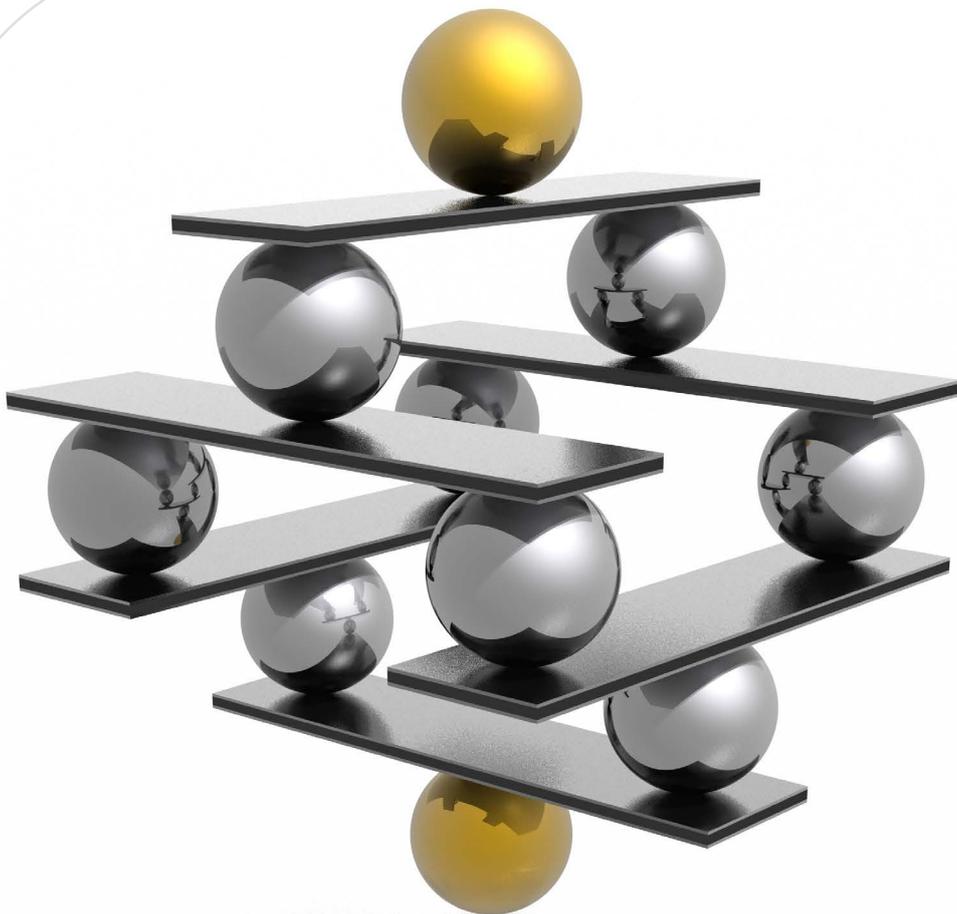


Combining Cost Cutting and Customer Value in the search for Competitiveness: The 'Design to Cost' perspective

When the leaders get involved





Design to Cost

‘Design to Cost’ can be defined as an “organized and creative method for competitiveness, which seeks to satisfy user requirements, through a specific design approach, which covers the functional, economic and multidisciplinary aspects”.

Our vision of the ‘Design to Cost’ concept within the range of approaches to optimize competitiveness is: a set of principles, methods and tools, which help embed Customer Value on one hand and Cost Drivers on the other hand in design decisions.

The ‘Design to Cost’ method shortens the “design / development / test” loop, which makes it possible to simultaneously examine several alternative solutions to meet a requirement, while maintaining or decreasing the level of resources consumed or even fewer number of resources. It thus considerably improves the effectiveness and efficiency of development and, in this sense, is close to the “Set Based Design” approach promoted by Toyota for nearly a decade.

The ‘Design to Cost’ method activates the offer design lever (of products and / or services) for improving all the segments of the company’s value chain.

Long regarded as an approach for technicians, the 'Design to Cost' method has now earned its reputation for excellence and is part of the value-creation arsenal of managers.

Without drawing any conclusions, nor making a formal presentation, we would like to discuss the key success factors which guarantee the results of this approach, and in the process, find the reasons behind certain failures... To do so, we will draw insights from the experience of leaders we have worked with. The role of Senior Managers is often highlighted, as this approach is above all management tools, besides being a work method for engineers.

