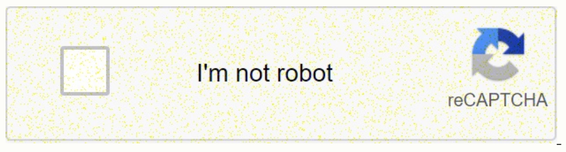

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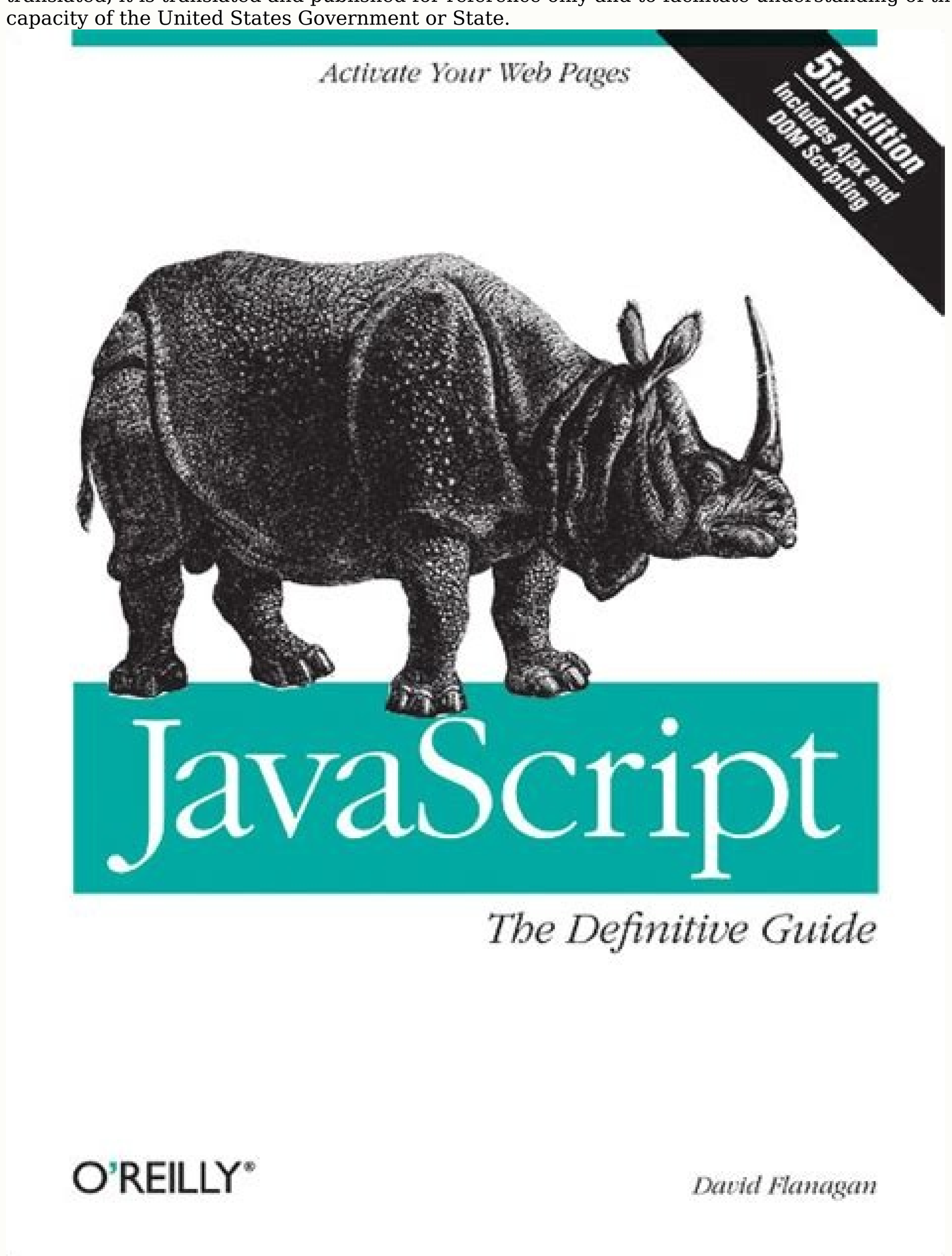

