

VOLVO

Safety Management Audit Presentation

2010 update

The Volvo Group corporate values are well known



This presentation concentrates on Safety

Volvo Group Safety Vision

Zero accidents with Volvo Group products

The Safety Vision points out the direction for our work. The vision of Zero accidents is a way of thinking, a mental image of an optimum future state. We are committed to always strive towards zero accidents with Volvo Group products.

It is a fact that most accidents involve factors that are out of our control. Therefore, cooperation with other concerned stakeholders in society will be needed to reach our vision.

As long as there is a risk of accidents occurring, Volvo will strive for this vision through high quality, innovative products that reduce the frequency of accidents as well as their consequences.



What is Product liability ?

Product liability is the area of **law** in which **manufacturers**, distributors, suppliers, retailers, and others who make products available to the public are held **responsible for the injuries those products cause**.

All countries are developing laws to protect their consumers

The collage consists of three screenshots of government websites related to product recalls:

- UK market:** A screenshot from the Vehicle & Operator Services Agency (VOSA) website. It features the VOSA logo and the heading "VOLUNTARY RECALL SYSTEM". The text explains that recall campaigns are launched and monitored as agreed in various voluntary Codes of Practice. It also mentions that the first code was introduced in 1979 and that further six codes have been introduced since 1982. A bullet point lists "Trailers under 3500kg GVW".
- European market:** A screenshot from the RAPEX (Rapid Alert Procedure) website. It features the RAPEX logo and the tagline "KEEPING EUROPEAN CONSUMERS SAFE".
- US market:** A screenshot from the National Highway Traffic Safety Administration (NHTSA) website. It features the NHTSA logo and the tagline "Our Mission: Save lives, prevent injuries, reduce vehicle-related crashes". The page is titled "Vehicles & Equipment" and includes a section for "Motor Vehicle Safety Defects and Recalls Campaigns".

There are also requirements within the Volvo Terms & Conditions

Product liability has no limit of time. Not limited to the warranty period

11 WARRANTIES FOR PARTS, SUITABILITY FOR INTENDED USE

11.1 The Supplier warrants, for a period of two years (unless a longer period is agreed) from the date the Parts are delivered to the end-user, that: all Parts delivered under the Purchase Agreement (i) shall conform to the Technical Specifications and to any sample approved by Volvo; and (ii) shall be free from defects in title, materials, workmanship, manufacture and design (to the extent the Supplier, its employees, agents, contractors and/or vendors are responsible for the design) and (iii) shall be fit and sufficient for the intended use.

For deliveries of Parts to Volvo, to be used in Products sold in the United States of America, the abovementioned warranty period shall be three years from the date the Parts are delivered to the end-user, unless otherwise agreed in writing by Volvo.

The Supplier agrees to waive the time limitation to which the foregoing warranties are subject in the event that after the applicable warranty period has expired, (a) defects of the same or similar nature have been discovered in a statistically significant portion of the Parts, (b) a defect is discovered which may cause or has caused (or is alleged by a third party to may cause or has caused) damage or poses a significant threat of damage to property or to the health or safety of any person or c) Volvo anywhere in the world is statutory obliged to perform a Field Action involving the repair or replacement of Parts.

11.2 The Supplier shall immediately inform the relevant goods receiver and the responsible purchasing department at Volvo of any Defective Parts, discovered or anticipated which have been dispatched to Volvo.

11.3 The Supplier shall ensure it has obtained all information on the intended use of, application of and other conditions affecting the Parts. Volvo shall upon request from the Supplier provide all information, which Volvo in its sole discretion deems relevant for the design, development and/or manufacturing of the Parts.

23 PRODUCT LIABILITY AND INSURANCE

23.1 The Supplier shall defend, indemnify and hold Volvo harmless from and against any and all loss, liability, cost and expense (including reasonable attorney's and expert's fees) arising out of a claim that a defect in the design or manufacture of the Parts, including defects in material and/or manufacturing processes or techniques, caused personal injury or loss of, destruction or damage to property. This agreement of indemnification includes the Supplier's responsibility for all judgements or settlement amounts which may otherwise be or become the responsibility of Volvo but for the agreement of indemnification set forth in this Section 23.1. This agreement of indemnification shall inure to the benefit of Volvo, its officers, directors, AB Volvo Subsidiaries, successors and assigns. The Supplier shall, at Volvo's request, assist Volvo in disputes in which Volvo could become involved by reason of such alleged defects and if required by Volvo take on the conduct of any dispute.