We will also explore the challenges and opportunities driven by emerging new business models like the extended enterprise, the open innovation and the "digital revolution".

A mature approach

The 'Design to Cost' approach is spreading and maturing, empowering multiple variants and extensions, the most convincing being undoubtedly the 'Re-Design to Cost' approach.

It hatched from the Value Analysis method which emerged in the United States at the end of the Second World War, thanks to the efforts of Mr. Lawrence Delos Miles, Engineer at General Electric, who developed it at Toyota in the wake of Lean Management, more than four decades ago. Today, the 'Design to Cost' method is a key component of the cost management arsenal of Senior Management and Programme Management teams in almost all manufacturing sectors.

Yielding to marketing, and freeing itself from the outdated image of Value Analysis, the concept has managed to revamp itself regularly: Design to Market, Lean Design, Design to Value, Design to Total Cost of Ownership, or even Lean Engineering. Beyond these different names, what is important is the relevance of the approach and its potential to address today's competitiveness challenges.



The reasons behind its success

Whatever its name, today 'Design to Cost' is key for most of the mature manufacturing firms. Why?

Spectacular results

When used wisely, the 'Design to Cost' method always achieves its objectives" – "guaranteed" savings ranging from 15% to over 40% within its scope of action - and an unmatched ROI: rarely more than a few months.

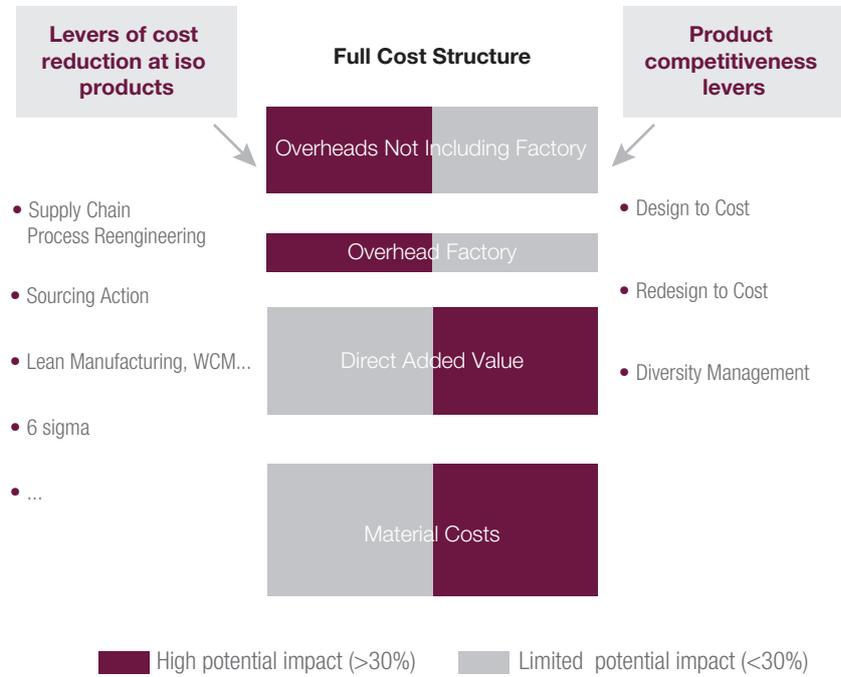
Using a radically different approach from the traditional cost-cutting or manufacturing continuous improvement actions, the 'Design to Cost' method offers much higher potential savings than approaches which have prevailed in the past decades. These initiatives were based on an implicit splitting of roles: the resources dedicated to product design were primarily concerned about the value for the customer, while cost control was the responsibility of Supply Chain management.

At the opposite end of these dominant trends : specialization, customer-supplier relationships centred on price negotiation and search for economies of scale, the 'Design to Cost' method fosters an integrated vision and looks for savings by aligning to the "just necessary requirement" of the customer, with a "win-win" philosophy. This vision is about activating the product design lever to tackle all the direct and indirect costs of the company and its ecosystem.

