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Preface

Introduction:

Introducing a new product to the market involves many steps spanning all departments in a company. The path to successful launch is fraught with challenges. Even if the design and engineering departments come up with fine product or creative use of technology, a product can still fail. The marketing team could miss out on the opportunity or the customer service representatives may not have enough information or expertise about the product to help the buyers.

Wherever the weak links lie, a chance to penetrate the market and expand profits can be missed. The key to ensuring this unfortunate turn of events does not happen via communication. A company must be able to properly send information about a product throughout the varying departments that have a hand in its success. This is where PLM, or product lifecycle management, becomes highly significant

Challenge Statement:

Manufacturing segment today is progressing by leaps and bounds thereby leading to expansion of OEMs as well as Supplier firms. This obviously calls for the need of skilful engineers who can contribute in Design, Validation, Simulation, Homologation, Build and various other domains. However there is lack of understanding on how these departments function, the information flow between the departments, Process that is followed and the reason behind the process being implemented. PLM process serves as a backbone of a business model for any OEM or Supplier firm.

Many engineering institutes today miss the PLM as their fundamental subject. As an outcome a professional is most of the time oblivious of the Engineering **Process** being followed. Hence they end up doing the **right things in a wrong way**. Professionals are not aware of their placement in the 'process model' of a firm and how their work effects and impacts various other departments and domains. It

becomes difficult for them to understand how their contribution is being utilized by the firm and how effective and in line his/her actions and inventions are with the organizational goals and objectives

Many **ERP** tools today are being utilized for **Product Data Management (PDM) and PLM**. Many large and small both product and service based **IT firms** (owning the ERP tools) interact with manufacturing firms and help them to streamline and automate their process using the ERP tools. There is a huge demand for **Functional Consultants (especially from Mechanical or Automotive streams)** in **IT** firms who can quickly understand the business of the client and should be able to quickly revert with process solutions. However as PLM concepts are not involved in most of the college's curriculum it heavily reduces the **employability quotient** of the students thereby leaving a booming and emerging field completely unexploited.

Solution:

- Only way to reduce this increasing industrial gap is to introduce the glimpse of PLM concepts right in the curriculum of the engineering institutes.
- Frequent short seminars needs to be conducted on various topics by the industrial experts in that domain.
- Seminars should always explain the importance of the topic from the **job Profile perspective** and how the knowledge imparted can put the students over the edge should also be explained.
- Practical sessions should be conducted by industrial experts which can give industrial work environment feel to the students
- Online Blog should be created where registered (interested) students can interact with the Industrial experts on day to day basis sharing their thoughts and ideas and getting feedbacks and guidance from the domain experts **(Once such blog is created by us which consists a team of industrial experts from various domains who are willing to share their wisdom with as many students as they can.)**
- I have come up with a comprehensive syllabus which if introduced in the institutes can definitely reduce (if not bridge completely) the industrial gap. **(we would be happy to conduct seminars and lectures on all the topics mentioned below as and when needed)**

Benefits to Students

- Students can apply for jobs in the firms providing PLM products and services
- Industrial domains that need PLM Services
 1. Aerospace and Defence
 2. Automobile and transportation
 3. Customer products and Retail
 4. Electronics and Semi-Conductor

5. Energy Utilities
 6. Industrial Machinery and Equipment
 7. Marine
 8. Medical services and Pharmaceuticals
 9. Oil , Gas and Refinery
- Any Manufacturing firm needs PLM and business processes in place where **PLM consultants** are needed for configuring and implementing PLM tools
 - Students well trained in PLM concepts can start their career as PLM tool Support guys and then climb up the corporate ladder to become PLM consultant trainee to full time consultants and Delivery managers

Industries using PLM:

Following are few industries listed that have sophisticated PLM tools for managing their products data and business processes efficiently:-

1. JCI (Johnson Controls Incorporation) – **Supplier** based American firm uses Innovia , SAP , GLIMS , E2KS , GPS and many other customized tools for their data and process management
2. Mahindra and Mahindra – Indian based **OEM** uses Teamcenter , Cordys , TKO , SAP and many other customised tools for their data and process management
3. AGS – A leading **Pharmaceutical** group uses Teamcenter for their data and product management
4. Nestle – Swiss based **Customer product** firm uses Selerant based DevEX PLM tool for their product and data management
5. Siemens – **Electrical and Semiconductor** division of this firm uses its own PLM tool product Teamcenter for their product and process management
6. DRDO – Indian **defence and research organization** used PTC based Windchill PLM tool for their Product and process management
7. Reliance Petrochemicals – **Leading Oil and Gas** firm uses Innovia e-Matrix ,Teamcenter and many other customized tools for their Process and data management

Any Manufacturing industry needs PLM tools and processes streamlined once their business starts growing beyond a certain limit. This has in turn increased the demand for PLM specialists in all these firms as well as in the firms that provide PLM Solutions

PLM (Product Lifecycle Management)

