

1

Selim Hobart Peabody, department head from 1878 to 1881, also served as regent of the University and **successfully lobbied to change the school's name from Illinois Industrial University to the University of Illinois.** And during his tenure, every engineering student learned physics from Professor Peabody.

UNIVERSITY

of ILLINOIS

Did you know? 32 Fun facts about MechSE

For more than 100 years, the University of Illinois has been a leader in mechanical engineering and mechanics research and education. MechSE sustains and nurtures the pioneering spirit that leads to the kinds of breakthroughs that have long distinguished this campus.

In this special section, we will share just a few facts—which you may or may not already know—that make MechSE at Illinois one of the top engineering departments in the world. (Please visit the MechSE website to learn about our current faculty's incredible breakthroughs, which were far too numerous to include here.)

2

Until the early 1960s, the main bay in the Mechanical Engineering Laboratory (MEL) **held a steam engine developed in 1871** by Professor **S. W. Robinson** and his students. Records indicate the engine “supplied power to the first shop in which instruction in the mechanic arts was given in the United States.”

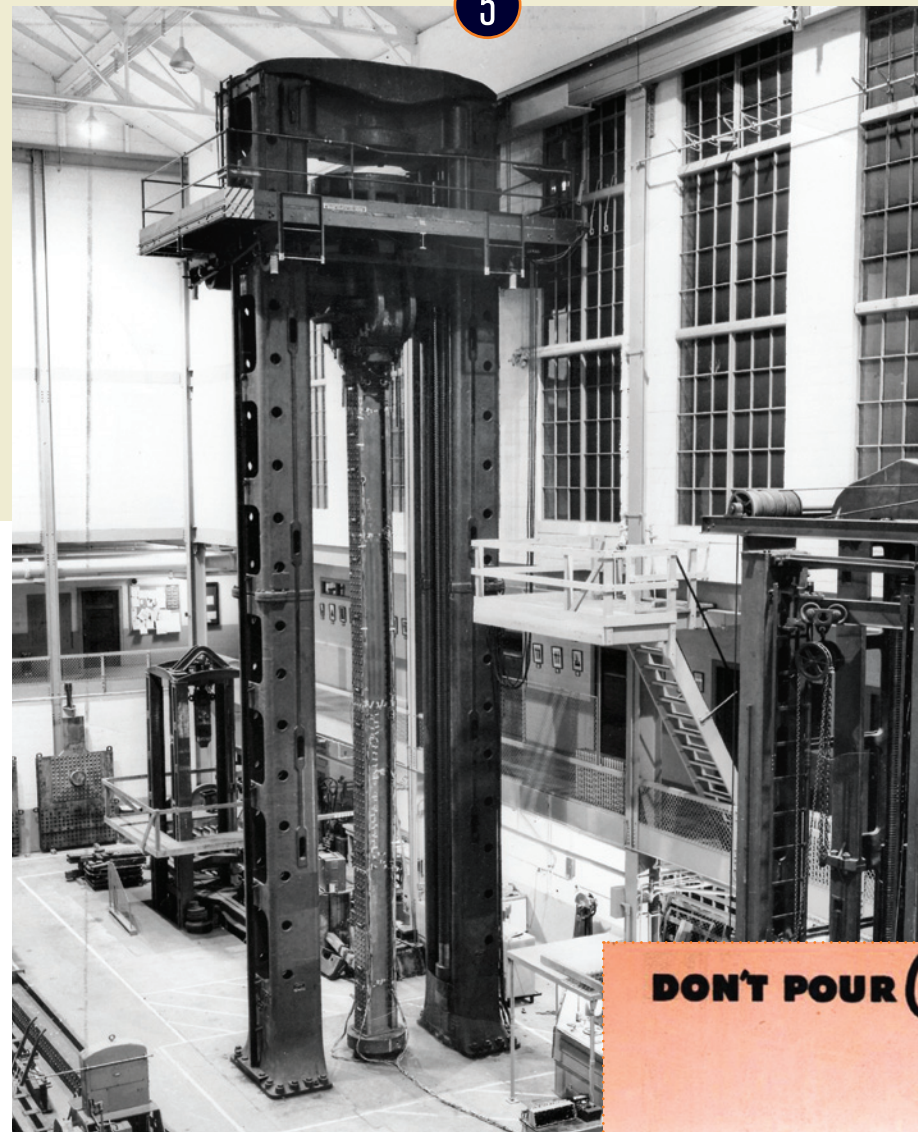
3

Professor **Helmut Korst** developed **base pressure theory**, which recognized that separated flows are inherently elliptical in nature and which illuminated the effects of separated flows and drag on rockets, missiles, and airplanes.



