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Envisioning Design @ Home

This paper presents A new method which involves users in the home in the design process. It is common to involve users in requirements generation, but rarely in product inception or design. With technology fast encroaching into domestic environments we need to explore the contribution that the general public can make to future design, and to understand its strengths and limitations. Part of a study is reported which involved five households in central Scotland, who were each visited on three occasions, using a new investigative framework. We demonstrate that the general public can generate design ideas and that valuable contributions can be expected both from children and from the elderly.

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Communicating Engineering Design - A Critical Success Factor in Projects

Engineering projects or designs fail frequently because they are not communicated well to the management of the company in which they are carried out. Communication of project proposals, project status and project results are vital to the success: the management takes the decision on whether to go ahead with a project or to take a finished design into production. The author believes based on own observations and previous research that the requirements on communication have increased. This paper gives examples of concrete communication problems and recommendations for supporting engineers in their communication. The paper focuses on the official board-room presentation to top management. Some principles explained in the paper can, however, be applied to other frequently occurring communication of engineers.

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A Guided Surgical Drilling Method

This work presents a method to obtain a surgical guide allowing the implantologist to execute easily and with accuracy the implant seat. The drilling direction is obtained by elaborating the CT digital images of the mandible by a semi-automated software and the guide for the execution of the hole is given by a customized drilling jig. The suggested method can be integrated with the current clinical protocol and it allows to execute less invasive surgery. The research has been restricted to implantological problems connected to the mandible.

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Mathematical Models for Determination of the Values of External Dynamic Inertia Moments of Driver's Hand while Operating a Vehicle

This paper presents a mathematical model for determination of values of external dynamic moments of inertia of driver's arm motions during driving, having been reduced onto the axes of a coordinate system located at the center of shoulder joint. As driver's arm motions during driving represent a spatial mechanism, for connection of mechanism joints the Denavit-Hartenberg notation has been applied. The position and orientation of the mechanism joints during motion with respect to reference system at shoulder joint have been determined by applying the method of homogenous transformations.

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HRV

The Significance of Contact Pressure Distribution on the Soft Tissue by Men Sitting

A lot of investigations today are devoted to make the people life better from the ergonomic point of view. Here the magnitude and distribution of pressure by men sitting is very often the topic of biomechanical research. This paper analyses contact pressures between body and chair during sitting using experimental set-up. To this purpose the original wooden chair has been designed, fabricated and evaluated. The results of experiment are presented in the form of diagrams with maximal pressure on the ordinate and height/mass ratio on the abscissa. The goal of performed measurements on the chair is not just new design of the construction, but also determination of relevant characteristics that have influence on the pressure transfer on the soft tissue between the skeleton and chair. Here are considered anthropological parameters and biomechanical parameters.

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Design as a Collaborative Process: A Systematic and Constructive Model for Developing Play Material for Blind/Visually Impaired Pre-School Children

This paper discusses a design process lived through, during the application of a model derived from design methodology and devised towards attaining a particular task. The task was: Designing a play system to contribute to the pre-school blind child's development of object permanence, sense of self, and spatial concepts. The model employed was based on a systematic and constructive framework towards ensuring consciously made decisions. The paper also discusses the field-testing in play situations of the system that was the outcome of this model. The model was illustrative of the fact that, design, a creative act in itself, is simultaneously a collaborative process involving the methods, strategies and knowledge of interdisciplinary network.

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Quality Improvement in the Design of Mechanical Systems

Quality in product development moved gradually from the end of a product's development process to its beginning, thus involving quickly and totally all its phases and pointed out the great liability of the Design activities on product's quality level. The study carried out is an attempt to find the right trend to follow to pursue improvements in design activity throughout Methodical Design Tools. So it was possible to define the way to cover, which, even in its complexity, leads to a very effective Procedure to be followed by any designer without many difficulties, which may be implemented on any Mechanical System's design. The effectiveness of DFQ Procedure was tested on a project regarding the redesign of a tripper.

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The Evaluation of Costs Related to Safety of Mechanical Systems in Design Stages

Cost is a factor having a great influence on the properties of any Mechanical System, limiting in a significant way designers' and manufacturers' choices, who are always limited in their choices. It is then put in evidence the necessity to find some criteria to evaluate the maximum level to which the Safety of a Machine could be increased, so to make it economically feasible at same time.