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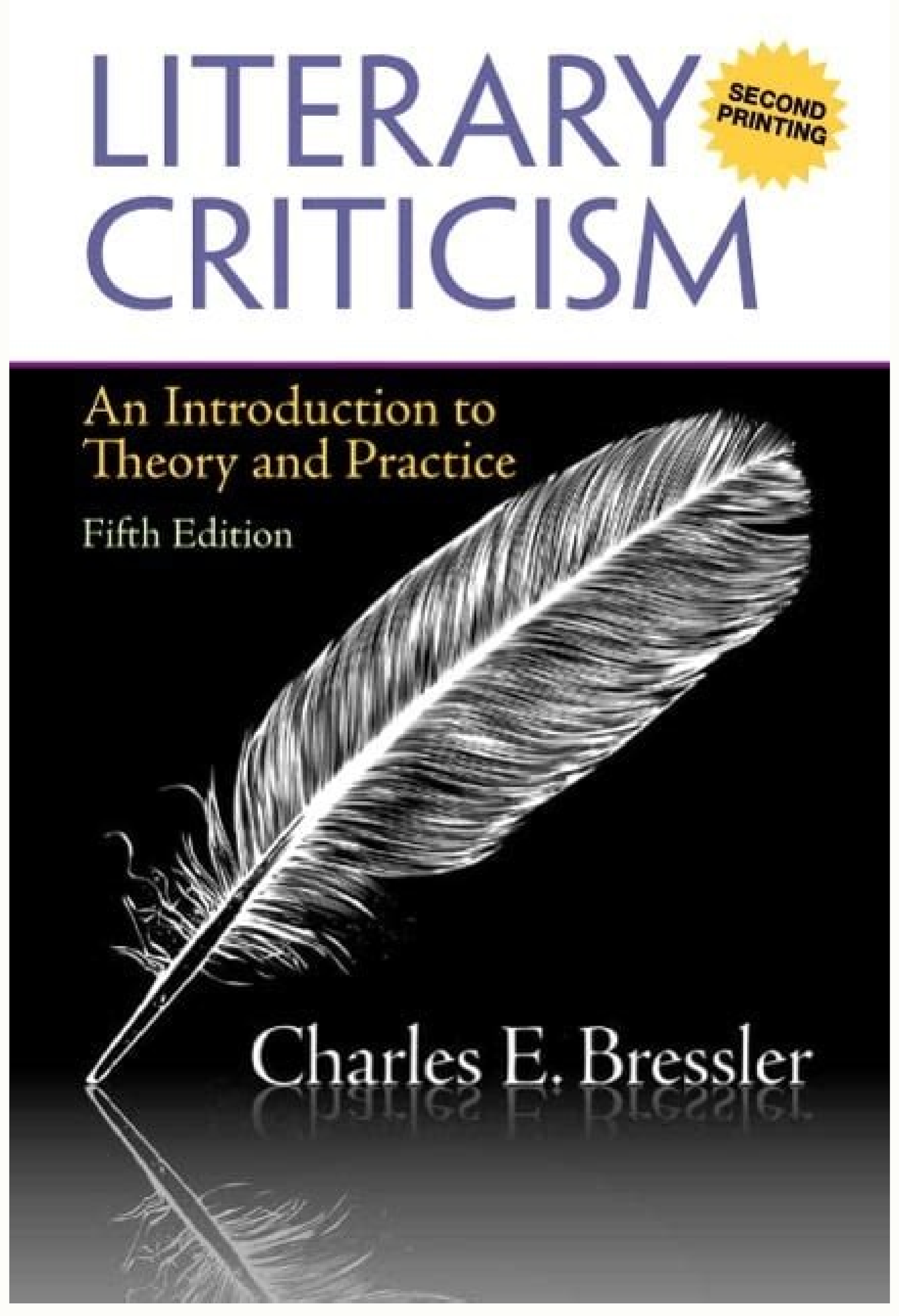

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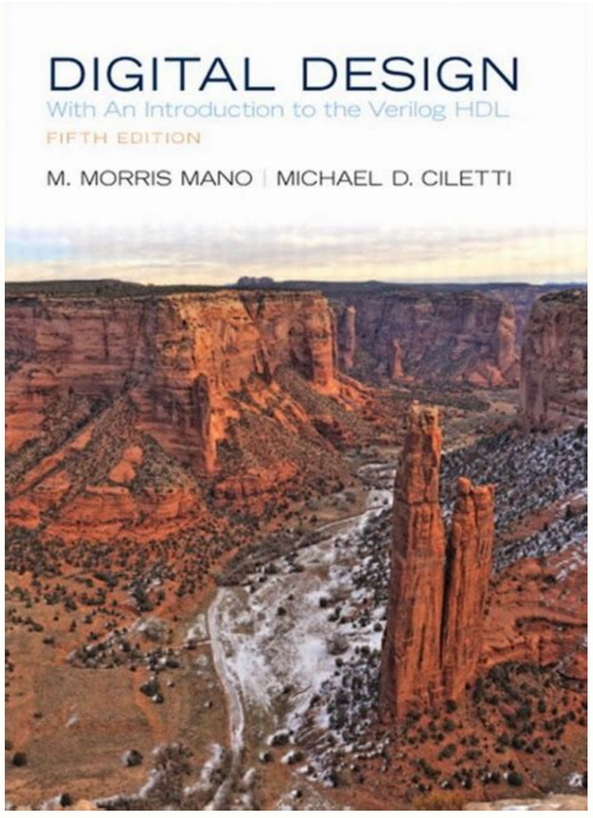

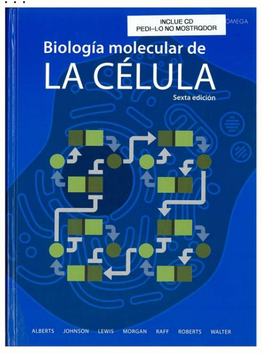

 - 11 - 1 Introduction The joint publication is in over three years of collaboration between the producers of original equipment and the automotive industry, Aiag group (AIAG) 1 -level supplier. and Association of Automobil Indians Rie (VDA). The text is completely rewritten and the FMEA method is revised in different key areas.

The goal was to create a common base in FMEA throughout the automotive sector that these organizations represent. Although all efforts are made to achieve consent, it may be necessary to refer to publications of individual companies in order to determine the specific customer requirements.

New method: it is added to further surveillance and reaction of the FMEA system (FMEA-MSR), whichA way to analyze the diagnostic detection and exclusion of errors while working with the client to maintain a safe state or compliance with the standards. The main changes A. FMEA method are described by planning and preparation, followed by a six -stage process. This is similar to the previous FMEA FMEA process in VDA Volume 4: 2012/3, with the addition of determining the beach.

A. Determining the scale of the project and planning b. Structural analysis. Functional analysis d. Refusal analysis of risks f. Optimization B. Form FMEA Hearter I) The control date II has been removed from III) is removed from III) is prepared from III) The start date and date of change IV was changed) the level of confidentiality b was added. C. Definition (new), specially designed to determine what is turned on and what is disabled in FMEA. Structure I) In the case of the DFMEA element, it applies to the system system, element and components. II) In the case of an PFMea element, it is expanded to cover the element, process step and working element of the process. III) Adide Adenegulation tracking: - 12 - IV) person, machine, indirect materials, environment, etc. D. Expected result, function of the element of the system.