23.2 Neither Volvo nor the Supplier will file cross-claims or third party complaints against the other in product liability litigation without notifying the other Party in advance. Where practicable, notice should be given sufficiently in advance to allow thorough discussion of alternatives to such filing.

23.3 If there is a risk of a Product causing personal injury or property damage due to a Part being a Defective Part, such that Volvo decides to perform a Field Action, the Supplier shall compensate Volvo for its costs in conjunction with such Field Action, including but not limited to costs (including reasonable attorney's and expert's fees) for labour, replacement, assembly and disassembly, detection and analyze, scrapping and transportation to Volvo and/or its end-users.

23.4 The Supplier shall enter into and maintain an adequate product liability insurance policy during the period of the Purchase Agreement and shall at Volvo's request also supply Volvo with a copy of the insurance certificate.

Product safety requires management involvement

- Product safety does not rest with engineering functions.
- It involves manufacturing, purchasing, finance, training,
- Inappropriate decisions in those areas can subject the company to safety problems

VOLVO

Safety Policy

Volvo products are characterised by
SAFETY.

Volvo shall provide its customers with products,
which meet highest demands on safety.

Volvo shall be recognised as a leading producer of safe
automotive and transport products, equipment and systems.

STRATEGIES

A Global View

We shall provide our customers with outstanding products in their respective markets, regarding real as well as perceived safety. We shall aim at the same high level of safety, wherever we are in the world.

Working Methods

Safety shall take a prominent part in product development and be based on knowledge of the user's expected behaviour and on a systematic hazard and accident analysis.

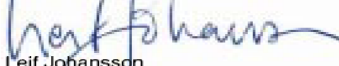
Commitment

We shall encourage all employees to contribute to the fulfillment of the intentions in this Safety Policy by increasing their awareness and their knowledge of products, traffic and work environment safety issues. To help enable the creation of safe products and usage environments in accordance with our goals we shall influence authorities and opinion leaders.

A Holistic View

A safe product in a safe environment provides the best overall solution.

Authorised as of November 10th, 1997.


Leif Johansson
President of AB Volvo and CEO

Why product liability and safety management activities?



Incorrect torque
on steering column



Small causes, can cause **BIG EFFECTS**



Oakland, California 2007, fuel tanker fire



Incorrect fixing
of ground wire



Or electrical short
circuit, or brakes
overheating, or

When do we talk about safety ? (ref. STD 105-0001)

- When a risk is liable to cause an accident
- When a risk can lead to personal injury
- We consider the following groups of persons: vehicle users, road users, passers-by or maintenance personnel.



Safety Customer Effects

- The notion of Safety Customer Effect is not specific to Volvo.
- Volvo is demanding, but authorities are also demanding

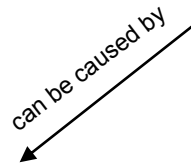
National Highway Traffic Safety Administration

Examples of Defects Considered Safety-Related

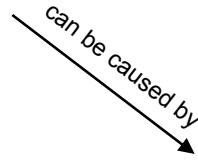
- ♦ Steering components that break suddenly, causing partial or complete loss of vehicle control.
- ♦ Problems with fuel system components, particularly in their susceptibility to crash damage, which result in leakage of fuel and may cause vehicle fires.
- ♦ Accelerator controls that break or stick.
- ♦ Wheels that crack or break, which may result in loss of vehicle control. ■ ■ ■

Avoiding Safety Risks

Safety risks



Design of the part



Assembly of the part

In Volvo plant

In supplier plant

How to prevent the potential safety risks

- Redundancies
- Downgraded mode
- Use of possible detection
- Critical Characteristics [1]
- Design standards
- Define « safety » margins or coefficient
- Perform specific testing plan
- ...

Tool to help identify the cause of the potential safety risks

- Dependability Analysis
- FMEA
- Critical Characteristics Analysis
- Design guideline - lessons learned

How to prevent the potential safety risks

- Critical Characteristics [1]
- Use of possible detection, poka-yoke (on the line, by design of the product)

Tool to help identify the characteristics causing the potential safety risks

- FMEA
- Critical Characteristics Analysis
- Dependability Analysis

How should Volvo & suppliers identify a critical characteristic?

