This article describes the process and flow chart of the complex and up-to-date issue "product recall" regarding defective products.

**KEY WORDS**

Product recall, planning, Flow chart, Defective product, critical product.

**ABSTRACT**

Product safety is, without question, one of the most critical aims of a manufacturing organization. Yet, even with our best efforts, there is always the potential for unforeseen problems that may ultimately result in having to recall the product.

An effective plan for product recall planning is a must for any company that has even the remotest possibility of product safety exposure. In today’s marketplace, the expectation is to purchase a product safe enough to be used in almost any circumstance, and by even the most incompetent of individuals. The consumer or end user of a product is demanding legislative protection from unsafe products, and is more aggressive in pursuing grievances by instituting legal action against the manufacturer or subcomponents of the products.

Defective materials, failure to properly warn the user of hazards, improper design, and nonconformities of manufacturing specifications are some of the reasons that can cause a product liability situation. All of these must be addressed in a preventive mode if we are to minimize our exposure to unsafe products leaving our facilities, and possibly a subsequent product recall.

Failure to prepare adequately for a product safety recall can result in significant and irreparable damage to a company’s brand and reputation.

The available article describes the process and flow chart of an organization which should be prepared to recall defective products from the market.

1. **INTRODUCTION**

The automotive industry is particularly affected by critical products and/or components which can cause problematic situations. The causes for this change are:

- Global development.
- Higher complexity of products and organizations.
- Shorter development time.
- Shorter product life cycle.
- Higher outsourcing of components or even whole assembly groups by vehicle manufacturers (VMs) Original Equipment Manufacturers (OEMs) to “Tier 1” suppliers.
- More and more components will be delivered by “Tier 1” suppliers from all over the world (global sourcing).
- etc.

In addition, the automotive supply industry manufactures components for vehicles in large series (OE) over comparatively long periods with hard cost goals and high quality yardsticks, and it has to supply also after End of Production (EOP) with spare parts in Parts&Service (Aftermarket/OES). This and other situations force the vehicle manufacturers and their OE suppliers to new concepts because of new challenges and problems. It seems that the number of product recalls will increase. The numbers of the German Kraftfahrt-Bundesamt (KBA) show a frightening, constantly rising tendency of product recall actions (source: Kraftfahrt-Bundesamt, annual report 2008). The illustration 1 shows this development of the recall actions from 1998 to 2008.

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1 The Kraftfahrt-Bundesamt (KBA) is the official German Federal Motor Transport Authority which provide information and services for vehicles and their users. The Kraftfahrt-Bundesamt is within the scope of the German Federal Ministry of Transport, Building and Urban Affairs and their tasks are allocated by laws and ordinances. www.kba.de.
Because of this frightening, constantly rising tendency is important a good planning and preparation. A product recall system is a fundamental component of a company’s product safety management system; however, experience has shown that this is an area of operation that tends to be given insufficient management focus.

Business must also be aware that impending European Union (EU) legislation e.g. General Product Safety Directive 2001/95/EC (GPSD) will mean that all sectors of the supply chain and regulatory authorities will have an enhanced obligation to ensure effective systems are in place to minimize safety risks to the consumer. All organizations involved with the supply and sale of product and must take necessary action to protect public health in the event that they become aware of, or are notified of, a potential safety incident.

A product recall plan is instigated to:

- Minimize the risk of injury.
- Ensure compliance with legal requirements.
- Protect company assets (including brand reputation).

Advanced stock replenishment systems within the supply chain mean that the product is moving faster from production to the point of purchase. If a mistake or error was to occur, the consumer would therefore potentially be exposed to an increased risk of an exposure to unsafe product. This risk must be minimized by the introduction, implementation and maintenance of effective and efficient product recall processes.

2. CONCEPT OF A PRODUCT RECALL

2.1 Definition

In the following a concept is to be presented which permits to model and to control product recalls in marketplace.

The general definition of the KBA for the product recall in their "Code on the Implementation of the Geräte- und Produktunsicherheitsgesetz (GPSG - Equipment and Product Safety Act) for road vehicles" which is regarded as a “measure to be performed by a product manager that aims at having consumers return products, permanently or temporarily, which products have already gotten into circulation. This includes all measures that serve to avert, eliminate, or minimize any risks inherent in such products”. The aspect suggests likewise M. Schulenberg in the literature who understands as an “instrument of preventive danger removal”.