And the expected result of the work and the functions of the constituent element, and the requirement, or the result, or the characteristics provided. II) In the case of PFMEA, the function/requirement applies to the function of the main element, the function of the process step and the function of the working element. volume. Analysis of failures I) The conceptual element of the focus determines the purpose of the analysis. II) change the order of columns in the form of FMEA for the refusal regime, the consequences of refusal and the reasons for the refusal to create a refusal chain (simplifying reading the history of failures). III) a change in the information flow of the design of the structure for functional analysis for the analysis of damage (significant change due to universality). F.

Risk analysis I) Evaluation of seriousness • Den scale with new definitions for each level. Separation of notes into 10 and 9 allows you to adapt to functional safety groups (security 10, regardless of warnings and 9 rules). The same scale is used for DFMEA and FMEA-MSR with another seriousness scale for PFMea. II) Assessment of occurrence • A ten -point scale with new definitions for each level. Particular attention was paid to preventive checks as the initial data for evaluating occurrence. FMEA-MSR replaces the frequency rating scale. III) Detection assessment • A ten -point scale with a newFor each level. Considerations on detection capacity and times. FMEAMSR replaces the evaluation scale of the evaluation of the evaluation. iv) the number of risk priority (RPN) and the priority of action (AP) have been replaced. AP is not a "risk" priority; Action is a priority to reduce the risk of the function it is. DFMEA, PFMEA and FMEA-MSR'DIKI are used to evaluate the priority of separate tables. G. Optimization I) modified the action proposed for prevention and detection. Two columns: ii) Added new column for "State :: not distributed, considered, continued, completed, released - 13 - hours. Special functions i) removed from DFMEA, no modification to PFMEA.

II) The special functions have been created in the Annex A1.1. Effects (FMEA) is a consolidated, systematic analytical method, qualitative for: • Evaluate the potential technical failure risk of the product.

The process is forced to analyze the causes and effects of these faults, propose measures to reduce the risk of the sector, Increase customer requirements for quality, costs optimization, greater complexity of products and processes and with the product of product commitments. Designer and producer Ricchi Esto from the legislation. Therefore, the FMEA method is used to deal with the technical aspects of risk reduction. Figure 1.1-1 The risk aspects of the FMEA are not "early" actions, but actions following the event. To obtain maximum value, the FMEA should be performed before the application of a product or process with the potential for a method of error. - 14 - Fmea is not an "autonomous" document.

For example, the output of an FMEA can be used as input for subsequent product development processes. This is a summary of the team discussion and analysis. 1.2 FMEA development date The FMEA development date covers over 60 years. The following milestones are important for the method: 1949: the FMEA method was developed by the United States Army as Mil-P-1629 military. It is used as an reliability assessment technique to describe the effects of system and hardware failures. The disorders were classified according to the effectSuccess is the safety of people and equipment. 1955: Common use of potential problems KEPNER/TEGEE 1963: American National Aviation and Space Administration (NASA) develops failure, effects and critical analysis (FMECA) for the Apollo project. 1965: Extensive use in air and air applications, food and nuclear technological applications. 1975: This method is used in nuclear energy and other sectors. 1977: Ford Motor Co. Beginning of the use of the FMEA method in the automotive industry until 1980: The analysis of error regime in Germany and the FMEA undertone (DIN 25448) was standardized. Combined by the German automotive industry (Verband der Automobile -vustrie -VDA), this method was developed especially for cars.

1986: The first description of the method was published as a VDA volume 4, ensuring quality before serial application. This method is increasingly used in the automotive industry. 1990: FMEA design method and FMEA process for the automotive industry was further developed by VDA. The application of the FMEA method in the areas of medical engineering and telecommunications took place in the 1990s. 1993: AIAG FMEA reference guide has been developed by Chrysler, Ford and General Motors Teams, which work with hope of the automotive industry of the American Association. It has been released to improve the situation where the differences in quality control (ASQC) and for instructions and formats require greater demand for supplier sources. 1994: SAE J1739 FMEA was developed by the United States of Automotive Research LLC (AUTO) by Chrysler, Ford and GM.

1995: SAE J1739 2nd edition. - 15 - 1996: VDA Volume 4, Section 2, Serial application system was published with FMEA. 1999: The German Association (Deutsche Gellschaft F la La ãr Quality E.V. - DGQ), which was recorded for quality, has set up a working group that describes the implementation of FMEA for other areas such as service industry and management projects.

2000: SAE J1739 revised according to recommended applications 2001: DGQ Volume 13-11 published. 2001: International Standardization (IEC 60812). The UAE J1739 3 Handbook served as a reference for ISO QS-9000. AIAG FMEA Guide edition was released. 2002: DGQ 13-11 volumealso revised in 2006: The VDA manual was revised in 2006.

2008: SAE J1739 4th edition is the technical basis of the AIAG reference manual, on which members of the J1739 working group make technical changes and improvements to the reference manuals AIAG FMEA. The 4th edition of the AIAG FMEA manual is also being published. 2009: DGQ brought up to standard.

