IPM/Windchill : demonstration of the IPM approach with Windchill

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Graduation Study

IPM/WINDCHILL

Demonstration of the IPM Approach with Windchill

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Abstract

In modern engineering there are a lot of changes that are happening in a short time. Among these changes global competition and changing customer behaviour areperhaps the most important. As a result of these changes companies have to produce faster, better and more cost-effective. In trying to achieve these goals, there are al lot of problems that have to be dealt with. In the development and production process there are a lot of things that don't fit or that manufacturing just can't produce. This is the result of (mis-)communicating with a lot of other parties. The IPM approach states that a few new principles and other working methods, supported by new IT solutions can improve the production process considerably. IPM is based on Product Data Management that makes the right process related data available to right parties at the right time. In this study a demonstrator is developed that is as small as possible, but big enough to prove that the IPM approach can be realised and that it works. The demonstrator will encompass the product model, the process model and the organisational model with the different roles from the different parties and functionaries which are involved with the project and it's development. The demonstration is compared to a non-IPM situation with the RapidPDM simulation model.

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Summary

This document describes the IPM/Windchill project that was performed as a graduate study for a student at the Technische Universiteit Eindhoven. The name IPM/Windchill comes from the combination of the Integral Product Model (IPM) theory which could be implemented by the Windchill product from PTC. The IPM/Windchill project is a joint project and was started by a group of organisations who have an special interest in PDM and PDM solutions in industry. The initial idea came from AEGOR Production methodology which is a small company that developed a theory called Integral Product Model in which PDM systems are implemented along with some other organisational and technical starting points. This organisation had connections with CIMPA, groupe Aerospatiale in France who wanted to try the theory of AEGOR and see if it is possible to work with different PDM systems and a communication backbone in combination with the theory. AEGOR had also connections with Thomson-CSF Technologies & Methodes who wanted to use separate workbenches and have a general communication mechanism and thought that it could be satisfied with an IPM approach in Windchill. URBIDATA BV was involved because it is interested in PDM with regards to a real life working solution. Rijkswaterstaat Civil Engineering Division is involved because they are interested in Windchill and want to find out what it can do for them. Hollandse Signaalapparaten BV is interested in the general knowledge from the IPM/Windchill project. The Technische Universiteit Eindhoven is interested because they want to use the system as a case in their RapidPDM project and by that comparing the IPM approach with conventional methods. With all these different goals from these parties it is difficult to find a general problem definition and objective, but the problem statement has been stated as the fact that there are a lot of problems with product information inside and between companies. This leads to mistakes and rework. To prevent this the IPM approach can be used in which all product data are put in a model under PDM and all disciplines work together to realise a product or service. To deliver all information at the right time on the right place a distributed PDM system has to be used on different levels of the organisation. The problem is how to combine these PDM systems and make it work with the IPM approach. This problem statement leads to the objective of the project: Develop a demonstrator that shows that the IPM approach works and can be implemented with Windchill. This demonstration involves the production process and organisational model with the different roles from the different parties and functionaries which are involved with the project and it's development. Next to this objective for the project itself the partners in this project have the object to acquire knowledge and create a better market position.

A basis for this project is the IPM theory from AEGOR Production Methodology. This theory was developed because in engineering there are a lot of communication errors and a lot of non-consistent information. The IPM is digital representation of a product. It is one well-managed source of information from which a product can be designed, build and maintained. This source has to be available throughout the whole organisation and beyond. The IPM approach is based on a set of organisational and technical starting points under which PDM is one of the most important. This is why the IPM approach will be compared with a "normal" PDM solution in the RapidPDM project. The advantages of the IPM are expected to be a reduction in costs and throughput time, improvement of product- and process quality and less engineering mistakes in design.

RapidPDM has designed a tool that can visualise the effects of a PDM implementation in terms of quality vs. time, total costs vs. time, number of documents released vs. Time and utilisation rate

of an engineer. This tool will be used to compare the standard situation with the IPM situation. The tool itself will be described only briefly with focus on the in- and output.
To make the implementation of the IPM we have to have a situation with a product that we can adapt to the IPM theory. In this case a Smartcard reader that was developed by a small group of engineers was used. The group of engineers had no specific organisation and there were no specific project processes apart from the processes defined in the general company in which the product was developed. The exchange of information was done by just talking or sending an e-mail. The product itself was not very complex, it contains over 200 parts but only 53 different from each other. In the original process there were two different disciplines and workflows were company standard.
Making the IPM implementation required a new infrastructure, organisation, workflow, processes and datamodel had to be developed. Even the product structure was slightly changed. The organisation from the IPM can be easily adapted when implementing the two disciplines. Also the processes are adapted to the specific project. The infrastructure has to be specifically designed for this theory because there was no real structure in the original situation. There are a lot of applications involved but the main components are used on two levels. The top level is the management layer of the organisation and the second is the production level. The Windchill PDM system which will be used on the top level of the organisation and Windchill and IMAN which will be used on the lower level. The CAD application Pro/Engineer will be used in combination with Windchill and UG and CATIA CAD applications will be used with IMAN. Next to these main applications there are a lot of other components that need to be installed among them are Java ,Oracle and Web servers. After the systems is installed the data has to be entered. The product structure and users have to be filled in in the Windchill system. Also the workflow is implemented and has 6 phases: Identified, In work, Post, In review, restricted release and Full release. The first one is often forgotten and there it takes a whole lot of programming to implement this in Windchill. All of the rules accompanying this lifecycle (like access rules) are practically embedded in Windchill.
The RapidPDM simulation of the two situations (normal and IPM) is expected to confirm the thesis that IPM approach leads to higher quality and lower costs.
When we see the three situations we have discussed i.e. IPM, normal situation and the pilot in which we tried to implement Windchill. We can comment on the possibility to use IPM in a environment with Windchill.
This conclusion is that it is possible to use the IPM approach in Windchill, but some (temporary) limitations apply. One of the reasons is that in this project version 4.0 of Windchill was used. Recently PTC released version 5 of Windchill which has extended possibilities. One of the greatest limitations is that IPM uses one product structure for all operations and applications, but Windchill uses one product structure for its own data and another one for the Graphics which are stored in the Graphics Server files.
Another drawback is the communication between PDM systems. Since not all formats are open, adapters are hard to get. In this project a adapter was used directly on the database, which leads to problems when writing directly to the database, so communication is only one way (only reading).
Despite these problems, I'm sure that it will be worthwhile to make a system like this in industry because it will definitely provide advantages that other systems don't have. I think the next step is to explore the advantages and properties of the system in another RapidPDM simulation. Nonetheless this project provides enough information to implement the IPM/approach with Windchill with a new customer in industry.