4

Celebrating its 30th anniversary this year, the Air Conditioning and Refrigeration Center (ACRC) was established in 1988 by the National Science Foundation (NSF) as an industry-university cooperative research center. It is now **powered by more than 100 researchers**, including about a dozen faculty and their students from MechSE, and **funded by 30 industry partners.**



5

Assembled in 1929 in Talbot Laboratory, where it still stands, the two-story tall Southwark-Emery Universal Testing Machine can load up to **3 million pounds in tension or compression** and can measure the applied force within one tenth of one percent. The massive machine is often used to do testing for companies, such as tensile testing steel bridge components.

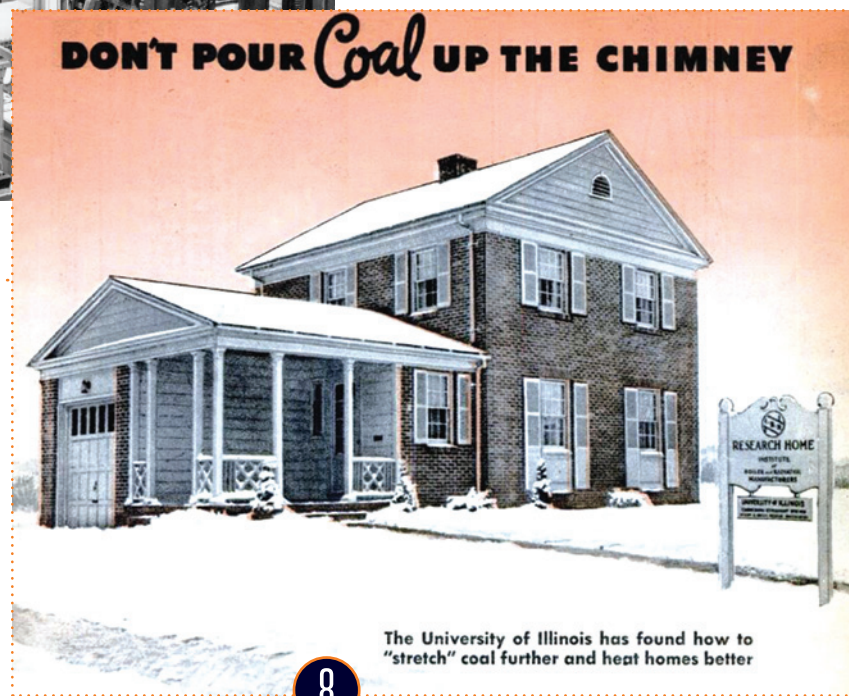
6

The **Dolan-Corten theory** was named for Professors **Thomas J. Dolan** and **Herbert T. Corten** and has become widely referenced and used, accounting for a sequence effect that depends on the most recently recorded maximum stress that occurs during fatigue loading.



7

The mission of the International Institute for Carbon-Neutral Energy Research (I²CNER) is to contribute to the advancement of **low carbon emission and cost-effective energy systems**, and improvement of energy efficiency. I²CNER's research efforts are underpinning impactful energy technologies that address the energy needs of Japan and the world. The I²CNER project is highly unique because it is co-hosted by Kyushu University in Japan and the University of Illinois at Urbana-Champaign with an additional 24 international partnering institutions worldwide, including MIT, UC Berkeley, ETH Zurich, Imperial College London, and the University of Göttingen. .