The principle is the same

- **DESIGN FMEA** during concept study phase
- **DESIGN REVIEW** with SUPPLIERS during detailed development phase :
 - **Functional analysis of safety part** : Describe main and auxiliary functions fulfilled by the part
 - **Describe physical interfaces of the part with its environment**
 - **Description of special characteristics** (dimensional and performance) which will contribute to fulfill and maintain the function of the part under operating conditions.

Breakdown and control risk using FMEA (AIAG reference)

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (DESIGN FMEA)

System: _____ Subsystem: _____ Component: _____ Model Year(s)/Program(s): _____ Core Team: _____

FMEA Number: A
Page: _____ of _____
Prepared By: H
FMEA Date (Orig): F

Design Responsibility: C Key Date: E

Item	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Potential Cause(s) of Failure	Current Design			Recommended Action	Responsibility & Target Completion Date	Action/Results					
						Controls Prevention	Controls Detection	Detection RPN			Completion Date	Severity	Occurrence	Detection		
Front Door L (black 0000A)	Maintain integrity of inner door panel	Integrity breach allows access of inner door panel	Compromised inner door panel may affect life of occupant protection	5	Upper edge protection was application searched for inner door panels in tool box	Design instructions (last practice 08P 3450)	Vehicle durability test (1487) upper edge OK 03 30	7	125	Laboratory accelerated corrosion test	A. Tale Body Engineer 08 09 03	Based on test results (test no. 1487) upper edge OK (see sheet 125 OK 03 30)	5	2	3	30

Identification of safety related failures

Breakdown to causal characteristics

Identification of Critical characteristics

Control of risk from design (D-FMEA) or process (P-FMEA)

Effect	Criteria:	
	Severity of Effect on Product (Customer Effect)	Rank
Failure to Meet Safety and/or Regulatory Requirements	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation without warning.	10
	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation with warning.	9

Volvo requests are not new and are part of ISO TS 16949 requirements

SIS-ISO/TS 16949:2002

7.3.2.3 Special characteristics

The organization shall identify special characteristics [see 7.3.3 d)] and

- include all special characteristics in the control plan,
- comply with customer-specified definitions and symbols, and
- identify process control documents including drawings, FMEAs, control plans, and operator instructions with the customer's special characteristic symbol or the organization's equivalent symbol or notation to include those process steps that affect special characteristics.

NOTE Special characteristics can include product characteristics and process parameters.

ISO 9001:2000

7.3.3 Design and development outputs

The outputs of design and development shall be provided in a form that enables verification against the design and development input and shall be approved prior to release.

Design and development outputs shall

- a) meet the input requirements for design and development,
- b) provide appropriate information for purchasing, production and for service provision,
- c) contain or reference product acceptance criteria, and
- d) specify the characteristics of the product that are essential for its safe and proper use.

How do we identify safety critical characteristics ?