Overview of Cost and Non-Cost Competitiveness

Moreover, the 'Design to Cost' approach, as its name partially suggests, is advantageous compared to most of the cost-cutting techniques, as it preserves, or even improves the customer perception. It helps restore the competitiveness of our industries by closely combining cost reduction and innovation levers.

Definition and conception of products are major levers for growth... but also for cost reduction...



An approach which has spread to almost all market sectors

These arguments explain the presence of 'Design to Cost' "in the DNA" of large-scale manufacturing firms (automobile, capital goods, etc.) and its pivotal role in the "platform" initiatives which revolutionize these sectors. As for the major systems manufacturers of the aeronautical industry, these arguments drove the creation of specialized cells. For the same reasons, the 'Design to Cost' concept has even expanded to sectors with very different cost structures such as the pharmaceutical industry or even the luxury industry.

And occasionally, but with some great success stories, the 'Design to Cost' method is used to control and reduce investment budgets (industrial equipment, etc.). Later we will look at the service sector which is the only one not to systematically practice the 'Design to Cost' method although it has already adopted Lean Management.

Leadership Testimonials

"The results of the Design to Cost deployment in the company amount to hundreds of millions of Euros. The methods that we have developed and the results achieved are so strategic for us that we never communicate the content."

Executive Vice President, R&D, Automotive Sector



The responsibilities of the leadership team

'Design to Cost' is a sophisticated industrial approach, not limited to common sense; the methodological principles, techniques, and success factors are proven and published. These conditions require strong involvement from the leadership team. The leaders we interviewed highlighted seven key management tasks:

- 1. Set ambitious goals**
- 2. Ensure equal cooperation from all the stakeholders of the value chain and the product lifecycle**
- 3. Ensure the involvement of suppliers and partners**
- 4. Spread the understanding about the cost drivers**
- 5. Make tradeoffs and take responsibility of the risks associated**
- 6. Stay involved until results are achieved**
- 7. And finally, have the approach rooted in the company culture**

Leadership testimonials

“Contrary to what is commonly believed, innovation is not just the business of Technical Departments. It is primarily the Business of the leadership team. We should get rid of our inhibitions on this subject in order to put an end to the black box syndrome. When I took up my post, I explained that this would be one of our priorities and that I would personally take care of it.”

CEO
Automotive Industry

1. Set ambitious goals

One of the structuring principles of the 'Design to Cost' method is to break away from the logic of "best effort", which always results in steering the design process with equations such as these: "Selling Price = Cost + Margin", or even worse, "Margin = Selling Price – Cost".

Leadership testimonials

“A salesperson will always be more inclined to take a risk than a technician, but the decision is always up to the Senior Management. There is always an element of risk. We hope for statistical gains. It is the purpose of our “Opportunities Selection Committees”: to weigh the risk that we are taking, and then, to “exempt” the technical teams “from any liability”: it is the only way for them to sustainably dare to think out the box. But the Senior Management needs to keep this in mind: it’s out of the question to blame our teams when things don’t work out. By doing this, we would immediately kill the spirit and the method, and then it will be goodbye to future savings.. It is up to us to assume the element of risk, and to show it clearly. Evidently, it is a radical cultural change for us as well or perhaps for us first...”

DCTO
Telecom Sector

It is the leader's responsibility to set the target of a 'Design to Cost' Initiative, breaking habits while still staying credible. The leader will draw on his/her experience and intuition, on market related aspects and the technological context. More broadly, he/she will provide the strategic arguments that can justify the level of ambition set, and in return, the level of risk that he/she is ready to assume prima facie.

2. Ensure equal cooperation from all the stakeholders of the value chain and the product lifecycle

It should be noted that teamwork becomes very important in this approach. An "achievable" initiative rarely comes from just one individual alone. On the contrary, it often emerges from a group which combines all the necessary skills and examines the many sides of the problem: value for the customer, technical solutions, industrial and logistical constraints, etc. Earlier the practice was to deal with problems in a sequential manner or in silos; now, this approach cuts across several functions manifesting itself within companies through organizational structures with varied names: multidisciplinary work group, project teams, and innovation lab or innovation factory for the most advanced.

It is up to the managers to provide the necessary resources to ensure the engagement of the business teams depending on the specific issues in different segments of the company's value chain, or at different stages of the product lifecycle. For example, if the "voice" of a direct client requires the presence of the sales and marketing function, then that of the end user could require the collaboration of the maintenance function...

