Efficient Implementation of 3d Printer Using Team center And Nx Cad

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Abstract- *The essential features of the project are outlined in the abstract for the effective implementation of 3D printing utilizing PLM TEAMCENTER and NX CAD. The goal of the project is to improve the 3D printing procedure by integrating Siemens NX CAD software with a Product Lifecycle Management (PLM) system. Users will be able to manage the product development process more streamlined and effectively by designing, simulating, and using this.Designers, engineers, and production teams will be able to work together more efficiently thanks to the deployment of PLM TEAMCENTER and NX CAD. The goal of the project is to streamline the 3D printing production process from basic design to final assembly. The project team hopes to enhance 3D printing accuracy, quality, and cost-effectiveness by utilizing PLM TEAMCENTER and NX CAD.The project's main goals, methodology, and anticipated results are all summarized in the abstract. The project team predicts that the efficiency and effectiveness of 3D printing will significantly increase as a result of utilizing PLM and NX CAD's power.*

Keywords- PLM, TEAMCENTER, NX CAD, 3D PRINTER.

I. INTRODUCTION

A 3D printer is a kind of manufacturing tool that uses a digital model to produce actual products. Comparatively to conventional manufacturing methods, which involve removing material from a block of material, 3D printers add material one layer at a time to create an object. A 3D model or design developed with computer-aided design (CAD) software serves as the basis for the 3D printing process. The design is then converted to a digital format, such as a .stl or .obj file, and uploaded to the 3D printer. After the file is uploaded, the printer gets the model ready for printing by layering the digital model. Then, these layers are printed one on top of the other using a variety of materials, including plastics, metals, ceramics, or even food, depending on the printer's capabilities. The material is heated to a semi-liquid condition by the 3D printer after it has read the digital model. The finished product is then built up by layering the melted material that has been deposited onto a build platform. A layer is added, cooled, solidified, and bonded to the one before it until the object is complete. .In comparison to conventional production techniques, 3D printing has a number of benefits. It permits quicker prototyping and shorter lead times, which may ultimately result in lower prices. Additionally, it enables the production of complex shapes and geometries that would otherwise be difficult or impossible to produce using conventional methods. 3D printers are employed in a variety of sectors, including aerospace and automotive as well as healthcare and education, and they are becoming more widely available and affordable to individuals and small businesses.

II. LITERATURE REVIEW

In [1] today's organizations turn to PLM as the approach to achieving product quality and commercial goals. But because the product structure is the foundation of the PLM implementation, it becomes crucial to define one in order to meet these goals. According to Schuh et al. [1], the data structure unifies all the information and documentation pertaining to the product (such as CAD files, NC codes, and product specifications) and represents the structured relationship between the product's components. Organizations would profit from using a standardized data structure in this situation. Recent research and field evidence, however, suggests that a single reference model cannot describe a standard product structure because processes and goods vary from one organization to another. [1Additionally, as mentioned in CIRP Design Conference 2009 [2], there are still few standardized data representations that identify and detail comprehensive and corporate-wide integrated product information architecture. Applying a broad reference model is useless, in accordance with Zina et al. [3], so the implementation must be adjusted to the needs of the particular situation. As a result, they suggest an approach to customize a reference model. The first step in this process is choosing a reference model appropriate for the industry sector. The execution of the chosen reference model is then studied in various case studies before being transformed into a generic model finally, in order to get the desired model; the general model is tailored to the unique circumstance. Based on the observation that a single reference model cannot be used to simulate the product structure of every business in the sector,