2015: Recognizes the need to harmonize FMECA guidelines for the benefit of OEMs and multinational suppliers. This has resulted in improved text, standardized grading scales and refined risk assessment methodology, and the inclusion of functional safety specific risk assessments. 1.3 Objectives and limitations of FMEA The objective of FMEA is to define product functions or process steps and their associated possible failure modes, consequences and causes. It is also used to assess whether the currently planned preventive measures and detective controls are sufficient and to recommend further risk mitigation measures. FMEA helps identify a product or process by analyzing the interactions and interfaces between elements, including functional dependencies and error dependencies. Supports the development of complete specifications, test plans, and process control plans. Achievement of the following business objectives is supported by FMEA and other activities: • Improve the quality, reliability, manufacturability, performance, and safety of automotive products Maintain consistency and alignment of system requirements to sub -systems and components. Reduce warranty and reputation costs â¢ â¢ â¢ â¢ â¢ â¢ â¢ Save product and technology risk analysis for product liability Reduce late development changes Smooth product launch Targeted communication in internal and external relationships with customers and suppliers Create a knowledge base within the business, e.g. document lessons learned Follow rules when registering complaints for components, systems and tools Ensure that a hierarchy, relationship and interfaces between components, systems and tools are realized Understanding FMEA is important for correctly interpreting FMEA results It is a qualitative analysis method. FMEA shows dependencies between failure causes, which are always considered single failures. Other methods such as FTA (Fault Tree Analysis) and FMEDA for quantitative and multipoint failure analysis.Methods, effects and diagnostic analysis). These are methods that can calculate and analyze the appropriate metrics (one point error, multiple points, latent errors) to achieve quantitative analysis. And the interface between the elements that make up the system. FMEA: Reduces the time and expenditure on product renewal. Report and follow the steps to reduce risk. This helps to create reliable control plans. This helps to develop reliable project control plans. This helps engineers to prefer and focus on preventing / reducing / reducing and / or helping with products and processes and improving customer satisfaction / FMEA integration in society. The company is “a multidisciplinary operation that affects the entire product production process. FMA implementation must be well planned to be completely effective. The FMEA method is an integral part of the activities of product development and process development. 1.4.1. Obligations - 17 - Road traffic breach may include civil liability (in case of product liability) paid by the manufacturer and in the case of personal guilt, criminal liability (negligence in case of physical injury / death). Each product requires a FMEA that also defines a specific risk.

The analysis should take into account the operating conditions of the product during the period of use, in particular dangerous safety and incorrect use. References to existing delivery of the new FMAA product or product/process replacement must be documented in writing. These things should be taken into account from the legal point of view of FMEA. FMEA should be: “Must be clear or descriptions of possible failures and the measured measures must be justified. Persons responsible for performing this activity must be completely misunderstood. In this case, the use of a technically accurate version should be used, which allows the expert to assess errors and possible consequences. The terms 'flexible' or full emotions (dangerous,Avoid irresponsibility, etc.). True, i.e. the results are sometimes not pleasant (remodeling, postponement of childbirth, etc.) Possible mistakes should not be underestimated.

Detected potential faults, i.e. should not be hidden. The fear of defining too much knowledge by creating a correct and competent FMEA should not lead to limited representation. Completeness refers to the entire product/process analysis (system components and functions); It depends on the risk of depth of detail. Legal and institutional guidelines must be followed when transferring FMEAs to clients. In the FMEA, all potential errors were identified when and by whom. New technical developments, new requirements, or new product promotions may mean that the FMEA must be considered, revised, or even redone, even if no product changes were contemplated. 1.4.2. The deployment of the necessary resources is essential. This is important for the development of FMEA - the active participation of product and process owners and the commitment of top management. - 18 - Management is responsible for using FMEA. Ultimately, management is responsible for accepting the risks and taking actions to minimize the risks identified in the FMEA. 1.4.3 Protection from design know-how FMEA/FMEA process The definition of intellectual property between suppliers and customers is governed by legal agreements between suppliers and customers and goes beyond this guidance. 1.4.4 Customer-supplier agreements between customers and suppliers should be coordinated with the relevant parties and/or suppliers based on the tender or bid or tender documentation.

Among other things, an agreement should be concluded on the implementation of the FMEA, including the definition of the system boundaries, the necessary working documents, the analysis methods and the evaluation table. 1.4.5. Reuse of existing FMEA FMEA for well-known products and processes (typically used as a basis for new analyzes to provide knowledge.Product life cycle and past performance issues are not repeated. In addition, reuse also reduces costs. The reported information and notes should be critically studied in relation to the corresponding possibility of use and experience with the known application. 1.4.6 Managing an existing FMEA An existing FMEA created using a previous version of the FMEA guidance can remain in its original form for future changes. If desired, the group may decide to translate the data into the latest module and update the FMEA according to the latest FMEA procedure to take advantage of the improvements related to the latest FMEA procedure. FMEA, which will be used as a starting point for new software applications, is expected to be transformed in accordance with the new format. However, if the team decides that the new program is considered a slight change to the existing product, they may choose to leave the FMEA in its current format. New projects should follow this FMEA procedure unless otherwise specified, unless the company's procedure dictates a different approach. Note. If the new project or application is some type of existing product, it is recommended to use a base version or family, as they offer the best opportunities to leverage past experience and knowledge. If there are small differences, the team needs to identify and focus the analysis on those differences.

- 19 - 1.5 FMEA for products and processes If the products and processes are complex, it is recommended to use specialized software to use the FMEA method. This guide shows two types of FMEA examples. The software presentation illustrates what the user sees in the FMEA development using specialized software that used e.g. system element structure, function network, fault network, etc. The sheet performance illustrates what the user sees in the FMEA development sheet. There are three main cases in which FMEA should be used, each with its own application area or orientation. Case 1: New projects, new technologies or new processes. The field of application of FMEA is a complete design, technology or process. Case 2: New application of an existing structure or process. The FMEA application area is an existing design or process in a new environment, location, application, or use profile (including work cycle, regulatory requirements, etc.). The scope of the FMEA should be focused on the effect of the new environment, location, or application use on the existing project or process. NOTE: See note in 1.4.6 regardingFMES. Case 3: Technical modifications of an existing project or an existing process. AMDE contains a set of knowledge on a project or process and can be revised after starting production if one of the following elements applies: problems), for example. Factory experience, zero mileage or problems in the field, internal/external complaints changes in risk analysis and risk assessment (hara) changes in the results of risk analysis and risk assessment (Tara) due to the adaptation of the surveillance of the products which have been found in the two main suites for FME: analysis based on the characteristics of the product or the steps of the process. 1.5.1 Design AMDEC Design AMDE is an analytical method which is mainly used by the responsible design engineer to secure it and examine it for production before the publication of the room. Each element must be evaluated with all the associated systems, assemblies and components. -The FMEA project analyzes the characteristics of the system of interest, such as the limit indicated in the limits scheme, the relationships between its basic elements and external elements outside the limits of the system are determined to identify and eliminate possible weaknesses of the project for transfer. Eliminate potential risks and minimize failures. The FMEA design can also be used to assess the risk of product failure other than other such as machines and tools. The measures resulting from the analysis can be used to recommend changes, additional tests and other measures that reduce the risk of failure or increase the ability of the test to recognize errors before the design is subject.

