

SPECIAL
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Industry & Competitiveness



GLOBAL CONNECTIONS optimizing innovations

Santa Catarina SENAI Institutes and UniSENAI work
with global centers of excellence and develop solutions
to make Brazilian industry more competitive



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INTRODUCTION



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The new international face of the Santa Catarina SENAI Innovation & Technology Institutes and UniSENAI marks a new step forward in consolidating the state as a strategic hub for industrial innovation in Brazil. Underpinned by guided collaboration for solid results, the institutions have expanded their connections with Science & Technology Institutes (STIs) and educational centers outside Brazil. The development of joint projects and access to international innovation are facilitated by partnerships with leading global actors, such as the Fraunhofer Institute (Germany) and MIT (USA). These collaborations have promoted a dynamic exchange of technologies and professional experiences, enhancing the capacity of Brazilian industry to compete on an increasingly technological and demanding global stage. Technological solutions developed in Santa Catarina are being applied in other countries in parallel with the adaptation and transfer of cutting-edge international solutions for the Brazilian context, contributing to the sustainable, competitive advancement of industry in the country.

Gilberto Seleme
FIESC President

New frontiers for innovation

Internationalization of the Santa Catarina SENAI Innovation & Technology Institutes and UniSENAI links Brazil to global centers of excellence and broadens industry horizons

For more than a decade, the SENAI Innovation Institutes (ISI) and the SENAI Technology Institutes (ISTI) in the southern Brazilian state of Santa Catarina have been treading a path of growth and consolidation in Brazil. Now at an advanced level of maturity, they are moving forward with a new strategic cycle: internationalization. Goals include the expansion of partnerships and international visibility, revenue generation through projects and technology developed locally for global application, and the transfer of technology developed overseas to Brazil, in addition to increased international mobility for teams of researchers and academics. “We want to be recognized by relevant global institutions as partners capable of developing highly technological projects,” says Fabrício Pereira, regional director of SENAI/SC.

International operations take on a number of guises, with more than 400 different actions by the SENAI Innovation and Technology Institutes and higher-education partnership UniSENAI/SC, aligning their strategies to meet industry demands. To mid-2025, these actions had involved 164 international partners, impacting projects, companies, and professionals through missions, events, exchanges, and technological cooperation efforts, among other interactions—this edition provides a sample of these cases and partnerships.

“Competitiveness in industry today is about achieving technological capabilities at international level, and it is therefore paramount for the SENAI Institutes to be exposed to international demands, working in partnership with science & technology institutions (STIs) from outside Brazil,” says Gustavo Leal, director general of SENAI National. “Santa Catarina is at the forefront. The SENAI Institutes in the state have outperformed the national average and are advancing internationally,” Leal points out.

Internationalization is in the DNA of the SENAI Innovation Institutes, created to bridge the gap between universities and corporations and transform scientific knowledge into usable products. The key inspiration for the network’s creation is the Fraunhofer Institute for Production Systems and Design Technology (IPK), based in Berlin, Germany, part of Europe’s biggest applied research organization.

The Fraunhofer was commissioned to assist in the



Gustavo Leal, director of SENAI National, and Fabrício Pereira, SENAI/SC regional director: exposure to international demands

planning and implementation of each of the 28 SENAI Institutes located across different regions of Brazil, with focus on the development of applied research and guidance for the market. The network was also implemented with the support of the Massachusetts Institute of Technology (MIT) in the US, a global reference in technological innovation, to analyze the Brazilian innovation ecosystem and propose methodologies and practices adapted to Brazil’s particularities.

Currently, the Fraunhofer monitors the SENAI Institutes, both individually

400 Actions promoted by the SENAI SC Innovation & Technology Institutes and UniSENAI

164 International partnerships involved, impacting projects, companies, and professionals (data from July 2025)



Fraunhofer IPK and MIT BOTH HAVE BEEN INSPIRATIONAL AND HAVE HELPED TO DESIGN AND IMPLEMENT THE SENAI INNOVATION INSTITUTES

and jointly, assessing technological maturity levels and other aspects. "The SENAI Innovation Institutes of Santa Catarina have demonstrated a unique mindset from the outset, geared toward proximity to industry and focused on its real demands," says David Domingos, Director of International Business Development for Fraunhofer IPK, who contributed directly to the conception and implementation of the Brazilian network. Since then, the Santa

Catarina SENAI Institutes have stood out for scoring highest in assessments by both the Fraunhofer Institute and SENAI National.

