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Optimisation of Order Planning Process (Hallmark Cards UK)

Background

Hallmark was founded in 1910, by Joyce Hall who started with only two shoe boxes of postcards. Joyce Hall's business has since then continued to grow with Hallmark UK emerging in 1958. Today, Hallmark PLC is recognized as UK's leading greeting cards publisher, representing 60% of Hallmark International business with an annual turnover of £150 million and more than 3000 employees in the UK.

Hallmark PLC (UK) operates as two separate entities: Operations division which manufactures the cards, and gift items and Hallmark Cards which manages the customer-facing side of the business. Cost issues and the company's quest for continuous improvement have triggered further streamlining of processes to achieve higher efficiency on their current processes. Hence, Hallmark UK has to identify opportunities to reduce its stock levels and streamline manufacturing processes while not impairing delivery lead times.

Aim & Objectives

The aim of this project is to analyse the greeting card production processes data in order to develop SKU profiles based upon the runners, repeaters, and strangers principles. These profiles would then be used to improve the sheeting efficiency and inventory levels as well as optimise the order planning process at Hallmark Cards, UK.

Approach

The project commenced with a series of visits to Hallmark to collect data in order to understand and map the current situation. A literature review of relevant concepts was conducted in parallel to the data collection to identify best practices relating to the problems under investigation. A variety of approaches were used to analyse the data including database and statistical tools. The results from the data analysis together with models identified in the literature review helped to formulate initiatives which would address some of the challenges facing the organisation. A workshop was then carried out with Hallmark employees to present both the findings and initiatives so as to validate the findings and get feedback on the viability of the proposals. Recommendations were then developed considering the different stakeholder views.

Findings/Recommendations

The SKU profiles were used to identify the runners, repeaters and strangers in the products manufactured in 2007, combined with the knowledge about the process the team identified areas for improvement in the management of stock levels, sheeting & pre-production, communication of orders and the order quantities & frequency. The underlying concepts of Collaborative Planning, Forecasting and Replenishment (CPFR), combined with a Vendor Managed Inventory approach were recommended for some SKU profiles in order to streamline the order planning process which would ultimately improve sheeting, lead time and inventory levels. These recommendations constitute a change in current ways of accomplishing tasks and hence a change management programme has also been recommended.

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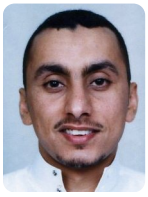

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Benchmarking European Manufacturing Operations (Airbus)

Background

Airbus is currently engaged with a large research and development programme that will deliver the Next Generation Composite Wing. This programme consists of a series of work-packages ranging from design, materials and manufacture. Within the context of manufacturing systems development, there are a series of work streams to be addressed. In each of these, the preferred approach is to first carry out a benchmarking exercise to establish the industrial best practices. This project benchmarks a number of European manufacturing operations to establish innovative ideas for manufacturing system design and more specifically optimising manufacturing processes for developing new products.

Aim & Objectives

This project aims to establish the leading practices for manufacturing systems design that complement the production requirements of the Next Generation Composite Wing.

Approach

A benchmarking exercise across a wide selection of European manufacturers has been carried out. The project team has identified target companies, negotiated access, visited companies to study practices and then compiled case summaries and reports. Evidence of leading practices has also been searched for in the research literature. Structured decision making techniques to down-select and establish a set of promising practices have subsequently been applied. These have been presented to Airbus to inform their internal concept selection process in mid-2008. Finally, in terms of integration, this project ran simultaneously and interacted with the Airbus Group Project on Low Carbon Manufacturing.

Findings/Recommendations

The statistical analysis of the data collected during the visits has been carried out using data mining techniques to cope with the high variability of the data. For unique or innovative ideas and practices that the statistical analysis was unable to capture, the team has used visual management tools. Finally, the synthesis of the study has provided a set of practices that are supported by both the visits and an extensive literature review. A report providing detailed descriptions of data-collection activities, research methods and mayor findings has been created and will be shared out to Airbus and all the participant companies.