[1] offers a methodology for product structuring as well as a collection of six specialized reference models for product structuring to cater to the unique requirements of each project type already in existence. This problem is addressed and the complete spectrum of PLM information needs are supported by the product information modelling framework Sudarshan et al [2] offer thefour core components that make up the framework's kernel are the NIST Core Product Model (CPM) and its extensions, the Open Assembly Model (OAM), the Design-Analysis Integration Model (DAIM), and the Product Family Evolution Model (PFEM). The primary objective of establishing the information modelling framework is to enable the PLM system and its subsidiary systems to receive all product description information via a single, uniform information exchange protocol at every level of the design process [2]. The framework provided, however, cannot be used in a PLM system because: (1) it is only a first draught of a product modelling architecture and does not represent or incorporate all of the components of product information. (2) Potential information exchange issues brought on by the framework's heterogeneity. To create a complete conceptual framework, it is also necessary to identify the needs for entire PLM system products and product information. The PDM schema, based on the STEP (Standard for the Exchange of Product) standard, is described in [4] as an integrated data model and implementation strategy for a PDM system. The PDM data schema is a standard product data architecture that satisfies the PDM features and comprises product structure management, configuration management, document management, workflow management, effectivity management, and engineering change management.According to the authors of a study cited in [5], it is critical that a company's knowledge encompasses its product, process, and resource elements since this will enable the development of products that are focused on consumers. They explain the PPR model, which stands for "product, process, and resource." The following connection in this model represents the configuration of the product: "configuring the product (product structure, materials bill) configuring the business process (process structure, operation types) configuring the resource (structure of system, equipment, and staff types)" [5]. Huang and Mak[6] stress the importance of integrating product, process (activities), and resource components in the design collaborative environment and describe the product realization process as "a triple P, A, R. of Products which compete in the market, Activities which realize products, and Resources which are available for realizationq1." An association exists between P, A, and R. Relationships are explained by the fact that "products consume activities, and activities consume resources" [6]. Similar to the product process organization (PPO) model, other research studies present various methods for modelling data pertaining to products. However, [7] asserts that both the relationships between the three central ideas and other information objects as well as those between them are incomprehensible. The top-down 4P2C model is an object-oriented model that Han and Do [7] suggest in this situation. The four Ps of collaboration are product, process, project, participation, cost, and cooperation. The six sub models that make up a complete CPDM model are described based on this.Although Kim et al. [8] agree that the PPR model aids in addressing all engineering information pertinent to the product, they claim that human-related information, which is frequently regarded as a component of resource information, is improperly managed in PLM systems. They propose the PPR+H model, an XML-based structure that integrates and manages data on products, processes, resources, and people in PLM. Eynard et al. [9] offer a PDM system called VPM Chains that is based on Enovia and makes use of an extensive class map of the product structure and workflow management. The proposed system uses a framework for teamwork made up of three applications: (1) a Web portal to support product data access, (2) Build Time application for modelling processes, and (3) Runtime application as a workflow engine for carrying out the processes. In the most recent instance, a component called a briefcase offers resource, process, and product integration. Process components, product information, and metadata are all contained in this suitcase. Current businesses have access to enormous amounts of knowledge that is dispersed across numerous sources and is growing exponentially, which is relevant to the role of PLM in knowledge management. This knowledge, which the corporation can think of as an intangible asset, can be found in everything from emails and instant messaging to in-depth reports and PowerPoint presentations. Companies now understand how vital it is to keep this knowledge and intellectual property for developing new products and streamlining processes. In fact, information is a strategic asset that drives future success in the contemporary organizational scattered context, and it must therefore be properly controlled. Knowledge management (KM) is described as "the process that deals with systematically eliciting, structuring, and facilitating the effective retrieval and use of knowledge."Explicit knowledge that has been codified in rules, processes, and instruments, as well as tacit information held by experts, is involved. [10] Because of how complicated internal relationships can be and how challenging it is to capture, exchange, and utilize knowledge, organizations increasingly face difficulties in sharing and regulating knowledge. Recently, certain IT solutions, including ERP, PLM, CRM, and SCM, have started to enable and facilitate knowledge exchange. However, there is still an obvious need for more efficient frameworks in this area. Users can operate more productively thanks to PLM's support for integrating the various types of knowledge across the whole life cycle. In fact, having a common knowledge