According to Domingos, Santa Catarina was already a key player in offering specialized technological services, making the transition to a more structured collaborative innovation agenda with industry natural and fluid. Now he sees the advances of the Santa Catarina SENAI Institutes in coordinating relevant cooperation projects with different countries and innovation ecosystems around the globe. "This openness and international involvement demonstrate that the SENAI Institutes understand the strategic importance of internationalization for research, development, and innovation agendas. It is a necessary, modern vision to widen the impact and competitiveness of Brazilian industry on the global stage," he says.

Internationalization, though, is not something to be achieved or willed instantly, but rather a long process of multiple stages and challenges, from the most commonplace to the most complex; for example, investments applied to people training and development of a globally focused organizational culture.

Santa Catarina SENAI Institutes and UniSENAI also have English conversation clubs, financial incentives for language study, linguistic proficiency targets, and ongoing technical exchanges. On average, between 40 and 50 international mobility programs take place each year involving students, faculty staff, and researchers. "Language is just one tool. We aim to create a conducive environment grounded in culture, incentive, and active participation," says Valério Piana, head of internationalization for the SENAI Technology & Innovation Institutes and UniSENAI.

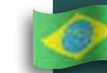
Other challenges include the scarcity of specific financial resources for internationalization actions, contracts to be drafted under

Formal partnerships with educational and science & technology institutions



Germany

- Industrie 4.0 Maturity Center (i4MC)



Brazil

- Brazilian International Education Association (FAUBAI)



USA

- Olympic College
- American Global Tech University (AGTU)
- Industrial Liaison Program of the Massachusetts Institute of Technology (MIT – ILP)
- Florida Tech University – Center for Advanced Manufacturing and Innovative Design (CAMID)
- Must University / Miami College, LLC
- Laser Institute of America (LIA)



Ecuador

- Universidad Técnica Particular de Loja (UTPL)



Finland

- Turku University of Applied Sciences (Turku AMK)



French Guyana

- GIP FCIP



Mexico

- Benemérita Universidad Autónoma de Puebla (BUAP)



Portugal

- Universidade Nova de Lisboa (UNL) – FCT
- Universidade do Minho

foreign legislation, and difficulties in accessing opportunities such as calls for entries, bid invitations, and funding programs around the world, in addition to the prospection of partnerships and projects. These barriers have been constantly overcome: to date,

Internationalization actions

- Technical visits (inbound & outbound)
- Participation in international forums
- Technical training
- Researcher and academic exchanges
- International consultancy
- R&D and technology transfer projects
- International events
- Publications and participation in conferences
- Intellectual property registrations
- International revenue generated through service provision



RAPHAELA BERKA

The 4th episode of Sweden-Brazil Matchmaking was held at the SENAI Innovation Institute for Embedded Systems (ISI-SE) in Florianópolis in 2024

all this work has resulted in formal partnerships with 15 international organizations, and more than 40 potential ones, in negotiations with universities and research centers in countries such as Canada, Belgium, Finland, Norway, the US, and the Czech Republic, along with African and Latin American countries.

Liaison efforts have also ensured involvement in funding applications with international resources, such as the Imagine Fund (Canada), 100K Strong in the Americas (US) and bilateral calls for entries with European countries. These initiatives complement R&D projects, technology transference and revenue generated by technological service provision, participation in forums and fairs, exchanges, technical visits and training, publications, and the organization of international events—UniSENAI, for example, holds an annual international symposium on education, research, and extension.

The internationalization strategy, formulated with the assistance of the Fraunhofer Institute, is based on four pillars (see inset), and is aligned to Brazil's comparative advantages in areas of international interest, such as renewable energy and the energy transition, strategic minerals, bioeconomy, biodiversity, sustainable agriculture, and a consolidated oil & gas sector. "The SENAI Innovation Institutes have the potential to play a strategic role as a bridge between Brazilian industrial demands and centers of excellence in research, development, and innovation overseas," says the Fraunhofer Institute's David Domingos.

To keep abreast of technological needs in Brazilian industry and have access to national support mechanisms, SENAI is able to leverage its own technical competencies, at the same time organizing partnerships with renowned international institutions to accelerate the development of technological approaches in Brazil in areas with consolidated knowledge overseas, enabling their adaption to the national context.

