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CELIO FRANCISCO FILHO: THE MIND BEHIND THE INTERNATIONAL TRYOUT THAT MODERNIZED DYNA'S PRODUCTION LINE

CELIO FRANCISCO FILHO: A MENTE POR TRÁS DA SELEÇÃO INTERNACIONAL QUE MODERNIZOU A LINHA DE PRODUÇÃO DA DYNA

CELIO FRANCISCO FILHO: LA MENTE DETRÁS DE LA PRUEBA INTERNACIONAL QUE MODERNIZÓ LA LÍNEA DE PRODUCCIÓN DE DYNA

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ABSTRACT

This article presents a comprehensive case study of the strategic and technical contributions of Brazilian mechatronics engineer Celio Francisco Filho, who led a critical international tryout in France for the implementation of CNC (Computer Numerical Control) automation at Dyna, a long-established manufacturer of windshield wiper systems. The project involved validating the performance and operational feasibility of a custom-developed CNC machine intended to automate the production of wiper arm rods—components that require high dimensional precision and structural integrity. Filho was responsible for overseeing the machine's calibration, sensor integration, tolerance testing, and communication with control systems. His leadership ensured not only the technical success of the tryout but also facilitated cultural and operational alignment between international partners. Upon successful validation, the CNC system was transferred to Dyna's Brazilian production line, resulting in substantial improvements in productivity, quality control, and data integration. This case underscores the importance of combining engineering expertise with global collaboration, illustrating how individual leadership can drive industrial innovation and support digital transformation in emerging markets. The study also contributes to broader discussions on smart manufacturing, retrofit automation, and the evolving role of engineers in globalized production ecosystems.

Keywords: Industrial automation. CNC technology. Engineering leadership. Smart manufacturing. International collaboration.

RESUMO

Este artigo apresenta um estudo de caso abrangente das contribuições estratégicas e técnicas do engenheiro mecatrônico brasileiro Celio Francisco Filho, que liderou um teste internacional crítico na França para a implementação da automação CNC (Controle Numérico Computadorizado) na Dyna, uma fabricante tradicional de sistemas de limpadores de para-brisa. O projeto envolveu a validação do desempenho e da viabilidade operacional de uma máquina CNC desenvolvida sob medida para

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automatizar a produção de hastes de braços de limpadores — componentes que exigem alta precisão dimensional e integridade estrutural. Filho foi responsável por supervisionar a calibração da máquina, a integração dos sensores, os testes de tolerância e a comunicação com os sistemas de controle. Sua liderança garantiu não apenas o sucesso técnico do teste, mas também facilitou o alinhamento cultural e operacional entre os parceiros internacionais. Após a validação bem-sucedida, o sistema CNC foi transferido para a linha de produção brasileira da Dyna, resultando em melhorias substanciais na produtividade, controle de qualidade e integração de dados. Este caso ressalta a importância de combinar conhecimento de engenharia com colaboração global, ilustrando como a liderança individual pode impulsionar a inovação industrial e apoiar a transformação digital em mercados emergentes. O estudo também contribui para discussões mais amplas sobre manufatura inteligente, automação de retrofit e a evolução do papel dos engenheiros em ecossistemas de produção globalizados.

Palavras-chave: Automação industrial. Tecnologia CNC. Liderança em engenharia. Manufatura inteligente. Colaboração internacional.

