

Robots 5.0: Innovative laboratory for Tec students' practicals



The renovation of the advanced manufacturing laboratory is part of a strategic partnership between Tec de Monterrey and MIT.

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The renovated **FrED Factory** lab provides a space for students to build and improve devices, tackle real-world challenges, and simulate industrial environments.

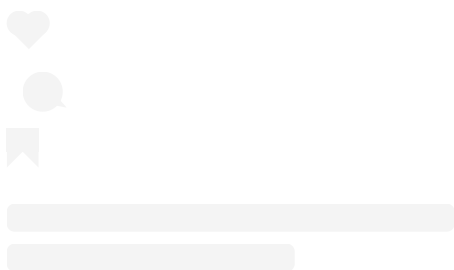
It was inaugurated as part of the **FrED Factory Summit**, the first official event organized as part of the strategic partnership between [Tec de Monterrey](#) and the [Massachusetts Institute of Technology \(MIT\)](#).

The partnership between the two institutions is focused on the **democratization of advanced manufacturing education**.

The event, held at the **Monterrey campus**, was attended by Brian Anthony, Associate Director of **MIT.nano** and Russel Bradley, leader of the **project at MIT**.



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Although the laboratory already existed, **its electrical and communications infrastructure was renovated to integrate Industry 4.0/5.0 equipment** such as industrial robots.

Manufacturing cells were standardized, the furniture was modernized, and a **viewing area with interactive screens** for remote monitoring was added.

It now features collaborative robotic arms (**KUKA, EPSON, Schneider Electric, ABB, Xarm**), modular work and inventory control stations, real-time digital twinning, and sub-assemblies.

The laboratory, which belongs to the **Mechatronics** department, has a **FrED** called **AlFrEDo**.

Impact of AlFrEDo

FrED Factory is a teaching and research center centered around the **Fiber Extrusion Device (FrED)**, a desktop fiber extrusion system designed to teach smart manufacturing.

Described as a *“glue gun on steroids,”* the device allows students to experiment with manufacturing parameters and analyze results in real time.

“This space will become the ‘campus factory,’ where we can produce prototypes and academic projects,” explained Erick Ramírez, the project leader.

He said that the lab enhances the **development of students’ technical skills through workshops, seminars, and micro-challenges**.

It also strengthens teacher training by providing refresher workshops on **4.0 technologies**, which train teachers on how to use emerging tools and innovative methodologies that they can take back to their classrooms.

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Its impact is also reflected in academic output: currently, **92 undergraduate students are actively involved in research projects linked to the laboratory.**

They author **scientific articles, technical reports, and produce specialized content** that contributes to furthering knowledge in the field of advanced manufacturing.

“We held a roundtable discussion with prominent business owners who form part of the Board of the Mechatronics Engineering program.

“They provided us with valuable industrial perspectives that will further strengthen the initiative and closely link it to the manufacturing sector,” said Erick Ramírez.

FrED Challenge

The fifth **FrED Challenge** was launched during the **Summit**. This semester-long academic challenge was co-created by the **Tec** and **MIT** and integrated into the sixth semester **Manufacturing Systems Automation** course, which is part of the [**Mechatronics Engineering**](#) program.

Students work in teams to design and prototype solutions that improve production processes related to the manufacturing of **FrEDs**.

This year, two groups are working to develop machines that validate communication and continuity between working shifts.

The challenge consists of an intensive 48-hour period in which teams build a **functional manufacturing cell**. Winning teams will receive a digital credential for participation in **MIT’s Global Classroom** and the opportunity to present their solutions to colleagues at that institution.



The FrED Challenge was co-created by Tec de Monterrey and MIT. Photo: Liliana Fierro

Active learning at the Summit

During the Summit, specialized talks were given on **artificial intelligence, computer vision, data analytics, and the Internet of Things (IoT)**.

The students who participated in the first research stay at **MIT** presented their research achievements and results.

In addition, the call for applications for the 2025 stay was formally opened. This will allow eight students from the **Mechatronics Engineering** program to study their seventh semester at **MIT**.

The partnership between the **Tec** and **MIT** is expanding to the Guadalajara and **Mexico City campuses**, with the latter hosting the second **FrED Factory Summit**.

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