This is a hybrid approach, placing SENAI front and center as the technical and institutional coordinator of industrial innovation in Brazil. "As we ramp up on internationalization, we will be qualifying our local operations, generating economic impact, and demonstrating that Santa Catarina has state-of-the-art science and technology to offer the world," says Maurício Cappra Pauletti, SENAI/SC Innovation & Technology Executive Manager. [ic](#)

From mobility to visibility: the global architecture of the SENAI Institutes

The process to internationalize the SENAI Innovation and Technology Institutes and UniSENAI in Santa Catarina is guided by a clear, consistent strategy based on four pillars: mobility, technology transfer, international fundraising, and global visibility. This structure sustains the efforts of the SENAI Institutes to position themselves as references not only in Brazil, but also in the global scenario of industry research.

The mobility pillar involves student, researcher, and faculty-staff exchanges with overseas institutions, promoting the interchange of knowledge and cultures. Technology transfer is about exporting locally developed solutions to other countries, and adapting overseas solutions to the realities of Brazilian industry. International fundraising allows the SENAI Institutes to sustain projects with funds from overseas agencies, increasing the reach and impact of innovation initiatives.

Finally, visibility is essential to consolidate the reputation of the SENAI Institutes and UniSENAI as trustworthy global partners. This is achieved through participation in fairs, publication of research, and a presence in high-level academic and industrial networks. The projects detailed below demonstrate the efficacy of this strategy in the quest for internationalization.

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Services and solutions provided by the SENAI Institutes benefit the client base of more than 20 countries, creating global revenue streams
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SENAI Innovation Institute for Embedded Systems (ISI-SE) attracts international support for highly relevant research





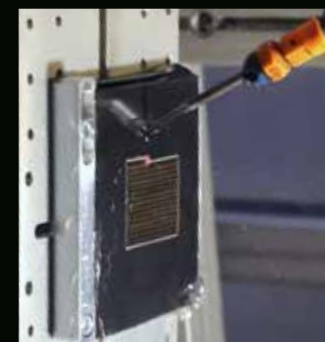
HIGH- impact partnership

Supported by research agencies and centers from the Czech Republic, the SENAI Innovation Institute for Laser Processing is a hub for studies attracting interest and investment from strategic industries in Brazil

The SENAI Innovation Institute for Laser Processing (ISI-PL) is making its mark as a laser innovation and technology hub in Brazil. Projects such as PROSHOCK and LINSERT are aimed at refining the properties of materials and developing state-of-the-art applications for high complexity industries such as aeronautics, automotive, and casting, with a central focus on sustainability and efficiency. The key to success for these enterprises lies in international partnerships and the involvement of Brazilian industries and startups to facilitate knowledge transfer and access to top-of-the-line technologies.

The PROSHOCK project, funded in partnership with the Brazilian Industrial Research & Innovation Corporation (EMBRAPII), is a groundbreaker in Brazil for implementing and disseminating laser shock peening (LSP) technology, a sustainable alternative to the traditional process of shot peening, which increases the fatigue resistance of essential mechanical components for a range of industries.

The project commenced through a partnership with HiLASE, a renowned research center in the Czech Republic, which is also collaborating with the SENAI Institute to install the first LSP treatment station in Brazil. "We were able to transform these partnerships into a significant project for Brazil, introducing innovative and high-impact technology,"



PROSHOCK and LINSERT apply laser shock peening to create special surfaces for Tupy, Suspensys, and other companies

says the technical coordinator of PROSHOCK and LINSERT, Santiago Javier Caraguay Correa.

The company Tupy was the first to show an interest in the possibility of using the technology in partnership with SENAI. According to André Ferrarese, R&D director for the Santa Catarina corporation, this type of international project is essential to ensure the "amplitude and potential of the company's technological roadmap." The company envisions two potential outcomes from the research: one focused on boosting mechanical strength to meet the demands of more powerful and efficient engines powered by a range of sustainable fuels. "The second technological potential is in its contribution to systems with high resistance to hydrogen," adds Ferrarese.

Suspensys has joined the project with an end to technically enhancing steel suspension components for commercial vehicles. Technical project lead André Zahn says that the goal is to

optimize fatigue resistance in these components, focusing on areas subject to concentrated cyclic loads difficult to access using conventional processes. "The involvement of Suspensys in the project reinforces the strategic vision of Randoncorp and the Hercílio Randon Institute (IHR) in the quest for innovation and new technologies, so collaboration with the LSP project is an important step for the company to continue developing and applying sound, reliable solutions," Zahn says.