One common standard applied throughout the Volvo group

This information is available through the supplier portal

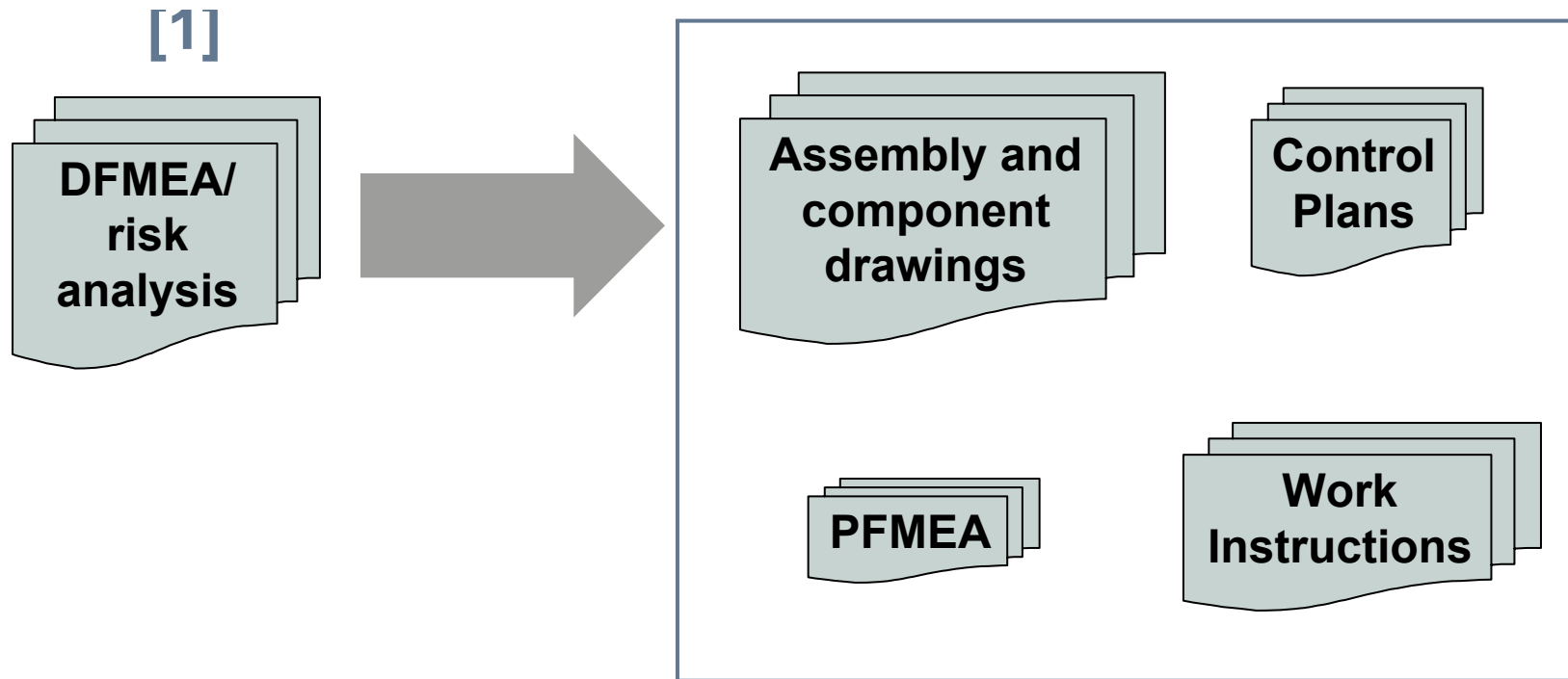
VOLVO	Standard Volvo Group	STD 105-0001
Established December 2005		Version 2 Page 1(6)
The English language version is the original and the reference in case of dispute.		Den engelska språkversionen är originalversion och skall åberopas i händelse av tvist.
Critical characteristics of design products Identification and grading		Kritiska egenskaper för konstruerade artiklar Identifiering och bedömning
Orientation This standard is based on Renault Trucks' standard 00.10.4021 and Volvo standard STD 5060,3, which it replaces for new design. This standard can be supplemented with other standards or instructions that describe in a more detailed way how marked critical characteristics shall be treated within a specific Volvo company.		Orientering Denna standard är baserad på Renault Trucks-standard 00.10.4021 och Volvostandard STD 5060,3 vilka den ersätter för nykonstruktion. Standarden kan kompletteras med andra standarder eller instruktioner som mer detaljerat beskriver hur markerade kritiska egenskaper skall behandlas inom ett specifikt Volvobolag.

