The Global Six Sigma & Business Improvement Awards 2008

Delphi Powertrain (PT) – Nomination for the Best Project Achievement in Business Enabling Processes
Enterprise Warranty Risk Reduction Process

Strategic Objectives and Scope

Delphi is a Fortune 500 company that supplies automotive components to the global Automotive and Truck Original Equipment Manufacturer (OEM) markets. Delphi Powertrain (PT) is the largest of five Divisions within Delphi, headquartered in Luxembourg, Europe. Delphi PT's 2007 sales revenue was $5.7B split between three Product Business Units (PBU's).

Like all automotive suppliers, PT is facing increasing pressure from the vehicle OEM community to improve product quality and assume a larger share of the warranty risk associated with their products. This is an issue all industries face, but as Chart #1 illustrates, the automotive industry currently makes up the majority (54%) of the $70B spent annually. Supplier risk factors include:

- Vehicle OEM's aggressively pushing down warranty cost to the supply chain
- Vehicle OEM's offering extended warranties as a sales strategy. Most OEM contracts require supplier support of these extensions with no re-pricing opportunity
- Recent Government consumer protection legislation has increased the risk of product campaigns, recalls, and consumer warranty events
- Vehicle/ System integration complexity is stressing the supplier's test and validation capabilities

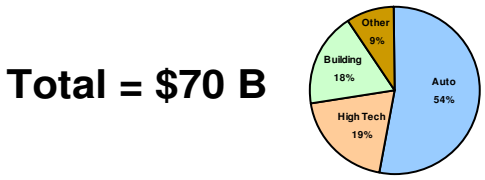

Chart # 1: 2006 Worldwide Warranty Spending – Source: "Warranty Week" Magazine

In mid 2005, Delphi PT executive leadership recognized the significant impact associated with warranty claims, and challenged the organization to develop a formal process for identifying and quantifying the warranty risk associated with all projects during the development and production phases. The objective was to create an environment of "no surprises" from project launch to end of product life. The mandate was to develop a method to quantify and mitigate the warranty risk, identify all key warranty critical cross functional gaps, and clearly define ownership for each activity. Expected benefits would include:

- Improved Customer Satisfaction
- Reduced warranty impact
- Improved organizational awareness of warranty risk
- More effective utilization of project resources

Based on the need to assess the impact of the new process, the PT Executive Staff established the following organizational goals:

- Provide a quantitative risk metric and well developed mitigation strategy by 01Jan08
- Launch all new products with improved warranty performance vs. their predecessors(s)
- Ensure that all new products are launched with zero "special cause" field events
- Increase all functions understanding of warranty liability drivers and their role in reducing risk

Business Excellence Project Implementation and Timeline

Project activities were managed by a cross functional core team assigned by the Executive Staff. Two of the core team members were certified Six Sigma Master Black Belts and two were certified Six Sigma Green Belts with over 20 years of warranty experience. In addition to the core team, the executive staff also allocated process experts from each functional staff area to help understand and resolve any organizational integration issues that may be identified during the project activities. Following a review of all available Six Sigma roadmaps, the core team elected to use a Six Sigma DMAIC process for the project. The core team also identified the need to initiate a Six Sigma IDDOV project to develop the required risk assessment tool. (Ref. Supporting Material, Pages 1 and 2)

Following project initiation, DMAIC measurement activities quickly identified the fact that significant warranty risk existed in all business areas and functions. No functional staff areas could be excluded from interaction within the new process. Significant risk areas included:

- OEM/ Supplier Contract Terms and Conditions* (Sales/ Purchasing/ Engineering/ Legal/ Finance)
- Delphi Product Design/ Manufacturing Robustness (Engineering/ Manufacturing/ Quality)
- Supplier Development and Management Activities (Purchasing/ Legal/ Manufacturing)
- Product Training and Support (Service Engineering/ Quality)
- Warranty Financial Analysis and Recovery (Finance/ Engineering/ Purchasing/ Manufacturing/ Legal)

* Note: The risk in the OEM/ Supplier Contract Terms and Conditions area involved undefined OEM/ Delphi roles and responsibilities, incomplete requirement definition, unfavorable terms/ conditions, and ambiguous contract language.