The aim of the study is the development of a Design Methodology (SCRM - Safety/Cost Ratio Methodology), which allows to set the limits a designer should move within to find the optimum agreement between Safety and Cost: the effectiveness of the Methodology was performed in re-design a Machining Centre for the manufacture of wooden products.

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Context Modeling in a Collaborative Virtual Reality Application as Support to the Design Process

Context can be used to define which knowledge should be considered in a virtual reality environment in which a multidisciplinary team will discuss modifications or developments in design, product development, maintenance and production planning. It is desirable that objects within the virtual environment respond according to the context in which they are being used or they are likely to be used. A model of the context can be used as a filter for giving the right meaning to the current context and provide users with a greater control over knowledge. We propose a set of rules that have to be elaborated in order to allow the system to create a model of the context in which a design task is being carried out.

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Designers' Involvement in Designing

In the paper designing is conceived as a social, interactive process of interpretation and meaning construction. Sociological concepts are adopted to describe how designers build meaning through routine interpretative practices. Extracts of a recorded design session in practice are taken as data for the analysis presented. The paper investigates a referential practice in design conversation through which designers refer to themselves. Evidences are put forward that designers use the referential practice to express subjective involvement in designing. Designers appear to experience the design space more directly by symbolically displacing themselves and stepping into the 'object worlds' to empathize with or taking the role of the objects.

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E-map. Investigating Methods for Mapping Experiences

In spring 2001 an investigation was conducted at the University of Westminster intended to analyse personal experiences of the London Underground as a review of current techniques for recording and mapping ideas. This was carried out by a group of students in collaboration with PDD Ltd., a leading London Innovations consultancy. The work was intended as a pilot study, and forms part of a larger research investigation. The project is funded by the government through the TCD.

The project analysed the success of particular methods of categorising research and a review of methods of mapping and communicating observations. Some of the primary issues under consideration were: How can designers begin to understand the structure of people's experience of the world and map the results effectively? What mechanisms are available to effectively communicate experience? How can a model help designers work collaboratively around a shared language? The work focussed specifically on exploring different ways of observing and capturing information for subsequent application to design. The methods needed to be suitable for subsequent communication and application to cross-disciplinary design teams.

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Towards A Designer Working Culture That Encourages Sleep And Dreaming

There is a growing acceptance of a work culture where both superior and peer respect can be gained by working longer hours than contracted to, at work or at home. However, in response to growing needs to increase performance, it is suggested that professionals should strongly consider changing this culture. It concluded that a change in work culture, towards respect for individual sleep needs is required to enhance performance of creative thinking, decision making and interpersonal communications, which are key to the designers role.

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Office Furniture Design According to a Human Anthropometric Data

If the design of the office furniture does not follow ergonomic principles, and if there is lack of exercises or relaxation during working hours, it is possible that various forms of physical deformations can occur. On the basis of recent research and standards, basic rules how to design office workstations according to ergonomic principles are shown. Dimensions of workstations in sitting and standing posture are shown with examples of ergonomically designed workstations for laptop computers and workstation for all age groups. Designers of office furniture, architects, and companies which design office interior should apply the international standards group ISO 9241 and the European standards EN 527-1; EN 1335-1 and European directives.

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Trajectory of the Human Body Mass Centre During Walking at Different Speed

The body's centre of mass is a key factor in the analysis of human gait, as it reflects the motion of the whole body. The major objectives of this paper were to describe the inter-subject variation of the motion of the centre of mass in normal walking through determination of mean and standard deviation and to investigate the influence of walking speed on trajectory of the body mass centre. An automatised method for determination of the whole body centre of mass has been established. A typical pattern of trajectory of the body mass centre during gait cycle has been established for every subject and general pattern for normal and fast gait has been determined from typical patterns.

