

Center for Packaging and Unit Load Design

CPULD News

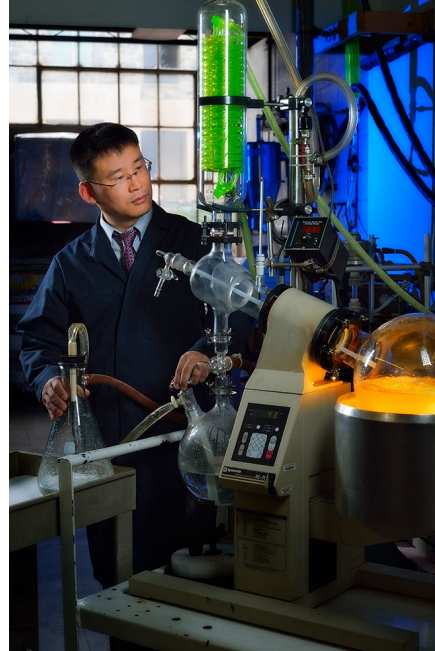
Quarterly Newsletter



Summer Renovations Nearly Complete

CPULD has continued to renovate sections of our testing laboratories over the summer. We've updated the area under the student study loft to be able to do more packaging testing, specifically shock testing on electronics, as well as now having space to perform long-term, load capacity tests on pallets and unit loads. The small

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CPULD Now Offering New Primary Packaging Testing

CPULD has added primary packaging testing to our portfolio of services offered to the industry. We can now provide packaging materials evaluation and analysis as well as packaging structure development and testing. These new testing services follow official standard testing methods outlined by ASTM, ISO, TAPPI,

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All of CPULD's Lab Workers Are ISTA Certified

During summer 2019, 10 of our students and technicians received ISTA Certified Packaging Laboratory Professional (CPLP) certifications. We currently have six students certified as CPLP Technicians, and four staff and students as CPLP Technologists. Our director, Laszlo Horvath, has obtained the highest level of certification, which is the CPLP Professional. Only 28 people in the world have reached this level of CPLP certification. CPULD is one of

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CPULD's History: Dr. George Stern's Contributions

Dr. Ernest "George" Stern was born in 1912 in Wuerzburg, Germany, and received both his undergraduate and master's degrees at the Technical University of Munich before coming to the United States and receiving another master's and a Ph.D. from Penn State. In the 1940s, Stern, then considered a refugee from Nazi Germany, came to work at Virginia Tech. He was an architect by training, with expertise in housing

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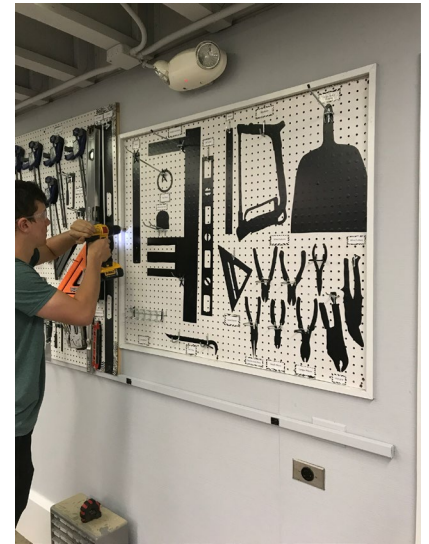


CPULD's Annual Industrial Affiliate Membership Meeting

During CPULD's annual Industrial Affiliate Membership meeting on August 6, our students gave presentations regarding the research completed over the last year, the members gave their input on what directions they'd like research to go in the future, and everyone was updated on CPULD's renovations and annual budget.

Most of the students' research projects were done specifically at industry members' requests and usually designed to satisfy questions or issues that

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rooms adjoining this lab were also updated. Prior to this lean transformation, this section of the laboratory was not an efficient space, which created many unnecessary challenges. We followed the 5S lean improvement processes in the renovation of this space. First, we cleared out the area (Sort), then we arranged the remaining items based on their use and assigned a fixed location for each of them (Set-in-order). We cleaned the area and maintained the equipment to prevent deterioration (Shine). Next, we worked to create a system that would ensure that all tools get back to their fixed location by the end of the day (Standardize). The last step is to Sustain the changes.

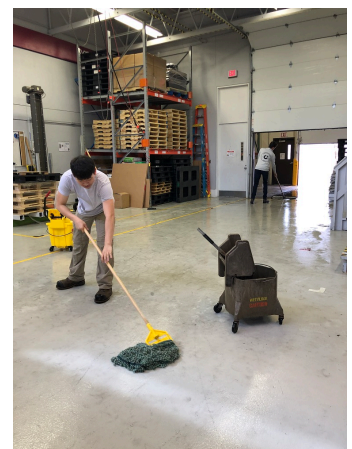
A new sensor lab was also created in one of the small offices adjoining the updated main lab space. The sensor lab will provide a clean area for new sensors to be created and installed for testing purposes. This will corollate with some of the new research goals of CPULD such as determining an Internet of Things enabled system for palletized supply chains.