Project Measurement activities also identified the need to perform a deep dive analysis on all past significant warranty events to assure that the cause was clearly understood and benchmarked. Those results were used to identify the 24 key cross functional project tasks (see Chart #2) that must be managed effectively to minimize risk throughout the product life cycle. The results also supported the earlier findings which indicated that the highest risk areas resided within the warranty contracting and warranty engineering phases of the product development process. That discovery is what led to the decision to focus the warranty risk assessment Six Sigma IDDOV project on those two phases.

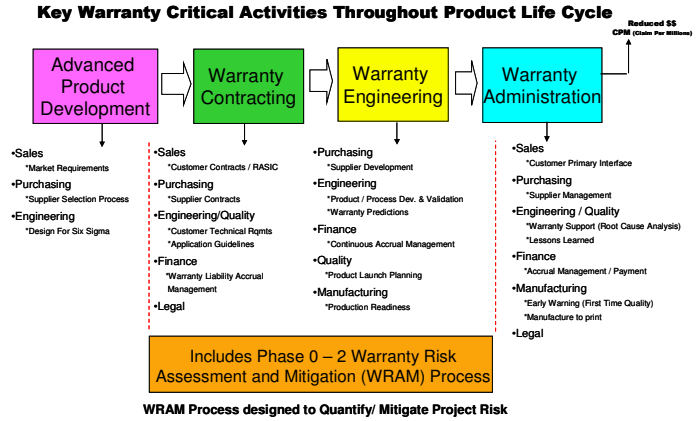

Chart # 2 – Key Warranty Critical Activities vs. Functional Ownership

The warranty risk assessment and mitigation process utilizes specific questions in four categories to assess the commercial and technical risk for each project. The results are used to identify the high risk areas (among the 24 key activities) and to develop mitigation plans or strategies (complete w/ owner names) for the activities identified with high risk. The results are plotted on a 4 quadrant graph that was designed to track the impact of the risk mitigation activities as the project moves from the early stages of development to production (see Chart #3 below and Ref. Supporting Material Page 3).

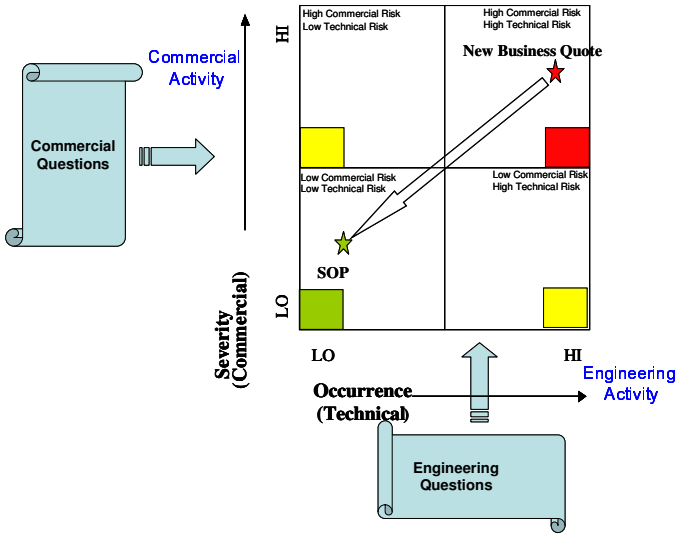

Chart # 3 – Warranty Risk Assessment and Mitigation Risk Capture

The Commercial risk score is plotted on the vertical axis, while the Technical risk score is plotted on the Horizontal axis. The scoring transform was normalized to enable project to project and product line to product line comparisons. The questions vary depending on project phase and whether the project is a component project vs. an integrated system project. Question categories include:

1. Commercial Risk
2. Technical Risk
   - Product
   - Process
   - Quality Planning

The Commercial risk score is generated from the answers to the questions in the commercial risk category, while the Technical risk score is generated from the results of the other three categories. The assessment is repeated prior to the completion of each project phase. The output is also integrated into other decision making processes, such as Design Reviews, Management Reviews, and new business opportunity discussions.

