

$261,133
Iowa State University: Accelerated Performance Testing of Biopolymer-Modified Mixture
Nam Tran

$250,000
National Academy of Sciences: Construction Guide Specifications for Cold Central Plant Recycling and Cold In-Place Recycling
Ben Bowers

$208,735
Virginia Transportation Research Council: Impact of Production Variability on Balanced Mix Design
Ben Bowers and Fan Yin
NCAT has partnered with MnROAD, a test road owned and operated by the Minnesota Department of Transportation, for parallel studies in both northern and southern climates.

Thirty state departments of transportation and the Federal Highway Administration are currently engaged through MnROAD and NCAT research projects.

Since 1995, our engineers have published over 300 cutting-edge research reports, NCHRP reports and refereed journal and conference publication articles.
AGING RESISTANT BINDER TECHNOLOGIES

NCAT received a $700,000 research award in 2019 focusing on the development of aging resistant binder technology.

This project is aimed at developing a new category of additives that inhibit the damaging effects of asphalt binder oxidative aging that leads to cracking and raveling of flexible pavements.

NCAT is working with Kraton, Michelin’s Lehigh Technology, ChemCo Systems, Blacklidge Emulsions and Iowa State University to scientifically evaluate the technical and commercial feasibility of five promising technologies, including PolyRejuventor, Hybrid GTR, Epoxy Asphalt, UltraBinder and Epoxidized Benzyl Soyate.

The anticipated outcomes of the proposed study will be two-fold. First, the research will expedite development of promising aging resistant additives for asphalt binders and move those toward implementation; and second, the research will establish standardized methods for evaluating future products aimed at providing similar benefits.

The ultimate potential impact of this research will be much longer service lives of asphalt pavements and therefore a substantial reduction in the cost of maintaining the nation’s pavement infrastructure.
AUTONOMOUS FACILITY

Auburn is building one of the nation’s few autonomous vehicle research facilities attached to a test track.

For researchers in Auburn University’s GPS and Vehicle Dynamics Laboratory (GAVLAB), prepping autonomous vehicles outside in Alabama’s elements — from the sweltering summer sun to pop-up thunderstorms — has become a near daily occurrence. That is about to change with the planned addition of a sophisticated new autonomous vehicle research facility at the NCAT Test Track.

The facility is expected to provide a garage with multiple bays and lifts for commercial trucks and passenger vehicles, office space for researchers, a conference room and an observation area overlooking NCAT’s 1.7-mile oval test track. The building is estimated to cost approximately $800,000 and will be one of the few autonomous research facilities in the nation attached to a test track.

The GAVLAB has built a strong reputation in autonomous vehicle navigation and developed a broad sponsored research portfolio, with projects ranging from the Department of Defense and the Federal Highway Administration to many private industry partners. With various sponsors visiting each month, the facility’s planned observation area will provide a high-quality space to demonstrate its research.

With a growing research thrust in transportation engineering, the autonomous research facility also demonstrates Auburn’s commitment to supporting these research initiatives.
In the mid 2000s, pavement engineers across the United States recognized that asphalt pavements were not performing to expectations for durability. The Superpave system, implemented about 10 years earlier in most states, had effectively solved rutting issues, but new pavements and overlays were not performing well with regard to cracking and raveling.

Highway agencies began exploring ways to increase the asphalt contents of mixes by tweaking volumetric requirements, adjusting compactive efforts and tightening down on policies related to aggregate testing. At the same time, a stronger push was being made to increase recycled asphalt materials contents for economic and sustainability reasons. Some states began research with their local universities to develop new tests to identify mixtures that were prone to premature cracking.

After another 10 years of these efforts, very little real progress was made. A variety of new cracking tests had been recommended by researchers, but most of the tests had not been validated with field performance and there was no consensus on which test (or tests) were suitable for day-to-day usage.

In 2015, NCAT and MnROAD began a partnership to address national research needs that the two organizations were uniquely suited to handle. One of those needs was field validation experiments for the cracking tests. NCAT would build test sections to focus on top-down, load-related cracking and MnROAD would focus on thermal cracking.

Five years later, we are harvesting the fruits of that labor. NCAT has been sharing preliminary results with industry stakeholders who are interested in implementing Balanced Mix Design. Selecting the best tests is the first major step toward improving pavement performance and opening the door to a wide range of innovations that could not be adequately evaluated with Superpave.

