

Tech-Clarity

making the value of technology clear

Tech-Clarity Insight: Engineering's Role in Surviving a Down Economy

*Designing Profitability through an
Economic Downturn*



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Executive Overview

Many manufacturers are feeling the impact of the global economic downturn. They are seeing already competitive, global markets tighten up and customer demand slipping. Revenues are falling, price points are weakening, and profits are sliding. To make matters worse, many Engineering departments are dealing with budget cuts, headcount freezes, early retirements, or even workforce reductions while still trying to develop the right products to keep the company competitive. Unfortunately, many of the product development challenges and inefficiencies they were already facing are brought further to the forefront as design capacity drops.

Despite the urge to throw up their hands and give up, it is important for Engineering to recognize the role that they can play in keeping their company financially healthy in troubled economic times. There will surely be challenges and significant difficulty for many, particularly for those companies that must reduce the size of their workforce. Today, survival requires a combination of strategies and enabling technologies to help keep the business alive during the downturn, and ensure that it is in decent – if not very good – shape to take advantage of the eventual market turnaround.

This paper is intended to provide guidance and insight to Engineers and Engineering Management as they develop their strategies for surviving the economic winter and preparing for the economic spring that will surely follow. These strategies include:

- Pursuing product excellence to help sales hold the top line
- Implementing cost control to compete and save shrinking margins
- Investing for the future by continuing research and development and enhancing engineering capabilities

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Engineering software solutions, including “digital prototyping” solutions, are proving to be an enabler for all of these strategies. This paper reviews the experiences of several companies that have leveraged their engineering software solutions to help survive hard times and capitalize on recoveries. One encouraging finding is that, in many cases, companies already have the software in place or available to support these strategies.

By leveraging the right strategies and enabling technologies, engineers can play an active role in sustaining company performance in the downturn and coming out of these troubling times ready to fight another day in what will surely emerge as more fertile, but still fiercely competitive, global markets.

Holding the Top Line

As consumer confidence and credit have weakened spending, a ripple effect has impacted the manufacturing industries. As product demand slips, a critical first step is to keep money flowing into the business. There is less business available to win, and competitors are hungry too. Manufacturers are now competing for a higher share of a smaller market just to keep from losing ground. Now is the time for Engineering to partner with Sales to help drive short-term wins, a key component of the strategy to “survive today.”

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Engineering can help sales in the down economy by directly energizing sales and exciting customers. Dave Smith, Director of Engineering for Unverferth Manufacturing Company explains “*Engineering is the busiest when things are down, because Sales bombards us with things they need to generate a sale.*” One approach to arm sales is by providing customer-centered product enhancements or customizations to help win deals. Jim Berkebile, Vice President of New Product Development at Genmar Yacht Group highlights the importance of this strategy to their business; “*We are focusing on unique customer requests. Anything that may lead to selling three or four boats could have a pretty dramatic impact on the company.*” A small customization or minor enhancements to a product might be just the edge that Sales needs to win hard-fought deals.

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Richard Schulz, Managing Director, Adept Airmotive

Sometimes companies can support Sales without changing the product at all, but by supporting the selling process itself. Being very agile and turning bids around quickly by leveraging existing design data makes companies look good. The publishing and visualization capabilities of today’s engineering software suites can help develop compelling bid packages that will excite customers. Mr. Berkebile explains how his company can look bigger than life; “*We get a lot of leverage from our 3D CAD models, so one person can now pick up and use the work of others and put together a world class presentation like we did with our full design staff,*” he explained. By leveraging existing design models, Genmar Yacht can develop appealing digital prototypes with rapid revisions to share with customers and Sales, leveraging visualization technology for collaboration but also to help close new sales. Richard Schulz, Managing Director of Adept Airmotive explains the power of showing off 3D models; “*We like digital prototyping because it looks so darn good. Generating interest in our products is a less recognized advantage of 3D design.*”

Of course nothing beats new products to generate customer enthusiasm. Even though many companies have cut back on new product development budgets, it is still important to be able to show new product innovation. But limited R&D throughput means companies have to get the most out of their engineering investments. Now more than ever it is critical to validate product concepts early in the product lifecycle before investing significant engineering resources. *“We are using visualization to get interaction between Engineering and Sales, it’s fantastic,”* says Dave Smith of Unverferth. *“We can get more people involved in the design process by presenting ideas to sales people by sending them a 3D model and they are able to view, move, and rotate without learning a CAD tool.”*

Delivering Customer Value at Reduced Cost

Protecting the top line is important, but companies also have to protect margins as price pressure and competition impact selling prices. Even if your market isn’t experiencing price pressure, you can offer another competitive weapon to Sales by trimming cost. Engineering can help by giving them the flexibility to win competitive deals without sacrificing profit margins by reducing product and manufacturing costs. Product cost reduction is a sustainable advantage because you can carry it beyond the downturn, providing greater value than reducing headcount – because with headcount you lose engineering knowledge. Many manufacturers have already started this process because of global competition, which is serving them well in the downturn. *“We put ourselves in a position to compete in a global market, we saw that need five or six years ago. It’s a good thing for us, because we are still here,”* says Jim Berkebille of Genmar Yacht.