Running concurrently with PROSHOCK, the LINSERT Project also stands out for its strong international involvement, working with companies from the Czech Republic. It all started through a consortium with the Technology Agency of the Czech Republic (TACR), and explores two key fronts: in the central European country, evaluating the LSP process for hard-material tool coatings and molds; in Brazil, developing laser-generated textures for the aeronautics industry, including superhydrophobic surfaces for self-cleaning. **IC**

Automated HARVEST

Monitoring system has capability for real-time measurement of proportions between harvested product and impurities, and mapping of crop productivity

Agricultural harvesters have undergone important transformations in recent years, incorporating technological resources that enables greater efficiency, accuracy, and sustainability upon production. Automation, sensors, telemetry, and AI systems are just some examples of the resources that make these machines real digital production centers in the field, optimizing the use of resources and reducing operational costs. Brazil is a global giant in agribusiness, and CNH stands out as a leader in this innovation process.

Owner of the brands Case IH and New Holland, the CNH group forges partnerships with research institutions capable of developing the required technologies; the multinational counts the SENAI Innovation Institute for Embedded Systems (ISI-SE), based in Florianópolis, among its global partners. The institute has developed an output monitoring system capable of measuring in real time the proportion between the harvested product and impurities such as crop residues, while working to improve harvest efficiency.

Based on computer vision and artificial intelligence, there is a range of potential applications for this resource, primarily using the information to control an automatic harvester cleaning system,

for which the conventional model depends on the human eye. This control makes possible the improved regulation of equipment workloads, resulting in preservation of parts and savings on fuel. "The fan that blows the residues is the second-highest consumer of diesel in a harvester," says Patryk Gonçalves, a computer vision researcher and technical lead on the project for SENAI.

The system also provides output maps for each stretch of land, enabling the identification of specific problems such as nutrient deficiency, pests, or irrigation issues, with definition of strategies to tackle them, including planning around the selection of crop varieties better adapted to the soil.

The solution's edge lies in the use of sensors, cameras, and advanced algorithms to automate tasks and decision-making previously carried

out by the operator. "As well as lightening the load on the workers, raw material losses and machine breakages are reduced, not to mention the incentive for more efficient, sustainable, and data-oriented agricultural practices," describes Gonçalves.

João Lucca, innovation manager for cane harvesters at CNH Industrial in Brazil, says that the automation meets client requirements for simplified operations. "Today we have equipment with myriad resources, and



hundreds of buttons. Automating functions reduces the complexity of the operation," he says. The uniqueness of this solution has already led to fourteen patent applications across four countries—Brazil, the United States, China, and India.

In March 2023, four researchers

from ISI-SE were in Belgium to present the equipment to the CNH global division responsible for the project. In January last year, two researchers went to Florida to test the solution's performance in conditions different from those encountered in Brazil. "The test was a success. Everything that had worked here worked there as well," adds Gonçalves. The partnership between ISI-SE and CNH on this project began in 2019, and is set to be renewed for a further two years. **ic**



PARTNER INDUSTRY

• CNH



INSTITUTION INVOLVED

• SENAI Innovation Institute for Embedded Systems (ISI-SE)



TECHNOLOGY

• Computer vision
• Artificial intelligence



APPLICATIONS

• Automated monitoring and control harvest throughput



TECHNOLOGICAL MATURITY

• In phase of testing under real conditions



Partnership with international institutions and Brazilian mining sector companies brings more sustainable and efficient German technology for restoring industrial components into the country

INNOVATION with sustainability

Questions have increasingly been raised, primarily from an environmental standpoint, over consolidated processes in the Brazilian market for the restoration of industrial components with metallic coating, such as welding, thermal spraying, and hard chrome. These methods use chemical products that can harm operatives and the environment, with high consumption of fuel and materials and high noise emission levels, in addition to having limitations such as coating defects and poor resistance to corrosion.

Issues such as these can be circumvented by using High-Productive Laser Metal Deposition (HIP-LMD), which has the capability to deposit dense, metallurgically bonded coatings in fine layers (50 µm), proving the components' performance. The HIP-LMD process is also around a hundred times faster than conventional laser coating.

