

COVER STORY



Pressing issues

Natoli, the tablet compression tooling manufacturer outlines the opening of its institute at Long Island University

Tooling, tablet compression accessory, and services provider, Natoli Engineering Company has opened an oral solid dosage (OSD) research and development institute to advance the field of industrial pharmacy education and technology. The Natoli Institute for Industrial Pharmacy Research and Development was established in partnership with the Arnold and Marie Schwartz College of Pharmacy and Health Sciences on the Brooklyn campus of Long Island University (LIU).

Supporting one of the remaining industrial pharmacy programmes in North America, the Institute is dedicated to advancing knowledge in the field of pharmaceutical solid oral dosage formulation and engineering. Rutesh Dave, associate professor, a tenured faculty member and director of LIU's division of pharmaceutical sciences, and Dr Charles Kettler, director of Natoli Scientific, will oversee the institute's daily activities and projects.

A legacy of technical support

Natoli Engineering is a key player in the tablet compression tooling, supporting products and services industry and has been in business for more than 40 years. The company has technical experts on staff who often provide troubleshooting assistance to their clients and travel around the world to present training classes and participate in conferences on various topics affecting the tableting industry.

Because of high demand for technical knowledge and the need for resources to investigate customer problems that arise during the production of tablets, Natoli established its Natoli Scientific division. Natoli Scientific can provide or locate resources to help industry professionals find solutions to issues with product formulation, selection of proper tablet design and recommendations for tooling specifications to meet typical as well as specialized tablet needs.

Combined with four decades of experience and a network of university, consultant, and resident resources, Natoli Scientific operates from Natoli's headquarters in St. Charles, USA. It is tasked with the everyday customer requests to help customers determine correct tool selection, tool steel, tool coating, and die configurations that combat common tableting problems such as tablet sticking, picking, capping, lamination, tool binding, and accelerated rates of tool wear due to abrasive formulations.

As Natoli Scientific realised the number and types of customer problems, it became clear that the tableting industry would greatly benefit from the allocation of additional resources to study the issues that are presented to the company every day. Thus

discussions with LIU began and, in addition to conducting its own research and studies, Natoli Scientific now oversees and partners with the Natoli Institute at LIU to conduct experiments and troubleshoot tableting issues for which customers and other clients have requested a solution.

Supporting the future of tableting science

Natoli provided funding to establish the institute in order to not only provide opportunities for manufacturers and external clients to receive solutions for the complex

manufacturing issues they face, but also to strengthen the field of industrial pharmacy. The number of industrial pharmacy programs available to students in the United States has decayed over the last several decades as many schools of pharmacy have focused on satisfying the needs of the market: retail and clinical pharmacists. Establishing the Natoli Institute expanded LIU's pharmacy program to provide opportunities for students to study the formulation and manufacture of tablets.

"There are fewer pharmacy programs in the United States that still offer industrial pharmacy opportunities. Many pharmaceutical students will go to work at one of the retail pharmacies or in a hospital formulary. The Natoli Institute supports those who wish to pursue careers at companies that manufacture tablets," said Dr Kettler.



The Natoli Institute features dispensing, granulation/milling, compression and coating suites. Work will focus on understanding the current problems associated with the development of formulations for new and existing molecules that meet the dissolution and bioavailability for the current clinical requirements. Delivery of the formulation to the tablet press and control of the tablet press will be the focus of some of the research work done as some of the new

institute will also perform powder rheology measurements, fluid-bed granulation, fluid-bed coating/drying, high-shear wet granulation, milling, blending, roller compaction, tablet coating (solvent-based and aqueous) and tablet compression with a single-station laboratory press or a rotary tablet press.

“Many pharmacy students haven’t had the opportunity to see tablet manufacturing operations in progress. Watching a high-speed

tablet press can be an experience that explains why understanding the underlying science of powder handling and compaction is so important. Providing students with hands-on experience will help them better understand the actions and

attention to detail required to make quality medicine,” said Dr Kettler.

A resource for the tableting industry

In addition to furthering pharmaceutical compression science and supporting research into challenges facing the industry, the laboratory will provide real-world research opportunities to undergraduate and graduate students. Tablet manufacturers may submit projects for students to research, which will give them the opportunity to troubleshoot and experiment with real issues that these clients are facing every day.

Together with Natoli Scientific, the Natoli Institute provides resources to the tableting industry, including new product manufacturing studies, tablet tooling sticking and picking evaluations, and new formulation technologies. So not only does the facility provide an environment for students to learn industrial pharmacy unit operations for solid oral dosage forms, it also provides a unique opportunity for Natoli customers to have their tableting problems investigated.

“We found that we needed a laboratory setting to explore some of the challenges our customers were facing. With our investment in the Natoli Institute, we were able to help LIU bring back their Industrial Pharmacy program while receiving



access to capable experimenters,” said Dr Kettler.

Students will work on projects submitted by Natoli customers and other clients with the end result being to provide solutions to complex challenges that customers face during formulation and manufacturing. Students working at the Institute will gain valuable knowledge and learn how formulation adjustments can impact tablet properties and the performance of the medicine. By gaining experience working with troubleshooting equipment and designing appropriate experiments, students will be well prepared for the tablet quality issues they will encounter in the professional world of solid oral dosage forms. This will be true whether they work at a traditional pharmaceutical company, a compounding pharmacy or some other industry in which powders are assembled and compressed into products.

“We are committed to supporting the future of the industry, as well as providing additional resources to our customers to combat their tableting issues,” said Dale Natoli, company president. “By establishing the institute, we are demonstrating our commitment to the support of education in industrial pharmacy operations. We look forward to continuing to provide opportunities to partner with our customers to find solutions to their challenges.”

Any work completed on customer projects will always uphold intellectual property requirements, as well as contracts and nondisclosure agreements as necessary. And no company or product that is researched at the institute will be identified unless permission is explicitly granted.

The institute may prove valuable to generic drug manufacturers as sometimes these companies are on tight timelines and moving from approval to scale up can present many challenges that require additional development work. The institute will work with customers to quickly execute experiments that will provide clients with process and product data which will in turn help them in their discussions with regulatory agencies such as the FDA and EMEA.

Graduate students may leverage the resources of the Institute for their thesis or dissertation work with approval from Professor Dave and Dr Kettler. Faculty at the LIU’s school of pharmacy may initiate projects as well. “It’s a resource for them to integrate industrial pharmaceutical science into their classes. We welcome them writing experiments to create new learning opportunities for students,” said Dr Kettler.



formulation techniques provide unique challenges to ensure the resulting dosage form meets the fitness for use criteria. Multiple unit pellet system (MUPS) formulations, multiple layer tablets and multi-tip compression tools all have distinct requirements for powder handling and compression to ensure the resulting tablets consistently meet the quality requirements for the product.

“Many students aren’t familiar with the unit operations that tablet formulation and manufacturing requires. The facility features traditional solid dosage formulation equipment, as well as the technology to measure the physical and chemical properties of tablets. The Natoli Institute will be investigating new technologies for granulation as well as building an understanding of the best way to take a formulation that is currently built through granulation to a direct compression process while maintaining the proper delivery of the API to the patient,” said Dr Kettler.

Students will have the opportunity to receive hands-on training with the proper and most common equipment that is used in tablet manufacture and formulation. They will have the opportunity to learn tablet analysis including principles behind tablet breaking force, dissolution, friability, disintegration, and content uniformity. The