We also repainted all areas of the main lab and the equipment in it, installed an epoxy floor in the main area, and installed laminate floors in the wood shop and sensor lab. We installed new shadow tool boards and, following the standardized operating procedures created during previous renovations, completely revamped the organizational system. New labeling decals were installed on every door and on the overhead beams. We are currently working on new posters, featuring our students and their work, to adorn the walls. During previous renovation projects, we created an annual lean training program to ensure that all new workers are properly trained on these SOPs, and we started ongoing Kaizen (rapid improvement) events.

As a result of all of these activities, we gained more space, more testing capabilities, and more tool visibility. The William H. Sardo Jr. Pallet and Container Testing Laboratory is the most comprehensive pallet testing and research lab in the United States. Here, students can get real-world, hands-on experience in lean management techniques as well as prepare for industry careers dealing with packaging, pallets, and supply chain management.



Photos: (clockwise from top left) finished lab space; student installing shadow tool boards; interns cleaning the lab; student installing the laminate wood flooring; workers painting the main laboratory room.



Continued from Page 1 (Primary Packaging Testing)

or other standards organizations. This new testing lab, known as the Sustainable Packaging Materials Lab, is headed by Assistant Professor Young-Teck Kim, who is an expert with over 10 years of experience in sustainable packaging, bioplastics, smart packaging, biosensors, and nano-composite structure analysis. Kim and his research team have recently been working on developing new packaging material composites, focusing on their structure and functionality by using a variety of natural and synthetic polymers or agents derived from biomaterials.

The focus of the Sustainable Packaging Materials Lab is the study of sustainable materials, and their applications in the manufacturing process for food packaging systems, smart packaging systems, and biosensor systems. Through this lab, new primary materials testing can now be offered to our Industrial Affiliate Members as well as the industry at large.

Product shelf life is primarily dependent upon multidimensional interactions between packaging materials, packaging structure, and the products themselves. The Sustainable Packaging Materials Lab provides diverse primary packaging testing services and conducts research and development projects designed specifically to meet the needs of the primary packaging industry. The lab's services are already in high demand because the evaluation of existing and future packaging materials is essential to both manufacturers and consumers. The constant development of new packaging materials is highly demanded by our global society of fast-moving consumer trends and cultural diversity.

Kim's research team is developing and investigating the structure and functionality of new composite materials. The team is researching a variety of natural

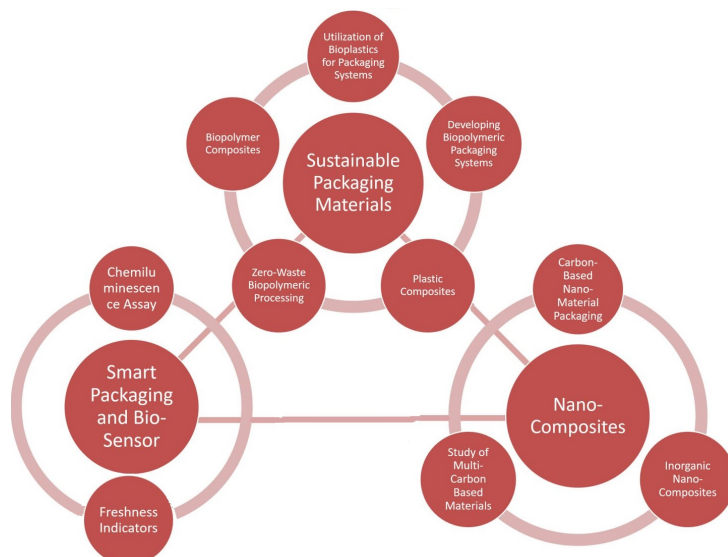


Diagram: various areas of research of the Sustainable Packaging Materials Lab.

and synthetic polymers, and studying the composite structure of both carbon-based nanomaterials and inorganic nanomaterials. The extraction of biopolymeric materials from biomass and their utilization in packaging has been funded both by government sources and private industry donations.

The lab's team is now providing third-party, primary packaging materials testing services using standard ASTM, ISO, or TAPPI methods. This includes packaging materials evaluation and analysis, as well as packaging structure development and packaging materials testing. Package materials testing is an important part of the research and development process. Testing helps ensure that new package designs and their primary materials are created specifically to handle real-world situations.

The lab offers tests such as gas barrier property measurement, which determines how much vapor, gas, or oxygen flows through specific materials; thermal analysis, which outlines how materials' properties will change based on the temperatures around them; and spectroscopy, which is a method of collecting analytical data about a specimen based on its primary materials' reaction to different light waves.

