Global DFA Initiative

DFA Breaks into The Global DE Community

By

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Abstract

There was an opportunity that developed when two of Motorola's divisions merged creating one Global organization. The opportunity was the Design for Assembly (DFA) initiative where we formed a Global DFA Team comprised of key manufacturing experts from Motorola's global design centers around the world (Mexico, Israel, NY, Penang, Schaumburg, and Plantation). The team charter was to review and understand each of the sites DFA process, learn from each other and determine a Best in Class process that can easily be shared and is a value added process. The team quickly established that the common thread within each of the different methodologies was the BDI DFA software. While everyone was using the tool, each site had a different way of applying it to their process. The team agreed that the BDI DFA software would be the central focal point for the new global process. The next steps were to take the other key pieces of the DFA process and build a solid foundation around the BDI tool. The team decided to redeploy the use of a common DFA guideline as a vehicle to establish design risks. With all the pieces in place the next step was to get aligned with the DE communities across the globe. So the DFA Global team embarked on a world tour to provide each of the DE teams with the new DFA process and show how it can help them with their designs and reduce parts.

In conclusion, the Global DFA Initiative team was able to show each of the Design Engineering's sites's the effectiveness BDI DFA tool as being the center piece of the development process was a key to the success of the overall product launch.

Introduction

The challenge the Global team faced was introducing the Design community to the DFA process and getting them aligned and in full agreement that it was useful and beneficial. So the question we posed to each of the DE teams was how often someone has asked you, “How good are our designs?” Or more often enough, “How good are our competitor designs?” Of course the most challenging question to answer, “How do our designs compare against our competitors?” Performing a DFA review using the Boothroyd Dewhurst DFA software can give a unique comparison of any two or more products using the DFA Index as a scoring guide. The DFA Index easily answers those questions. However, when you are asked, “Are our designs best in class?” the answer becomes a little more difficult. The calculation of the DFA Index will give you a distinct and clear evaluation of current products.

Our team was tasked with showing the DE communities how the use the DFA index as a key measure of the overall design. This information would be used to determine if we have a best in class DFA design. Our mission was to educate the Design community on the DFA process and how the DFA index can help measure their products designs.

Once the team was assigned this undertaking, we had to identify how we were going to show the effectiveness of the DFA index and how it can measure the overall design. The challenge was to determine and prove to the DE communities that the DFA index can be a measure of effectiveness to them. Our next task was to identify a straightforward means of showing how we can accomplish this task. Finally after capturing this data, we needed to identify the type of metrics that we now could generate to show how good our designs. So we developed a *DFA Index Family Range*.

Define the team's goals

Identify Metrics to identify a best in class product design.
Compile output metric source data (BDI DFA) into an open format
Share this data with our Design and Manufacturing Teams
Categorize metrics to determine best in class designs

How to capture the data and establish the metrics

The ultimate goal of Design for Assembly is a tool to help establish a product design with the least amount parts and labor. There are also numerous additional benefits of a good DFA process, but we will not go into those in this paper. The Boothroyd Dewhurst DFA software guides us through the process of reducing parts and identifying our labor challenges. After reviewing a number of different options, our team decision was made as to not generate another type document to burden our engineering staff. Since we were already using the BDI DFA software and it is the focal point of our DFA driven platform, the team chooses to use the DFA index as the key measure that is available to all BDI DFA users. This was an easy decision for the team to make, as the BDI DFA software is the cornerstone of our DFA process and is used by all of our manufacturing engineers. This is something readily available, the engineers are already very familiar with it, and it was easy and show to the DE communities. As part of our DFA process, the DFA Index Family range would help in showing Design engineering how their designs are best in class.

So our first and second goals were accomplished:

- Data driven evaluations will be used to generate our metrics.
- Use the BDI DFA Index measure to collect our metric data.

Identifying the *DFA Index Family Range*

The next step in our process was to establish comparable points between our current products design DFA Index scores and our *DFA Index Family Range*. We wanted to establish direct points of reference between the "Product Families" and the "New Products being developed". This would help identify how close our products designs are to our best in class goal.