Created and rolled out across Europe a decade ago by the Fraunhofer ILT Institute based in Aachen, western Germany, this innovation has been studied for the last three years in Brazil through a partnership involving the SENAI Innovation Institute for Laser Processing (ISI-PL), the Federal Institute of Santa Catarina (IFSC), and the Brazilian Industrial Research & Innovation Corporation (EMBRAPII), in addition to companies from the Brazilian mining sector (see table). The project was approved in the 32nd round of calls for entry by the Cornet Collective Research Network, a global group of support agencies that pool funding schemes to set up consortia for R&D projects involving companies and research institutions.

One of the participants in the international project is mechanical engineer Jeferson Trevisan of the ISI-PL, who has completed two short-term exchange visits to the Fraunhofer ILT where he had the opportunity to learn LMD first-hand. "The patent for the technology is theirs, but we can learn about it through this partnership. This is a new process for us, and we need to understand the variables that influence the outcomes and parameters for each metal, because if we don't, we won't obtain the desired properties," says the SENAI researcher.

Trevisan explains that laser deposition is a very quick and efficient method, cutting machine



PARTNER INDUSTRIES

• Granajo Fundição • Höganäs Brasil • HRC Metalização • Indústria Carbonífera Rio Deserto • Mineração Rio do Ouro • NETZSCH do Brasil • Vulkan do Brasil, and others



INSTITUTIONS INVOLVED

• Fraunhofer ILT (Aachen, Germany)
• SENAI Innovation Institute for Laser Processing • Federal Institute of Santa Catarina
• Brazilian Industrial Research & Innovation Corporation



TECHNOLOGY

• High-power laser deposition



APPLICATIONS

• Restoration of expensive tools in a quicker, more efficient, and environmentally friendly manner



TECHNOLOGICAL MATURITY

• Undergoing initial testing phase with three partner industries

shutdown times by increasing the lifespan of the parts based on the deposition of more noble metals. Unlike other methods, wastage is practically negligible, and risk to operatives much lower. "The process is more costly to implement, but the productivity gains offset the investment," he says.

Brazilian company NETZSCH, based in Pomerode in the middle region of Santa Catarina's Vale do Itajaí, is one of the companies involved; the German multinational manufactures helicoidal, lobe, and screw pumps, and crushers for the Brazilian mining industry and other



Before and after: laser metal deposition is 100 times quicker and makes better use of materials to restore industrial components

sectors. Parts undergoing the LMD process at the Institute—such as driveshafts for pump sets—are currently in the initial testing phase, says engineer and innovation supervisor Arthur Zinke, adding that the results are set to be compiled and feedback given to the researchers by the end of this year.

One of the near-future project aims is to replace less sustainable metallization processes with LMD. According to Zinke, this was one of the key

points that convinced NETZSCH do Brasil to enter into the partnership. “We joined this project to seek an alternative to hard chrome, widely used in helicoidal pump components,” the engineer goes on. “The company benefits from SENAI having a considerable network of knowledge in both the industrial and academic spheres and innovation support sources. In other words, we have been able to take part in a complex project by investing minimally in labor and financial terms to achieve the same goal, which is making the technology feasible,” Zinke concludes. In addition to the Pomerode-based industry, other parts have been sent for testing at Vulkan do Brasil.

According to Trevisan, the next project phase is set to produce a robotic cell for studies at the ISI-PL. This will make it possible to work with much bigger parts—researchers are currently limited to components weighing a maximum of 10 kilograms (kg) and measuring 60 millimeters (mm) in diameter. The robot will make it possible to test parts weighing half a ton, with a diameter of 300 mm. “The first stage had no planned funds for a machine of that type, so we adapted another to progress the research,” Trevisan says. It will also be possible to extend the range of tests to other industries, such as the oil & gas and automobile sectors. **ic**

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MUTUAL benefit

Exchange visit by MIT student to SENAI Innovation Institute in Santa Catarina state capital enhances partnership with one of the world's foremost universities



ADOBESTOCK

Elwin Futrell, 19, an undergraduate in Electrical, Computing, and Physics Engineering at the Massachusetts Institute of Technology (MIT), spent four months in Florianópolis on an incentive program for students of the renowned institution to gain exchange experience outside the US. From a host of options around the globe, Futrell chose the SENAI Innovation Institute for Embedded Systems (ISI-SE) for his Summer Internship.

The key attraction was the prospect of practical experience in data systems analysis for training in Artificial Intelligence. Futrell reports that the experience couldn't have been better. "The opportunity to use my skills in a real-life programming environment, with excellent mentors supporting me, was a real gift for the construction of my professional repertoire. What I learned went beyond Excel worksheets and Python scripts. I learned lessons about breaking down barriers and broadening outlooks."