With the addition of the Sustainable Packaging Materials Lab, CPULD is now able to offer the industry complete testing services – from testing and redesigning the actual makeup of the primary materials going into their packaging, to the testing and redesigning of the boxes and pallets protecting and carrying their products, all the way up through the testing and redesigning of entire unit loads of palletized products being shipped worldwide.



Photos: (left) rotary evaporator; (right) advanced rheometer.

Continued from Page 1 (ISTA-Certified Workers)

the few ISTA-certified laboratories in the U.S. that has made it a goal to have all lab workers (including undergraduate interns) become **certified through the ISTA CPLP** program.

The International Safe Transit Association (ISTA) is one of the worldwide organizations dedicated to developing standards and testing procedures for packages traveling global shipping routes for all modern industries. ISTA, which has been in existence for over 70 years, is a global organization that develops and maintains distribution packaging testing standards and certifies people and laboratories to correctly use those standards.

As previously mentioned, 11 of our students and staff are ISTA CPLP certified. But these CPLP certifications are only part of CPULD’s wide range of certifications from various packaging and shipping organizations.

CPULD recently obtained the **Amazon APASS laboratory certification**. This means that we are qualified to certify packaging for use with Amazon.com sales, and we can do it faster than most other labs. Our labs are now qualified to conduct both the basic Amazon package testing and the Amazon Frustration Free Packaging (FFP) testing. We can now help vendors meet the Amazon FFP certification as well. Due to our extensive experience in distribution and protective packaging, CPULD faculty and staff are also qualified to help improve vendors’ packaging so that it will pass all applicable Amazon testing (if it fails the tests initially). As of August 1, 2019, all of a

company’s packages must pass these tests in order to avoid paying extra fines and fees to Amazon.com.

In addition, CPULD is the only North American package testing laboratory to be **certified by IKEA**. Our laboratory has been researching the characteristics of corrugated boards for more than 10 years. In 2018, we became an IKEA certified laboratory. We have the ability to evaluate and compare the material characteristics of corrugated fiber-board, pallet feet, and load bearers according to IKEA test methods. In short, any North American packaging supplier wishing to do business with IKEA must receive approval of their corrugated board products through CPULD labs and our testing processes. This new recognition has allowed the Corrugated Packaging Materials Lab to become a reference for testing services in the United States and abroad.

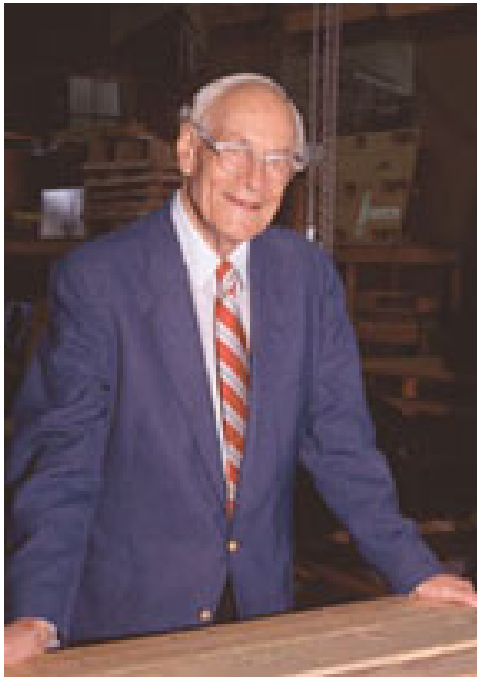
CPULD also received **certification by the National Motor Freight Tariff Association (NMFTA)** that allows us to certify packages and unit loads for over-the-road transport.

We are currently looking into **ISO 17025 certification**, which would be an ongoing accreditation process offering a third-party guarantee that CPULD follows best business practices and ensures the calibration of our equipment and the consistency and quality of our testing processes.

CPULD is always on the lookout for new ways to make our labs stand out from the crowd!



Photo: Dr. John Bouldin (far left), graduate students, and interns with their ISTA certificates.



Photos: (left) Dr. Ernest “George” Stern after retirement; (right) the Pallets Move the World sculpture (with plaques highlighted) that Stern helped to get installed outside of the Brooks Center in Blacksburg, Virginia.

Continued from Page 1 (Dr. George Stern)

design and in creating better and stronger trusses. Stern started his Virginia Tech career working in the architecture and engineering departments. At that time, he was focused on researching and developing the best way to quickly assemble and disassemble wooden structures. Stern wanted to help the military with their troop movements by providing easily transported wooden buildings. This led him to study the various fasteners that could be used in wood construction to determine which types were best suited for the military’s needs.