"The Next Generation Composite Wing team at Airbus have been very impressed with the enthusiasm, commitment and progress shown by the Cranfield Benchmarking Group."

Neil Wolstencroft, Airbus UK

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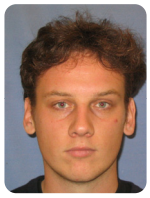

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Competitive Landscape Analysis of Management Consulting in the field of Operations (McKinsey&Company)

Background

McKinsey was founded in 1926 by James O. McKinsey in Chicago and pioneered budgeting as a management tool. Through the years, his original mission has remained the same: to help clients make distinctive, lasting, and substantial improvements in their performance and to build a great firm that is able to attract, develop, excite and retain exceptional people.

The Operations practices in Europe are committed to helping clients achieve world-class operations. Blending strategic thinking with hands-on implementation, they develop and define operational strategies to help clients around Europe solve their most critical problems related to the following sub-practices: Supply Chain Management, Purchasing & Supply Management, Manufacturing, Product Development, Service Operations and Business Support Functions.

Increased competition from large management consulting companies as well as growing specialised boutiques necessitates McKinsey to identify the strengths and weaknesses of the competitors in respect to providing capabilities to meet clients' needs within the field of Operations.

Aim & Objectives

The aim of this project is to showcase how to analyse the consulting market in the various sub-practices listed above in a selected country, starting with identifying the strongest competitors, assess their capabilities and provide recommendations for McKinsey to strengthen their competitive advantages.

Approach

For each sub-practice, industry sectors offering the best growth opportunities in the biggest European markets were identified and the most important selected for further deep dive analysis. Then, an identification of the key capabilities required to succeed in these sectors was conducted by interviewing academics and industry experts. In the following step, several competitors deemed strong were identified and their strengths and weaknesses were assessed in relation to their key capabilities. McKinsey was positioned in this landscape lining out opportunities and threats.

Findings/Recommendations

Findings from this project have confirmed McKinsey's reputation in operations consulting and also highlighted their strong offers in manufacturing/service operations consulting. Based upon McKinsey's competitive landscape, recommendations were proposed in order to further develop the competitive offers in Operations practices and to build the leading capabilities in all the dimensions where growth and development potential has been identified.

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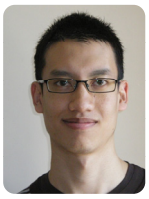

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Zero Carbon Manufacturing Facility (Airbus)

Background

With global warming and environmental sustainability becoming growing concerns for society, Airbus has taken major initiatives to reduce carbon emissions in the manufacture and operation of its aircrafts. This project focuses on the wing assembly process during aircraft manufacture. To tackle the issue of environmental sustainability, the areas of research analysed in the project include government regulation, sources of alternative energy, design of the facility for occupant comfort, manufacturing process and facility interaction, workforce culture, community interaction, as well as supply chain management.

Aim & Objectives

The aim of the project is to propose options for a 'factory of the future' facility for Airbus (UK) with particular emphasis on zero carbon manufacture and low recurring costs.

Approach

To fully understand the project requirements and to define the scope, the team conducted interviews with key representatives at Airbus. A tour of the current facility (A320) was provided for the team as a basis to visualise a 'factory of the future' facility. Areas of research were identified and shared among team members. A project plan was drawn up to enable effective monitoring of the project's progress so as to ensure that the deliverables are met at the end of the project. The team proceeded to analyse data collected from secondary and primary research such as trade exhibitions, conferences, meetings with industry experts (e.g. MPS, BRE). In addition, some companies were identified as implementing best-in-class environmentally sustainable practices for comparison.

