

# GLOBALISATION DEVELOPMENT OF AN INTEGRATED CONCEPTION PLATFORM

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**SUMMARY :** Nowadays, globalisation is one of the main trends in company organisation. Wider fields such as conception, analysis, manufacture and sales equipment provide competitive advantages as regards technology, natural resources and culture. At the same time, however, within the widespread industrial environment of design and manufacture, potential communication problems are arising and require solutions. There are two types of communication problem : Vertical communication based on the product development sequence and Horizontal communication between people in similar professions. There is a solution to these potential problems with the application of new Internet technologies and the concurrent concept of engineering. Conception, based on computing networks (modules DFX and data access), speeds up vertical and horizontal communication in the broad environments of conception and manufacture. This results in a saving of both time and product development costs. The aim of the study is to improve the conception process by facilitating the sharing and modification of numerical models by the various people involved ; the company PRO-CONCEPT.

**KEYWORDS:** globalisation, organization, concurrent engineering, Design, CAD

## INTRODUCTION

Faced on a daily basis with a difficult international economy , the appearance of new markets and also with ever increasing pressure as regards competitiveness, companies wishing to increase their productivity and competitiveness are finding it more and more difficult to design a product, develop it, produce it entirely and market it on their own<sup>1</sup>. Faced with the pressure of international competition, the industrial network is restructuring and grouping around centres of interest ; we see more frequent implementation of the concept of the spread-out company, that is industrial chains or networks providing links from the supplier of raw materials right up to the final consumer ; one of the main principles of its organisation being mutual advantage.

Design, development, manufacture, marketing, maintenance and withdrawal of a product therefore appear as a co-operative project, whose aim is above all to trigger of a synergy amongst partners in order to increase their market share by reducing the time necessary to bring a product on to the market, checking the quality of the products manufactured as well as their cost price, understanding better what clients or final consumers want and reacting to market fluctuations. Concurrent engineering comes into its own in taking over the following functions

- Modelling
  - representation of the product and its environment throughout its life cycle
  - organisation and presentation of the information regarding this life cycle

- organisation, modelling and management of the processes used
- Distribution of the engineering activity
  - distribution of the information using various means
  - recognition of heterogeneous exchanges

The ability to facilitate human "dialogue" with "numerical models" or with physical objects by way of networks

- the ergonomics of what is "seen", "touched" "heard" by synthesis (virtual reality) or by restitution (increased virtual reality).
- The ergonomics of that which enables working with a "virtual universe" or at a distance

The organisation of access (identification, privileges, roles) to the information contained in the machine or direct human exchanges, making reliable updated information available.

There are several aims (Figure 1)

- Reducing the time for getting new products on the market (including study and manufacturing time)
- Increased quality
- Lower cost price
- Better understanding of what clients and final users want
- Improving flexibility

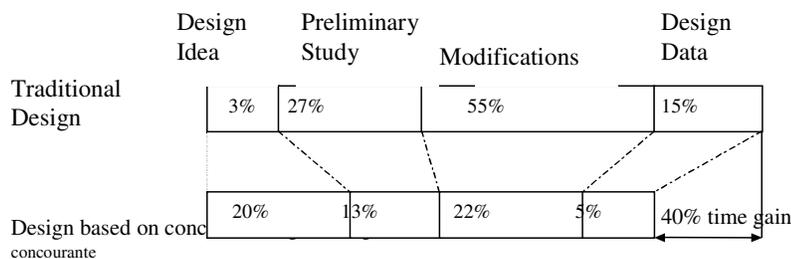


Fig. 1: The Advantage of Concurrent Engineering

Figure 1 illustrates one of the main advantages of Concurrent Engineering : the time saved throughout the process of developing a product by emphasizing the design stage (Concept design).

The economic difficulties which the industrialised countries have to face inevitably result in a reduction of the markets sustaining them in spite of the creation of free economic exchange zones trying to find the critical size. In a given market (automobile, hi-fi ...) several companies are generally to be found offering quite similar concurrent products according to the healthy law of emulation. When the perimeter of a given market shrinks significantly, whatever the causes, a point is reached where the spheres of influence of the companies operating on this market clash and interpenetrate to an intolerable degree. The most fragile companies then disappear, corroborating the evolutionist doctrines and the strongest have the choice between two attitudes if they want to survive :

- Either adopt a predator policy which drives them into aggressive OPAs as regards their economically weakest competitors. This method has at least the advantage of spacing and making the market healthier.
- Or opt for a flexible association policy, leading to the notion of inter-company programmes and "spread" companies.