After much consideration, we choose to keep the data input simple but at the same time we wanted it to be very precise. The DFA Index Family Range was the data associated with the specific product families DFA index. What we decided to do was take a product family (which could be as many as 1 -5 products) and correlate the DFA index for each of the products within that family and established a range for that family (low and high index). The family range would be used to evaluate the new product design and help determine we are getting better with our designs.

Identifying New or Re-used Parts or Processes

To the commercial, retail and consumer world, "New is better". To the Manufacturing world, new is not necessarily better. We would like to be able to re-use most, if not all parts and processes, for any new design. Most of the products we conceive are revolutionary by design. All of our products are all unique. Even when we are designing "the next generation" of a specific family of products, these products are mostly designed with the intention of being new and distinctive, thus enhancing the customer's purchasing experience. Therefore most of the parts we use are exclusive to that one particular product.

We wanted to know what the amount of significant parts of a product that are being used that are a "New" part or if they are a "Re-used" part. Part of our DFA process is to not to introduce new parts or processes, *if possible*. New and

unknown parts and process require a significant amount of engineering support while developing to become user friendly before entering them into the manufacturing environment. Everything from design time and tooling to new part logistics (qualifying a Supplier, purchasing material, stocking, etc…) take valuable resources. New process development also requires precious time and effort to develop.

Compile output metric source data (BDI DFA Index) into Family Range

The team decided to create the "Product DFA Index Family Range Summary Sheet' report to maintain the data on the various products. This report would then allow the user to show comparison of their current work and how they are doing to the older products. The following is a sample of the DFA index Family Range Summary;

	TOTAL DFA INDEX	# OF PRODUCTS	AVERAGE DFA INDEX	MINIMUM DFA	MAXIMUM DFA
Scanner, Laser Based	51.4	5	10.3	4.6	15.6
Scanner, Imager based	64.7	6	10.8	7.3	15.3
Scanner on a stick, Imager	14.9	1	14.9	14.9	14.9
Scanner on a stick, laser	27.3	2	13.7	10.9	16.4
Scanner w/radio, Imager	14.7	1	14.7	14.7	14.7
Scanner w/radio, Laser	25	2	12.5	10.6	14.4

So, each site developed their respective DFA Index Family Range Summary Reports. These detail summary Reports would be the core to showing each of the DE teams where each of their current designs rated and then how the new

designs were in comparison. By doing this we can show via a data point that the new design is progressing in a positive or negative manner. Also we can rate ourselves with are we best in class? Another thing we did was showing the DE communities how our products compared with the competitors products. We benchmarked a good portion of our competitor's products and were able to show how we measured against them.

Sharing the data with the Design Community

Now that all of the metric data has been clearly established the task was to get the DE communities to understand the effectiveness of the DFA Index and the comparison to the DFA index Family range. So the DFA Global Team embarked on a world tour presenting to each DE site the DFA index Family Range summary and showing them the comparison to the current designs. We had to also re-educate them on the overall DFA process and spent time walking them thru a BDI DFA analysis. This was helpful for them to understand what the DFA index stood for and why we were using it to assess the measure of the design. We drove to the core of the DFA and how it shows clearly what parts are required by design and what parts can be eliminated. We also showed the benefits tied to part reduction and how thru the elimination of parts you can achieve significant cost savings. We took this opportunity to show each of the DE teams some examples of where thru the elimination of parts there was a cost avoidance savings. We show the projected unit savings and then projected that savings across the volume of the product. This was significant because the engineering community could see how the tool show the comparison of the design performance and thru the results there was cost savings achieved.

Conclusion

The use of the Boothroyd Dewhurst DFA software was instrumental in being able to efficiently and effectively provide the design communities with the results and a method of effective measure. Through the use of BDI DFA Index Family Range design engineering has a means of being able to see real time how they are doing with their new designs. As an added benefit, we showed the part reduction methodology resulting in savings of the overall cost of the product. These metrics can now be used to answer the question, “Are our designs the best in class?”