1.5.2 FMEA processes unlike Design FMEA (DFMEA), which analyzes the default options that can be created during the product design phase, Process-Fmea (PFMEA) analyzes the manufacturing processes' failure scenarios, assembly and logistics.

Here, the emphasis is placed on the possible errors that occur during these processes. These faults may differ from the defects analyzed in the AMDE of the project. 1.5.3 of the AMDEC information flow of design to AMDEC processing It is advantageous to negotiate interfaces between fm. In order to report consequences and severity, we agree and agree with gravityYou can see between the levels. 1.5-1. FMEA FMACE FMACE-21-DESIGE FIGURE contains information corresponding to the FMEA: ¢ ¢ ¢ e ¢ Érore, not to production), which corresponds to the process, contains information that requires adaptation to the FMEA project. Types of failure and severity of the consequences of the failure Note 1: In addition, the additional effects of the process must be taken into account, in particular, the potential consequences for new operations and the safety of operators, which are not Included in the FMEA 2 project: expectations concerning the information flow of DFMEA to PFMEA differ in uniform development flows, for example, when the development of the “standard” process is preceded by the development of products that will be produced there. In such cases, the corresponding information flow between these FMEAs should determine the organization. An example is: obtaining a placenta in a leaf transmission case with a flowed metal transmission, a formation is used that, when choosing another drill diameter, can change every 2 mm .

If the operator selects the wrong formation, the hole will be 2 mm too large or 2 mm too little. These two failures cause the consequences of refusal, which are not included in the FMEA project. 1. Przy Otworze, Który Jest O 2 mm Za Duży, Wał Będzie Mia Mia Pump Duży Luz Style, ż E, for example, can meet a capacitor located next to the video and break it. 2. In the hole, which is 2 mm too small, the tree cannot be installed in the hole. If the operator selects the correct training, but which is used, this will lead to the failure (the hole is just below the limit of the lower tolerance), which can lead to the effect of the refusal, which has already been analyzed in The FMEA project.

It should be noted that incompatibility with the function of the product leads to the influence of failure. Only in this case, there is a refusal effect in the projectAs in the FMEA process. All error effects caused by process errors and are not identified in FMEA design, must be redefined and evaluated in the FMEA process. 1.6 Project planning Five TS is five topics that should be discussed at the beginning of DFMEA or PFMEA to immediately achieve the best results and prevent FMEA. These topics can be used as part of the project opening. FMEA team, who must be on the team? FMEA Time - When is it due? FMEA intention “Why are we here?

FMEA - How do we analyze? FMEA activity What work should be done?
1.6. This should include specialized knowledge and knowledge of the FMEA process. FMEA success depends on the active participation of the exceeded team to focus on the topics of the discussion. -23-1.6.1.1 FMEA team Central team can consist of the following people: • • • • The quality/reliability of the FMEA dating site (Passages 1 -3) FMEA dating. A large team (coordination of FMEA moderator) can participate on request.

A large team may include the following: • • • Buy a representative of supplier of other customers who may have specialized knowledge to help the central team analysis of specific aspects of the product /manufacturing engineer for engineers engineer engineer quality /reliability FMEA (passages 1 - 3) and participates in FMEA meetings. A large team (coordination of FMEA moderator) can participate on request. A large team may consist of the following: “¢ € - 24 - Engineer Engineer Engineer Engineer Engineer Engineer Engineer Management Engineer for Maintenance of Workers who meet purchases (if necessary) 1.6.1.3Responsibilities in the product development process should be assigned to the following roles and responsibilities for FMEA involvement. The responsibilities of a particular role can be divided among different people and/or several roles can be assigned to the same person. 1.6.1.3.1 Management, p. Management responsibility includes direct support to the team by clearing existing inspections and roadblocks. Budget manager. 1.6.1.3.2 Engineer - Projector/Process Leader (Technical Leader) - - Identify the elements, functions, requirements and interfaces that focus on the necessary information and the necessary information containing the lessons learned 1.6.1.3. 3 FMEA Facilitator - FMEA reduction for the Team's participation in the development of an approximate program - 25 - € participation in the development of the guiding principles/decisional criteria for the Analysis phase. Development of enterprise products or sample products for rubrics (optional) with the support of process engineer/method (FMEA) competence and participant familiarity with the FMEA method, FM fluency software documentation (if required) social skills ability. Work in the Authorized Moderator's TEM, persuasiveness, organizations and presentation skills that control the implementation of the 6 steps of the FMEA method, analyze the FMEA working group if necessary, showing that the actions preserve the FMEA documents on decision. -manufacturing. Documentary note. Any team member with the appropriate skills and training can act as a facilitator. 1.6.1.3.4Planning status already contributes to previous experience with FMA with participation of 6 steps FMA. Dalyvavimas Rengiant vs Atvejsk įtraukiant iithmoktas pamokas 1.6.1.3. The successful implementation of the FMAA program is timely. The previous time was properly completed by the FMEA, where product/process changes may be the easiest and most expensive implementation and reduce backlogged changes. FMEA, as a system to prevent analysis and system failure, preferably 26 - begins at an early stage in the product development process. It is used to assess the actual risks at the time to take action to reduce them. In addition, the FMAA can help prepare the requirements. FMAA should be carried out according to the project plan and evaluated at the project stages according to the analysis status. The company is recommended to determine the required reimbursement levels of the FMAA in accordance with the general stages of the specific projects for the development of the company, such as ¢¢¢¢¢¢¢¢¢¢¢ ¢¢¢¢¢¢¢¢¢¢¢¢¢ aged Â . Forecast information flow information from DFMEA to PFMEA Perform DFMEA analysis before publishing proposal, complete DFMEA actions before starting production tools, complete PFMEA analysis before making final procedural decisions before PFMEA to PPAP/PPA. process. Figure 1.6-1. FMEA time (APQP phase) - 27 - 1.6-2. FMEA Times (MLA)1.6. Recommended level of training at the level of awareness of a 6 -circular review of the FMA process. 1.6.4 FMEA tools are plenty of FMEA software packages that can be used to create DFMEA and PFMEA, as well as the following events. This software differs from special FMEA software to individual standard FMA development calculators. Companies can create solutions for their internal database or buy commercial software. In any case, the FMEA team should have knowledge of how to use FMEA software, as required by the company and / or client. An example of this manual is an example of creating a FMEA using a structural tree or table. If structural trees are used to create elements, functions and chess; There is also a message that shows how information may seem included in the message. In any case, the process of 6 steps is the same. 1.6.5 FMEA tasks in 6 -speed review show the structure of the problem and results of the FMAA. In addition, the FMAA team should be - ready to revise the results of its analysis with management and client on request. FMEA can also check the internal auditor, an auditor -client or the third recorder to make sure that each task has been completed.