Though he was initially hired to help apply wood technologies to the war effort, Stern pioneered many different aspects of the wood sciences at Virginia Tech. He invented a type of particle board, developed and tested over a thousand different nails, and helped standardize nails, staples, and pallets. Through all of his research, he became an expert on fasteners and wood, and how they interact. In fact, he was known as “Mr. Nail” and actually wrote the legal definitions of fasteners, nails, staples, and even pallets themselves.

During the 1950s, William H. Sardo Jr., president of the National Wooden Pallet Manufacturing Association, took notice of Stern’s work and thought that it would be very helpful to his association’s industry members if they could apply

Stern’s research into fasteners and wood construction to the wooden pallet industry. The association went on to become what is now called the National Wooden Pallet and Container Association (NWPCA): a group of global wood pallet and container manufacturers that have joined together to promote their joint industry interests through hiring political lobbyists, setting industry standards, and funding research at both private research facilities and public universities.

A few years later, Stern and Sardo convinced Dr. Walter B. Wallin of the USDA Forest Service to provide funding and collaboration for research into better design and manufacturing of wooden pallets. Wallin and the Forest Service recognized that a growing volume of the wood from the forests they managed was being used to manufacture pallets. Since the pallet industry was quickly becoming one of the Forest Service’s largest customers, they realized how beneficial funding research for this industry could be for their continued relationship.

By the 1970s, Stern, the Forest Service, and the NWPCA had convinced the president of Virginia Tech to create an official joint research initiative to study the design, manufacture, and performance of wooden pallets. After seeing how much funding was already coming into the university for this type of research, Virginia Tech decided to start making

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Continued from Page 5 (Dr. George Stern)

major efforts to continue to better the services offered to the industry. As part of this new focus, the university donated \$100,000 towards the building of the William H. Sardo Jr. Pallet and Container Research Laboratory – commonly referred to as “the pallet lab” in the Brooks Center building on Research Center Dr. in Blacksburg, Virginia.



Photo: The Brooks Center under construction.

The remainder of the funding for the pallet lab came from the NWPCA, the Forest Service, and donations from dozens of private pallet manufacturers and their clients. All parties were excited about the discoveries that would be made through the research conducted in the new lab – and enough initial funding was gathered to keep the pallet lab running until it became self-sufficient. In 1976, the new pallet lab, with 7,200 sq. ft. of testing, office, and conference space containing over half a million dollars’ worth of specialized equipment, was officially opened at a dedication ceremony.

Stern was appointed the first director of the new pallet lab, and he worked closely with NWPCA’s board of directors to set up the initial priorities and the directions for the research to be conducted in the lab. They determined that the lab would provide research information to the broadest possible segments of the forest products industry, specializing in the pallet and container industries. They planned to advance the technical know-how required to improve the design, construction, and assembly of pallets and containers. Stern and the NWPCA board planned for the pallet lab to start with research into the raw materials required by these industries and then research every step of the design and manufacturing process, only ending when the industry clients’ needs were fully met.

To compensate for the fact that he never became completely comfortable with his conversational English, Stern wrote over 900 research papers and articles, which were published in over 150 national and international journals, periodicals, and books on the subjects that he researched in the new pallet

lab. He most often wrote on the combination of fasteners and wooden construction, such as measuring the quality of fasteners under various conditions, how to determine which fastener to use in which designs of wooden pallets and containers, evaluating which fasteners work best in various species of wood, or even such topics as how the carbon content of nails affects their fastening ability in wood construction.

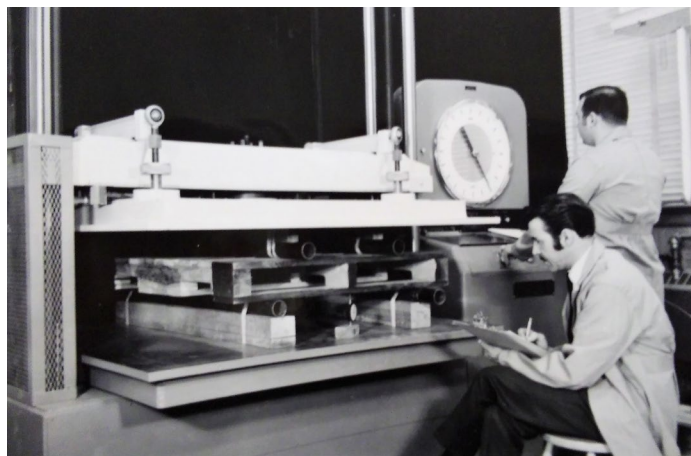
He also wrote books, the first being “Episodes in My Life,” an autobiography that started with his childhood in Germany during World War I. Stern was so committed to his research field that he even chose to live and raise his family in a “demonstration house,” which was used to test various fasteners and construction ideas.

Stern retired in 1981, but he kept an office at the Brooks Center and still came into work almost every day for another 20 years. His pace of work remained

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Photos: (top) Dr. Stern’s demonstration house; (bottom) an early pallet tester.