<http://www.volvo.com/suppliers>

The three criticality classes

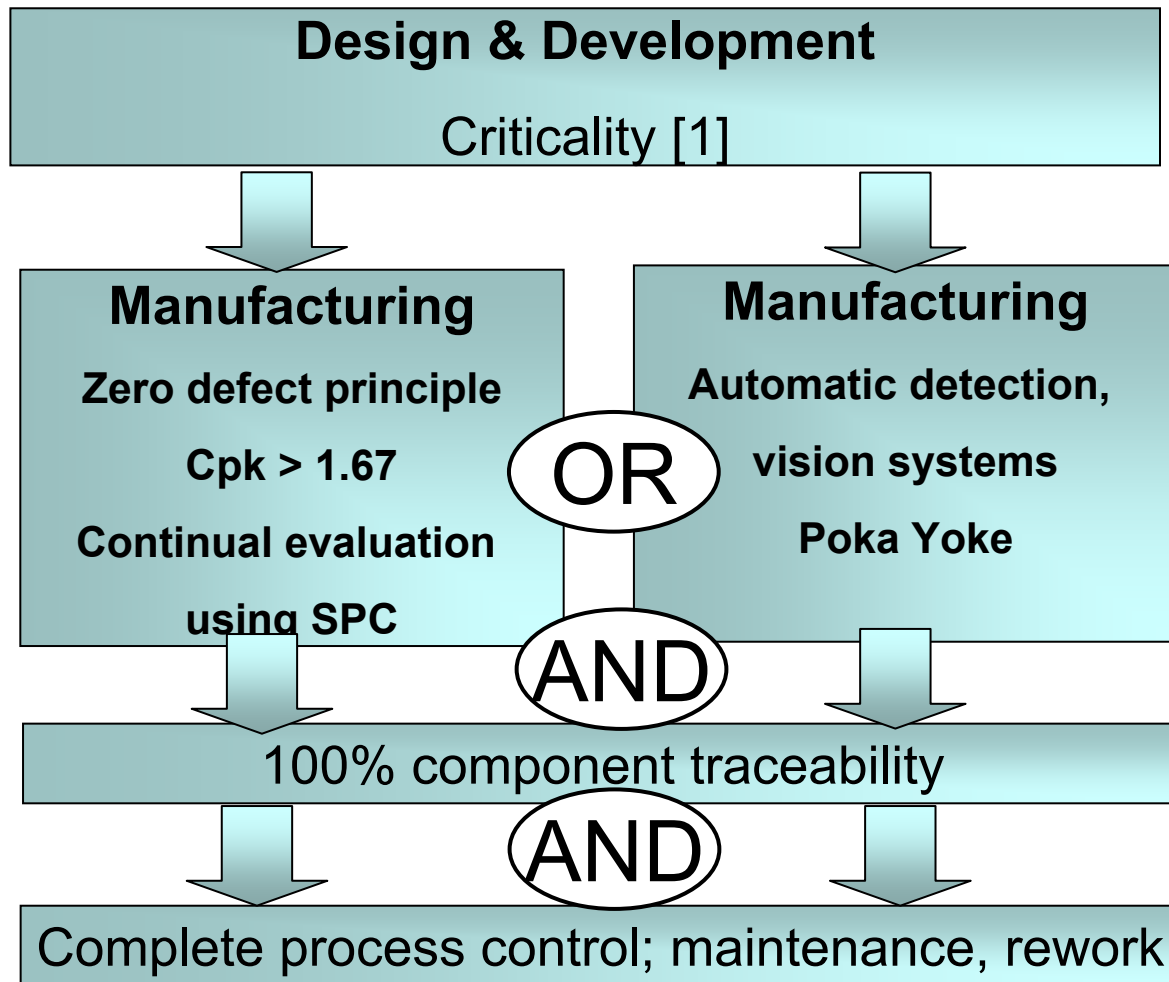
Class	Customer Effect	Possible Consequences
[1]	Danger/Accident	Non conformity may lead to a risk of safety
[2]	Unplanned Stop	Non conformity may lead to an unplanned stop
[3]	Disturbance	Non conformity may lead to reduced truck performance

How to deploy criticality From Design To Manufacturing



Based on the severity of the effects [1] determined in the criticality analysis, the manufacturing documents can be created with all subsequent [1] critical processes and characteristics identified.

How is a part with a [1] feature controlled in production?



FACT; tier 2 & 3 suppliers are often a cause
of Volvo supplier related safety recalls

Who assumes responsibility of
sub suppliers (tier 2 &3) ?