DON'T POUR Coal UP THE CHIMNEY

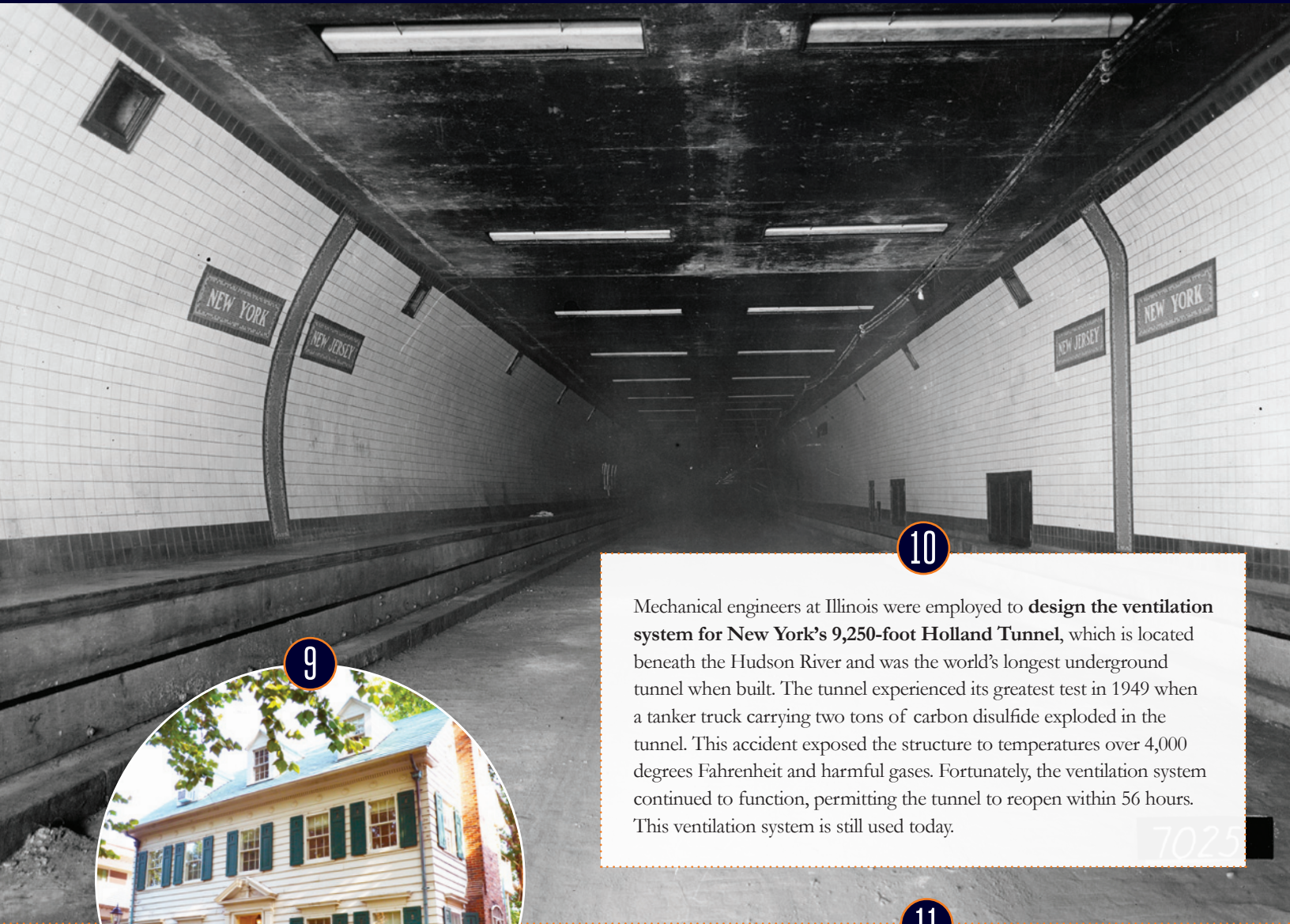
8

The University of Illinois has found how to “stretch” coal further and heat homes better

Professors **Julian Fellows**, **Alonzo Kratz**, and **Seichi Konzo** created a **breakthrough in home heating with the Illinois smokeless furnace**, which was capable of burning any soft coal without smoke, providing even heat, and saving as much as 30 percent of the fuel pile. Built around a downdraft coking principle and overcoming what had been a vexing soft coal smoke problem, their invention was featured on the front page of the *New York Times* and in a five-page article in *Popular Mechanics*, which included the above rendering.