Continued from Page 6 (Dr. George Stern)

steady, even after retirement. Shortly thereafter, Stern was asked to develop national standards for railings, such as those on staircases. As part of a partnership between Virginia Tech and Vyatka State Technical University in Kirov, Russia, he organized a tour to Russia to learn about preserving antiquities. He received a patent for an improved metal plate for end-plating railroad ties. Another of Stern's projects was leading the International Standards Organization (ISO) task force to harmonize British and American English terms in international wood products industries. Stern was also instrumental in getting the "Pallets Move the World" sculpture installed in front of the Brooks Center. He personally raised \$30,000 from the pallet industry to fund a beautification project, which featured this sculpture.

Pallet Enterprise magazine honored Stern with two Pallet Salutes for his noteworthy accomplishments and advances to the industry. He was also named one of the Five Pallet Immortals by the NWPCA – it states

that "the entire pallet world owes him a huge debt they could never hope to repay." Stern was continually written about and mentioned in articles and research around his topics of expertise, including the Popular Science article from 1954 shown below.

Work, Stern used to say, is essential for life: "I have a lot to do, which is fortunate. Because if you don't have anything to do, you're apt to die." In 2001, he died quietly in his sleep on the very same day that he completed his final research paper outlining the entire history of the department that he helped create. This historical book is now in the hands of his family, but the original will soon be returned to CPULD and made available to all who would like to learn more about this amazing man and the research he continues to inspire. You can read Stern's many research papers on nails and other topics in the SLICK library on our website (*CPULD Members only*).

Photo: Entirety of the two-page article about Dr. George Stern from the January 1954 edition of Popular Science.



ONE TEST STARTS when Prof. Stern hammers different kinds of nails into a carefully graded board. Weeks to months later, he'll measure how hard they are to pull out.



MEASURED BLOWS from the weight on this guillotine-like device reveal how readily a nail penetrates wood of known hardness. No human could hammer so consistently.



"IF YOU WANT TO MAKE a good pallet, you have to use a good nail," says Stern, here testing a pallet's rigidity on a machine that applies pressures of 10 to 12,000 pounds.

Only the best can pass Prof. E. George Stern's rigorous tests.

HUNDREDS of kinds of nails go to Virginia Polytechnic Institute and take exams from a research professor who knocks them for a loop.

E. George Stern is his name, and stern is his manner, too, towards what he

refers to as "the indispensable fastener." For eight years, Stern has done nothing but put nails through tough tests like those shown here.

Both nails and the building industry are the better for the experience.

College Examiner Is Rough on Nails



A TORTURING TWIST is applied to a furniture skid to find out exactly how much torque is needed to pry it open at its nailed joints. This test may save many a future table leg.



SLOW AND STEADY is the pull exerted on driven nails by the motor-operated claw of this machine. Motor runs at a constant speed and the machine measures nails' resistance.



ONLY A CHARGING BULL, striking a wire fence, could match strength of yank that machine above gives driven fence staples. Cable on pendulum axis applies brutal tug.



Continued from Page 1 (Industrial Affiliate Meeting)

have arisen in our industry partners' supply chains. These leading companies are working with us to be at the forefront of innovative pallet and package research. We are collaborating on developing new, innovative ways to design pallets and unit loads as well as finding ways to improve the sustainability of the packaging supply chain.

Over the past year, four graduate students have been researching the following topics:

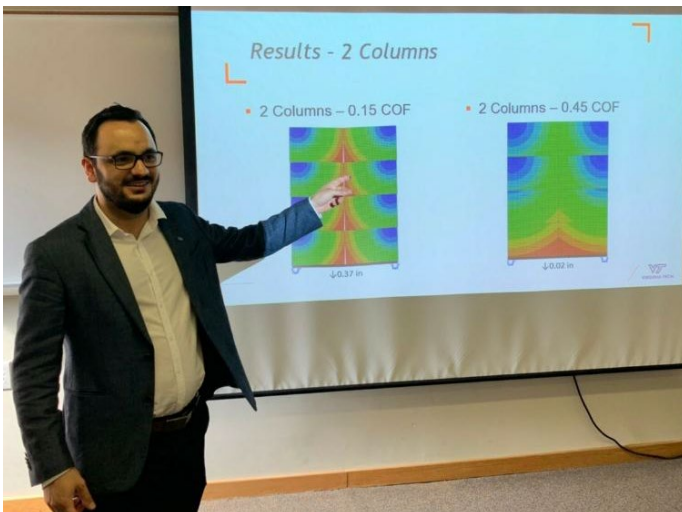
- The status of the U.S. plastic pallet industry (Dorina Bugledits),
- The effect of pallet design on the operating cost of a supply chain (Alina Mejias),
- The effect of pallet stiffness on the strength of asymmetrically loaded corrugated boxes (Chandler Quesenberry), and
- The development of a finite element model to predict the deflection of a unit load of stacked corrugated boxes (Eduardo Molina).