Leadership testimonials

The first team meeting helped break the taboo about costs by sharing the cost structure and drivers. For the first time, it was possible to exchange ideas on the influence of the weight on recurring costs and to address the key issue of allocation of technical margins in the process of breaking down the system specifications for the equipments. Do we really need a 1/100th tolerance while a 1/10th would probably be sufficient ? Everyone can thus be forced to question other business teams on the ability of the customer to detect such performance or on the foundations of a technical design.

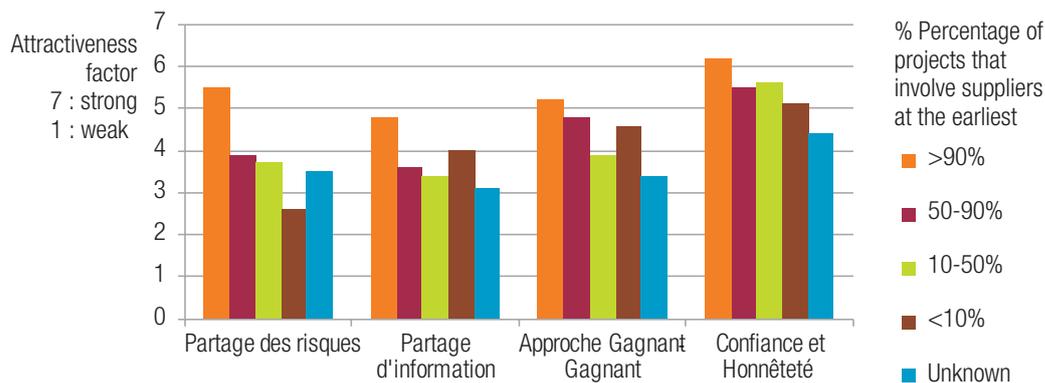
DCTO
Aeronautical Sector

The efficiency of these teams then depends on some slightly trivial yet intangible conditions, such as the mandatory presence of everyone at meetings, the fulfilment of commitments with regard to preparing and processing brainstorming discussions. Directors shall see to it that the management ensures the strict compliance to these rules and puts them into practice through appropriate rituals (Obeya, Daily Meeting, etc.).

3. Ensure the involvement of suppliers and partners

The necessity of involving key partners in the 'Design to Cost' process is indisputable: not doing so, you could leave aside more than 50% of the scope of research. The terms of this involvement however remain tricky: it involves combining contractual rigour with uncertainty, flexibility, transparency, and finally, an element of risk taking. Many companies face the following dilemma: how do we ask a partner to join a common innovation initiative while simultaneously maintaining pressure on costs in the short term, by negotiating fiercely, or even by being ready to prematurely end the relationship if results are not achieved?

Attractiveness factor for the supplier



The companies which have developed effective partnership contracts with their suppliers have dealt with the question of a win-win relationship right at the beginning, by building on three levers:

- The alignment of the decision-makers from both sides on the 'Design to Cost' approach: What are the objectives? What are the prospects? What are the milestones?
- The definition of rules regarding sharing gains...and costs
- The mobilisation of the joint teams dedicated to the 'Design to Cost' initiative for the duration of the project

4. Spread the understanding about cost drivers

The reluctance of the teams to quickly estimate the cost of a new technical solution often derails the spirit of the 'Design to Cost' approach. The task of examining the solution is postponed to ensure the reliability of one's cost assessment whereas the approach, on the contrary, requires the exploration of several alternatives in parallel, but only up to a point where they can be economically compared with each other.

This difficulty can be handled by developing Costing, a function still new in many companies. It involves estimating the costs of components, subassemblies or products through analogic or parametric approaches, without going through the traditional analytical cost evaluation process which will come when the study is almost finalized. Structured databases around Cost Drivers (number of inputs/ outputs for an automaton, the power for an engine, etc.) will be established based on the lessons learnt.

Leadership Testimonials

By implementing co-innovation contracts with our partners that bind and engage the parties to the initiative, the objectives and the industrial property, we were able to set boundaries for and secure each of the parties in our initiatives. Success inevitably requires the leadership teams of both the parties to reveal a common desire to succeed. And this needs to happen as early as possible in the process.