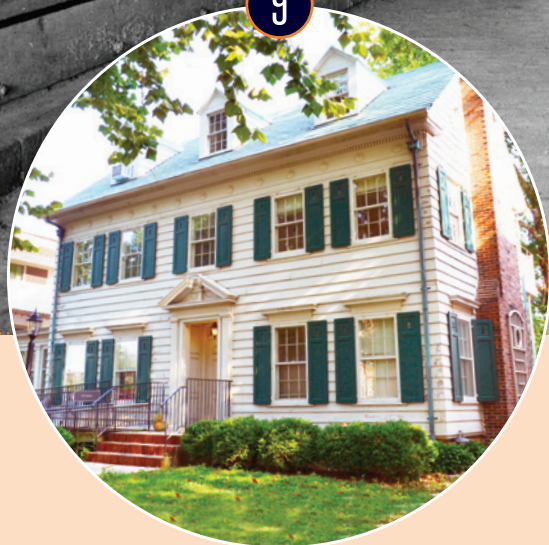
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10

Mechanical engineers at Illinois were employed to **design the ventilation system for New York's 9,250-foot Holland Tunnel**, which is located beneath the Hudson River and was the world's longest underground tunnel when built. The tunnel experienced its greatest test in 1949 when a tanker truck carrying two tons of carbon disulfide exploded in the tunnel. This accident exposed the structure to temperatures over 4,000 degrees Fahrenheit and harmful gases. Fortunately, the ventilation system continued to function, permitting the tunnel to reopen within 56 hours. This ventilation system is still used today.



9

Truly dedicated to his research, Professor and Department Head **Seichi Konzo** lived for two years in one of the earliest air-conditioned houses in North America at 1108 West Stoughton, Urbana. In his memoirs, he remembers his time in the house on Stoughton fondly, especially the summer of 1936 "when Urbana had 21 days over 100 degrees Fahrenheit."

11

According to university archives, the department was **home to the first thermo-mechanical fatigue lab** outside of industry capable of conducting experiments on a variety of metals, alloys, and composites.

12

Professor and Department Head **Hassan Aref** introduced **chaotic advection**, a state-of-the-art concept derived from nonlinear dynamics widely used as an approach to investigate transport and mixing problems in fluid flows.



14

The **first engineering experiment station in the United States**, dedicated to investigating real-world engineering problems, was founded by mechanical engineering professor **Lester Paige Breckenridge** in 1905.

15

XPACC

The Center for Exascale Simulation of Plasma-Coupled Combustion (XPACC) is using physics-based predictive sciences and massive-scale numerical simulation to **advance a new mode of managing combustion**. It aims to make breakthroughs in this emerging field at the basic science level. Funded by the National Nuclear Security Administration, part of the U.S. Department of Energy, the center is one of three Multidisciplinary Simulation Centers funded through NNSA's Predictive Science Academic Alliance Program II.

13

Every day, more and more talented women are fueling the field of engineering with a wide array of research and innovations that impact society. For most of them, their path truly starts during their undergraduate years, and we are pleased to report **positive growth in the number of women** in our mechanical engineering and engineering mechanics programs. In 2010, about 10% of our undergraduate students were women, but now it's nearly 20%.

16

Arthur Cutts Willard, department head from 1920 to 1933, was widely regarded for his expertise in heating, ventilating, and air conditioning. He went on to become **President of the University of Illinois**, and **Champaign-Urbana's Willard Airport** is named after him.