Methodological analysis of FMA design, FMA process and other monitoring of the system and FMAA (FMEA-MSR) are described in detail in the following parts. As a result, the release is inevitable. This has an advantage for users because he or can directly apply to the design and / or fmea and / or FMA-MSR departments process without combining other chapters. - 29 - 2 FMAA Project FMA Design is performed in six phases. These six phases provide a systematic approach to analyzing failure and effect mode and are recording technical risk analysis. Figure 2-1.

2.1 Construction steps FMA FMA 1: Determination of application area 2.1.1 FMEA application The purpose of the design is to determine what is included and is not included in FMEA based on the analysis created by the type, ie the system has a subsystem or component. The main targets of the FMAA design are: •Selection of the aspects of the project included in the project review plan (DFMEA activity, see 1.6 paragraph) of the relevant learned lessons and information material that will be used to define volume. Define a team responsibility clear understanding of what to evaluate before FMEA begins. What excludes can be as important as and what to include in the analysis. The scale is set at the beginning of the project to ensure consistent direction and attention. FMAA teams should focus on the areas of risk that lead to the main causes and effective remedial actions. FMAA discussions should focus on problem areas, which are determined by at least one member of the cohesive FMEA team. It is best to avoid long discussions with low rates. The higher the risk, the deeper the discussion should be. Low -risk issues should be discussed less but properly.

Effective FMEA link, Carl Carlson, John Wiley & Sons, 2012 These Resources can help the team define FMEA volume: Legal Requirements Technical Requirements for Customer Needs / Expectations (External and Internal Customer) Requirements Specifications Specification Specifications Functional Model Scheme Parameters Schematic Orienteering Matrix Scheme Materials List (BOM) Previous Analysis of FMA similar products and risk assessment (HARA) Analysis and Risk Assessment (Tara) Production and Association Design (DFM/A) Quality History (OWN), Zero Mileage, Operational Defects, Operational Defects guarantees and insurance claims for similar products) QFD Function Quality in determining the Vienna FMA application area can be taken into account by these criteria, but not limited to: ➢ allow ➢ allow allow allow ➢ Distribution History History Complexity Design of Human and Systems Safety Cyber Systems -Physical (including Cyber Security) Catalog and parts of regulatory legislation - 31 - COP When scaled, it is necessary to fill in the headline of the DFMEA document. The title contains this basic information about DFMEA volume: Company Name: System/Subsystem/Component/DFMEA Part of the Company Name: The name of the product analyzed the name of the client: the name of this document and system client (s). / Subsystem / Component / Part / Platform Model Year: The initial year of vehicle model and / or vehicle program asSUBJECT: Name of the PFMEA DFMEA START project: the team has started the DFMEA-CROSS functionality team: Team whose members are organizations and represent representatives of customers and suppliers; Team members can be internally or externally on the organizational date of the DFMEA revision: review of a certain DFMEA univoco document (date of the latest revision) DFMEA ID number: DFMEA DFMEA Diditification number for the project: person responsible for the project. This person also accepts the property of the contents and the detection of DFMEA. Confidentiality level: the level of confidentiality defined by the owner of the DFMEA, including the internal company use, limited, reserved. The main target analysis of the project structure is: • Identify the essential elements of the system and define the structure of the display system the analysis of the area, the interfaces and interactions between defined system elements. View from the trees of the structures, blocks of blocks (limits) etc. 2.2.2 System structure The system consists of system elements. Depending on the extent of the analysis, the systemic elements of the design structure can consist of systems, subsystems, solos and components. Complicated structures can be divided into different structures (working packages) or various development diagrams and analyze independently or guarantee sufficient transparency for organizational reasons. The system has a limit that separates it from other systems and environments. His relations with the surrounding area are determined by inputs and expenses. 2.2.3 The FMEA -FMEA system consists of various subsystems and components that are shown as system elements. The system component is a separate component of a functional component, no function, requirement or property. The system and subsystems depend on perspective or responsibility. Systems offer vehicle functions. These functions have fallen from subsystems and components. The subsystem and the system are treated for analysis purposes. The system can be analyzed by interfaces and interactions between systems, subsystems, environments and customers (e.g. level, OEM and end user).There may be software, electronic and mechanical components inside the system. Examples of systems include: vehicle, travel system, control system, brake system or electronic stability control system, etc. 2.2.4 FMEA component is a subset of the FMEA system.