Purchasing Director
Automotive Manufacturer

If companies – particularly in the B to B sectors, which often face the issue of providing a quote while the specifications are still vague – possess true know-how in this area, it is often a skill inherent and restricted to a few experts. The challenge is to have collective awareness of the Cost Drivers within the technical teams; this transformation, far from being natural, will depend on tools and methods, and will require sustained attention from the management.

It is a tricky issue, which can easily be over complex and for which universal solutions do not exist. If the creation of databases, which are based on the lessons learnt, provide significant support in case of relatively repetitive projects, how do we assess the cost for projects with only a single example or in case of new technologies which have not been mastered yet or which are even unfamiliar? In this case, a provision for the risks will be attached to the cost estimate, and the client and the partners can be involved through a risk-sharing model. When the portfolio of ideas is relatively large, it is possible to apply the laws of statistics: the estimate of the overall gain will be more reliable than the individual valuations.

5. Make trade-offs and accept the responsibility of the related risks

When the assigned goal is ambitious, the proposed solutions are likely to radically change the habits and thus bring out new risks; the obstacles or alerts could come from all the business functions that deal with products (Sales & Marketing, Technical, Production, Purchasing, etc.) or from suppliers. In the past, Senior Management or its representatives often did not take an interest in these issues, considering that they came under the remit of the Technical Department. Those days are gone and Senior Management teams have dealt with the issue or have ensured that their authorized representatives had the necessary means and authority.

Leadership testimonials

To save 25% on costs, I had to accept an element of risk on introducing a new technology with uncertainty about our ability to qualify it within the deadlines. This risk-taking move highlighted some extremely antagonistic positions. On the one hand, the Programs Department was highly motivated to adopt this solution for economic reasons, and on the other hand, the Technical Department was being extremely over-cautious because they were uncertain about their capacity to make the solution available within the set timelines. In this kind of a situation, you are the only one who can decide. As it happens, I had to put another project on hold so as to reallocate the resources, and that went through. These types of situations come before me relatively often. It is not surprising therefore that we look for real breakthroughs.

CEO
Telecom Sector

First of all, the challenge for managers is to ensure that these issues come to their attention, without the most innovative solutions being censored before they reach them and without the critical risks being hidden from them. Thereafter, they have to weigh the different elements and make the trade-off.

It is often a radical cultural change for the teams. Educating stakeholders about the Design to Cost methods and ensuring consistency over time are good levers. In particular, the leadership team should imperatively take responsibility of their trade-off decisions and remember them over time. And they should keep in mind that risk-taking means a certain dose of failures.

6. Stay involved until results are achieved

Experience shows that converting the gains identified “on paper” into “real and tangible” savings requires high attention from managers.

As part of a Defense programme, a manufacturer implemented an initiative which involved high team engagement resulting in several cross-functional work groups. Dozens of opportunities were identified, of which some were disruptive, and were validated initially. But the teams were completely disengaged because the leadership team did not vigorously monitor the detailed study of the opportunities, and because they did not put the required pressure on the development schedule.

Ultimately, a significant part of the savings ended up in the wastepaper basket, having overrun the validation milestones laid down in the programme schedule!

Leadership testimonials

The ‘Design to Cost’ approach is not yet in the DNA of the company, even though the concerns regarding recurring costs, has significantly increased within engineering teams in recent years in the wake of a renewed focus on production and the implementation of “Lean Manufacturing” projects. It’s a major challenge for us to switch from a series of focused operations to a sustainable approach which will be based on more structured tools – we are thus planning to enhance our PLM with cost estimating functions – and will have to integrate the “Total Cost of Ownership” to meet the expectations of our clients.

R&D manager
Aeronautocal Sector

7. Have the approach rooted in the company culture

Far from an opportunistic initiative, which is “ad hoc” in nature, the ‘Design to Cost’ method is taken up in companies which have understood that this method requires a long transformation, a profound cultural change.

In fact, the ‘Design to Cost’ method often clashes with the dogmas guiding the actions of certain technical communities for decades: the search for perfection “at any price”, the indisputable adherence of the “sacrosanct specifications” provided by the ordering party, etc.