Each of the graduate students gave a presentation to the membership outlining the results of their research. Their results were made available to

members online as well. Our members also had the chance to offer suggestions for the focus of next year's research projects.

Our industry affiliate membership is a three-level program offering industry promotion, discounts on CPULD's services, and access to a wealth of knowledge and world-renowned experts. In addition, we foster a close relationship between our membership companies and their potential future employees – companies are regularly connected with our students during research projects, internship opportunities, and networking events.

CPULD is very excited about our 2019 growth and the membership program's momentum. We've gained two new industrial affiliate members this year: ORBIS Corporation and Pallet Machinery Group (PMG). Join these worldwide companies in benefiting from being an Industrial Affiliate Member of the Center for Packaging and Unit Load Design at Virginia Tech.



Photos: (clockwise from top left) annual membership meeting; Dorina Bugledits presenting her research; all of the researching/presenting students and interns; Eduardo Molina presenting his research.



Photos: (left) Yu Yang Huang Qiu; (right) stretch-wrapped unit load of corrugated boxes being tested in the forklift handling condition.

Yu Yang Huang Qiu Receives Graduate Fellowship to Evaluate the Maximum Pallet Deflection That Occurs Under Forklift Handling Conditions

The most common handling method for pallets are by industrial forklift trucks. When pallets are handled by these trucks, the pallet deflects (bends) due to the weight of the unit load it's carrying. Commonly, the maximum deflection occurs at the pallet's outside edges and corners.

Both ISO 8611 and ASTM D1185 define the maximum acceptable deflection for a pallet in this handling condition; however, the relevance of these limits was questioned in a recent ISO meeting. It was determined that the exact effect of pallet deflection on the stability or handleability of the unit load while in the forklift support condition is not well understood. Therefore, pallets might currently be designed using unrealistic values.

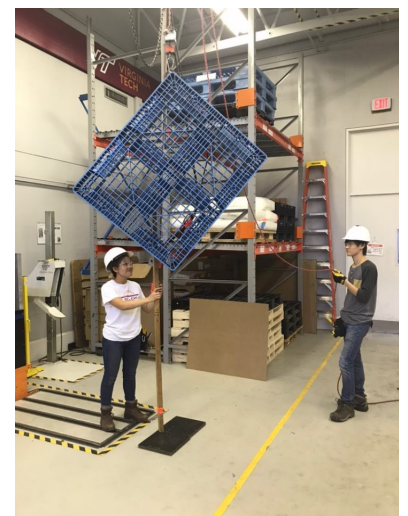
Understanding how a pallet's deflection while in a forklift support condition affects the stability of the unit load, and, from this, deriving industry accepted deflection limits will help the industry to design safer, more cost-effective pallets. Master's student Yu Yang Huang Qiu has received a graduate fellowship to research this topic.

The intensity of vibration caused by the forklift will be measured using a Lansmont SaverX device under different handling scenarios. The representative vibrational profile will be used to simulate the dynamic movements that a pallet experiences during forklift handling. A custom jig will be built for the vibration tester, and the static and dynamic pallet bending will be measured during simulated forklift handling scenarios. The experiment will be repeated for various representative unit loads – such as testing it with a unit load of bags, bottled beverages, or a column of stacked boxes, etc. At the end of the project, a maximum deflection limit will be proposed for forklift truck handling in both ISO 8611 and ASTM D1185 standards.

Videos of CPULD's Lab Tests Coming Soon!

One of CPULD's latest projects is to begin recording and producing videos of all tests regularly conducted in our laboratories. Our summer interns, as well as the graduate student lab managers, have been in charge of recording all of the tests that they've learned to conduct while working in CPULD's labs. These videos will be edited together as shorter clips showing and explaining the testing process from set up to completion inspection.

It is CPULD's goal to make these videos accessible to the general public, as they will explain the processes that packages, pallets, and unit loads need to go through before they can be certified as stable/protective enough for general use. Soon, instead of explaining these tests to laypeople, we will be able to point them to our series of educational videos!



~ Graduate Research Highlights ~ Investigation Into the Types of Issues That Pallets Cause in Automated Warehouses

By Alina Mejias

Companies are looking to automation to help them solve their most pressing fulfillment problems, driven by the need to manage high velocity operations with limited labor resources while meeting the ever-changing needs of their customers. The proper selection of appropriate material handling equipment has become one of the most important choices in modern manufacturing. Using proper material handling equipment can enhance the production process, decrease manufacturing lead time, provide effective utilization of manpower, increase the efficiency of material flow, and improve system flexibility and productivity. In fact, efficient material handling can reduce operation costs by 15%-30%.

