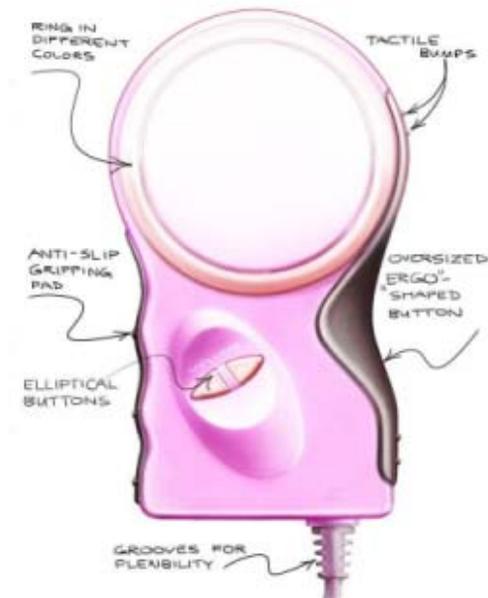


Using consultants for new product development: an emerging trend

By Paul Kurowski and Vlad Zila

Every product starts with a concept, which is then given its form, function and material. What separates the initial concept from a physical prototype ready for manufacturing is the Product Development Process (PDP). The Product Development and Product Manufacturing are two distinctly different activities that require different expertise and different organizational arrangements. While manufacturing can be pictured as a continuous process, the Product Development is intermittent. In this article we'll share a few thoughts on outsourcing of the development of new products. Please notice that the same rules will equally well apply to the development of new tooling.



So, to develop a new product you must go through a PDP. And you can't afford to take any shortcuts or else design flaws will make manufacturing unnecessarily expensive, impair product reliability and will eventually make your customers go away! The absolute must of coming up with the correct and verified design even before committing to a prototype is illustrated in qualitative terms by the cost of design change at different stages of product life (figure 1). At the same time, due to competitive pressure, new product must be developed fast. And last but not least it must not cost a fortune or else we'll have no money left to manufacture our product.

In summary, the Product Development Process must satisfy several contradictory requirements. By all means this list is not "all inclusive"; we invite readers to append it.

- Expertise in Product Development is needed and it is different from the expertise required to run manufacturing operations
- There is no room for errors; design flaws SHOULD be eliminated before committing to a prototype and MUST be eliminated before production starts
- The Product Development Process must be fast
- The Product Development Process must be cost efficient
- Time and cost pressures make it essential to reduce the number of prototyping iterations, preferably to just one for the final verification of the design

The above requirements call for the use of CAE (Computer Aided Engineering) tools: CAD for design quality and Simulation tools (most often the Finite Element Analysis) for simulation of product performance without using a prototype. The implementation of CAE helps streamlining the PDP by moving design iterations away from physical space of prototyping and testing to the virtual space of CAE tools (figure 2 and 3). But those expensive and complex CAE tools must be

expertly implemented. Users expertise or the lack of it makes all the difference between turning them into productivity tools or a sour liability.

Outsourcing the Product Development Process

Many companies do not have resources required to successfully execute the PDP within the above constrains. Companies running "lean operations" often find it more economical to contract out some or all of the PDP to specialized consulting firms. This trend is on a rise in present economy. Contracting out the PDP can be done in different ways. We we'll briefly describe several "modes of interaction" in which a company may wish to work with an outside Product Development firm we'll call here a consultant:

Contracting out all Product Development activities

The consultant becomes company's "R&D Department". This requires established relations and is best done for long term projects allowing the consultant to acquire an in depths knowledge of product.

Contracting out "overload"

The consultant picks up the overload helping to "average out" peak loads. The company still maintains the PDP expertise and necessary CAE tools but at a significantly lower, economically justified level.

Exploiting know-how not available inside of the company

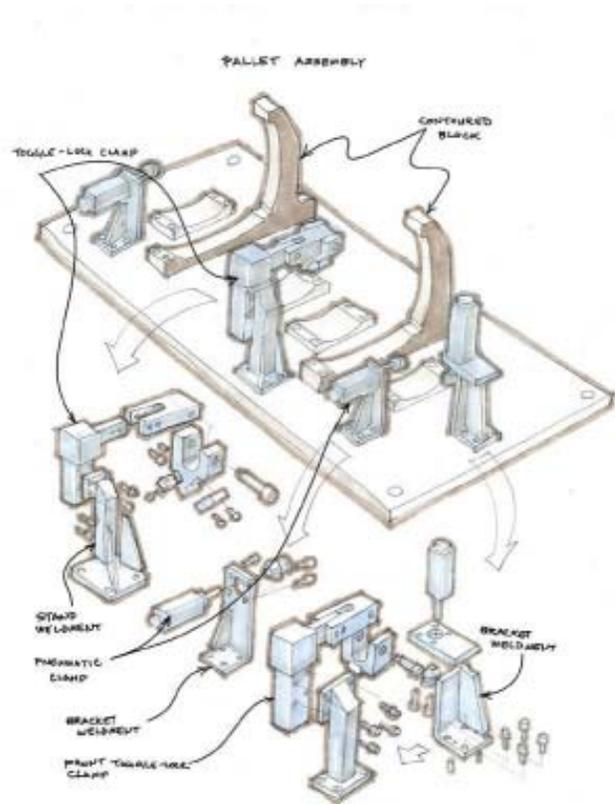
Certain expertise does not exist inside the company and has to be brought from the outside. The company is using the consultant to come-up with fresh ideas and innovative solutions. The R&D team gradually acquires consultant's expertise during the process or the consultant remains the source of new ideas for future projects.