RESUMEN

Este artículo presenta un estudio de caso exhaustivo sobre las contribuciones estratégicas y técnicas del ingeniero mecatrónico brasileño Celio Francisco Filho, quien dirigió una prueba internacional crucial en Francia para la implementación de la automatización CNC (control numérico por computadora) en Dyna, un fabricante tradicional de sistemas de limpiaparabrisas. El proyecto consistió en validar el rendimiento y la viabilidad operativa de una máquina CNC desarrollada a medida para automatizar la producción de varillas de limpiaparabrisas, componentes que requieren una alta precisión dimensional y integridad estructural. Filho fue responsable de supervisar la calibración de la máquina, la integración de los sensores, las pruebas de tolerancia y la comunicación con los sistemas de control. Su liderazgo no solo garantizó el éxito técnico de la prueba, sino que también facilitó la alineación cultural y operativa entre los socios internacionales. Tras la validación satisfactoria, el sistema CNC se transfirió a la línea de producción brasileña de Dyna, lo que se tradujo en mejoras sustanciales en la productividad, el control de calidad y la integración de datos. Este caso subraya la importancia de combinar la experiencia en ingeniería con la colaboración global, ilustrando cómo el liderazgo individual puede impulsar la innovación industrial y apoyar la transformación digital en los mercados emergentes. El estudio también contribuye a debates más amplios sobre la fabricación inteligente, la automatización de modernización y el papel cambiante de los ingenieros en los ecosistemas de producción globalizados.

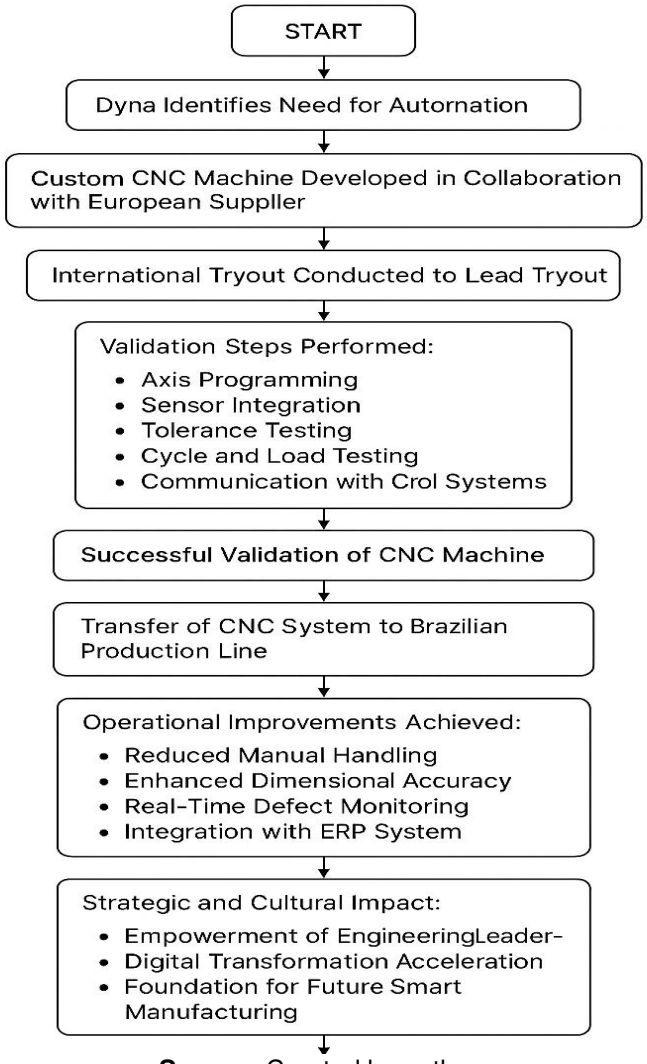
Palabras clave: Automatización industrial. Tecnología CNC. Liderazgo en ingeniería. Fabricación inteligente. Colaboración internacional.

INTRODUCTION

In the constantly evolving field of industrial engineering, quiet revolutions often play a greater role than headline-making announcements. One such silent but transformative shift occurred at Dyna, a long-established manufacturer of windshield wiper systems, when mechatronic engineer Celio Francisco Filho led a pivotal CNC (Computer Numerical Control) machine tryout in France. This project, which marked a significant advance in automating the production of wiper arm components, stands as a case study in technical precision, cross-cultural coordination, and strategic innovation.