Unfortunately, pallets are not often taken into consideration when designing material handling systems, even though pallets are the backbone of the modern supply chain. This research project surveyed the readers of the Modern Materials Handling Magazine to identify the issues that pallets can cause in modern automated warehouses.

Overall, 256 individuals responded to the survey, representing a variety of different industries including 3PL warehousing distribution centers (16%), groceries (10%), consumer goods (9%), beverages (4%), chemicals (3%), and aerospace (2%). A typical respondent used 697,392 pallets annually. The most popular pallet size was the 48 in. x 40 in. GMA pallet (used by 62% of respondents).

When asked about their current level of automation,

23% of the respondents said they use automated palletizing/depalletizing equipment, 33% use automated materials handling equipment, and 24% use automated storage equipment. However, most companies (51-63%) still use manual systems.

Of the companies that use semi- or fully-automated storage systems, 53% indicated that they experience pallet related issues in their system on a daily or weekly basis, and 25% experienced issues monthly. The most common issues included missing or damaged pallet components and excessive pallet deflection.

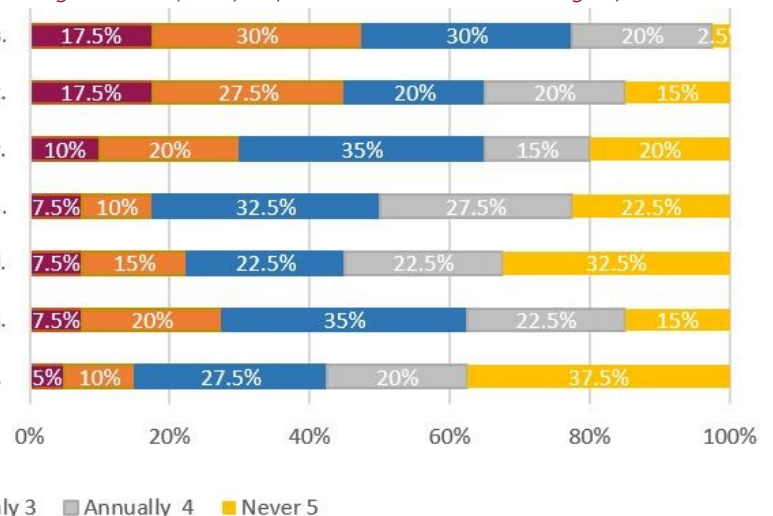
Broken or loose components cause issues daily or weekly for 21% of the respondents, while incorrect bottom deckboard placement leads to split pallets during pallet jack handling for 38% of the respondents.

The most common pallet types that cause these damages are the stringer or block class wooden pallets. Due to cost saving initiatives, companies are asking pallet companies to build lower quality pallets. Unfortunately, these pallets are not durable or dimensionally stable enough for modern automated material handling and storage systems.

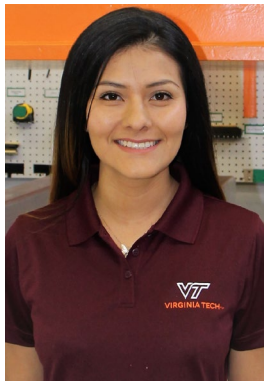
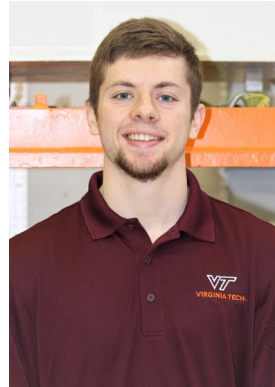
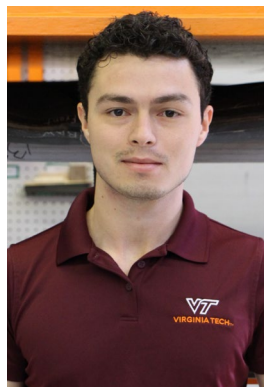
The results of the research will reveal which pallet components cause issues in the modern warehouse. This information will help pallet designers build better pallets for automated warehouses and help companies identify the areas where pallets interact with their systems.

- Poor quality or missing bottom boards resulted in jams or faults.
- Missing or damaged components resulted in improper placement.
- Excessive pallet deflection resulted in retrieval difficulty.
- Inconsistent pallet dimensions resulted in improper placement of unit loads.
- Missing or damaged component resulted in increased unit load speed.
- Incompatibility of incoming pallets with the current storage system.
- The low COF of pallets resulted in greater unit load acceleration.

Figure 1: Frequency of pallet related issues in storage systems.



Meet the 2019 Graduate Students



Graduate Students: (clockwise from bottom left) Alina Mejias Rojas (M.S.); Nicolas Navarro (M.S.); Dorina Bugledits (M.S.); Mary Paz Alvarez Valverde (M.S.); Chandler Quesenberry (M.S.); Yu Yang Huang Qiu (M.S.); Eduardo Molina (Ph.D.).