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Forming a Base for a Manufacturing System Design and Evaluation Method

In this paper, a base for a manufacturing system design and evaluation method is proposed. The main goal within the project is to create a method that addresses important aspects with manufacturing system design. The building blocks of the method should give reliable and accurate data and also, display the relationships between the different parts that form a manufacturing system. Building blocks include, for example, a management strategy for designing manufacturing systems to comply with demands for mass customisation. Partial goals are to find and evaluate these building blocks as well as to examine how different changes in a manufacturing system influence other factors than those intended to improve.

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Three-Dimensional Modelling of Solid-Fluid Interaction as a Design Tool in Screw Compressors

In order to reduce internal leakage in screw compressors, efforts are continually being made to produce them with smaller clearances. However, since their rotors deform due to the high pressure loads under which they operate, a reliable estimate of the interaction between rotor deflection and fluid flow is needed to maximise the compressor performance while avoiding contact with the casing. A 3-D numerical grid comprising both solid and fluid domains, applied to a commercial computer code for simultaneous calculation of the fluid flow and compressor structure, is presented here. This demonstrates the effects on compressor torque, volume flow, efficiency and specific power due to the change in working clearances caused by rotor deformation.

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Model Generation and Application in Medical Domain

3D model of real object can be generated using many different algorithms. The paper presents the method of creating the model with input images of real model, base model and expert knowledge. Input images represent real object and can be taken from variety of sources (MRI, CT, X-ray images). Base model is 3D model that presents the common shape of model that is generated. Expert knowledge more precisely defines the properties of generated model. Model is visualised using VTK library and OpenGL. The method cannot replace the model, generated from series of CT images. It represents the possibility of faster and cost effective representation of a real patient before any surgery or decision takes place.

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Facilitating Creativity and Shared Understanding in Design Teams

We investigated team interaction arrive at a shared understanding of the task and at fresh, creative ideas in 20 meetings in different types of industry. The patterns are iterative in terms of team communication though structural approaches were seen as beneficial in interviews. These observations were utilised to design a computer-based environment for early stages of product innovation. In two experiments with students, we compared the new tool against paper-based and non-facilitated groups and different creativity techniques. The results show that for simple tasks, different techniques are equally appropriate.

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Managing Uncertainty in the Design and Development Process by Appropriate Methods Selection

Potentially, the numerous design methods generated for decades have much to offer in the complex multi-objective product design activity. However, the number of methods used in industry is relatively small. Of those that are used, some are practised at the wrong stage or incorrectly, which leads to poor results and to distrust of design methods generally. A framework for the classification of methods intended to help engineers select them appropriately is presented in this paper. It has a basis on concepts from the field of creativity. The selection principle matches the fundamental characteristics of the design methods with the solution requirements of the problem. Its use provides a way of handling uncertainty in the design process.

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The Influences of Organisation on Leadership in the Design Process: Results of an Investigation in Five Industrial Companies

The concept of leadership is closely bonded with the concept of organization: one defines and influences the other. The consequences and situations in which these problems arise are shown in this paper. The question: "What kind of role organization plays for leadership in product development?", is being approached by psychologists and construction methodizers in the context of an interdisciplinary project sponsored by the DFG (Deutsche Forschungsgemeinschaft). Until now, we have investigated five industrial product development departments and coached three of them to do better work. In this abstract we are presenting the experience of these investigations and our first detailed findings, focusing on the influence of organization. In addition to this, the theories, methods, and detailed findings of the investigations will be presented in this paper.

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The Importance of Corporate Culture in Collaborative Product Design

Due to the increasing complexity of technologies and products, the search for new know-how as well as the shortening of development cycle times a lot of companies collaborate in (new) product design. But only as little as fifty percent of these ventures are successful for both partners. One explanation for this lies in the lack of consideration of the cultural aspects of a collaboration. This paper explains the way in which corporate culture influences the process of collaborative product design, gives some advice on what project managers can do and shows some results of a survey conducted in Swiss industry.

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Participative Laboratories for the Co-Production of Public Space: Redefinition of Social Meaning

This paper provides an outline of a study of the development of new strategies for an integrated process for the design of public space using participative laboratories. The laboratories involved experts, elected representatives and lay citizens in multi-cultural and interdisciplinary discussion throughout the design process, and opened the dialogue from technical considerations to social issues. The intention of this experience was to evaluate the capability of a local project's dynamic to enhance the social and urban development.