Findings/Recommendations

Data collected confirmed the feasibility of designing a zero carbon manufacturing facility. A materials and energy flow model (IDEF0), together with a calculation model were the major tools developed to enhance the team's findings. Current and future UK regulations on energy use by non-domestic buildings were identified have a potential impact on the facility and manufacturing process. The facility's energy use in heating and ventilation will be reduced through a passive solar building design, use of low thermally conductive insulation materials, and facility-manufacturing process integration. The use of diffused natural light and low energy lighting within the facility has been recommended to reduce energy consumption. It can also help create an improved working environment. Airbus should implement measures to change the attitude of the workforce towards energy use. The facility's energy requirement will be met by electricity from renewable technologies: ground source heat and anaerobic digestion/gasification. Waste from the local community, destined for landfill, could be used to power the latter technology. Airbus may, in return, supply any excess energy to the community. Lastly, research also shows that the supply chain management can have a significant impact on emission reduction.

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Improving Engine Machining & Assembly Lines (Ford Motor Company)

Background

Ford Motor Company is a worldwide automotive industry leader and one of the oldest car manufacturers. Founded in 1903 by Henry Ford in the United States, Ford arrived first in Europe around 64 years ago. Since then, Ford Motor Company manufactures and distributes engines, cars and trucks in 200 markets across 6 continents, employing about 280,000 employees in more than 100 plants worldwide.

This project is based at Dunton, one of the Ford's largest research centres in Europe. In this site, engines and cars are developed from the design to the production process.

Competitiveness of the automotive sector and evolution of the environmental legislation require all stakeholders of the sector to improve their process continuously. Due to this, Ford uses simulation as a decision making support tool to evaluate the feasibility of projects, increase throughputs, eliminate wastes and make profitable investments.

Aim & Objectives

The aim of this project is to suggest improvement for the existing lines and forecast the future behaviour of the new lines by building simulation models and conducting experiments in order to validate key design assumptions.

Approach

Ford's methodology has been adopted to develop five simulation models for five engine production lines. After collecting data from different departments and visiting the manufacturing facilities, models were built using FAST (Ford Assembly Simulation Tool), a bespoke simulation tool developed by Ford. Experiments were designed with respect to the requirements from Ford's engineers.

Findings/Recommendations

Having conducted the experiments and analysed the data gathered from the simulation results, recommendations for the necessary changes on both existing and new lines have been provided to Ford engineers. For the new lines, forecast on the throughputs that could be achieved and the possible bottleneck zones have been identified, so that the engineers can analyse the expected behaviour and then focus on the potential improvement areas. For the existing lines, the bottleneck zones have also been identified and potential solutions to eliminate these bottlenecks have been recommended. Suggestions on the optimal number of platens and buffer sizes are also provided. All the work carried out on modelling and simulation for Ford engine production lines has enabled Ford's engineers to make decisions more scientifically to attain effective production.

"The projects offered are part of Manufacturing Engineering's planning process and it is absolutely vital that the models built are truly representative of the planned process"

John Ladbrook, Simulation Technical Expert

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Manufacturing System Design (ABSL Space Products)

Background

ABSL Space Products provides high quality bespoke power solutions that meet the demanding requirements of space industry applications. Formed from a privatised subsidiary of the Atomic Energy Association, they have recently expanded their operations considerably and are now looking to augment their manufacturing systems performance with these new capabilities.

Space is becoming an increasingly accessible frontier with new markets, demanding lower costs and increased variety, offering new opportunities. One of the challenges facing the company is how to improve cost and lead-time competitiveness whilst maintaining the high standards of quality and flexibility which differentiate them to other providers of space power products.

The project scope was to identify opportunities to reduce lead time and cost at ABSL's factory producing satellite batteries, near Oxford.

Aim & Objectives

The aims of this project are to audit the current manufacturing capabilities and recommend opportunities to increase competitiveness through an improved manufacturing system design.

Approach

Lean manufacturing offers a holistic strategy for improving plant performance, and value stream mapping tools have been employed to assess the current capabilities and company behaviour. Possible future manufacturing system designs have been evaluated using discrete event simulation and ideas for improving organisational communication, improving manufacturing visibility and other best practices have been sought from organisations facing similar challenges to ABSL.

Findings/Recommendations

Product and process variability is detrimental to manufacturing system performance. Although it is inevitable when making bespoke product such as satellite batteries, variability can be reduced through standardisation.