A product recall can be understood as a preventive instrument for the recall of a dangerous product in the market which was introduced in the market by the manufacturer and/or distributor. This will be done under the view that the incorrect product exhibits fundamental safety deficits and thus danger for life and health of the consumer. A product recall contains the warning to the consumer and the removal of the dangerous product from the market. A recall can take place as preventive recall or must be seen as a safety recall or arranged recall.

2.2 Preparation of corrective actions

2.2.1 Compilation of the product recall guide

The following section extends to the planning of a recall and to the associated single steps. The illustration 2 includes all quality-assurance measures and stands in a close relationship with the recall of products. Therefore they should be submitted before, while and after a product recall and analyzed regarding weak points in a separate view.

The recall guide contains all relevant elements and/or guidelines of a crisis plan, which are necessary for the preventive danger removal. The details of such guidelines permit rapid corrective activities, the supply of necessary resources as well as complete and immediate information of the consumers in crisis situations. The illustration below shows substantial contents of a recall guide.

2.2.2 Contingency operational sequence diagram

First of all, the recall guide and following flow chart have to be seen as a minimum or standard and can not deal with all conceivable scenarios. This condensed version combines public recalls and silent recalls, setting out a pre-defined process in the form of a flow chart. These can be revised or added to by the company concerned in each individual product recall case. Should further scenarios need to be dealt with, it will be necessary to draw up an individual and tailor-made recall plan by the management. The action plan contains milestones (see illustration 3) which serve as guidelines for testing and actually performing a recall plan. As the diagram below shows, the milestones provide an approximate schedule and sequence for the recall team’s activities. However, the fact that the action plan is depicted in the form of a flow chart does not necessarily mean that all processes have to be tackled in the order given. As already mentioned each individual product recall case is different. Although the flow chart follows a logical sequence, an action plan should always be adapted to the needs of individual situations and the product concerned.

The quality assurance system and other applied regulations and operational sequence within an organization are aligned to ensure and/or increase product security.

The products are continuously improved and the development use as well as production techniques are being constantly refined. The aspects of product security will be supported by production specifications, by innovations and by the interpretation of the production mechanisms.

All staff has to be informed about the principles of the product security. They should analyze and summarize all information which has to be discussed immediately with the management. This meeting includes the responsible persons from finance, quality, sales, research and development, and arranges in order to evaluate the issue and to specify the further proceeding.

This applies in the same way if the company or customer is considered to make a product recall of a defective product which is already in use. In both cases the following contingency plan has to be used (see appendix I at page 6).

The recall plan is the "compass" for systematic cooperating of all activities of the recall affected company. It must provide information on "who", "which", "where", "when" and "how". Therefore it is to be aligned to future activities and after accomplished recalls.

An accurate description of a contingency plan for a product crisis does not appear possible because substantial points for each individual case can occur very different.

2.3 Inspection procedures

The company should lead complaint statistics which must be sent by its customers at least once a year. This inspection procedure enables the quality assurance, to control the failure rate of lodged complaints and/or incorrect products over certain time intervals.

That means that complaints should be centrally collected and evaluated over current or alleged incidents by the set off products in the market. The view should be aligned to facts samples particularly in order to recognize fundamental inherent lacks as promptly as possible and to prevent them. Such a system makes it possible to seize and analyze the following information:

- Warranty claims
- Complaints of customers, directly or over wholesaler and retailers.
- Results of product tests.
- Reports about accidents, in which products of the manufacturer were involved.
- Insurance claims and/or legal issues.

6 The responsibilities will be explainted in detail in the article “Product Recall Management Team and allocation of responsibilities”; 2009.
• Inadequacies which are announced by quality control or by other organizations.
• Information from service technicians and field representatives.
• Any proofs for dangers which result from sales to unexpected user groups (e.g. not standard vehicles which were not produced in OE/serial production).
• Any proofs for abuse or misapplication of products by consumers.

This information must be examined regularly by the manufacturer and ensure that there is no danger for their consumers which can arise from their products. This is particularly important if the manufacturer changes the product design (changes and supersession of parts) or the release of a new (sub-) supplier.

The evaluation of specific product parameters with possible use in production, marketing, environmental load, mutual comparison with competitor products, detection of critical points of product properties and other issues in self-evaluation. Calculations are based on mathematic and statistic methods, and are of exact nature without subjective influences in evaluation of deterministic specified parameters of evaluated subjects.

The next illustration shows a complaint document as master paper for the customer who sends the appropriate data to the concerned company.

Illustration 4: Warranty Report.