The political will to experiment with participative laboratories on such a scale in France recognises the evolutionary progress of society, from modern to post-modern, from representative to participative democracy.

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NLD

Using Finite Elements Model of the Human Body for Shape Optimization of Seats: Optimization Material Properties

An optimization procedure was developed to search for the ergonomically optimum product shape. The optimization entity is a FEM of the human body. The modification variable is the pressure in the contact area. The FEM and the optimization were developed for a seat.

This paper presents the FEM, in particular the material properties, and the first results of the FEA. The model is a simplified assembly including skin, bony parts and in between soft tissue. First experiments were to validate the material properties for agreement of the maximum pressure and the predicted pressure from regression formulas. A relationship of the maximum interface pressure and the stiffness is hypothesized. The results confirmed the hypothesis partly. The current model needs continued elaboration to test the hypothesis completely and to obtain a valid estimation of the material properties.

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Design of Digital Graphic System

In this work, design of graphic procedures is analysed, in dependence on obstructions in production line. By quantitative determination of work amount that is a reason for the lack of speed and job piling it is possible to correct and improve the present state. Simulation of planned activities flow is based on real data measured in digital printing house. Obstruction is determined, and on the basis of measuring and result analysis optimal parameters for graphic production are designed. The new approach in observation an evaluating graphic engineering area is given, and this is reflected through a better usage of present graphic equipment. Researches are initiated by a new situations in integration of digital and conventional printing and graphic designers demands for more demanding graphic product.

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On a Hip Joint Simulator Electric Actuators Integrated Design and Optimization

The multidisciplinary implications occurred in the integrated design and development of the motorization for a novel multi axis hip joint simulator using 3D parametric CAD system integrated with analysis and simulation software tools will be described.

The high dynamics required imposed the designers to deeply focus on determining an optimized actuating devices configuration and perfect combination of servomotor, gearbox and drive solution to realize the best dynamical performance.

The 3D CAD system and dynamical simulation software tools strong integration permitted the designers to verify the simulator real final mechanical behaviour and the effectiveness of every single actuators' combination.

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Terms and Measures for Styling Properties

The integration of styling work into the overall product development process is still not sufficiently achieved. Engineering and styling use different concepts and terminologies. Both areas are increasingly well equipped with computer-aided tools which call for a formalisation of geometric and verbal model descriptions. In this paper a list of styling relevant features and properties is presented and simple measures proposed. These verbal and numerical representations of styling terms could be used for communicating the design intent of a model and for facilitating automatic optimisation procedures.

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Structured Reflection for Improving Design Processes

Continuous improvement of design processes is a necessity. Our objective is to stimulate designers to improve their own process by reflecting on their design process. Reflection has already proven to be useful for improving, for example, the learning process of managers. Studying the usefulness of reflection for designing received, however, little attention. In the paper, we explore possibilities of reflection for improving design processes. More specific, we investigate the possibilities of structured reflection; we define structured reflection as reflection that is performed on a regular basis and that is performed in a systematic way. We also discuss a model that integrates structured reflection in a design process.

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Colour in Technical Presentation

This paper considers the gap between the standardized single coloured, mainly two-dimensional representations in engineering design based on rules of technical drawing and new, mostly optional capabilities of multi-coloured three-dimensional electronic presentations, providing new opportunities beyond the mere application of conventional presentation practice. It is noted that the maturing of standards in technical presentation did not adequately follow the fast hardware development and software implementation into engineering practice and that colour was hardly ever the issue in standardization in technical drawing. This paper also reveals few examples, which may hopefully clarify the vast possibilities and apparent benefits of utilizing colour in creating and communicating via technical images, as well as the need for amendments to standards relating colour.

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Invisible Niche: (Re)Considering Cultural and Social Factors in Design

This paper presents the traditional thinking of Cantonese people's beliefs and values concerning death. It then reviews cultural and social changes in Hong Kong, and how people have changed their minds about burial methods. By reviewing the spatial dimension of culture (that is, beliefs and values, activities, and physical objects) and borrowing the Invisible Niche (a new cemetery design concept) as a case, this paper advocates a (re)consideration of cultural and social factors in design in the present rational and function-oriented society.