management system integrated into PLM improves efficiency (i.e., reduces learning curves), allows for process excellence, and fosters innovation. The knowledge-centric PLM system proposed by Ebert and Man [10] enabled Alcatel-Lucent to achieve successful engineering tool, process, and human interaction. Knowledge about products, processes, and projects is brought together by this KM and PLM integration technique. Among other benefits brought about by the system's implementation, cycle times, communication, rework, and overheads have all been reduced. PLM supports the integration of the many forms of information over the whole life cycle, enabling users to operate more successfully. In reality, having a common knowledge management system integrated into PLM increases efficiency (i.e., reduces learning curves), allows for process excellence, and fosters innovation. The knowledge-centric PLM system put out by Ebert and Man [10] allowed Alcatel-Lucent to achieve successful engineering tool, process, and human interaction. This KM/PLM integration technique combines project, process, and product knowledge. Among other benefits brought forth by the system's use include shorter cycle times, increased communication, reduced rework, and lower overheads.Instead, Cheung et al. [12] outline an approach for organizing information and incorporating it into product development. To capture, organize, and portray knowledge, this methodology makes use of the knowledge management editor Protégé. To support a distributed and collaborative product development environment, the data is subsequently converted into XML files and stored in a web-centric PDM system. Research has proven that there isn't an industry-standard data structure that takes expertise and information about the product over the course of its entire existence into account. Additionally, it is suggested that such a framework would facilitate the adoption and customization of the PLM system in contemporary organizations, improving data and information sharing both within and between businesses. The product-process-resource model has shown the advantages of integrating all life cycle data. These PPR models have a problem in that the three components cannot be combined from a top-down perspective.

III. METHODOLOGY

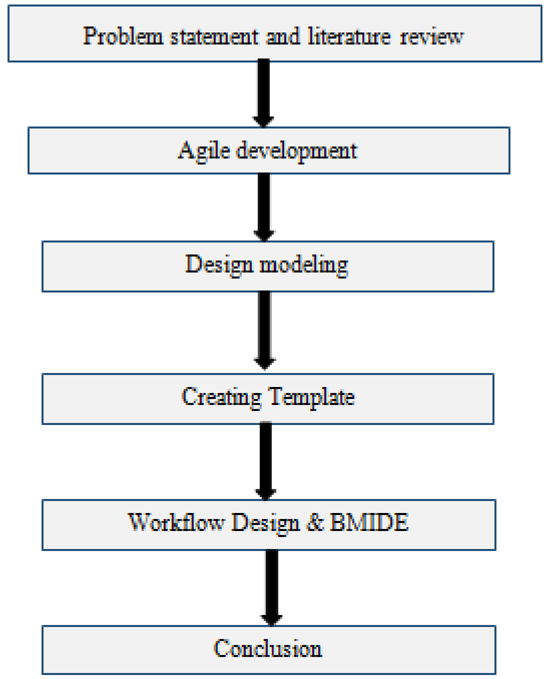


Fig. 1. Block diagram of the system

IV. PROPOSED SYSTEM

V. SIEMENS TEAMCENTER:

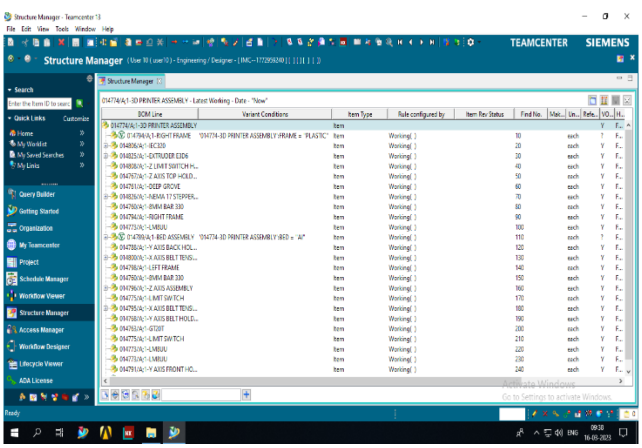
The product lifecycle management (PLM) system TEAMCENTER software creates a digital thread for innovation by connecting people and processes across functional silos. We are better prepared to solve the challenging issues required to develop products with a high likelihood of success due to the distinctive depth and breadth of the TEAMCENTER portfolio. The straightforward, user-friendly TEAMCENTER user interface enables people across the organization to contribute to product development more efficiently than ever. We receive the same tried-and-true solutions designed to help us develop more quickly regardless of how we choose to install TEAMCENTER, whether it be on-premises, on-cloud, or SaaS provided by TEAMCENTER X. To begin using TEAMCENTER, take control of product data and processes, including as 3D designs, electronics, embedded software, documentation, and our bill of materials (BOM). We can maximize the benefits of our PLM system by utilizing our product information across more domains and departments, such as manufacturing, quality, cost engineering, compliance, service, and supply Chain. The UI of TEAMCENTER is depicted in Figure, and it is adaptable enough to change with organizational needs and handle any challenges that arise during product development.

