



# HIGH-TECH BENCHMARKING

Are you behind the curve, or in front of it?



**T**he demand for innovation is high in a global economy where keeping ahead of your competition is vital and preventing market share loss is a constant struggle. So, how can you peer out into the ocean of the market, to not only honestly assess where you are currently, but also to navigate the coming storm? You must use state-of-the-art benchmarking. Vague market studies and simple tag-and-bag benchmarking is not enough to map your position and future course. A new world of analyzing techniques is generating the metrics that new market leaders are using to stay on



the crest of the next wave instead of being crushed in its wake.

The routine of regular manufacturing has a familiarity to the practitioner who tows the corporate line and stays in step. For most at the middle management level, the idea is to chart a safe course and avoid upsetting captains (executives).

However, the captains of the ship are constantly looking for more gold or a larger bounty from the journey and rely on accurate information from their people in order to make course corrections and strategically plan the future of the company.

Benchmarking is one of many indicators of course direction for a manufacturer. In today's fast

expected at most primes or OEMs in business today. If you are not accomplishing this currently, then it is time to get your ship in order.

However, many companies have figured out that there is a lot of other factors that this level of benchmarking does not cover that could be a secret weapon should they possess knowledge/data their competitors lack.

So, let's break it down into sectors or gaps that companies may or may not be addressing:

#### Internal Mandates Expectations:

- What level of accuracy do you normally expect your team to provide from your internal bench-

“...when you can measure what you are speaking about, and **express it in numbers**, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind...”

— Lord Kelvin

paced technological environment, knowing where you stand next to your competitor is vital and the regular standards of comparison are not enough anymore.

Most benchmarking exercises comprise merely of disassembling a product, taking pictures and/or collecting dimensions, organizing the parts, tagging them to make a bill of materials, weighing them and, if they encounter an unusual material or material application, then some FEA is carried out to see if something comparable should be used by them in a future product line. Currently, this is what is

marking efforts?

- What level of depth does your project demand?
  - Are you just meeting the minimum?
- Do you know or actively investigate the level of benchmarking your competitors use and which metrics they track?

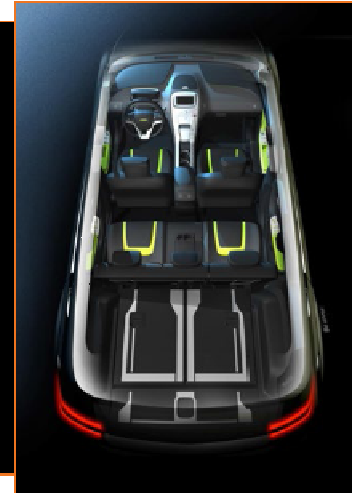
#### Supply Chain:

- Is your supply chain a consistent producer of on-time quality parts, or is it disorganized, causing you warranty costs and delays?
- Are your competitors using the same suppliers



## PRIUS/CHEVY VOLT TEARDOWN

Munro did a teardown on the Prius and Chevy Volt to examine the electronic modules from a technological and supply chain perspective. Lots of interesting information came out of these studies, including differences in electricity storage technologies (Ni Metal Hydride – Prius vs. Lithium Ion Polymer – Volt); cooling systems (Volt liquid cooling vs. Prius air-cooled); and, what that means for the consumer. In this case, it shows that Lithium ion polymer is much more energy dense, which means more miles per kilowatt-hour (in fact, almost four times the distance in pure battery mode versus the Prius).



in their supply chain and, if so, do they get equal and similar product delivery timing, cost, and quality?

- Are your competitors' supply chains superior to yours in production quality, price, and delivery?

### Costing:

- What costing systems do you have in place to understand the gaps between you and your competitors' product? How accurate is your process?
- Do you use blanket-costing techniques that do not capture unique processes, parts, or in general, activity-based costing?
- Are you often surprised by the gap between predicted cost and actual cost of your product lines?

### Manufacturability:

- Does your design create ergonomic issues on the manufacturing floor that cause production slow-down and high workers compensation and disability costs?
- Is your manufacturing technology up to par? Do you need to invest in new machines, tooling, or equipment? Is your current infrastructure hold-

ing your production volumes back, creating inefficiencies, or resulting in quality and manufacturability challenges?

- How manufacturable is your product? How manufacturable are your competition's products? Do you have an accurate methodology for confirming these assumptions?
- Is your manufacturing process optimized, or are you creating waste on the manufacturing floor?
- Does your design meet a level 10 MRL (defense) and, if so, what checks and balances did you use internally or externally to audit this?

### Sustainability, Energy, and Pollutants:

- Have you ever audited your factories for energy efficiency? Do you know where your energy costs are attributed?
- Are your energy costs too high? Could you reduce them by changing consumption habits or updating/changing infrastructure?
- Do you understand your carbon and waste production and emissions? Is it this causing you tax penalties (in the states or countries in which this is a penalized item) or excessive waste removal or storage costs?



- Does your product consume too much energy? Can it be redesigned in order to be more efficient?

**Quality:**

- Are you aware of the Cost of Quality of your competitors' products?
- Do you accurately track the Cost of Quality that is designed into your new or existing product designs or product lines?
- Do you employ lean and Poke Yoke systems in your manufacturing process?
- Do you have predictive Cost of Quality tools that identify costs in the concept and design phase before these costs are realized on the manufacturing floor?
- How do you measure costs?

**Market Share, Price, and Understanding Your Consumer Base:**

- Is your company a market leader or are you trailing behind your competition?
- Is your product priced correctly for the individual markets, and are you happy with your profit margins?
- Are your competitors beating you on saleable

features?

- Are your competition's products more reliable in action in the market place than yours?
- Are you meeting your customer's needs?