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Some Problems of Unreliability and Hazard in Technical Objects

In the paper the analysis of the relations between the hazard and unreliability characteristics of the technical objects has been presented. The mathematical model, described in the paper, enables the analysis from the point of view of influence of various factors on the safety. In the paper the formula describing dependency on reliability from safety was considered. Analysis of these formulae permits to state some advice for specialists who investigate technical objects accidents. The correlation coefficient between the safety and reliability characteristics has been determined. Analysis of the correlation coefficient enable to formulate some recommendations for the constructors of technical objects.

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Designing and Discrete Production of Office Furniture in CIM Systems

The objective of the research project was to develop an integrated model of parametric application operating in the environment of Mechanical Desktop® with an MRP (Material Resource Planning) class system which could assist ergonomic designing of constructionally complex office furniture and to present a method of representation of production processes of such furniture in the MRP system. In its assumptions, the program constitutes an expert system which provides the user with clues as to which characteristic office furniture dimensions are optimal and also comply with standard requirements.

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Integrated Design in the Operating Room: Review and Analysis of Medical Product Development

The multi-phase research programme 'Integrated Design in the Operating Room' aims to improve the integration and usability of operating room equipment. This paper focuses on a review and analysis of medical product development. Design methodology, internal and external communication, complexity of medical design, and operating room experience were investigated. Data collection was mainly by semi-structured interview with designers and managers in companies supplying operating room products. Design methodology and communication could be improved, most designers had minimal operating room experience, and the complexity of medical design led to the design process being centred on specific factors at the expense of an holistic design approach.

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Haunting Space - The Role of the Body in Design Interaction

This paper will investigate the contention that the body and in particular the sense of touch, plays a central role during interaction associated with design. The approach will be grounded in the philosophical tradition of phenomenology, particularly the role of the body and how it impacts on the process of design. The theme of engagement provided by the haptic qualities of physical models will be illustrated by a prototype design concept based on shape grammars. Through the incorporation of an explicit linkage of touch and interaction, it is contended that such tools to support design might begin the process of reconnecting the body and the senses to the eye and produce design solutions that are more grounded in humanity.

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Microtext Design for Digital Printing Techniques

This work contains research results for different digital printing techniques. We are facing raising demand for printing smaller amounts of individualised and protected prints (tickets, lottery coupons, value coupons etc.) One element of those products is microtext, and is used for carrying many informations on less important documents. Because of digital printing technologies limitations (for example: toner particle size), in print procedure some letters loose their details, and so, they are less legible.

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The Role of the Designer in the Innovation Process: Experience of a Large Supermarket Chain

This paper concerns the design of new checkouts for an SA group of a supermarket chain. The goal of this research was to extend the approach to the general situation of payment and not just to improve the checkouts. We are interested in the rationale underlying the project concerning the innovation aspects. In this paper we present the contributions of the designer to the whole innovation process and how he/she handles the information flows associable or associated to him/her in the specific case of the checkout project.

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Collaborative Engineering: 'Towards Design Guidelines for Risk Management in Distributed Software Development'

Distributed software development activities require intense collaboration between groups who are scattered over geographically separated locations. While group-oriented software development has always provided a source of risk, several trends increased the importance of these risks. First, because software is developed in a distributed manner groups need different channels to communicate. Second, both inter- and intra group relations are (culturally) different (e.g. they become more formal). Finally, the actions and interactions taken by distributed groups are more difficult to coordinate. We identified nine risk factors and found that social-dynamic risk factors are more critical to project success than system-technical risk factors.

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How Designers Communicate Ideas to Each Other in Design Meetings

Multi Disciplinary Design Teams (MDDTs) are used extensively in the industrial manufacturing world to integrate the broad knowledge bases required for application of diverse technologies necessary in major projects. This paper reports on a study of how the members of a MDDT communicated design ideas of technical information and design concepts. Video was used to document design meetings, which were subsequently analysed using "Interaction Analysis". The study documents the diversity and frequency of the communication strategies employed in this MDDT. The study also reports on the relative effectiveness of these communication strategies in achieving shared understanding.