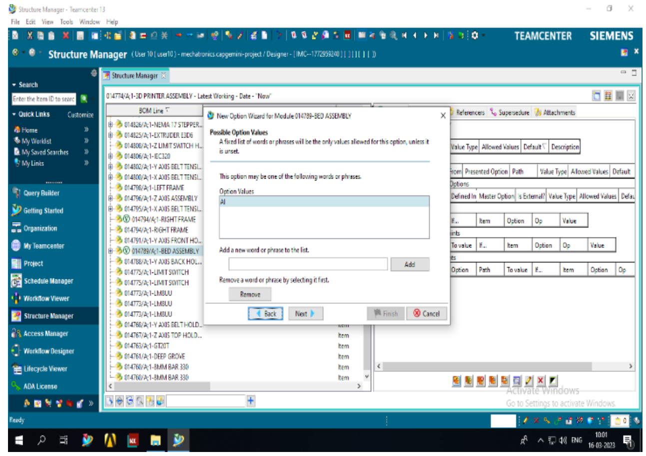
5.1 MY TEAMCENTER:

The TEAMCENTER's rapid working area or, as the name implies, our workspace is what it is called. Basic features like object creation and query-based object searching are offered by this program. Our worklist and mailbox are both easily accessible. Under the Home folder, we may also make folders and store necessary information for convenient access. This is a default program, therefore we don't need to install any additional features or obtain a different license in order to use it. For our regular work, we must become accustomed to this application's features.

5.2 STRUCTURE MANAGER:

An assembly of the product, the structure is made up of subassemblies and components. The Bill of Material (BOM) for the product can be made using the structure manager tool. A hierarchical structure can be built using BOM lines that we can generate and arrange. Find We are unable to design a product structure with several levels using any attribute. Features like variation management, effectivity management, occurrence, substitution, and alternates, among others, are all very helpful in Structure Manager. In order to produce 100% BOM of various variants, we can first construct 150% of the BOM using the structure manager.



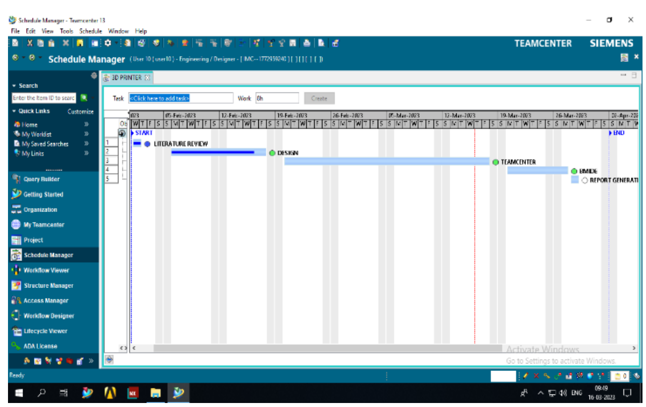


5.3 WORKFLOW PROCESS:

Workflow, as its name suggests, is the order in which actions are taken by a person to accomplish a process. Each task is carried out in turn. We can design a workflow process with a variety of tasks according to the needs of the business process using the TEAMCENTER Designer module. Some of the often used tasks to construct workflow processes include Do, Review, Condition, Or, Validation, and Status tasks. Each activity has handlers. When a job is initiated, server-side scripts called handlers are run on the workflow objects. To use this program, we need administrative rights. Figure illustrates the key TEAMCENTER modules.