~ Personnel Spotlight ~ Young-Teck Kim, Assistant Professor

Dr. Young-Teck Kim is a 10+ year expert in sustainable packaging with experience in bioplastics, smart packaging, biosensors, and nano-composite structures. Kim graduated from Clemson University with his Ph.D. in packaging science and joined the Department of Sustainable Biomaterials in 2010 as a co-founder of the packaging B.S. degree program. He teaches classes in packaging materials, including paper, corrugated, and plastic packaging as well as packaging polymers – and specialty classes in food and health care packaging. In the last several years, he has also served as the primary advisor to the student packaging club. Our students are very lucky to have Kim, who is an award-winning professor with “young research scholar award,” “teacher of the week award,” and “outstanding faculty” awards to his name.

Kim and his research team have recently been focused on developing new packaging material composites and studying their structures and functionality using a variety of natural or synthetic polymers, as well as looking at functional and active agents derived from biomaterials. Some of his current work includes the study of composite structures with carbon-based nanomaterials or other inorganic nanomaterials. Recently, Kim has filed patent applications in the areas of isolation and utilization of biopolymeric materials from agricultural waste (under the concept of zero waste production) for applications in packaging systems. For example, he has developed nano-cellulose based forms that are capable of replacing existing traditional plastics, and fabricated biopolymeric films with enhanced gas barrier properties. These projects are funded by USDA NIFA and private packaging industry sectors.



~ Continuing Education Opportunities ~

2019 Webinar Series (CPULD Members Only)

CPULD is pleased with the response to our new webinar series. Director Laszlo Horvath gave two separate lectures in spring 2019, which were free to our members. Both webinars had around a dozen participants and received high satisfaction ratings from the survey sent out to attendees.

Before beginning this series, we collected topic suggestions from our members and have tailored all of these lectures to meet their needs. The webinars that will be offered fall 2019 are “How to determine the load capacity of the pallet” on October 8, followed by “How to specify pallets for automated warehouses” on November 12.

We hope to ramp up to offering at least one webinar every other month in 2020. If there are any topics in particular that you or your company would be interested in, please feel free to suggest them to us!

Stay tuned to learn when the 2020 series of webinars is announced.



Wood Pallet Design and Performance Short Course, Spring 2020

Pallet design is an integral part of the material handling system. Wood pallet suppliers, sales professionals, professionals responsible for pallet purchases, packaging engineers, and pallet specifiers will all benefit from an understanding of how to design pallets that will last longer and perform better.

This intensive three-day short course will teach techniques that pallet designers can use to save money when designing pallets by considering the interactions between all of the components of the material handling system. The course will use state-of-the-art pallet design software called the Pallet Design System (PDS) to better demonstrate the steps that go into the pallet design process. You will also be taken on a tour of a working, state-of-the-art, pallet testing laboratory!



Unit Load Design and Performance Short Course, Fall 2020

Unit load design is a revolutionary, systems-design approach that significantly reduces the cost of distributing products to consumers by understanding how pallets, packaged products, and handling equipment mechanically interact. Unit load design is a new and valuable service that pallet, packaging, and handling equipment suppliers can offer their customers.

This intensive three-day short course will teach techniques that pallet and packaging designers can use to save money on corrugated board and plastic packaging materials when designing pallets and packages by considering the interactions between all of the components of unit loads. The course will use a state-of-the-art unit load design software called Best Load to better demonstrate the steps of the unit load design process. You will also be taken on a tour of a working, state-of-the-art, packaging and pallet testing laboratory!



To learn more or register for these courses, visit:
www.unitload.vt.edu/education/continuing-education/

2019 Calendar of Upcoming CPULD Events

- Oct. 2: Majors Fair – Current students can learn more about the packaging major
- Oct. 8: Webinar: How to determine the load capacity of a pallet *(for members only)*
- Oct. 23: Round table discussion event with the industry (2-5 p.m.)
- Oct/Nov (TBD): Ribbon cutting – joint event with Montgomery Co. Chamber of Commerce
- Nov. 12: Webinar: How to specify pallets for automated warehouses *(for members only)*
- Nov. 23-Dec. 1: Thanksgiving break
- Dec. 11: Classes end at Virginia Tech

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*Quotes for new testing projects,
 distribution packaging projects,
 unit load design projects,
 membership with the center,
 new research projects*

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Dr. Laszlo Horvath
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*Scheduling meetings
 with Dr. Horvath,
 short course information,
 other center events,
 website and marketing*

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Contact Our Team:

*Ongoing testing
 operations, lab
 management, schedule
 sample deliveries*

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*Immediate needs,
 delivery info,
 invoicing questions,
 AP / AR*

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*Primary packaging
 design and testing
 questions, primary
 packaging research*

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