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One of the primary sources of cost savings is reduction in material cost, particularly in recent times as commodity prices have been volatile. Richard Schulz of Adept Airmotive explains *“Cost control is critical; we have been reducing material usage by making sure less material is tooled away during the machining process by optimizing our designs through simulation.”* Reducing cost is important, but companies can’t afford to sacrifice quality or customer experience. Electronically analyzing stress, strain, plastics flow, fluids, heat transfer and dynamic simulation all help engineers create designs that are optimized for quality and cost. Dave Smith of Unverferth explains, *“The competition constantly keeps you working on cost. The toughest part of our job is balancing quality with cost. We can’t afford to overdesign our farm equipment to be like a piece of construction equipment. We need to make sure the product is structurally sound with the least amount of material, so we use simulation and visualization to make sure the product will get the job done, and validate that early.”*

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Beyond material cost, companies can turn to Engineering to help reduce manufacturing and tooling costs. These direct costs can be an important element in any cost reduction effort. Richard Schulz of Adept Airmotive describes their approach: *“When we design a virtual component we make sure it is one that will work, but also one that can be manufactured efficiently. It has to be made with tooling that is not expensive, and use processes that are readily available. Using digital prototyping, we can go from a design to a virtual prototype of tools and production all the way to developing hard and soft tooling. We use design data to create rapid prototyping molds to create components, it saves a lot on the downstream side.”*

Taking this approach means investing the time up front to design products and manufacturing processes right. Engineering can develop digital prototypes of both the product and the manufacturing tooling, and validate it in advance. *“We are looking for less overall cost in the product, so we take a broader view than the department,”* Dave Smith of Unverferth explains, *“We will accept extra cost in engineering if it saves money downstream.”* Analysis tools as a part of a digital prototyping solution can help companies reduce cost without sacrificing quality, allowing them to optimize the value they deliver to their customers.

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Running a Lean Organization (as if you had a choice)

Hopefully bolstering the top line and product cost reduction will be sufficient for most companies. But running lean is the mandate for most businesses today, particularly manufacturers. Whether it is hiring freezes, mandatory retirement, reduced use of contractors, or reduction in force, companies need more productivity from fewer people. Unfortunately, despite the fact that reductions in force result in reduced design capacity and loss of company knowledge, some companies have found it necessary to reduce staffing. Fortunately, design and analysis tools help allow companies to run lean, and give those that are left doing more with less a fighting change. *“Over last year, our industry has had pretty substantial cutbacks,”* said Jim Berkebille of Genmar Yacht Group. *“Without 3D assets our response time to customer requests would be much too slow, it’s a tremendous asset right now.”*

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Not all company downturns are based on the general economy. Adept Airmotive experienced a lack of funding early in the project. Richard Schulz explained the benefits they enjoy today because they put in place engineering software technology to improve their efficiency during the tough times. *“Previously, lack of funding meant we had to cut back, we leaned out early when others were doing well. We have been innovative as a company early and started using virtual technology, rapid prototyping, and digital prototyping. The use of digital prototyping gives you a cushion against boom and bust.”*

The use of design prototyping technology helps companies engineer efficiently by giving them the tools they need to get the most out of their design efforts. One of the best ways to improve efficiency is to do things right the first time, which reduces both time to market and the effort needed to rework designs. Testing ideas, concepts, and designs in a virtual environment can greatly enhance the chances that companies get their designs right, and do so in less time and with lower total cost. Jim Berkebile explained the use of 3D models to make fiberglass tooling. He said that the most important thing is how fiberglass parts come together and how they fit. *“We have transitioned from holding our breath when go to put them together to pretty confident that it would work. Over last 5 years, we have really been able to make a difference with virtual prototyping, it is helping to make a better product instead of seeing problems at the end and rushing around to try to fix it.”*

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Jim Berkebile, VP of NPD, Genmar Yacht Group

Last minute changes can play havoc on deadlines, quality, and efficiency. To avoid this, many companies build multiple iterations of physical prototypes to validate their design work. Unfortunately, physical prototypes are very expensive in regards to time and money. Many companies, including Unverferth, have tried to reduce physical prototypes and turn to validation in a virtual environment. *“A digital prototype is much easier to manipulate than the actual iron,”* Dave Smith laughs. *“The big advantage is seeing your 3D, and the movement you can create helps you do a much better job of interference checking. Things like that make a big difference, we can evaluate options more quickly, build fewer prototypes, and make a lot fewer mistakes so we have fewer reworks.”* Lean organizations can leverage digital prototyping to get it right the first time, designing better products in less time without the need for expensive physical prototypes.