The student says that having the opportunity to visit Brazil, about which he had limited knowledge, was a fascinating bonus aspect of the exchange. "My perspectives have widened drastically after

learning about the culture, lifestyle, economy, and, most importantly, the people of Brazil. I was fortunate not only to come to a beautiful country, but also to the wonderful city of Florianópolis," he adds.

Futrell's exchange visit represents a reapproximation of SENAI Santa Catarina with MIT, says Brazilian Rosabelli Coelho, managing director of relations between MIT and Brazil. "Collaboration between MIT-Brazil and SENAI Santa Catarina is a powerful example of how the patient construction of relationships can lead to transformative opportunities in education and research," she says, recalling the commencement of the relationship—an MIT student's exchange program in 2015 at the SENAI Innovation Institute in Joinville. "The synergy between the SENAI/SC mission and practical approach of MIT makes this a promising natural

collaboration of efforts to connect knowledge, practice, and social impact," says Rosabelli.

The executive says that international liaisons such as this are paramount for MIT, as they give students the opportunity to apply their technical knowledge in new and challenging situations. "They develop cultural conscience and resilience at the same time, essential qualities for the global leaders that MIT seeks to prepare," she concludes. For the Brazilian side of this cooperation, the presence of students from MIT, considered one of the world's best universities, confers technical excellence and provides meaningful cultural exchange. Giancarlo Marchesini, head of Artificial Intelligence at ISI-SE, says that Futrell's stint in Brazil, working on an AI project for the soy agroindustry, conferred effective value upon projects at the Institute. [ic](#)



COURTESY OF ELWIN FUTRELL

*"I learned lessons
about breaking
down barriers and
broadening outlooks"*

Elwin Futrell
MIT undergraduate

EXPERTISE in exports

SENAI Institutes provide services and solutions with cutting-edge technology and international certifications for clients in Brazil and more than 20 countries worldwide

In 2024, a group of eleven small and medium-sized industries in Uruguay embarked upon an intensive training program, with a key goal of reducing decision-making time by up to 98%, drastically improving efficiency and productivity among these enterprises. Developed by the SENAI Institute for Technology in Operational Excellence (IST-EO), the methodology applied—known as Intelligent Production—is tailored for smaller companies, and aims to evaluate digital maturity, collect industrial process data, and transform them into useful information in real time. The service, engaged by the Uruguay Chamber of Industry (CIU) in late 2024, is another of the many offered by ISTs based in Santa

In-person meetings in Brazil and Uruguay and online events shared SENAI technology and know-how with the neighboring country

Catarina for dozens of countries around the globe, including trials, certifications, consultancy, analysis, and qualification.

The inclusion of Intelligent Production in the scope of *Impulsa Indústria*, a project developed over recent years by CIU, has allowed these small and midsize companies to use digital transformation and industry 4.0 methods and tools through the transference of SENAI technology and know-how. Consultants from the IST delivered training in Uruguay, and collaborators from the companies involved—in sectors ranging from food to logging and metallurgy—attended online workshops and training sessions in Brazil. An in-person event on May 19 marked the conclusion of the Operational Excellence IST consultation phase for the CIU. Over the course of the day, companies applied their first actions using the methodology, and engaged in dynamic activities, working directly with specialists qualified in Intelligent Production. In the coming months, these participants are set to advance the implementation of industry 4.0 processes across their companies.

The solution was customized for Uruguay in terms of language, indicators, and processes, and negotiations are underway for expansion to other countries such as Argentina, explains SENAI instructor and senior consultant Nilton Bendini.

“While large corporations have the capacity to invest in emerging technologies, small and midsize companies face obstacles such as lower levels of knowledge, limited resources, and a lack of structured processes. To remedy this we developed an accessible solution to support small industries taking their first steps on the digital journey”



Among the benefits of the SENAI training, CIU's Communications and Projects Director Carola Saavedra lists “improved operational efficiency, fewer deviations from planning, and the reduction of negative impacts on the process in terms of stock, sales, and customer service.” The Uruguayan Chamber now aims to apply the methodology across more industries in the country. “SENAI has created a great collaborative space for companies. The expertise and experience of the SENAI technicians have enabled us to develop capabilities in our country,” adds Saavedra.