You ! As a supplier to the
Volvo group and according to
ISO/TS16949

Poor safety management at tier 2 suppliers can be more of a risk

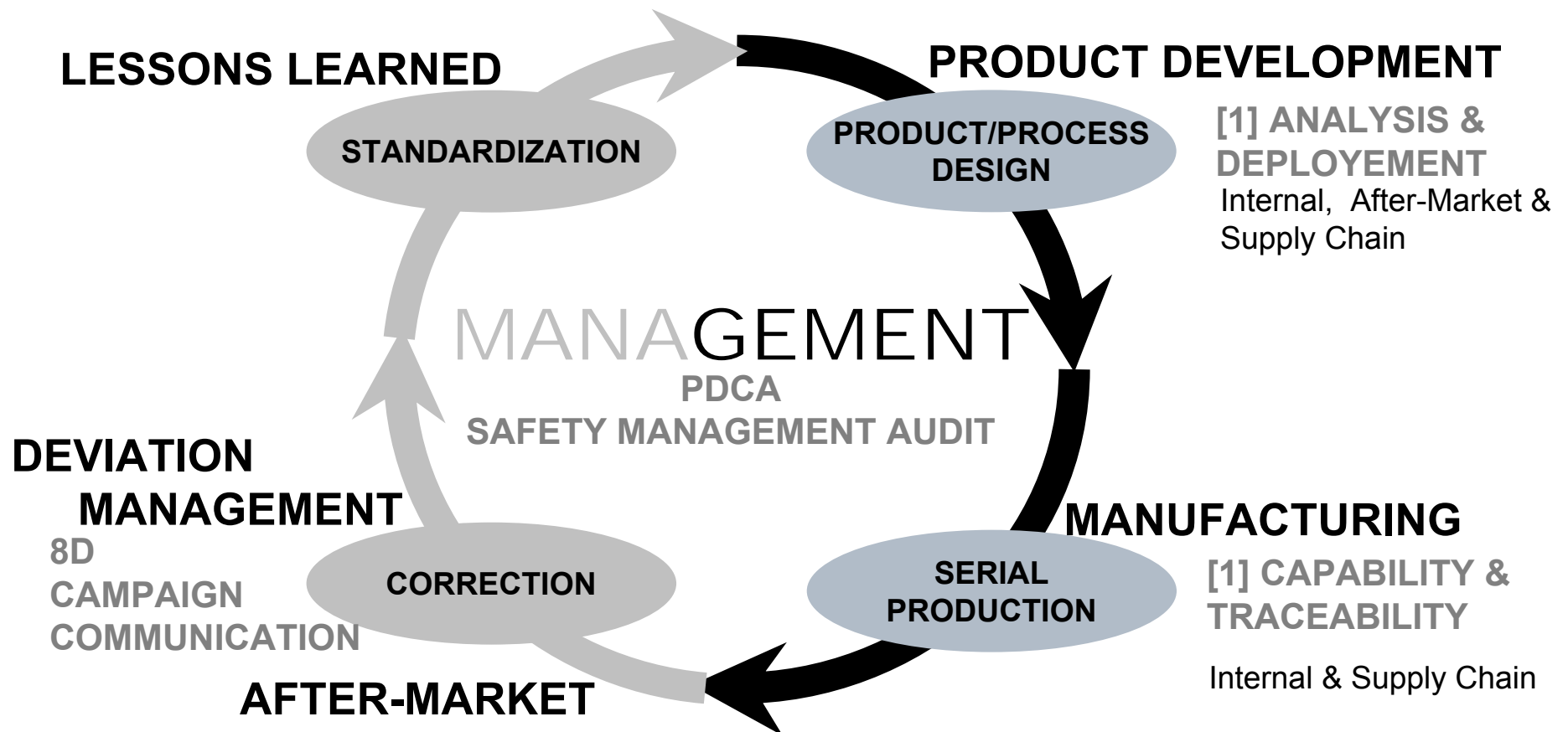
- Tier 2 does not have a direct relationship with the truck company and may **IGNORE** or be **UNAWARE** of the consequence of a non conformance.
- A safety non conformance can be **UNDETECTED** by Tier 1.

As tier one we expect you to;

- Identify tier 2 safety parts
- Perform an analysis of tier 2 safety parts
- Identify the [1] on the technical specifications
 - sent to tier 2 suppliers
- Communicate to tier 2
 - process requirements for [1]
 - customer safety effects
- Control and advise us of changes
 - of material, product or process changes
 - re sourcing activities
- Secure traceability of tier 2 parts
- Deploy SMA at tier 2 suppliers by
 - performing an SMA at tier 2 suppliers
 - development and clear actions with tier 2



Merging Best-Practices in a Safety Management System



Reference

- **SQAM last chapter**
- **Supplier portal / e library/Quality**
- **www.volvo.com**



GENERAL REQUIREMENTS

RESULTS : 2012 TARGETS	
PPM	10
QPM	30
FAULT FREQUENCY	< 0.005% *
SERVICE CAMPAIGN	0
SAFETY RECALL	0
DELIVERY PRECISION	98%*