Keeping an Optimistic Eye towards the Future

While companies need to address the realities of the economy to survive in the short term, they have to be careful not to be too short-sighted. Although the recovery may seem far off for some, companies that simply survive the bad times may find themselves irrelevant to the recovering market. Manufacturers must continue to develop products that they can leverage when the market recovers. As demand picks up, those that have new products ready will gain the lion's share of the market. Adept Airmotive explains how they were able to keep strategic design moving forward during tough economic times. *“Earlier in the life of the engine project, our investor in the start-up company pulled out. We had a pre-production prototype and the feedback from the market was good. But, the economic climate was tricky, and it took some time bring in a private equity company and establish Adept Airmotive. But we managed to keep the core design team employed during the down time. We adopted a design philosophy of 3D, rapid prototyping and digital prototyping, which was the single most significant decision that enabled us to become what we are today.”*

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Adept did more than develop products during the tough times, they also invested in developing advanced design capabilities. They took the opportunity to develop efficient processes that would help them prepare now for the busy times ahead when the market is strong. Companies that invest in making things more efficient for today, but also for the future with templates, standards, design libraries, or other productivity tools will not only survive today, but also be ready when the market comes back. *“Our philosophy is to be ready,”* said Richard Schulz. *“We are currently testing and we can demonstrate capabilities today. We plan for market penetration 12-18 months out, and feel the economy will be turning around then. We will be ready.”* Dave Smith shared a similar story and the impact that being unprepared had on their competition; *“Today, we are doing well because we operate in a counter-cycle. During the last down cycle, our 2D competitors were being weeded out because they weren't efficient enough to keep up.”*

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Engineering software played a key role in helping these companies make it through their difficult periods, and came out of their downturns prepared to compete. Manufacturers can leverage software solutions to help improve the performance of most of their Engineering functions. Many companies already have the tools in house, and those that take the down time as an opportunity to improve will help themselves compete today and in the future. Engineers can turn to software tools and automation for a host of functions, including improved mechanical or electrical design, better development of control software, earlier analysis and validation of designs, streamlined development of manufacturing documentation, enhanced design of molds, tooling, or packaging, enhanced manufacturing process planning, and better release and change management among others. The opportunities are there, but Engineering leadership must choose to invest during a difficult time instead of following their urge to hunker down and wait out the storm.

Conclusion

Times are tough, but Engineering can make a difference. Engineering has the ability to help pursue product excellence, reduce product cost, and invest in the future. These strategies can include helping sales bolster the top line, reducing material costs, stripping out manufacturing cost, increasing engineering efficiency, continuing research and development and getting ready to take advantage of the recovery when it happens. There is a lot to be done simply to survive the day, but companies that do not keep an eye towards the future will find that they emerge from the darkness of this down-cycle only to find their competitors reaping the rewards of the new market opportunities. Companies need to adopt the appropriate strategies and support them with the right engineering software to remain competitive. Jim Berkebile of Genmar Yacht Group sums up the importance that engineering software plays in supporting these strategies; *“The key is that if you don’t have digital prototyping, you had better get on it right now. It will help survival in tough times, and when good times come back, it will enhance them.”*

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Richard Schulz from Adept Airmotive puts a sharper point on it. *“Without digital prototyping, we would not be in business – it’s as simple as that. We would not have had the resources to bring the engine to the current state of development. We have the advantage now, we have proven ourselves to the skeptics and we are in a strong position to bring in investment. But without digital prototyping, we would have been ‘toast’.”*

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Recommendations

- Keep bringing new products to market, including minor enhancements that provide a large visual impact but require less engineering resources
- Investigate offering product customization to enhance sales
- Use visualization to support the sales process and develop compelling product marketing
- Use simulation to reduce product cost while maintaining quality and customer experience
- Get the most from lean resources by reducing rework and physical prototypes
- Leverage design knowledge in existing models for new products, enhancements, and compelling, visual marketing materials
- Don't lose focus on the future, rationalize the portfolio, but keep the product pipeline moving to capitalize on the upturn
- Invest in new capabilities in addition to new products, implement enhanced design processes and tools to prepare for the future
- Investigate the ability to extend the use of existing engineering software enablers to adopt strategies to survive the economic downturn and thrive in the eventual recovery

About the Author

Jim Brown is the President and founder of Tech-Clarity, an independent research and consulting firm that specializes in exposing the true business value of software technology and services. Jim has over 20 years of experience in application software for the manufacturing industries, with a broad background including roles in industry, management consulting, the software industry and research spanning enterprise applications such as Digital Prototyping, PLM, ERP, SCM and others.

Jim is an experienced researcher, author and public speaker and enjoys the opportunity to speak at conferences or anywhere that he can engage with people that are passionate about improving business performance through software technology.

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