The optimisation of the internal structure of the company, according to the Concurrent Engineering organisation covering the sub-contractors, inevitably leads to the "spread company", the model of adaptation and survival. The worry about improving "time-to-

market" is spreading naturally to the relationship Order Givers/sub-contractors, whose correct operating will depend on respecting dates.

## THE TECHNOLOGICAL ENVIRONMENT

Concurrent engineering is based on a certain number of technologies including, in particular, information and communication technology. These technologies sometimes to norms, originate from the four following fields<sup>3</sup> :

- Communication infrastructures (wide networks, local networks, local industrial networks, high-debit networks (ATM ...))
- Software and material architectures (object oriented technologies (CORBA, OLE ...) parallel architecture computers.
- Massively parallel structuring gives considerable processing and calculating power, enabling certain application software to be used more easily - thus constituting the basis of the concurrent engineering (simulation tools, calculation codes, virtual reality, CAD/CAM tools.... )
- Information systems (data exchange tools, configuration management tools, technical or management data bases, technical data management tools).
- Internet norms (HTML, VRML ...) help facilitate co-operative working. Considerable progress is expected within the field of data bases in order to optimise simultaneous access, security, user intervention control in real time on the date, written especially.
- Application software (simulation tools, finite element/finite difference calculation codes , XAO tools (CADCAM, production management ....))

A simultaneous engineering project requires the cohesion of these technologies as a whole.

## COMMUNICATION PROBLEMS

"Distributed" fields such as design, analysis, manufacture and sales equipment provide competitive advantages as regards technology, natural resources and culture.

However, at the same time, in the fields of design and manufacture, a globally distributed industrial environment raises potential communication problems which have to be solved. There are two types of communication problem<sup>4</sup>:

- Vertical communication
- Horizontal communication

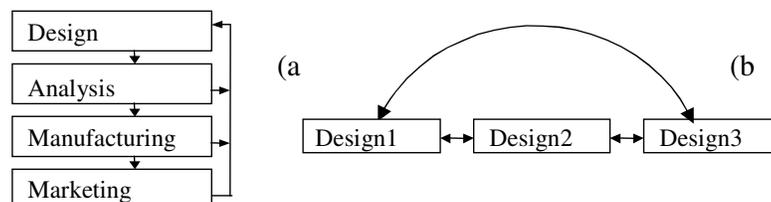


Fig. 2: Communication within a distributed environment  
Vertical communication (a), horizontal communication (b)

## NECESSARY RESOURCES

Sharing information amongst the members of a team within a company is possible when they have the will and the resources to do so. Supposing these members want to communicate and share the information during the development of a product, resources are necessary to obtain efficient distributed design and manufacture.

To encourage pertinent communication within the environment of distributed design, there are three major approaches.

Recent Computer software, used in this study, actually enabled users based in different geographic situations to assemble and modify a simple design by means of the Internet network OneSpace (CoCreate company).

## CONCLUSION

The project of setting up and evaluating an integrated design platform using OneSpace software has been fully studied due also to the availability of suitable computing means.

This study has enabled the development of a concrete application of Concurrent Engineering (CE) which has turned out to be an extremely interesting precursor.

Having mastered the main Design and Calculation software, our work has consisted of integrating into the concurrent One-Space software, a mechanism composed of elements (geometric and finite element data) designed by heterogeneous software.

Downloading these under One-Space raised the problem of exchanging data via Internet.

Concurrent Engineering is now a reality with a solid theoretical base at all levels of application and it has become indispensable to company competitiveness on the industrial market.

The time saved through the application this way of working has already been confirmed by the majority of users.

The present problem concerns informing company directors and encouraging them to adopt such a system and contribute to the progression of industrial culture.

## REFERENCES

1. Patrick, J., "Concurrent Engineering, la maîtrise des coûts des délais et de la qualité », *Hermès-Paris*, 1993.
2. Rouchou, Ch., "Ingénierie concurrente, élément décisif pour l'entreprise entendue", *Revue Industries et Techniques*", 2001, n°824, pp 42-64.
3. Petit, C., "Analyse de la valeur et ingénierie simultanée, AFNOR, 1995.
4. Carter, D.E., Baker, B.S., "The product development environment for the 1990s.", *Addison-Wesley Publishing Company*, 1992.