The Size of the Project Challenge

Due to the size of the organization, the complexity of programs in terms of multiple geographic regions, multiple functions, multiple customers, multiple product lines, and the large number of projects, the PT Executive staff requested that the Warranty Risk Assessment and Mitigation process be piloted first within the Gasoline EMS Product Business Unit (PBU), and then rolled out to the remaining two PBU's. Eighteen component and system pilot projects were selected to ensure that the process was compatible and effective with all project types. All pilot project results and feedback were first reviewed by the core team and then by a special executive level "guiding coalition" committee to make sure that the process was uncovering and addressing hidden risk. The guiding coalition was comprised of the Managing Director of the Gasoline EMS PBU and all his direct reports (Director's of Engineering, Quality, Finance, Purchasing, and Sales). The guiding coalition was also tasked with removing any organizational roadblocks that may have developed during the pilot activities.

Following the successful completion of the pilot activities, the PT Executive staff made the decision to implement the process for the entire Gasoline EMS organization, effective 02Jan08. This decision impacted 108 critical worldwide projects and all PT Gasoline EMS PBU employees in 7 functional staff areas. The project core team was responsible for developing the training materials, the organizational training plans, and for rolling out the training (Ref. Supporting Material, page 4). Training methodology consisted of the following:

- Training would be performed using a "train the trainer" approach
- Training would be rolled out from top to bottom within the organization
- Executive participation would be required in all training sessions to ensure that executive support was demonstrated to all trainees.
- Core team members would support all classes to assure that all questions could be addressed and that any feedback could be rolled back into the training materials/ process.
- Training documentation would be formally added to the Human Resource files to assure 100% compliance

Since 02Jan08, the Gasoline EMS organization has completed a total of 350 assessments on the 108 projects. All product teams have been reporting favorable feedback on the process and have stated that the process identified risk areas that previously would have been missed or overlooked. Implementation and training activities within the remaining two PBU's are scheduled for mid 2008.

The Organizational Impact of the Business Excellence Project

The Enterprise Warranty Risk Reduction process was formalized via a Divisional Procedure. The procedure contains five forms designed to support the Divisional standard work initiatives and consistency across the product teams. Standard work documents include:

- Warranty Risk Assessment and Mitigation Template
- Contract Terms and Conditions Checklist
- OEM/ Delphi/ Supplier RASIC (Responsible, Approve, Support, Inform, Control) Template
- Delphi Product Application Guideline Template
- Cost per Claim and Financial Accrual template

The Warranty Risk Assessment Template is made up of more than 80 unique questions designed to identify commercial and technical risks. The form was developed to understand product complexities and system interactions, as well as identify the potential for missed failure modes, and contractual issues. Each question is scored quantitatively based on the actions that have been completed to mitigate the risk. (Ref. Supporting Material, Pages 5 and 6)

The Contract Terms and Conditions Checklist is designed to assist the Sales Account Managers with identifying risky or open ended contract language during the contract review phase of a project. The form was developed following an intensive industry wide benchmarking study which examined OEM contracts terms and conditions from around the world. The form highlights the potential risk to the organization and provides "best practice" guidance to the Account Manager on preferred language and terms.

The OEM/ Delphi / Supplier RASIC template was developed to ensure all project deliverables are clearly identified and documented as to ownership and organizational responsibility. Many times there is lack of clarity between the OEM and supplier on who is responsible to perform key tasks with little or no documentation. Delphi's intent is to utilize the RASIC template when OEM's do not provide the documentation or detail necessary to prevent warranty disagreements.

The Application Guideline template is used to document the formal "do's and don'ts" of applying Delphi's products and technologies to OEM vehicles and subsystems. The document is intended to ensure that Delphi engineering and application knowledge is shared with the OEM's to prevent misuse of the product and the associated warranty. For new technologies and customers, this information sharing is especially critical.

The Cost per Claim / Financial accrual template is designed to ensure that Delphi fully understands and comprehends the potential warranty cost impact of a project. The form identifies all potential cost factors that must be considered within the business case. The OEM community is passing these costs (i.e. towing, rental car costs, replacement vehicle costs in the commercial area, etc.) to the supply base as business and customer conditions merit. The output of the form is also designed to support the Divisional Financial Warranty Accrual activities required by the U.S. Government.