For example, the brake block is part of the brake unit, which is a subsystem of the frame system. - 33 - 2.2.5 The identification of customers in the FMEA analysis should take into account two main customers; Everyone can be considered: • an end user is a person who uses the product after it has been completely developed and sold. Assembly and production: places where production operations are carried out (e.g. gears, pressing and production), as well as the installation of vehicles/products and the processing of production materials. The connection to the interface between the product and the assembly process is essential for an efficient FMEA analysis. It may be any subsequent or subsequent action process or production of another level. Knowing these customers can help you define functionality, requirements and specifications and help you determine the consequences of the refused refusal systems. NOTE. Note in section 2.4.5 for cases where the final use is unknown. Usually two methods are used to view the system structure: • Block schemes 2.2.6 lock schemes/locking patterns (see Fig. 2.2-1) show logical connections between the components of the product. There are several approaches and formats for the creation of a development diagram. The development diagram shows the interaction of components and subsystems within the project, as well as the interface of the product, the customer, the production, the services, the supplies, etc. The Development Diagram/The Borders should identify each person and the things with which the design project with the limited path interacts. For the life of the project.

The scheme can be in the form of blocks connected by lines, in which each block corresponds to the main component of the product. The lines correspond to how the components of the product are interconnected or intended to interact. The organization will determine the best approach or format for the boundaries of the scheme/block. The diagrams used in the preparation of DFMEA must be included and/or should be connected in the DFMEA file/documentation. - 34- Figure 2.2-1 Scheme/border blocks Figure 2.2.7 Structure structure the trees of simplifying hierarchically the elements of the system.Illustrates dependence through structural ties. Therefore, a clearly structured representation of the full system is guaranteed by the fact that each element of the system exists only once to avoid redundancy. Structures located under each element of the system are independent substitute (see Figure 2.2-2). The interaction between the elements of the system can then be described as functions and shown by functional networks (see Analysis of the step 3). There is always a current system element, even if it is obtained only from the function and is no more clear. - 35- Figure 2.2-2 An example of structural analysis using structural structural structures. System structures can be created in the section "Structural analysis". A characteristic type [geometry, material, surface purchasing, coating, etc.] -3 Example of the structure of the structure using table 1. System (element): the highest level of integration in the analysis sector. 2. System element (element/interface): target element. This is an element that obeys the chain of failures. 3. Component element (element/interface): the element at the next level in the structure of the focus element.

The field of the main goals of analysis of the design function is as follows: describe in detail each function using parameters or other methods for the purpose/properties of individual functions. On visualization, for example, a network of structures/functional structure of trees, a cascade of functional matrices (external and internal) with the relevant requirements for the planned use of the TOON ERVATION HEN HEN OF TOON ¢ IS Iges are characteristic and requirements. This requires knowledge of the systems and environmental conditions of the system, such as heat, cold, dust, water projections, salt, frost, vibrations, electric breakthroughs, etc. 2.3.2 The function describes a function that a function functioning an element of the article / SystemHe was going to do. A function must be assigned to a system element. In addition, a structure element can have multiple functions. The description of the function should be clear. The recommended sentence format is to use an "action verb" followed by a "noun" to describe the measurable function. Function must be "current"; Use the basic form of the verb (deliver, grab, check, collect, pass). Examples: power delivery, fluid retention, speed testing, heat transfer, blackness. Functions describe the relationship between input and output of a system model/element to perform a task.

Note: A component (i.e. a part or an item in a parts list) can have a purpose/function without an input/output. Examples such as finish, grease, clip, bracket, body, joint, fusion, etc. have properties and requirements including material, shape, thickness, etc.

- 37 - In addition to the main functions of the product, there may be other functions that can be Evaluated functions, secondary functions, such as interface functions, diagnostic functions and maintenance functions. (See Figure 2.3-1) 2.3-1. A picture. Input/interface/output flow 2.3.3. Interface An interface is a certain function that describes the interaction of system elements. There are five main types of interfaces: - fishing (such as brackets, screws, clamps and various connectors), material exchange (such as or materials), energy transfer (such as heat transmission, frictional movement or displacement, e.g. chains or gear shells) data exchange (e.g. computer input or output, cables, electrical signals or other information exchange, IT security elements) Humanity - Makhina (e.g. commands, switches, mirrors , screen, messages , seat, I/O) Another type of interface can be physical distance between parties where there is no physical connection. Games can be static and/or dynamic. Because interfaces can comprise up to fifty percent or more of all failure modes, it is important that any FMEA consider the interfaces between subsystems and components in addition to the contents of the subsystems and components themselves. Responsibility for each interface and interaction can be defined within the FMEA team or teams. 2.3.4. Requirement A requirement is a measurable function associated with the performance of a function; for example. resiliencePower), Fluid (Volume), Speed (RPM), Heat (Temperature), Color Fade (Ozone Resistance). - 38 - Functional necessity is a criterion where an intended function is discussed or measured. This can be defined by the descriptive properties of the requirement. These features are divided into two groups: functional requirements and non-functional requirements. A non-functional requirement is a design decision boundary, such as material hardness (functional), non-interference (non-functional) material selection. ISO 9000 defines a requirement as a need or expectation expressed in documented information. Information. A general indirect "requirement is a general or common application of the organization that specifies the internal requirements of the product (eg. Defined. Derived from it. 2.3.5. The product is a mark of product difference (or a quantitative attribute that can be detected as subjectivity). For example, the diameter or surface coating 2.3.6 Parametric diagram (P-diagram) P-diagram, team understanding of physical related functions and element/system element noise factors It is a structured tool to help reduce sensitivity A - 39 - P -DIAGRAM can be used as needed to demonstrate its impact on a system element The team analyzes design investments and expected and unexpected outcomesAs well as controlled and uncontrolled factors that may affect performance. The inputs and outputs of the product, i.e. H. Expected characteristics and side effects of the product, environmental impact, noise factors and control factors are useful for determining inaccessible output data. Using this model, you can present and discuss individual functions with the required inputs and outputs.