If you cannot answer these questions completely and accurately, you are steering your ship into uncharted waters on a daily basis.

Some might argue that some of these metrics cannot be captured or that tools do not exist in the market place in order to accomplish this type of evaluation. That is nonsense, as there are a number of services and tools available in any market that can provide the metrics mentioned above. In many manufacturing companies, the crew and their captain are either unaware that there is a lurking iceberg ahead, or know the ship is taking on water, but are unsure how to bail it out quick enough.

Benchmarking should be both a proactive and an active solution to these problems, illuminating issues and pointing to solutions, as well as proactively helping to steer the course of the company. To do this, you need systems that provide honest and accurate metrics.

One of the tools available is the software Design Profit. Design Profit allows customers to accurately map their manufacturing processes, including all

individual parts, weight, dimensions, materials,



Accurately mapping your manufacturing processes. People looking to advance their benchmarking, and innovation/new product development activities, should not be restricted to their own manufacturing sector. Design Profit processes can help keep you ahead of the competition.



material modifications (in-process, such as e-coat or forging, etc.), assembly processes, manufacturing cells and flow, packaging, time, labor, ergonomic metrics and issues, costing formulas, energy, sustainability data, and the ability to track custom metrics or add custom formulas to the map. After generating this map, all parties have a very good understand of their entire system (from raw material to shipping the finished product out the door). From there, they can identify quality, ergonomics, manufacturing problems, timing and cost overruns, as well as the cause for them in specific areas.

The Quality Report Card Tool inside of Design Profit allows the customer to identify Sigma and, more importantly, accurate Costs of Quality or what is known as Q burden, which can be supplied as early as the new design/concept phase of engineering. It should be also noted that this tool, aside from being more accurate, is significantly faster than current Six Sigma tools or quality prediction models.

Defense industry customers will understand and appreciate that manufacturing readiness level (MRL) is a vital part of your auditing and funding process. The MRL tool in Design Profit provides a special advantage in your search to remain compliant and receive funding, as it is cross-team functional. The tool goes into more compliance depth than traditional tools, allowing the team to identify individual parts or systems with individual MRL levels, immediately allowing the team to identify causes for concern, areas that need to be redesigned, or bottlenecks to be resolved.

However, "What about the competition" you ask. After you have properly taken stock of your own ship, you can now apply similar tools to the competition. If a barrier to your benchmarking efforts is budget, you do not have to break the bank and tear

apart absolutely everything. Just start small.

Some examples of benchmarking studies could include any of the following:

- Small systems or subassemblies
- Large systems or subassemblies
- Whole products (even as complicated as an airplane)
- Multiple product lines or variants (internally and externally)
- Best of Best in group – all competitors vehicles, products, or parts are examined and the best aspects of each are chosen to improve upon in the company's next design
- Costing audits of parts, processes, or whole products
- Energy audits of a system, plant(s), or a product
- Technology analysis of a part, subassembly, or full product
- Market studies looking at customer demand and preference
- Profitability studies to see if you are under- or over-pricing yourself in the market and whether your gains are comparable, or whether you are bleeding on every sale

### **Benchmark Outside of Your Industry**






Often the best source for innovation comes from outside of the industry. People looking to advance their benchmarking, and innovation/new product development activities, should not be restricted to their own manufacturing sector. Many innovations come from technology cross-pollination from other industries. Quite literally, you can compare apples to oranges. Why not make a hybrid with the best of both worlds? This has led to customers not only winning awards, but also dominating their market. Here is a checklist for those wishing to be successful



## REDUCING EMISSIONS OF GREENHOUSE GASES

FEV Inc. contracted Munro to help benchmark existing and leading edge technologies for a study the EPA was conducting to determine direct manufacturing costs for various advanced light-duty vehicle technologies for reducing future emissions of greenhouse gases in the future. This study included mass reduction, cost analysis, valve train, transmission, and hybrid electric vehicle (HEV) technologies.

For more information, check out these links to the studies:

- Light-Duty Technology Cost Analysis Pilot Study 
- Light-Duty Technology Cost Analysis, Report on Additional Transmission, Mild Hybrid, and Valvetrain Technology Case Studies 
- Light-duty Technology Cost Analysis – Report on Additional Case Studies 
- Light-Duty Technology Cost Analysis, Power-Split and P2 HEV 
- FEV Inc. Report 'Light Duty Technology Cost Analysis, Power Split and P2 Hybrid Electric Vehicle Case Studies' 

in their benchmarking efforts:

- Understand function/performance and market demand of both yours and your competitors' products from the consumer's perspective.
- Understand both yours and your competitors' manufacturing process.
- Have accurate ways to obtain costing metrics from a part, labor, and manufacturability perspective.
- Understand your operational efficiencies and deficiencies, including flow, capacity, technology, and energy consumption.
- Understand ergonomic ramifications of your designs and manufacturing process.
- Identify and understand the strengths and weakness of your supply chain, as well as that of your competition.
- Have objective MRL tools/criteria to judge MRL levels and avoid over-confidence errors.
- Try benchmarking outside of your own industry as a means of finding innovation.
- Be honest in regards to your and your competitors' abilities, strengths, and weaknesses.

If you are not studying or acquiring these metrics, then now is the time to start. Be aware that you should consider changing internal directives, processes, and focus, as well as use external sources or tools in order to gain a sense of where you truly stand compared to your opponent.

Perhaps, the famous Chinese General Sun Tzu put it best when he said, "...if you know others and know yourself, you will not be imperiled in a hundred battles; if you do not know others but know yourself, you win one and lose one; if you do not know others and do not know yourself, you will be imperiled in every single battle." **AM**



**Munro & Associates**