Overall process ownership was identified via the use of a detailed Pugh analysis. Every functional staff area interfaces with the process, and have ownership for their piece of the process, but there was no natural owner for the entire process. The Pugh analysis indicated that there were three different job classifications within the organization that met all ownership requirements. The Guiding Coalition used the Pugh analysis results to determine that the responsibility would be best placed with the Quality Group's Advanced Quality Engineers. All other process responsibilities/ ownerships were flowed down to the employees via specific reference in the employee Personal Business Plans. This activity included all employees from the Executive Staff to entry level personnel.

The Business Results of the Business Excellence Project

Due to the long maturation period associated w/ product warranty liability (10 years for many OEM's), the true impact of the excellence project can not be fully defined for several years. Delphi PT believes, however, that the initial assessment results can be used to accurately predict the reduction in warranty risk realized due to the implementation of the new risk mitigation process. Initial assessment data indicates that the overall Gasoline EMS PBU commercial risk has been reduced by 24%, and the technical risk has been reduced by 37% since the process was implemented (see Chart #4).

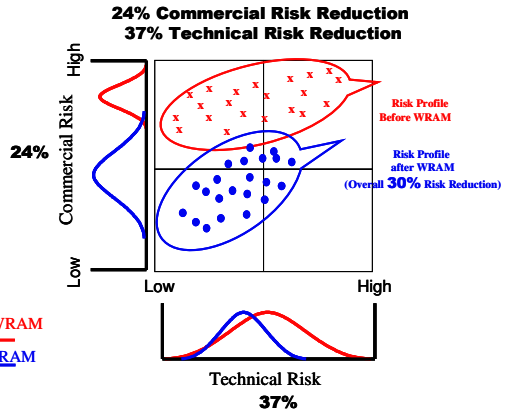

Chart #4 - Warranty Risk Reduction Progress

Risk mitigation successes include:

- 75% of the teams are reporting progress with the customer on developing joint validation agreements and RASICs (reduced technical risk)
- 100% of the teams are reporting an improved comprehension of the true warranty liabilities when developing new business case due to the improved warranty focus and the standard work documents (reduced commercial risk)
- Product teams have reported the development of new contractual agreements with 3 major customers that will benefit both parties. (significant break through in commercial risk reduction)
- Several teams are reporting an expanded understanding of the true application environment via better defined customer requirement, and vehicle or engine characterization (reduced technical risk)
- No "special cause" field events have occurred on impacted projects (reduced commercial and technical risk)

Believing that these results and data trends will continue, Delphi PT feels confident that it will realize a significant reduction in annual warranty liability. We estimate these savings at up to 30%. This savings would transfer directly to the corporate bottom line, and have a profound effect on share holder value and corporate reputation.

In addition to the Delphi PT benefits and cost savings, the process will also have a significant positive impact on customer satisfaction (OEM's and product end users) and OEM warranty costs. The process is designed to improve product quality and communication with the customers and suppliers. Clarifying the contractual terms and conditions, providing product Application Guidelines, and better defining the OEM/ Delphi/ Supplier roles all help to accomplish that task. Delphi PT is convinced that the OEM's/ supplier organizations will realize similar benefits (and savings) to the Delphi PT results stated above.

Implementation of this new risk assessment process has also greatly improved PT's internal focus and communication on warranty. Training data indicates that approx 73% of the employees in several functional staff areas didn't understand the key warranty factors and their associated customer satisfaction and cost impacts. Effective risk mitigation could not have occurred without the organizational cross functional focus provided by the new process and the way it was implemented.

Additionally, Delphi PT is also participating on several key automotive industry warranty risk reduction projects (i.e. Automotive Industry Action Group (AIAG)/ Original Equipment Suppliers Association (OESA) Consumer-Centric Warranty Management Project and the AIAG Early warning Standards Project) which will help Delphi continue to improve this process and increase overall customer satisfaction.