GLOBAL CREDIBILITY

Another area of expertise much in demand among international clients was developed in Chapecó, SC, by the SENAI Institute for Technology in Food and Beverages: the Proficiency Testing Provider (PTP) is a regular, independent external assessment, obligatory for laboratories to operate in line with standards such as ISO 17025 and FSSC 22000, to demonstrate competence in conducting their analyses for industry. “Whether for foods, ceramics, or metal-mechanics, they need to provide assurance that the results they obtain for clients are reliable,” explains Joseane Cristina Bassani, a food engineer and technical lead for the service at the IST.

The project began in 2002, after a requirement

from the Brazilian Ministry of Agriculture and Livestock for accredited laboratories to have their performance assessed in comparison with other like facilities. In 2011, the IST was among the first eleven institutions in Brazil to obtain accreditation from the National Institute for Metrology, Quality and Technology (INMETRO) to run proficiency testing programs—a reference conferring global-scale credibility upon the work carried out by the SENAI Institute, which operates in liaison with other SENAI facilities across Santa Catarina state.

To date, the IST has tested more than 1.18 million parameters for companies in Brazil and more than 23 other countries—95% of which for the food industry. There are also specific trials for sectors such as cosmetics, biogas, textiles, and environmental. In addition to proficiency testing, the SENAI Institute also offers reference materials: the Reference Material Producer (RMP) creates samples for physics-chemistry laboratories in the food and beverages sectors, enabling them to apply internal controls to their trials. “For example, if a client wishes to prove its testing method for protein content in cheese, then they will purchase the material with a known protein percentage, conduct the test at the company facility, and verify whether the result matches—whether it is achieving that percentage,” says Joseane.

PROFICIENCY TESTING PROVIDER

Numbers from the
SENAI Technology
Institute at Chapecó

MORE THAN:

- 1.18 million tests carried out
- 1,490 companies assisted
- 850 parameters applied
- 23 countries involved

EXTERNAL ENDORSEMENT

São Bento do Sul is one of the biggest furniture industry hubs in Santa Catarina, and it is not by accident that the SENAI Institute for Technology in Wood and Furniture is based in this small upstate town; the facility also provides an international, but different service: helping Santa Catarina’s industries in the sector to export their products. At the beginning of 2025, the unit received accreditation from the US Consumer Product Safety Commission (CPSC) to conduct testing required for the certification of children’s products destined for the US market, by far the sector’s biggest customer in the state—to May of this year, US\$45.3 billion worth of these products had been imported by the US, more than four times the total of the second-placed importer, the UK.

Testing carried out by the IST in São Bento do Sul generates big savings by eliminating the shipment of heavy samples for testing in the US, and ensuring speedier redesign and adaptation of new products. “Before that point there was no facility to conduct those tests here, so as well as shipping costs there was a long waiting list. It was quite an achievement to get accredited, first by INMETRO, and now CPSC, and this means that our companies can solve issues much more efficiently and at lower cost, shortening lead times and gaining more credibility,” says Sandra Fürst, head of the Wood and Furniture IST,



Tests and trials conducted by the São Bento do Sul IST certify furniture for the US market

and a specialist in furniture safety standards in the United States.

The tests encompass products such as infant beds and cribs, which are subject to strict safety regulations in the country, and clothing storage units such as wardrobes and closets, the latter having been subject to a US Congress decision approved two years ago in response to the number of child deaths caused by the toppling of this type of furniture—some 400 in twenty years. “With the changes, this type of furniture must now undergo a series of stability and safety tests, which we carry out here,” Fürst adds. Customers include companies in Santa Catarina and those in the US importing Brazilian products to sell under their brand names, such as Nestig and Delta Enterprise. [ic](#)

A WORLD OF possibilities

From more sustainable pork production, in which Santa Catarina State leads in Brazil, to more comprehensive use of açaí in northern Brazil, the SENAI Innovation Institute for Embedded Systems enjoys international support to advance highly relevant research for industry

Developing mechanisms to enhance the sustainability of pork production is a requirement for industry in Santa Catarina, Brazil's outright leader in the sector. This is also relevant for Canada which, according to the UN Food and Agriculture Organization (FAO), stands with Brazil among the world's four biggest protein exporters.