A manufacturing system flexible enough to cope with product variety necessary for competitiveness, yet which reduces waste and improves flow has been designed and tested using simulation software. Root-cause analysis has been used to highlight the missing organisational factors that are a prerequisite to a flexible, flow-orientated manufacturing environment, and programmes for improvement have been recommended.

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Cranfield UNIVERSITY

Planning for High Ramp-up Production of the A350 Wing (Airbus)

Background

Airbus has embarked upon an ambitious programme to build wings for the A350 from advanced composites. To meet objectives associated with the launch, Airbus needs to be confident in its development of new production capabilities. This project therefore seeks to review and where necessary improve business processes and controls that underpin and manage the key production capabilities between concept design and the volume delivery of wing-sets to the final assembly line.

Aim & Objectives

The project aim is to help Airbus follow a robust process for the timely introduction and sustained ramp-up of the A350 wing from concept design to final assembly. This project also aims to develop a management tool to assess the ongoing evaluation of the capability and readiness of the ramp-up production of the A350 wing.

Approach

In order to gain comprehensive understanding on the main issues and activities involved during ramp-up of production it was necessary to start with a literature review. This enabled the team to identify key production capabilities and produce a methodology to achieve the project goals. A series of semi-structured interviews and workshops were conducted to devise a complete portfolio of business processes and to identify risks associated with these processes. The severity of these risks were categorised and quantified using the risk management approach FMEA (Failure Mode and Effect Analysis); this was used to analyse and evaluate the business processes. Information gathered from literature review, survey and other companies undergoing new product development, was employed to give significant recommendations. Finally, key information and data was used to develop a management information tool that will enable Airbus to assess the progress, evaluate readiness and confidence for ramp-up of production.

Findings/Recommendations

Providing recommendations on the key capabilities identified for ramp-up of production was one of our deliverables. Areas of recommendation include robust recruitment and training procedures, supply chain, planning, manufacturing & design integration, and innovation. Creating a status monitoring tool used to assess the ongoing evaluation of the capability and readiness of the ramp-up production of the A350 wing was another project deliverable. The monitoring tool allows Airbus management to generate reports that state specific recommendations and suggest possible areas to investigate for the mitigation of risks, and flags imminent milestones.

"The project succeeded in introducing a tool to monitor sustained production ramp-up using assessed variables"

Lucy Mitchell, Manager of Requirements and Ramp up production readiness, Airbus UK

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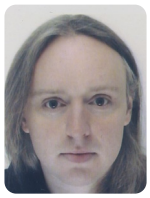

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Cranfield UNIVERSITY

Improving Warehouse Management Performance (DSGi)

Background

DSGi is one of Europe's leading electrical specialists retailing groups, with more than 1,300 stores and online stores, spanning 28 countries and employing 40,000 people. Its origin dates back to the late 1930s when Charles Kalms opened the first Dixons photographic studio in Southend. It was in 2006 when the Group won a "Queen's Award for Enterprise" for outstanding international growth, being the only retailer to do so and this was mainly due to an effective warehousing management strategy. Within the UK, one of DSGi's biggest warehouses is located at Newark; where this project is taking place. DSGi's Newark branch has one of the biggest warehouses in the UK which employees approximately 2,500 staff. The Small Product Warehouse (SPW), which has been in operation from April 2007, is the new warehouse for small products and handles approximately 19,000 different products.

DSGi's small product warehouse is currently facing challenges in achieving the performance figures that were originally designed for it, in terms of productivity and order completion times. The warehouse design is based on that of Screwfix, the UK's largest online do-it-yourself suppliers. Siemens Dematic Limited supplied DSGi with their warehouse management system.

Aim & Objectives

The aim of this project is to carry out gap analyses in terms of identifying the current warehouse capabilities to the original design specification. The chosen method to achieve this aim is to build a discrete event simulation model of the processes in the warehouse. However, because there is human intervention and behaviour which is unpredictable and cannot be modelled, an in-depth study of people issues which may also impact the processes will be carried out.