On the contrary, if a product is being designed just to satisfy a need, then above all, this implies that you should systematically question this need, and discuss with the ordering party in “B to B” or marketing in “B to C”.

It is finally about changing the sensitivities and the behaviours of all those working in the company: increasing the awareness about the issue of cost control, developing customer empathy, etc. For such a transformation project, it is essential to work with a long term perspective and concurrently on the tools and methods, and on the organisation by creating teams or networks of experts.

Like in any change initiative, spreading the results achieved within the company is equally essential.

Leadership testimonials

Our CEO frequently reiterates that the ‘Design to Cost’ approach is a major priority for the company. We have realized that it does not just boil down to common sense, thus we have developed a set of processes & tools, and have put in place internal experts to support the programmes. We include our partners in these initiatives, with a “buy” part of 70% in our recurring costs. We are convinced that this is a long-term cultural transformation which cannot be limited to a series of swift and impactful actions. Only a “continuous” vision of Design to Cost embodied by dedicated skills can help leverage all the benefits of this approach.

**Design to Cost Manager
Aeronautical Sector**

Leadership testimonials

I organized meetings to present the initial Design to Cost projects to bring to light the teams and the results achieved. These presentations proved to be so convincing that they triggered a collective awareness: all the managers present wanted to launch Design to Cost projects. The enthusiasm was so unexpected that we had to limit and prioritize the efforts!

**CEO
Telecom Sector**



Tomorrow: new frontiers and
new solutions

1. Sector-specific extension

Although the 'Design to Cost' method has reached a stage of maturity within major companies in several industrial sectors, with the automotive sector being the preferred "methodological laboratory", let us not forget that today industry weighs less than 20% of GDP in countries like United States, France, UK or 25% for Germany or Japan.

As we mentioned in our introduction, two sectors in particular could benefit from a more systematic application of the Design to Cost method.

The Service sector: steering the design process, a true challenge.

The Service sector (from 70 to 80% of the GDP in most developed countries) has so far made little use of the 'Design to Cost' approach; this can be explained in particular by the low level of investments in research and development which characterize it (e.g. 15% of the total R&D expenditure in France against 80% for industry), hence less mature design processes and the related methods. There is a good probability that the development of new offers in the service sectors will become professionalized in the years to come, opening up new areas for 'Design to Cost'.

In reality, several players of the Service sector are industrial equipment users and would be well-advised to engage in the 'Design to Cost' initiatives of manufacturers, or to launch those initiatives. For all, including those who benefit from lower capital intensity and much greater flexibility in adjusting their offerings, it is still a major challenge to give up empiricism in order to integrate value for the customer better and quicker and to reduce costs. Trial and error in this area proves expensive and detrimental to their image.

Equipment and infrastructure projects: 'Design to Cost' as a commercial tool.

For reasons which arise from the difficulty of implementation, the 'Design to Cost' approach also has very limited presence in infrastructure projects of the Energy sector or the Construction and Public Works sector. Building costing databases from lessons learnt is trickier than it is for mass production activities launching new products frequently. As for Re-design to Cost, it is not applicable in cases of a single installation, and tricky for small production series considering its impact on non-recurring costs and on timelines.

The challenges are however considerable; there are numerous examples of deviations in the final cost of investments and installations compared to the initial targets: it is about integrating the "cost" parameter while breaking down the system requirements, refining the trade-offs between the design-related costs and the implementation costs, closely involving all the stakeholders in a concerted effort to achieving savings...

In this area, some trends are emerging nonetheless. In the Anglo-Saxon environment, Target Costing, for example, has been part of the public tendering rules for some years now.

Recently, a French SME that designs and manufactures industrial equipment announced that it had won a contract despite a submission price which should have disqualified it. It had proposed a joint Design to Cost approach to the client and the latter agreed to the proposal. The client gave them a few months extra time to jointly refine the "exact requirement" and to thus stay within the budget envelope.

2. Extending to up stream activities

After 'Redesign to Cost' for existing products, should 'Design to Cost' be considered for new products? How about 'Innovation to Cost'?

At a time when our business leaders no longer doubt the need for Innovation, particularly as soon as they face "Low Cost" competition, the question of the economic governance of an innovation, of its cost and of its medium/long-term impact on the results of the company needs to be addressed. Regardless of the degree of disruption that it involves, the User value / Cost ratio will always be a deciding factor to determine the likelihood of success of an innovation.