"Fast-track" projects

The company can have the expertise, but consultant can deliver the solution in much shorter time. Outside consultant is not part of a large corporate structure characterized by substantial "inertia".

Using consultant expertise to customize CAE tools

CAE tools come with all options and capabilities needed for developing just about any product: from toys to space vehicles. However, the best productivity gains can be obtained if CAE tools, in particular CAD, are customized for the best performance in particular application. This



customization requires specialized expertise and is ideally suited for contracting. CAD customization can be with tools like e.g. Pro/Toolkit and Javalink.



Using consultant for customized, product specific software training

Training courses that are purely software specific do little to advance user's productivity. The best gains are realized with customized, product specific training often combined with software customization. Training focuses on understanding software tools and implementations and is not limited to what button to push in order to invoke the desired action.

Buying software from consultant who actually uses it as a productivity tool

Consultants who are also software re-sellers of CAD and FEA software hold the advantage of "hands-on" practical experience and can provide software support with full understanding of the implementation issues. For this reason many companies prefer to buy CAE software from those re-seller who typically also provide consulting services.

What is the most efficient manner of communicating with consultant?

By definition a consultant is not part of company organization and so proper communication links must be established. This may depend on the preferred mode of interaction between company and consultant, but must address the following questions

- What medium is used to exchange information?
- Is e-mail good enough?
- How important is the geographical distance?
- How do you want to receive information?

In the Internet era it may be tempting to say that consultant can be just about anywhere and all information can be exchanged electronically. However, the PDP also has its "intangible" side requiring personal communication. It is very difficult to contract out the PDP using strictly "hands-off" approach. Personal contacts are important especially in the project definition phase. While Internet can be used for routine exchange of data (fast link is essential) it can't completely replace personal communication. For practical reasons, the consultant should be at least in the same geographical area, within a couple hours drive at most. The best format for information exchange is using actual CAD files if company maintains at least one seat of CAD. If not, formats like html, vrml or any of MS Office applications standards can still be used.

Some guidelines of what to do and not to do

Problems if any, most often arise from an inadequate communication BEFORE project starts. That leads to different expectations on the side of company and consultant. Even when working with very tight deadlines, both parties must do their homework prior to starting the actual work.

Another important issue is to clearly define the development scope, goals, performance targets, responsibilities and deliverables, since changing the design criteria over the course of development happens quite frequently. Any such a change obviously affects development schedules and budgets and has to be dealt with by renegotiating the terms of the agreement; otherwise expectations and deliverables might start to diverge.

Perhaps the most important issues, especially for smaller companies and startup enterprises, are:

- What details should company initially supply to consultant?
- Who is responsible for different areas of PDP?
- What payment schedules are practical?

Companies often request quotes based on hourly rates and select consultant offering the cheapest rate. However, the lowest quote is not necessarily the best, in fact it seldom is the best. While selecting a consultant one must consider the level of expertise, efficiency and turn around time.

It may be helpful for both parties, especially if this is their "first contact" to split the quote into phases like:

Initial development (Conceptual or feasibility study) - quoted for a fixed price or price range

Detailed engineering development - usually based on time and material basis, because of the variable nature. This is the core of the whole development process and its result is a complete prototype or pre-production documentation and CAD data to build physical prototypes.

Production documentation and project transfer - quoted for a fixed price. Final stage with completed manufacturing drawings (including tolerances, surface finishes, assembly process sheets etc.), project report and instructional meetings with persons who will integrate the project data into company-wide information systems.

The initial development phase will assure that all project details will be provided to consultant, consultant will develop a feel for the extend of project and company will appreciate consultant's capabilities. Hourly rates used in the second phase are easier to interpret in terms of value provided to company. The third phase is intended to complete the work and transfer all acquired know-how to the client.

Not all three phases have to be defined at the beginning of project. Sometimes it is wiser to take one-at-the-time approach and define the next phase upon finishing the previous. This approach has one more benefit - any party can decide not to proceed without resorting to disputes about walkout conditions.

Conclusions

Consulting services should be looked at from the investment perspective, rather than as additional expense. Consultant is in essence a problem solver who, having a specific expertise can come up with a solution outside of corporate "box" without being burdened by traditional thinking patterns. Perhaps the most valuable contribution lies in knowledge transfer between different industry segments - this cross-pollination of ideas across information "tunnels" existing paradoxically within companies, by necessity, focused on solving day-to-day problems. This way consultant delivers what is our primary role - assisting in building better and less expensive products introduced to market faster.

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About Genexis Design Inc.

Genexis Design Inc. is a product development company with proven track record in office furniture, automotive, semiconductor, agricultural equipment and consumer product industries. Genexis Design Inc. has several patents from furniture and other industries. Genexis Design Inc has the highest level of certification from the PTC (Certified Engineering Provider from the Parametric Technology Corporation) in Pro/ENGINEER and Pro/Mechanica software. We also provide all level training in Pro/ENGINEER and Pro/Mechanica as well a non-software specific seminars in the Finite Element Analysis. We are member of Professional Engineers of Ontario.