Case Study

CAD/CAM APPLICATION WITHIN DIGITAL MACHINING FOR INDUSTRY 4.0

Keywords: *CAD/CAM, Digital Manufacturing, Machining*

Background to Case Study

CAD/CAM (Computer-Aided Design / Computer-Aided Manufacturing) is the use of computer software to design and manufacture prototypes, products and production runs. CAD/CAM is an essential technology of Industry 4.0 implementation in SMEs from the manufacturing sector because it allows information transfer between various actors, including the CNC machines. In addition, it allows for off-line simulation and validation of products and processes which in turn reduces the error.
Modern CAD/CAM solutions help SMEs to remain competitive by controlling the costs through more accurate estimating and quoting, improved quality, and lower levels of rework and scrap.

This case study presents a SME that leverages CAD/CAM in order to make the transition to digital machining in order to remain competitive and continue its growth.

Introduction to the Case Study and it's growth within Industry 4.0.

TECMA is a small family-owned precision machining business from USA that provides machining services for the aerospace and defence industries. It specializes in CNC and conventional precision machining for mission-critical components difficult to manufacture. To remain competitive and continue their growth, the company decided to transition from 2D programming and predominantly manual machining to 3D digital production.

The implementation of a CAD/CAM solution enabled them to increase output, reduce costs, expand the range of parts and better position for the future.

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The Case Study and Industry 4.0 Elements: A Pictorial Overview

Image source: TECMA

TECMA implemented CAM software (CAMWorks and CAMWorks VoluMill high-speed machining) seamlessly integrated with CAD software (SolidWorks), feature-based recognition capabilities, machining simulation and estimating tools, and extensive knowledge database that captures and reuses best practices.

CAMWorks offers true knowledge-based machining capabilities, Automatic Feature Recognition (AFR) and Interactive Feature Recognition (IFR). It also offers true associative machining - automatically accommodating changes to the part model, so any modifications made to the design are automatically updated in the CAM data, thus eliminating time consuming CAM system rework due to design alterations.

Image source: https://camworks.com/

The application of CAD/CAM supports the growth of the SME under study by allowing it to digitise manufacturing processes and automate digital machining operations which led to reduced machine setup time, significant increased output, improved quality, decreased scrap and rework. In addition, it enabled TECMA to obtain critical quality and cybersecurity certifications for aerospace and defence work.

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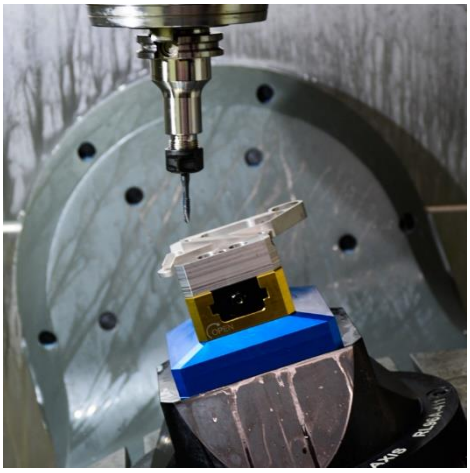
The Element Explored within Industry 4.0 Application.   *Images source: https://tecmacompany.com/*	*Initially, TECMA had only 2 CNC machines and about 20 manual machines. Its small employee base was using different and outdated 2D programming. The management realised that the company needed to re-tool and modernize to continue to be successful and to compete for new business. They decided to invest in automated, state-of-the-art CNC machining centres with 5-axis machining capabilities as well as in a software system to automate digital machining operations.* *The integrated CAD/CAM software solution implemented ensure seamless flow of data between design and machining departments. In addition, it enables the company to use advanced features such as feature-based recognition, machining simulation and estimation capabilities and extensive knowledge database that captures and reuses best practices.* *By making the transition from predominantly manual machining to machining parts in the digital world, TECMA position itself for the Industry 4.0 future, being able to improve its connectivity with clients and suppliers as well as the link between the real world and it's digital counterpart.* *In addition to directing the machine tool, the CAD/CAM software is also a platform for applications such as metrology, reverse engineering, and digital tool management. Clean, efficient data exchange throughout manufacturing processes supports the implementation of Industry 4.0 and the derived productivity gains.*
Application Target Audience	*The results of the case-study are intended for use by SMEs and entrepreneur subjects.*
Resources Used:	https://tecmacompany.com/ https://ddk3ap9k3zpti.cloudfront.net/wp-content/uploads/ERX-CAMWorks-casestudy.pdf https://camworks.com/
Further Reading:	*https://www.pwc.de/de/digitale-transformation/digital-factories-2020-shaping-the-future-of-manufacturing.pdf*

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