MANAGEMENT SYSTEMS	
QUALITY CERTIFICATION	ISO/TS 16949
ENVIRONMENTAL CERTIFICATION	ISO 14 001+ Self assessment
SEM	>90% No stopping parameter
SMA	
INDEXES	
VOLVO CUSTOMER SPECIFIC REQUIREMENTS	APQP - PPAP +specifics
SOFTWARE	SPICE Level 3
ETHICS	Corporate Social Responsibility self assessment
LOGISTIC EVALUATION	MMOG A
EDI	100%

* Check details in the document

Product Safety Management : 10 Keys Of Success

- Policy/Objectives
- Involvement of the Board
- Management trained & understood
- Responsibility identified and accepted
- Insurance in place
- Gather all data (Customers, internal)
- Use of 8D to correct and to capitalize
- R&D basics in place
- Suppliers basics in place
- Manufacturing basics in place

Audit documentation

A Simple Excel File For Evaluation

SAFETY MANAGEMENT AUDIT ITEMS		BASIC	GOOD	BEST	Comments
Company Management Safety Risks Management (result improvement)	1,11 Understanding the customer effect	Safety customer effects are known from company management	Safety customer effects are known in some departments	Safety customer effect are known from all functions in the company, there are part of the company culture.	
	1,12 ▲ Understanding product liability	Product liability is known from company management		Product liability is known and accepted from company management (=Purchasing agreement & warranty charter are signed)	
	1,13 ▲ Financial risk in case of recall			Company financial risk in case of recalls covered by an insurance (or self insurance) The amount is sufficient to cover the cost for recall for multi customer recalls	
	1,14 ▲ Result management	There are specific measurable objectives for safety characteristics or safety products (supplier PPM, internal PPM, customer PPM, field returns, ...)	Specific Safety measurable objectives are monitored at company management level	Specific Safety measurable objectives are monitored at company management level and in all concerned areas	

- Same content
- Scoring criteria in the same file
- Focusing on basics

Roadmap for Improvement

SAFETY MANAGEMENT ROADMAP



Item	Improvement actions	Expected scoring	Responsible	Implementation Date	Impact on SMA result
				13/12/2007	77%
Understanding the customer effect	deploy communication	2	CEO	01/02/2008	1,04%
▲ Financial risk in case of recall	Subscribe insurance	3	Financial director	01/04/2008	3,13%
▲ Result management	Gather information in one indicator				0,00%
	Ask customers for inputs				0,00%
	Introduce KPI in business plan	1	Quality	01/04/2008	1,04%
▲ Crisis management organisation	Define instruction	1		01/04/2008	1,04%
	Implement safety committee	2		01/04/2008	2,08%
	Train people	3		01/06/2008	3,13%

Results

SMA result is calculated as :

$$\frac{\text{Nb. of criteria at 3x3} + \text{nb. of criteria at 2x2} + \text{nb. of criteria at 1x1}}{\text{Nb. of criteria audited} \times 3}$$

SMA result is then expressed in % :


> 90 %	Approved *
60 – 90 % (and no item with 0 point)	Acceptable with improvement plan
< 60 % (or one item with 0 point)	Immediate improvement plan requested

Scoring is visible on supplier scorecard

Supplier Audits

SEM:	Approved, 65% Short (2003-12-03) No planned audit
Quality Certification:	ISO/TS 16949, DQS, Registered: 2009-12-07, Expire: 2012-12-06 No planned certificate
Environmental Certification:	ISO 14001, DQS GMBH, Registered: 2009-12-07, Expire: 2012-12-06 No planned certificate
Logistic Audit:	A 95%, Method: Verified, Version: MMOG/LE vers.1 rel. 1. (2005-11-07)
Environmental Evaluation:	89.5%, Registered: 2009-11-11
REACH EU Compliance:	Supplier is REACH Compliant
CSR Evaluation:	91%, Evaluated: 2010-08-09
Index Audits:	+ SMA / Criticality 1 Index: 90% Verified (2009-11-12)
Capacity Audits:	No Capacity Audit found!

Performance

 Time frames used: Actual (2010-07 - 2010-09), Last Period (2010-06 - 2010-08) | View Info

The Most Common Weaknesses

- No top management involvement
- Lack of safety management ownership
- Safety considered as a standard quality
- Criticality not applied / deployed
- Poor supply chain management



VOLVO

Thank you for listening.

Any questions?