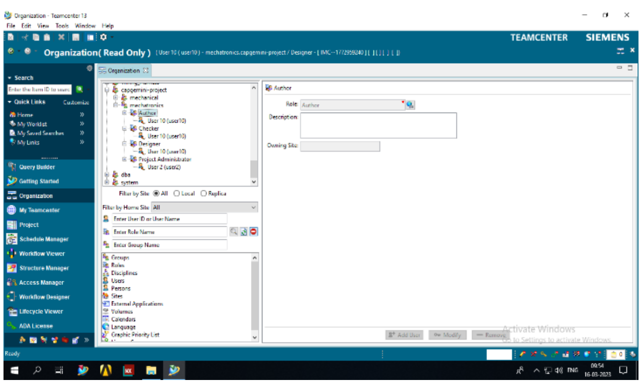
5.4 SCHEDULE MANAGER:

We can schedule activities in The TEAMCENTER utilizing schedule manager, as the name implies. Different tasks can be created, organized into a schedule, and given due dates and times. For instance, several businesses do preventative maintenance cycles on their heavy gear every three months. Using a schedule manager tool, these cycles can be initiated and carried out automatically every quarter. It will begin at the appointed time and last for the allotted amount of time. To utilize this application, we need administrative rights. Example: Gantt charts



5.5 ORGANIZATION:

An organization is the hierarchical structure of an enterprise's governing body. Based on the corporate departments, we can build various groups, roles, and users. Users must be created in TEAMCENTER using the organization module if they are to produce, modify, or read data from TEAMCENTER. The necessary license level can be made available to users of this module. The department can be organized hierarchically, with roles and appropriate users being assigned to the various groups. The organizational structure determines who owns and has access to the data in TEAMCENTER. We don't need to get a license to utilize it because it is a default module of TEAMCENTER. To utilize this program, we must possess administrative rights.



5.6 BUSSINESS MODULAR IDE (BMIDE):

IDE for Business Modular reference. You can carry out several database operations relating to your Business Modular IDE work using the tools provided by the program. To deal with the data model in Business Modular IDE, several command-line functions are provided. The TEAMCENTER Command Prompt can be used to launch each utility by typing its name and any optional parameters. Utilities are found in the bin directory where the TEAMCENTER server is installed. A -h parameter can be used to display internal utility documentation. Additionally described in the utilities reference are the Business Modular IDE utilities. Business Model Integrated Development Environment is what BMIDE is short for. It is a software development tool made to aid in the creation, testing, and deployment of business models. Developers can create, update, and maintain business model artifacts, such as requirements, use cases, activity diagrams, and business rules, on a workspace provided by the BMIDE. Additionally, it enables developers to define business processes, workflows, and data models. BMIDE is frequently used in the creation of commercial software such as customer relationship management (CRM), enterprise resource planning (ERP), and other types. Together with other software development tools and methodologies like Agile and Waterfall, it is frequently used. Business analysts, project managers, and software engineers frequently use BMIDE. Collaborating on the creation of business models and ensuring that the resulting software satisfies the requirements of the business aids these specialists.PLM, or product lifecycle management, can benefit from the use of BMIDE. Management of the entire lifecycle of a product, from conception to retirement, is a component of PLM. Designing, creating, testing, producing, and providing support are all included.

VI. CONCLUSION

The capabilities of 3D printing technology are being pushed to new heights by a number of new trends and innovations that have emerged in recent years. The following are a few of the most significant new trends and technologies in 3D printing:

- Multi-material printing: Multi-material 3D printing enables the creation of objects made of various materials during a single print process. This makes it possible to design intricate, multipurpose items with a variety of features.
- 3D bio printing: 3D bio printing is the technique of employing 3D printing technology to generate living tissue and organs. This has the potential to completely transform the medical sector by making it possible to create replacement tissues and organs that are ideally matched to the bodies of patients.3D printing in space: 3D printing in space is a rapidly emerging field that involves using 3D printers to create objects in space. This could be especially useful for creating spare parts and other tools on long-duration space missions, as it would eliminate the need to carry large inventories of spare parts.
- Continuous 3D printing: This novel method of printing items dispenses with the necessity for layering and enables the production of objects continuously. The speed of printing could be significantly increased, and post-processing might not be required as often.
- Large-scale 3D printing: Using 3D printers, large-scale 3D printing refers to the process of producing products on a much greater size than is now feasible. Given that it would enable the development of substantial structures using 3D printing technology, this could have important implications in the construction sector.

Overall, the possibilities and applications of this strong technology have the potential to be considerably expanded by these new trends and technologies in 3D printing. We may anticipate seeing even more innovative ideas in the years to come as 3D printing technology continues to develop and mature.

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