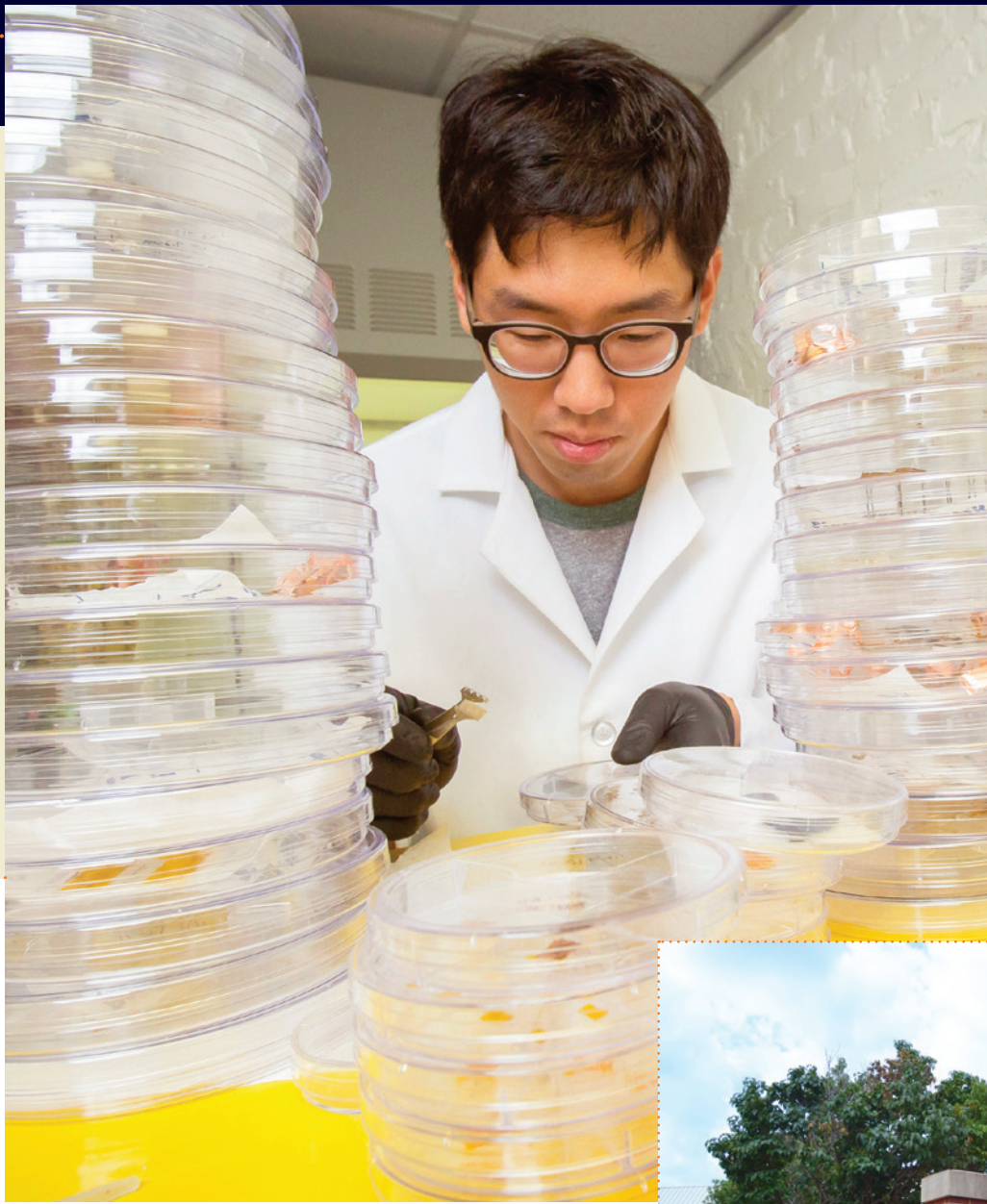
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17

MechSE has two large-scale flow diagnostic facilities that allow cutting-edge fundamental and applied research. MechSE's Eiffel-type, open loop wind tunnel has exceptionally low turbulence levels and is equipped with state-of-the-art instrumentations for point, planar, and volumetric flow measurements at high-temporal resolution. The department's refractive index matching flume is **one of the largest facilities of its kind in the world** and allows for unobstructed optics in setups with customized acrylic material.