Highway agencies and asphalt mix producers are eager to put the Cracking Group research findings into practice.
The Consortium for Asphalt Pavement Research and Implementation (CAPRI) will bring together all stakeholders in the highway construction and maintenance industry working to improve asphalt pavement cost-effectiveness, sustainability and safety. Innovative technologies and practices are more successfully developed and implemented through collaboration among state DOTs, FHWA, contractors, materials suppliers and academia. To better foster the development of innovations, CAPRI will serve to identify national priority research and implementation needs for tomorrow’s asphalt pavements.

Goals of the consortium are to develop asphalt pavement research needs, provide technical guidance on current and evolving asphalt materials specifications, select and fund small-scale studies to address knowledge gaps or explore new topics and foster the implementation of useful research.

Semi-annual meetings, rotated among participating organizations, will serve as a forum to facilitate knowledge sharing. Meetings will be organized into topics led by committees that focus on asphalt binders, asphalt mixtures, pavement design, construction, maintenance and rehabilitation, pavement-vehicle interaction and others as the need arises.

CAPRI will operate as a consortium of flexible pavement stakeholders open to all state, local and federal highway agencies, industry associations, companies, academic institutions and research organizations. Each participating entity may appoint one voting representative to CAPRI. NCAT will manage administrative duties.

The CAPRI executive committee will include balanced representation from major stakeholder groups serving with limited terms. The committee will draft consortium by-laws and policies to be ratified by members, approve budgets, set meeting agendas and serve as the final authority to approve deliverables.

All member organizations contribute to funding CAPRI. Highway agencies contribute through the Transportation Pooled Fund Program. Other stakeholder organizations can contribute $6,000 annually to CAPRI at Auburn University.
Drivers can now experience the first seven musical notes of Auburn’s fight song, “War Eagle” as they head toward campus. The section of South Donahue Drive is dubbed “War Eagle Road” and is located on the northbound lane between Len Morrison Drive and West Sanford Avenue in Auburn, Alabama.

Rumble strips are anything but pleasant to the ear — but with some reverse engineering, these vibrations can create distinctive frequencies that simulate musical notes and, in a sense, perform a musical composition.

“The concept is really kind of complex and simple at the same time,” said Auburn alumnus Tim Arnold, who had the idea to put America’s newest musical road on Auburn’s campus.

In pure physics terms, sound is vibration going through matter, and a musical note is comprised of sound vibrations at a particular frequency. A complete mathematical model is used to determine the exact number of elements and necessary spacing on the roadway to make the right the frequency of each note. An automobile driving across these physical disruptions in the road can then recreate a musical tune via the vibrations, which can be heard in (and around) the vehicle. Hearing the musical road is a bonus for traveling the roadway safely at the posted speed limit.

There are only a small number of musical roads around the world, and two in America both used grooves in the pavement. Arnold wanted to develop an improved method that would fit the project’s requirements of strength and durability while being safer, more durable, better sounding and, of course, non-destructive. Working with NCAT, Arnold tested DOT-approved marking tape affixed to the pavement surface on an auxiliary road at the Test Track. After determining that trial tape could work in the field, it was tested under simulated traffic conditions. Accelerated laboratory friction testing equipment — developed at NCAT — was used to test two additional adhesive tapes. By utilizing materials intended to meet or surpass the current standards of road markers, costs are kept low and production and installation of the musical road is simple and repeatable.

War Eagle Road is the first musical road with the surface application material, the first on a college campus and first with a fight song.
NTPEP TESTING

The National Transportation Product Evaluation Program (NTPEP) is a national testing program hosted by the American Association of State Highway and Transportation Officials (AASHTO). This voluntary program was established to minimize the duplication of efforts among AASHTO member states by providing a process where manufacturers and suppliers submit products for independent testing. The results are then shared with AASHTO member states for their own use in product approval or product quality verification.

NTPEP is truly a win-win cooperative partnership between state DOTs and transportation industry participants. From a state’s perspective, NTPEP provides benefits including cost savings from reduced testing and auditing resources, improved product quality acceptance, reliable independent test results and shared expertise and experience with other states. The benefits of NTPEP for suppliers are also substantial because it provides an opportunity to have their products exposed to all AASHTO member states at once, significantly shortening the product evaluation and approval process.

NTPEP currently has 24 product evaluation programs, with one being warm mix asphalt (WMA) additives and anti-strip additives (ASA). WMA and ASA are widely used asphalt technologies that provide environmental and performance benefits to asphalt paving mixtures. The objective of the WMA and ASA evaluation program is to compare mixes containing various WMA and/or ASA technologies to hot mix asphalt control mixes using the same asphalt binder and aggregate to determine relative performance.

NCAT was selected as the testing laboratory for NTPEP’s WMA and ASA program in 2019. NCAT has completed the evaluation of eight products to date, including four WMA additives, three ASA additives and one WMA plus ASA combined additive.