The flowchart illustrates the strategic process behind the successful implementation of CNC automation at Dyna, guided by engineer Celio Francisco Filho. It begins with the company's recognition of the need to automate its production of windshield wiper components and follows through the development of a custom CNC machine in partnership with a European supplier. The core of the process was an international tryout in France, where Filho led critical validation procedures including axis programming, sensor integration, tolerance testing, and system communication. After confirming the machine's performance, it was deployed in Dyna’s Brazilian facility, resulting in significant operational improvements such as reduced manual labor, enhanced precision, real-time defect monitoring, and ERP integration. The project not only modernized production but also highlighted the cultural and strategic benefits of international engineering collaboration, laying the groundwork for broader smart manufacturing initiatives.

Figure 1. CNC machine setup during the international tryout in France.



Source: Created by author.

Dyna's objective was clear: transition from labor-intensive manufacturing processes to a fully automated, precise, and interconnected production line. The challenge, however, lay in ensuring that the technology was not only theoretically sound but operationally viable before full-scale deployment in Brazil. In collaboration with a leading European technology supplier, the company commissioned a tryout in France to validate a custom-developed CNC machine tailored for metal rod production—components that are central to the functioning of windshield wipers.

Celio Francisco Filho, with a background in mechatronics engineering and specialization in business management, was selected to oversee this mission. His technical expertise and integrative approach across mechanical, electrical, and embedded software disciplines made him an ideal candidate to manage such a multifaceted task. The tryout was conducted in a French manufacturing facility and

encompassed the full scope of machine validation: axis programming, sensor integration, tolerance analysis, cycle testing, and synchronization with supervisory control systems. Filho's role involved not only technical supervision but also real-time decision-making and cross-cultural communication, ensuring seamless adaptation of the CNC system to Dyna's production needs.

The success of this trial run yielded tangible operational improvements upon implementation in Brazil. First, it drastically reduced production time by eliminating manual handling and introducing continuous flow operations. Second, the CNC system enabled tighter dimensional tolerances, enhancing the quality and durability of the final product. Third, the integration of sensor-based monitoring systems allowed for real-time data tracking and minimized defects, aligning with Industry 4.0 standards of smart manufacturing (Schwab, 2017; Xu et al., 2018). Finally, linking the CNC machinery with Dyna's ERP system streamlined inventory and production planning, enhancing organizational efficiency.

Filho's contribution exemplifies how individual expertise can catalyze systemic transformation. Beyond the successful deployment of a single machine, the project laid the groundwork for a broader cultural and technological shift within Dyna. It underscored the value of investing in skilled engineering professionals and leveraging international collaborations to accelerate domestic innovation. As emphasized by industrial engineering literature, such initiatives often serve as linchpins in the diffusion of advanced manufacturing technologies (Kagermann et al., 2013; Lasi et al., 2014).

The project's long-term significance lies in the broader implications for global engineering leadership. Filho's mission demonstrated how strategic international engagement can bring not only technical solutions but also foster leadership development and global competency among Brazilian engineers. Such exposure to complex, multicultural engineering environments is increasingly recognized as essential for cultivating innovation capacity within emerging economies (Galloway, 2008; Downey et al., 2006).

Additionally, the project's integration of CNC technologies into legacy production systems echoes a global trend in retrofitting traditional manufacturing lines to meet digital age standards. Retrofitting, often more cost-effective than greenfield installations, allows companies like Dyna to modernize incrementally while maintaining continuity in production. This balance of innovation with operational pragmatism is a hallmark of

effective industrial transformation (Mourtzis et al., 2016; Thoben, Wiesner, & Wuest, 2017).

The legacy of Celio Francisco Filho's work is not only technical but deeply human. His leadership illustrates that behind every successful automation lies the insight, decision-making, and adaptability of individuals capable of bridging technological and cultural boundaries. As Filho aptly noted, "Technology doesn't transform a factory alone. It's the people behind the projects who make the difference." His story remains a compelling example of how strategic foresight, interdisciplinary knowledge, and international collaboration can collectively redefine the trajectory of industrial innovation.

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