Approach

The methodology chosen for the DSGi project is to develop a discrete event simulation model of the operations which take place at the Newark warehouse. This will involve collecting data and carrying out shop floor observations and using this data set to build the model. The model will enable the team to make conclusions from the experiments and finally make recommendations to DSGi on possible productivity.

Findings/Recommendations

The main outcomes of this project will include a realistic and validated view of the warehouse performance in the form of recommendations based on evidence from the model. The list of recommendations will also include areas which cannot be captured by the model such as human analysis as well as an Ease-Effect analysis for each of the recommendations.

"The project team have fitted in very well with the operation and worked in a professional and friendly manner"

Steve Clutterbuck, DSG International

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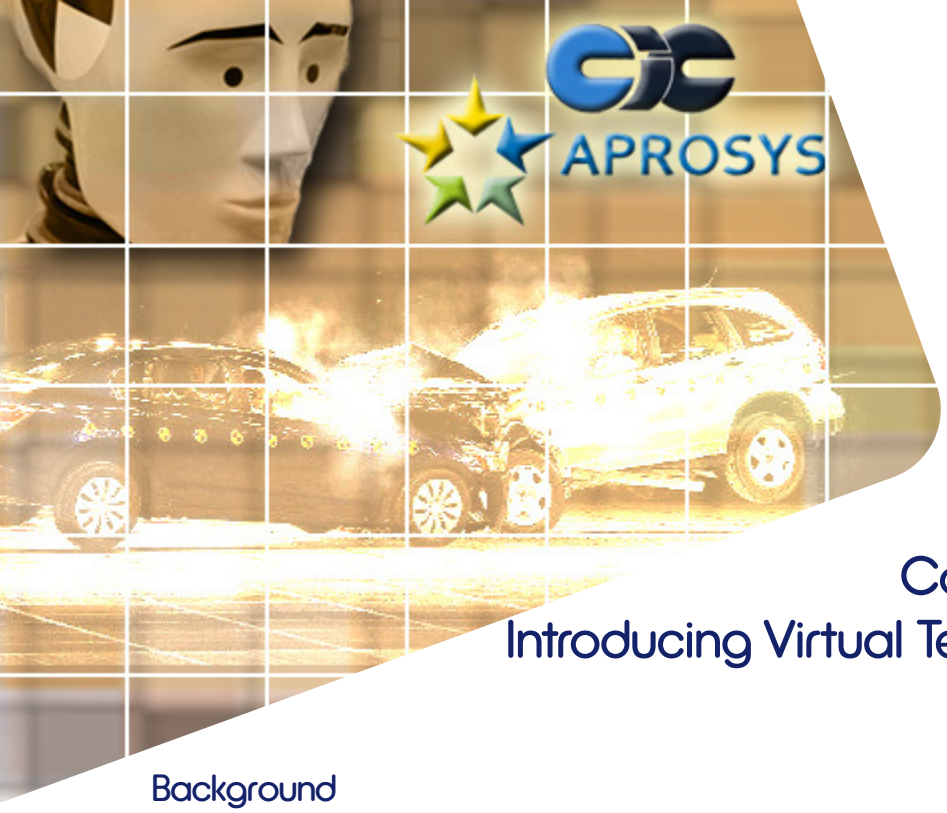

Cranfield UNIVERSITY

Cost Benefit Analysis for Introducing Virtual Testing in EU Legislation (APROSYS, CIC)

Background

Vehicle and occupant safety is becoming an increasingly publicised concern for today's road users. Although there is no way to completely prevent accidents happening, there are ways to manufacture and design vehicles to protect the occupants should the worst happen.

Crash testing, or the study of crashworthiness, is a method of measuring how well a vehicle withstands a crash or sudden impact. Today, it is becoming possible to simulate a vehicle crash entirely using high-tech, modern computational tools. European legislation still recommends utilising physical testing for safety analysis and legislation.