Once again, the automotive sector plays a pioneering role: far from a start-up whose future depends on a single innovation, the major companies of the sector are convinced that it is their ability to maintain a continuous flow of innovations which guarantees their sustainability; therefore, all of these companies have initiated major projects to structure resources and processes for innovation, in conjunction with the product development programmes (rather than doing this up stream) [please see "Réenchanter l'industrie par l'Innovation" (Revamping the industry through Innovation), Ch. Midler, R. Maniak, R. Beaume, Dunod 2012].

Therefore, they naturally focus on cost control and the overall value-creation of an innovation, beyond the direct impact on the first product which will integrate it. Advanced engineering entities are organized by functional product areas and no longer by the scientific discipline as in traditional research: going beyond the "Techno Push/Market Pull" vision, they drive the development of innovation by integrating the cost constraints.

3. Design to Cost and new business models?

The creation of new business models is a major area of innovation today, starting from the introduction of Pay-Per-Use contracts which are increasingly common from the aeronautical industry to companies organized in networks to form complex ecosystems with new methods of remuneration as is the case of the electric car.

How can the 'Design to Cost' approach address this new context? It should broaden the definition of its targets, which have traditionally been limited to recurring manufacturing costs, to integrate other components of the Life Cycle Cost: the running, maintenance and recycling costs. It should also extend its scope of analysis: if we take the example of the electric car again, it is not only about considering the manufacturing cost of the vehicle, but also the energy networks, the dedicated parking, battery replacement or the charging infrastructure...

Leadership testimonials

"Today, consumption of 2 to 3 litres per 100 KM for an average car is technically achievable in a production series at an additional cost of 3,000 to 4,000 Euros per vehicle. But this is still excessive for marketing."

**R&D Director
Automotive sector**

4.The impact of the "Digital Revolution"

Open Innovation

New technologies now offer solutions to some of the difficulties mentioned earlier, by facilitating networking between the key stakeholders of the ecosystem, as part of the Open Innovation approach. This opens up horizons beyond large organisations, like for Aztec – a small SME which manufactures snowcats – which designed a platform to interact with its end users, the drivers. This enabled the SME to redesign its products in record time with increased precision. It now has a place in a market which is dominated by two much larger historical manufacturers. "Electronic suggestion boxes" can easily be implemented. These collaborative zones enable, for example, collection, enhancement and summaries of the observations and suggestions of all the stakeholders of the value chain on a product (production operators, subcontractors, logisticians, sales personnel). Moreover, sophisticated electronic business intelligence platforms can scan the Web and provide rich and structured information to senior executives and their teams about markets or the technological innovations that affect them, such as the Exalead or Netvibes solutions of 'Dassault Systèmes'.

Digital Capabilities

However, the impact of the digital revolution in terms of innovation will essentially concern the design process, well beyond its contribution in terms of collaborative work or the ability to process large amounts of information. The massive development and deployment of Digital Capabilities will continue to radically change the products, their inclusion in the consumption chain and the consumption itself. It will also generate significant changes in the requirements, and multiple opportunities as much in terms of new value creation as in terms of reducing the total cost.