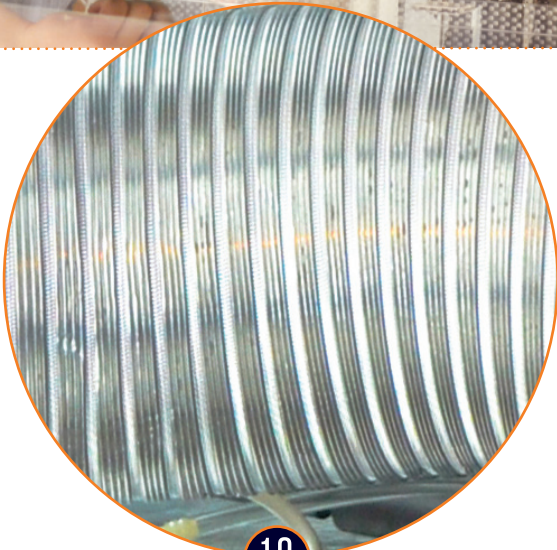


21

Several MechSE professors are part of the inaugural faculty for the new Carle Illinois College of Medicine, which welcomes its first class in Fall 2018. Called **the world's first engineering-based college of medicine**, it will leverage advanced technology to train physician-innovators who will deliver better and more accessible care to patients worldwide.

22

The department's research in residential heating and cooling produced **firsts in perimeter heating and heat pumps**.



18

The **first standards for rating furnace efficiencies and heating capacities** was established by the department for the National Warm Air Heating and Ventilating Association.



20

The **first scientific study of stresses in railroad tracks**, conducted by Professor **Arthur Newell Talbot**, is considered one of the most significant contributions to the scientific knowledge of railroads ever made. In 1938, the Materials Testing Laboratory was renamed the **Arthur Newell Talbot Laboratory**. It sits prominently on the west side of the Bardeen Quad and is still in use today.



23

The **first chapter of national honorary fraternity Pi Tau Sigma** was founded by Illinois students assisted by mechanical engineering professor **Charles Russ Richards**, department head from 1911 to 1920. In 1944, his great influence resulted in ASME creating the Charles Russ Richards Memorial Award, which is still awarded annually today.



24

The booming Research Park at the University of Illinois is now **home to more than 110 companies** employing more than 2,000 people and 650 interns. Many MechSE faculty, students, and alumni have contributed to the park's growth, launching or joining start-ups and taking advantage of this incredibly fertile environment for innovation and entrepreneurship.

19

Professor **Ronald Adrian** developed **Particle Imaging Velocimetry (PIV)**, a powerful flow diagnostic tool.

25

Once the Transform MEB project is completed, the Mechanical Engineering Building will have the **longest building frontage of any building on historic Green Street**, spanning a full block from Goodwin Avenue to Mathews Avenue.



26

The MechSE Department is proud to have its own **state-of-the-art cleanroom, the Micro-Nano Mechanical Systems (MNMS) Laboratory**. This valuable and extremely well-run lab was built in 1998, with a second phase added in 2005. The lab supports research and instruction in the general area of micro- and nano-electro-mechanical systems, and nano-chemical-electrical-mechanical-manufacturing systems.

27

Professor **Shao Lee Soo** was a leader in developing the field of **multiphase fluid dynamics**.

28

Professor **JoDean Morrow** introduced the **strain approach to fatigue**, and his efforts helped establish the first servo-hydraulic fatigue-testing facility in Talbot Laboratory, which has since become one of the most prestigious research laboratories in the country for materials testing.



29

Starting in Fall 2018, **MechSE students can follow a pre-med track** consisting of a prescribed sequence of traditional MechSE courses and newly recommended courses to qualify for medical school. It will allow MechSE students an opportunity to stay within the established curriculum, but also have a tailored program to help them go into medicine if they choose.



30

The **Mechanical Engineering Building** was the second new building on the Illinois engineering campus dedicated after World War II. Built at a cost of \$2 million, the building included 32 classrooms, 21 labs, and 44 offices.

31

Much of the **pioneering work on the theory of heat transfer in metal cutting** was done by Professors **Kenneth Trigger** and **Bei Tse Chao**.



32

The Center for Power Optimization for Electro-Thermal Systems (POETS) is funded by an initial \$18.5 million investment by the National Science Foundation, with additional support from many industrial partners, and **focuses on power optimization in mobile electrified systems**. With heat being the enemy for people designing cars, construction machinery, and aircraft, the mission of POETS is to pack more power into less space for electrical systems. Headquartered at Illinois, but with an international footprint, the center attacks the thermal and electrical challenges surrounding mobile electronics and vehicle design as a single system, striving to increase the total power density in vehicles by 10 to 100 times.