The investigation looks into the potential of virtual impact testing as a supplement to physical analysis, assessing the cost benefits implied by such an adaptation and the relevant implicating factors to legislation, society and car manufacturers.

Aim & Objectives

The aim of this project is to assess the current field of crashworthiness testing in both the physical and virtual domains by modelling the processes followed and assessing work and cost breakdown structures. Research is undertaken into the impact of introducing wider Virtual Testing (VT) to the automotive safety legislative environment and what cost savings this could bring. Justification of such changes and improvements to safety features is aligned to societal relevance via studying the procedures and costs associated with car accidents and how these could be altered via enhanced vehicle safety mechanisms.

Approach

The first stage of research involved undertaking a broad literature review related to the topic in order to understand the field via an AS-IS visualisation. The second step consisted in gathering data, cost information and knowledge needed to undertake justified analyses. These analyses were carried out via the media of process mapping, cost benefit methods, comparisons and gradient analysis, where cost breakdown structures for the three main areas (Virtual Testing, Physical Testing and Social Impact) were formulated.

Findings/Recommendations

The results and findings of the research were presented via a project webpage, designed by the research team to hold and effectively present all the information, both qualitative and quantitative, discovered during the course of the project. It enables the user to visualise direct cost comparisons of a test in both the virtual and physical domains for their chosen scenario with specific parameters.

"A cost benefit study performed by the team has explored new techniques of analysing costs for the Virtual and Physical Testing techniques in the field of automotive safety"

James Watson, Senior Project Engineer,
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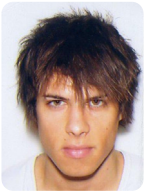

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Cranfield UNIVERSITY

Concurrent Engineering Application across Multi-Functional Departments (Jaguar)

Background

In 1922 a man called William Lyons had the original vision to design motorcycle sidecars with his Swallow Sidecar Company. By 1927, he had moved to building special bodied cars, which in 1931 resulted in the launch of the legendary SS1. As the range improved and expanded, it needed a name to reflect its speed, power and sleekness and in 1935 the Jaguar name was born.

Automobiles like the Jaguar family are software driven which provides the luxury and customisation features, however these can not be achieved unless full integration of electronic/software systems are well placed in Jaguar cars. The role of electronics/software integration should be understood by all the departments involved in product development else consistency issues are going to arise resulting in product and process re-design or even failure in the hands of the customers. This area of integration is what the MSc group from Cranfield University addresses. This project focuses on the challenging issues of electronics/software systems development process at Jaguar.

Aim & Objectives

The aim of this project is to propose an aligned and measurable maturity process development model for the electrical (hardware/software) department, based on the principles of Concurrent Engineering (CE) to enhance the collaboration among the different product development teams.

Approach

A qualitative and quantitative methodology was adopted for analysing the existing electronic/software development process and its challenges. The AS-IS model was captured using IDEF0 technique from the information derived from the analysis of interviews. Performance measurement of the company's practices was carried out. In workshops, the model was modified and details were clarified in cooperation with Jaguar. Best practices were then synthesised through extensive literature reviews. As a result, analysis of proposals in terms of feasibility and alignment for Jaguar was performed. Details were clarified and modified around the basic structure of concurrency in cooperation with Jaguar. Finally, both an aligned and measurable maturity process development model; and the adoption of Set-Based Concurrent Engineering (SBCE) were proposed, supported by fact-based scenario and the company specific circumstances.

Findings/Recommendations

A novel model combining Set-Based Concurrent Engineering with the standard "V" product development process was proposed. The proposed model allows for cost reduction by possible improvements in quality and productivity giving a long-term view.

"Working with Cranfield has been a breath of fresh air. The experience offered by such an enthusiastic and diverse group of students has been very rewarding. Their fresh ideas and energy have injected life back into a difficult and draining project."

Steve Howell, Integration Manager JLR Electrical Engineering

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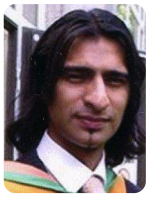

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