Leadership testimonials

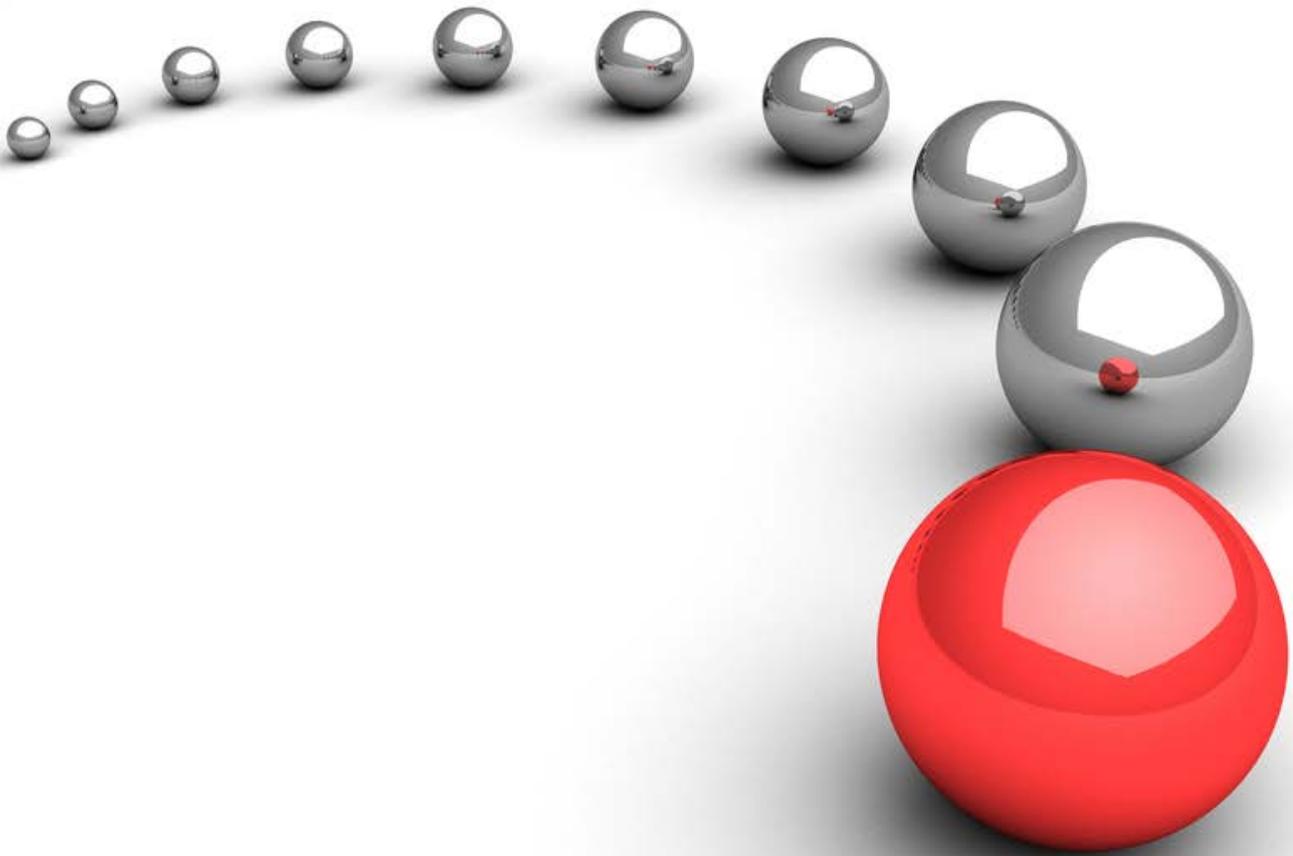
The Web generates great opportunities for us: it makes us feel that all the technologies and all the expertise of the world are within our reach. At the same time, this theoretically-accessible volume of information makes my head spin, or even makes me anxious. As a senior executive, I always wonder if I am not consequently losing out on a fantastic opportunity which is right under my nose.

**Technical Director
Automotive Sector**

Consequently, the teams in charge of a 'Design to Cost' process see a new range of opportunities opening up. However, it is essential that they seize the opportunities by consistently leveraging them to achieve their goals. It involves reviewing the potential impact of Digital Capabilities during each project.

How can we develop our product, our offering, its use, and its lifecycle? How could it be integrated differently in its environment and bring more value at a lower cost, taking into account the possibilities offered by:

- Connectivity,
- Positioning (geo-locating, RFID, NFC, etc.),
- Recognition (biometrics, RFID, NFC, etc.),
- New devices (tablets, etc.),
- Digitization of content,
- Electronic payment methods,
- Big data management,
- Or even "smart sensors".



Conclusion

At the point where the company's Value Proposition intersects with the extended Value Chain, the Design to Cost method can become a very powerful tool.

In a period which promises to be crucial for the industrial recovery in most developed countries, it will represent a major asset for leaders who will know how to integrate digital in their innovation and development processes.

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About Effidyn

Effidyn is a management consulting firm that aims to help its industrial clients to sustainably improve their competitiveness through Innovation and Product Development levers. The consultants of Effidyn, experts of the 'Design to Cost' and Lean Project Management methods, encourage knowledge transfer to the client teams as part of their approach.

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