NTPEP and NCAT have agreed to open three product submission cycles for 2020. The first cycle opened February 6, 2020 and closed February 28. Four WMA and ASA products were received. Testing at NCAT will commence in early April with an anticipated completion date of July 31, 2020. The other two submission cycles will open on June 1 and October 1, 2020.
STUDENT FOCUS

NATIONAL RANKINGS
(SAMUEL GINN COLLEGE OF ENGINEERING)

29th Undergraduate program ranking among public universities

40th Graduate program ranking among public universities

23rd Graduate online program ranking among all engineering colleges

1U.S. News & World Report, 2019

GRADUATE SNAPSHOT (NCAT)

Our exceptional students are trained on the most up-to-date technologies and graduate prepared to apply their skills to various industries. Since 1989, NCAT has developed 101 graduate students with a combined total of 73 master’s and 31 doctoral degrees.

Auburn Engineering offers 13 undergraduate degrees across 10 engineering disciplines as well as a host of graduate programs.

Ranked 12th in Best Online Engineering Programs, our online Master of Civil Engineering with an emphasis in pavements and materials combines traditional instruction with modern delivery methods to offer graduate degrees beyond Auburn’s campus.

Employment by Industry
- Consulting 15%
- Other 25%
- Univ./Research 18%
- Asphalt Contractor 19%
- DOT/Govt. 19%
- Matl. Supplier 4%

1U.S. News & World Report, 2019
The National Asphalt Pavement Association sponsored regional Balanced Mix Design workshops designed for state highway agency materials engineers who are typically decision makers on mix design and acceptance specifications, asphalt industry managers responsible for asphalt mix designs and quality control testing and other stakeholders interested in gaining an understanding of Balanced Mix Design. The workshops were conducted by NCAT Director Randy West and Assistant Research Professor Fan Yin.

Since the pandemic spread worldwide in mid March, NCAT researchers have conducted 114 webinars and online presentations to a global audience.

PRESENTATIONS AND WEBINARS
NCAT has successfully transitioned many of our presentations to live and prerecorded webinars. In the first of its kind, NCAT hosted a free webinar in Spanish, Sustainable Materials in Asphalt Pavement Practices. Topics of this event were the design of RAP asphalt mixtures, recycled tire rubber in asphalt mixtures, preservation techniques in asphalt pavements and workshops and courses for Latin America. The webinar was well received with over 370 registrations for the live event.

2April 1, 2020 - September 30, 2020.
NOTABLE ACHIEVEMENTS

Raquel Moraes-Puchalski was hired as an assistant research professor. She has been a postdoctoral researcher at NCAT since August 2017.

Karol Kowalski, associate professor and vice director of the Roads and Bridges Institute at the Warsaw University of Technology, spent six months at NCAT researching innovative technologies for sustainable road construction as a Fulbright Scholar.

Administrative Associate Stacie Hunter was recognized as an Auburn University Spirit of Excellence recipient in November 2019.
Auburn Engineering students Mo Fortunatus, David Vivanco, Danny Martinez, Zachary Pace and Madison Eason were announced winners of the CRH Americas Asphalt Mix Design Competition. As the first place team, the five members will split a $7,500 scholarship award.

Assistant Research Engineer Nathan Moore successfully passed the P.E. examination to become a licensed professional engineer in the state of Alabama.

Buzz Powell has been named NCAT associate director and research professor.
COMMUNICATIONS REACH

WEBSITE TRAFFIC

Overview

Oct 1, 2019 - Sep 30, 2020: Unique Pageviews
Sep 30, 2018 - Sep 30, 2019: Unique Pageviews

-1.88%
99,820 vs 101,734

15.44%
00:01:26 vs 00:01:15

TOP VISITORS BY COUNTRY

- UNITED STATES 18,425
- JAPAN 991
- CHINA 2,155
- CANADA 706
- INDIA 1,034

Unique Pageviews By Topic

- OUR RESEARCH
- ABOUT NCAT
- EDUCATION AND TRAINING
- TEST TRACK
- home PAGE
- PAVEMENT PRESERVATION

28.3%
15.7%
9.8%
30.0%
12.1%
4.0%
SOCIAL MEDIA

OWNED MEDIA

NCAT’s bi-annual newsletter, **Asphalt Technology News**, contains ready-to-use information, covers timely topics and includes a forum for industry personnel.

EXTERNAL MEDIA

NCAT was mentioned in a total of 64 local, regional, national, international and trade news outlets across print and digital platforms.

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**GROWTH RATE**

**TOTAL FOLLOWERS**