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Optimizing Overall Equipment Effectiveness at Beyond Meat

Beyond Meat is a Los Angeles-based producer of plant-based meat substitutes founded in 2009 by vegan environmentalist Ethan Brown with the stated mission of combating climate change. The company's products were launched in 2012 and include plant-based burgers, beef crumbles, sausage, meatballs, meat jerky, and chicken.

Beyond Meat has 472 employees and reported 2020 revenue of $406.8 million. As the first plant-based meat analog company to go public it was valued at $3.8 billion at its initial public offering in 2019. As of March 2021, Beyond Meat products are available in approximately 118,000 retail and food service outlets in more than 80 countries.

The company operates manufacturing facilities in Columbia, Missouri, Devault, Pennsylvania, Enschede and Zoeterwoude in the Netherlands, and Jiaxing in China. In 2018, Beyond Meat opened a 26,000-square-foot research and development laboratory in El Segundo, California. In January 2021, the company announced it would be opening a new global headquarters in El Segundo later that year.

In selling plant-based meat products, Beyond Meat's multi-faceted goals include improving human health, decreasing the impacts of climate change, limiting human reliance on natural resources and respecting animal welfare. Amidst rapid growth — three of the manufacturing sites were added in 2020 — the company's manufacturing team has committed to optimizing their production capabilities.

In order to identify and prioritize opportunities to cut costs and pilot one of the identified priorities, Beyond Meat brought in a student team from the Tauber Institute for Global Operations at the University of Michigan, consisting of **Gilbert Pasquale**, working on a Master of Business Administration (MBA) degree, and **Channing Wan**, a member of the Engineering Global Leadership Honors (EGL) program, which leads to BSE and MSE degrees in Industrial and Operations Engineering.

"The focus of the project was to help Beyond Meat improve the measurement capabilities of their newly acquired production facility in Devault," said Pasquale. "At Beyond's direction we used Overall Equipment Effectiveness (OEE) to measure the availability, performance, and quality of two manufacturing lines. In addition, we executed a pilot project to improve the availability and performance of one problem machine on one of the lines. Finally, we provided a roadmap to automated collection of the OEE metrics that we manually collected."

> "The Tauber team spent four weeks solely improving the availability and performance of this specific machine on one of the manufacturing lines of Beyond Meat. Ultimately, we were able to improve the overall equipment effectiveness by approximately 10%, which results in more than 1,000 pounds of additional product per day."
> *Gilbert Pasquale*

To measure opportunities for improvement, the Tauber team leveraged the OEE framework at the Devault facility. OEE evaluates opportunities on a machine level by measuring availability, quality,

Above: Gilbert Pasquale and Channing Wan

Dr. John Branch
Ross School of Business

Dr. Debra Levantrosser
College of Engineering

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and performance. The Tauber team manually measured OEE and provided recommendations for Beyond Meat to automate OEE measurement long term.

"Unlike almost any other Tauber project, Beyond Meat is manufacturing a product that is under 10 years old," said Pasquale. "No one can predict some of the operational problems that cause availability, quality, and performance issues on a day-to-day basis."

While measuring OEE, the Tauber team identified a specific machine on the plant floor that had significantly lower availability and performance. The Tauber team planned an Autonomous Maintenance Event (AME) and included the machine's manufacturer, facility management, the maintenance team, and the production team in the project.

"Our pilot project addressed a machine that was a frequent problem for the plant even before Beyond Meat had acquired it," said Pasquale. "In the past, to 'fix' the problem, the plant would bring out an Original Equipment Manufacturer (OEM) technician to perform maintenance on the machinery.

"In our improvement plan, the OEM technician spent considerable time training the various plant personnel that interacted with the machinery," he continued. "We also compiled training materials and maintenance manuals so that when the machine inevitably causes problems in the future, the plant personnel can better respond to it."

During the AME, operators were trained on proper machine use, the OEM technician inspected and made machine adjustments, and preventive maintenance was standardized. The Tauber team provided documentation and standard operating procedures following the AME.

"The Tauber team spent four weeks solely improving the availability and performance of this specific machine on one of the manufacturing lines of Beyond Meat. Ultimately, we were able to improve the OEE by approximately 10%, which results in more than 1,000 pounds of additional product per day."

By executing the AME, the Tauber team was able to improve the performance and availability of the machine and ultimately increase the output of the line. The team also recommended additional strategies to improve OEE, including rotating operator breaks and adding a pull system between two process steps. With these improvements,Beyond Meat can expect $3.3 million in savings and 35 million pounds of additional product produced over the next three years at the Devault facility.

Above: Channing Wan prepares to visit the manufacturing line.

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"Beyond Meat's leadership was instrumental in designing and implementing this project," said Pasquale. "Uniquely, Beyond has leaders who come from long careers in food and beverage, but also leaders who have vast experience in the technology industry.

"The marriage of these two worlds allowed us to use operational lessons from both," he continued. "This included moving incredibly quick and finding comfort in the production of a plethora of product Stock Keeping Units (SKUs), typical from technology, to starting every project and task with safety considerations, typical from food and beverage, which minimizes bacterial concerns."

Student Team:
Gilbert Pasquale – Master of Business Administration

Channing Wan – EGL (BSE & MSE in Industrial and Operations Engineering)

Project Sponsor:
Victor Davis – Vice President of Internal Manufacturing

Faculty Advisors:
John Branch – Ross School of Business

Debra Levantrosser – College of Engineering

About Tauber Team Projects

The 2021 Tauber Team Projects resulted in $989 million in savings according to sponsoring company calculations, an average of $43 million per project over three years.

Each two to three-person Tauber Team consists of graduate engineering and/or graduate business students. Along with receiving high-level corporate support from the sponsoring company, each team is advised by a College of Engineering and a Ross School of Business faculty member and overseen by a Tauber Institute Co-Director. The projects begin on-site in May and continue for 14 weeks. Students present the results of their projects and compete for over $40,000 in scholarships at the U-M Tauber Institute's annual *Spotlight!* Team Project Showcase and Scholarship event, held each September in Ann Arbor, Michigan. *Spotlight!* provides outstanding opportunities for students and corporate partners to establish relationships while exploring innovations in operations and manufacturing.

To learn more about the Tauber Institute for Global Operations, visit tauber.umich.edu or contact us at 734-647-1333.

Above: Pasquale and Wan's Beyond Meat project tied for third place in the 2021 Spotlight! *competition.*

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