Identification of shared interests among the two countries in the pork sector paved the way for a joint project between SENAI Santa Catarina and the Université du Québec à Trois-Rivières (UQTR), a partnership that goes back to 2019, when SENAI forged close links with the Canadian engineering university Polytechnique Montréal, which sent a student to Santa Catarina on a sandwich doctorate. The Covid-19 outbreak forced him to return, though plans for closer collaboration were merely postponed.

"In 2022, when the SENAI Institutes' internationalization program intensified, we resumed liaison with our Canadian contacts," recalls Renato Simão, head of innovation at the SENAI Innovation Institute for Embedded Systems (ISI-SE). During a visit to Canada at the end of that year, the Santa Catarina delegation met two doctoral researchers at the Polytechnique:

Ambre Dupuis and Loïc Parrenin, who expressed an interest in conducting part of their research on machine learning in Brazil. They came to Santa Catarina at the beginning of 2023, and spent three months working on SENAI SC agribusiness projects.



PROMISING PARTNERSHIP

Later, back in Canada, Dupuis took up a post at UQTR, quickly learning that the institution provided funds to incentivize research on international cooperation, and started to discuss possibilities with SENAI Santa Catarina, which she already knew well. "The challenge was in finding a relevant theme for the two countries, within our lines of specialization," Simão recalls.

The response was the development of an Artificial Intelligence platform to support decision-making among pork producers, based on the principle of reconciling reduction of emissions with increased profitability. "The decarbonization hub at the Santa Catarina State Federation of Industries (FIESC) had been highlighting the challenges in finding the ideal balance between profitability and environmental impact in pork production. We presented the idea, and it was accepted by our Canadian partners," says Simão.

The project is now taking its first steps at a proving ground in the eastern Santa Catarina region, the state's focal point for pork production. "My first goal is to build a solid, structuring, and lasting partnership in research and education between UQTR, SENAI, and UniSENAI (the SENAI-higher education partnership)," says Dupuis. "This partnership aims to strengthen scientific ties around sustainable agriculture, drawing on the varied pool of expertise, resources, and farming contexts; the initiative goes beyond producing a simple tool to bring about methodological and

WORLD'S LEADING PORK PRODUCERS

United States (31%)
European Union (29%)
Brazil (15%)
Canada (14%)



PHOTOS: ADOBESTOCK

strategic leverage for multidisciplinary research in agriculture 4.0, the environmental transition, and emerging technologies."

The Canadian professor and researcher envisions the creation of other joint projects, involving co-guidance of students and development of training programs adapted to the modern issues of sustainability. "Working with such a dynamic, competent, and committed team as SENAI-UniSENAI represents for me an ideal structure for the joint formulation of projects rooted in current issues, particularly the rethinking of our industrial and agricultural production models in light of the climate and social emergencies of the twenty-first century."

HARNESSING

Another internationally-funded project involving ISI-SE is Açaí Tech, geared toward harnessing açaí residues for industrial solutions. The partnership was recently established between the SENAI Institute for Environmental Technology and the Massachusetts Institute of Technology (MIT), through the renowned institution's Amazonia Seed Fund, which finances research projects in the region.

This is another clear case based on the identification of an opportunity to reconcile the operational areas of the SENAI Institutes and the profile of the funding source. SENAI Santa Catarina already enjoys established partnerships with the Federal University of Pará (UFPA) and the Vale Institute of Technology (ITV), and invited both institutions to participate in the project conception. Another essential element is Amazonbai, a cooperative of producers in the region of Bailique in the northern Brazilian state of Amapá.

"Currently, only the pulp of the açaí fruit is used, and that accounts for no more than 30% of it," explains Jocinei Dognini, researcher and project lead for the SENAI Institutes. "The challenge is to find ways to repurpose the seed kernel within the productive chain, creating sustainable solutions to increase income among producers."

Early lines of research include the possible development of an

MORE USES FOR AÇAÍ

The pulp, traditionally the only part of the fruit used, accounts for only 30% of it. The researchers are seeking ways to reuse the rest of the fruit. Ideas:

- Açaí coffee
- Making the seed kernels into ecobricks, fibers for clothing, or composite wood alternatives
- Ingredients for foods and pharmaceuticals

"açaí coffee," or transforming the seed kernels into ecobricks, textile fibers for clothing, or composite wood alternatives, and ingredients for foods and pharmaceuticals. The first project phase, set to run for one year, includes online classes delivered by MIT to all the institutions involved, in addition to plans for a hackathon (a collaborative, solution-oriented event). **IC**

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