Glossary of Acronyms

1. PLM – Product Lifecycle Management
2. PDM – Product Database Management
3. CM –Change Management
4. DA – Deviation Authorization
5. OEM – Original Equipment Manufacturer
6. NPD – New Product development
7. QFD – Quality Functionality Deployment
8. DSLRR – Data Storage , Linking , Revisioning and Retrieval
9. PAP – Project Action Plan
10. CAD – Computer Aided Design
11. CAM – Computer Aided Manufacturing
12. CAE – Computer Aided Engineering
13. CFD – Computer Aided Simulation
14. PR – Part Release
15. BOM – Bill Of Material
16. DFMAA – Design for Manufacturing And Assembling
17. DFMEA – Design Failure Mode and Effect Analysis
18. DVP – Design Verification Plan
19. SOW – Statement Of Work
20. APQP – Advanced Product Quality Planning
21. ECR – Engineering Change Request
22. ECO – Engineering Change Object
23. SCADA – Supervisory Control And Data Acquisition
24. PDI – Pre-Delivery Inspection
25. SPC – Statistical Process Control
26. ERP – Enterprise Resource Planning
27. PR – Purchase Request
28. PO – Purchase Order
29. SCM – Supplier Change Management
30. PVT – Plant Vehicle Team
31. CRM – Customer Relationship Management
32. OOP – Object Oriented Programming
33. DBMS – Database Management System
34. MVC – Model View Controller
35. PFD – Process Flow Diagram
36. MOST – Maynard Operation Sequence Technique
37. PFMEA – Process Failure Mode and Effect Analysis

- 38. FTG – Fixture , Tools And Gauges
- 39. FTR – Fitment Trial Run
- 40. SOP – Standard Operating Procedure

Syllabus Content

PLM (4 hours course)

- Introduction
- Pillars of PLM (PDM/CM/DA)
- Manufacturing Industry scenario and domains
- Various stages of PLM
- Usefulness and Necessity

PDM

- Introduction
- Types of data that are stored , Linked and retrieved

CM

- Introduction
- Necessity and Importance

DA

- Introduction
- Importance

OEM/Supplier NPD Process (18 hours – 6hrs/day x 3 days/month)

- Idealization/Conceptualization (2 Hours Course)
 - Marketing Team Inputs
 - QFD
 - Best Practices
 - Documents/Templates
 - Applications/Tools used for DSLRR
- Project Planning (3 hours Course)
 - Proposal and Plan
 - Budgeting/Approvals
 - Team Identification
 - Project Milestones Definition/PAP Concepts
 - Product Definition
 - Documents/Templates used for all of the above
 - Application and Tools used for DSLRR for all of the above
- Product Planning (3 hours Course)
 - Benchmarking
 - Feature and Variant Definition
 - APQP
 - Documents/Templates used for all of the above

- Application and Tools used for DSLRR for all of the above
- Virtual design/Analysis (**5 hours Course**)
 - CAD/CAM/CAE/CFD
 - Compliance Management Concepts
 - Part Number Creation and PR Process
 - BOM Creation and Concepts
 - PLM Tool – CAD/CAE Integration and benefits
 - DFMAA Concept
 - DFMEA and DVP Concepts
 - Documents/Templates used for all of the above
 - Application and Tools used for DSLRR for all of the above
- Proto Build/Validation and Certification (**5 hours course**)
 - Test Cases Finalization
 - Component and Material procurement
 - SOW and Quotes
 - DVP Reports
 - Change Management/ECR/ECO Concepts
 - Content Management Concepts
 - Documents/Templates used for all of the above
 - Application and Tools used for DSLRR for all of the above

Manufacturing/SCM (**We are not conducting seminars on this yet as we are in process of formulating the detail course content**)

- Pilot Batch production/Validation
- MPP
 - PFD Concept
 - MOST Concept
 - PFMEA
 - Control Plan
 - Quality Plan
 - Work Instruction/Process Instruction/SOP
 - FTG
 - FTR
 - Logistics Planning Packaging
- Mass Production
 - Factory Layout Planning
 - Assembling Process and Line Automation Management (SCADA)
 - PDI Process and SPC
 - Inventory Management
 - Pareto Analysis
 - RFID technology for Assembly tracking and status

- Electronic bridge between OEM , Suppliers and Showrooms for JIT process compliance
- Poka-Yoke Process and alarm System
- Role of ERP System in Manufacturing Context
- PR/POs and SCM
 - PR/PO Process
 - SCM Concepts
- Product Launch/Dealer Networking

Post Launch/CRM (We are not conducting seminars on this yet as we are in process of formulating the detail course content)

- Post Launch Activities and Duty of PVT team
- CRM Activities
- Enhancements

Lessons Learnt (We are not conducting seminars on this yet as we are in process of formulating the detail course content)

- Standardization
- Documentation
- Project Closure

PLM Integration/Solution Architecture (48 hours course - 6 hrs/day x 4 days x 2 month)

- Introduction
- OOP concept
- BPM Process and Framework
- Web-Services
- DBMS Basics
- MVC Structure

PLM Tool Practical Training/Hands On (90 hours course – 9hrs/day x 10 days)

- Teamcenter modules
 - Organization
 - BMIDE
 - My Teamcenter
 - Structure Manager
 - Workflow Manager
 - Schedule Manager
 - Systems Engineering
 - Access Control Manager
 - Manufacturing Process Planner
- SAP Modules
 - Material Management

➤ PR/PO Module

Beyond PLM (We are not conducting seminars on this yet as we are in process of formulating the detail course content)

- PLM Future Technologies