2.4 Product backtracing plan

Wholesalers and retailers as well as the free workshop must be able to recognize products which could be unsafe. In addition the manufacturer must be able to trace back the customers who bought the products. A containment of the incorrect product regarding damage delimitation is guaranteed by the following measures:

• Marking of components which are contained in the product.
• Marking at the product, e.g. manufacturing code 30qQ (i.e. week 30 in the year xxxx)
• Match marking numbers.

• Warehouse strategy FiFo; automatically by EDP (Electronical Data Processing) system.
• Warehouse time examination (periodically).
• Traceability from incoming of the goods in warehouse to dispatching of the goods to the customer.
• Generally bar codes are used for the identification and backtracing of different product types or variances.

2.5 Ending the product recall and ending report

From a practical point of view the product recall will finish when you are satisfied that the quantity of affected stock remaining unaccounted for represents an insignificant risk to the consumer or user. (Note that, if the risk is unacceptable, you may need to repeat the public relations and advertising until suitable results are achieved).

Letters should be sent to customers confirming that the incident is closed and expressing your thanks for their help and support. You could not have achieved a successful recall without them.

The file will remain open until all costs relating to the incident have been made or recovered.

You will have taken steps to prevent a recurrence of the problem but this is certainly never guaranteed. You may also have other products in your portfolio that may also present a risk at some stage. The recall you have experienced should be analyzed in detail with the following in mind:

How effectively did your Product Recall Plan and process deal with the incident?

What changes are required based on the lessons learned?

What changes are required to aid to the plan regarding future events?

The staff will have gone through a difficult period, from those dealing directly with the incident to those on the production line. Their efforts should be recognized and thanks should be given as appropriate.

Ending report

In the company guidelines it is finally specified that a careful documentation of all accomplished measures takes place. This concerns in particular the production of a final report which should contain data regarding the following aspects:

• Error cause.
• Introduced measures with proof.
• Procedure of the actions/whole event.
• Impacted costs.
• Introduced measures with proof for the prevention of possible repetition errors.
• Reaction by the public.

This final report serves particularly to learn from recognized errors in order to be better prepared in the future with the occurrence of similar circumstance constellations. The final report gives reference points, what can be improved company-internally in the processes. These questions should be the subject in the regular meetings of the Product Safety Committee. The committee is responsible for outlining improvement potentials and to taking care through appropriate measures for the constant improvement by the Recall Management. The final report has also the object to document to the public prosecutor's office/court that all rules were adherence during a product recall even hazard product remain in the market field and accidents can still occur later on.

3. CONCLUSIONS

This article has described the process and flow chart of the complex and up-to-date issue “product recall” regarding defective products.

The intention of the previous chapters was:
• to examine the organization of a company which should be prepared for a product recall.
• to give an approach to establish a product recall policy and a recall plan.
• to show a possible concept development of a product recall and its structures.

The key to a successful recall is planning and preparation. While companies may hope they will never have to conduct a product recall, they may suffer significant and irreparable damage to their brand and reputation if one becomes necessary and they are unprepared. With adequate planning and preparation companies may be able to minimize potential damage to their product and their name.

REFERENCES

Recalls USA.
Safety Alerts.
Appendix I – Potential concept of a product recall

**Preparation of contingency planning and Risk Management**
- Definition of processes
- Substituted possibilities because of important resources and equipment

**Result**
- Decision regarding a possible defective product e.g. through false manufacturing, design, construction etc.

**Receiving proofs** regarding possible defective products, Product risk or liability issue

**Immediate Crisis Meeting** with the Management and responsible Dept. Leaders (Recall Management Team)

**Detailed coordination** and draw up of a report regarding:
- Description of the fault/effect
- Cause analysis
- Risk assessment/evaluation and classification

**Decision from Management regarding a product recall**

**Recall of the affected part numbers?**

**Further field observation in the market**

**YES**

**Determinations of the level and kind of actions**
- Responsibility, who decides on a recall?
- Who coordinates all processes?
- When will the recall be done?
- How long the recall will be done?
- Recall actions with whole retailers and other affected parties in the supply chain
- Information to National Authorities

**For all actions**
- Communication with other persons
- Supervising of the progress of the corrective actions and revising of actions if necessary

**Actions regarding products in the Supply Chain**
- Accomplishing of all corrective actions in cooperation with supply chain members
- Information to the suppliers

**Actions regarding products which are already used by the consumers (if necessary)**
- Backtracing of affected products and their consumers
- Draw up of a communication program

**Recall of defective products in cooperation with the consumers**

**Learning from experience**
- Re-work of the contingency plan regarding the relevance to the present know-how and regarding the consideration of the action and improvement comments and thank saying

**Prevention**

**Intervention**

**Postvention**