Control factors assigned to functions are also presented. Particular attention should be paid to all noise factors, such as operating conditions. In reality, the output (gray area) of the element/element of the system often deviates from the desired behavior (straight line). Managing factors affect the project in order to get as close as possible to the desired behavior.

Rice. 2.3-2 An example of the behavior of the system is a full functional description forms the basis for the subsequent analysis of errors and risk reduction. The functions are described in table P with an active verb, followed by a noun, measured in the present time and related to requirements. Below is the parameter diagram that evaluates the impact on the main/primary function of the product: - 40 - Figure 2.3-3 diagram of parameters 2.3.7 View functions. The interaction of the functions of different elements of the system should be demonstrated, for example, in the form of a wood/network of functions or a matrix of functions. The analysis is focused on waterfalls from OEM to the level of level 1 and the level of level N. The purpose of creating a tree/network of functions or functional matrix is the integration of the technical dependence between the functions. Therefore, he supports the display of dependencies on errors. When there is a functional relationship between hierarchically related functions, there is a potential connection between errors associated with them. Otherwise, there will be no functional connection between hierarchically related functions, there will be not even a possible connection between related errors. To create functions of functions/network, it is necessary to study the involved functions. Fufunctions allow you to perform a global function. All subfunctions are logically connected in the structure of the function (logical and relationships). The structure of the function becomes more detailed from top to bottom.

A lower level function describes how a higher level function should be performed. For a logical sequence of functionIt is useful to ask: - 41 - Figure 2.3-4. An example of feature analysis using the structure of tree backgrounds can be created in the functional analysis of the table: property analysis (step 3) 1. The product and the next requirement at a higher level.

Requirements raise and lower the window by parameters. The switching system transmits electric current between pairs of electromagnetic converter coils in Figure 2.3-5. 3. Another function and requirement with a lower level or feature of the brush board body transmits the forces between the spring and the motor body in such a way that the brush spring system is the functional analysis of the x, y, z position (Point support switching) using an array. (1, 1, 2, 3) and color codes are included to show the content of structural analysis and related functional analysis (see Figure 2.3-6). In this chapter, you work - 42 - from left to right to answer the question: "How does the function provide a function with a lower level with a higher level?" 1. System function: analysis function volume.

2. Function of the system element and expected performance result: the function of the associated system element (focused element), which was determined in the analysis of the structure. 3. Function or characteristic of component element and output: the function of the associated component element, which is determined by structural analysis. - 43 - 2.4. FMA Draft Step 4: Pose Analysis 2.4.1. The purpose of design failure analysis is to identify the causes, types, and consequences of errors and show their relationship to assess risk.

The main objectives of the analysis of design defects are: • Identification of possible damage to the functions of structural elements; Determination of the chain of failure (consequences, regime, causes); Visualization of fault connections (errors). Networks and / or FMEA computer) Cooperation of customers and suppliers (consequence of errors) 2.4.2. Functional errors come from functions. There are different categories of a possible error, including: • • • • • • • • • • • • • time) exceeds function (i.e. above actionthreshold) Intermittent function (that is to say action starts/stops/random) unexpected function (that is to say, erroneous hour, unexpected sense, irregular action) delayed function (that is to say, Action after an unexpected time interval) Figure 2.4-1 - 44. - Types of damage to the system and the subsystem failure mode is described in terms of loss or functional degradation. The steering wheel turns to the right when the hand is moved to the left, for example an unexpected function. If necessary, the condition of the vehicle must be included, such as loss of management assistance when starting or stopping. The type of component defect consists of a name and a defect description, e.g. The stamp is folded. The description of damage must be clear and understandable for the person who reads it. "Failure", "erroneous", "invalid", "damaged" etc.

That is to say, several faults can be associated with insufficient function. Therefore, the crew should not stop as soon as a defect is found. "Otherwise, how could he fail?" Illustration 2.4-2. Definition of failure 2.4.3. Chain of defects The AMDE Analyzes three different aspects of failure: • Failure effect (FE) Failure mode (FM) FCA (FC) - 45 - Figure 2.4-3. Theoretical error chain model 2.4.4. Based on the characteristics of network analysis and chain, the failure methods are derived and the failure chains (for example failure of failure/failure of failure/damage trees/damage) are generated during the analysis of failures (See Figure 2.4-1).

The main element of the structure of the lesion is the mode of failure with the consequences and the causes of associated failure. Depending on whether the analysis is carried out at the level of the system, the subsystem or the component, the failure can be considered as a failure effect, a mode of failure or a cause of failure.

The failures, the causes of failure and the consequences of the failure must correspond to the appropriate column of the FMEA form. Figure 2.4-4. -46-Nature of the defect at different levels to connect the cause of the defect (s) to the fault mode, "Why the fault mode works?" "What's going on in fault mode?" To correlate failure with the defect regime. Figure 2.4 - Figure an example of error analysis using the structure of the errors' tree structure can be created in the Error analysis calculation sheet section. Development analysis (Step 4) 1. Impact of damage (FE) on the immediately higher level element and/or the end of the vehicle.Too low torque and engine speed speed of the glass Figure 2.4-6. 2. The failure mode of the focusing element (FM) 3. caused by another lower element or characteristic error of the commission system (FC), temporarily connect damaged coils. (L1, 3 and 2 instead of L1, 2 and 3) which leads to the card body on the brush card card on the brush card, because CO2 in the contact area, e.g. analysis, such as the analysis of the failure, the use of the table is too small - 47 - again the head number (1, 2, 3) and color coding when checking elements in functional analysis, start creating an error circumference.

1. Effect of error (Fe): Effect of an error related to the function of the system or system element in functional analysis. 2. Failure mode (FM): a failure mode (or type), which is assigned to the function of the system element in functional analysis. 3. Cause of failure (FC): Cause of failure related to the function and output or characteristics of the component function in functional analysis.

2.4.5 The effects of failure The effect of the failure is defined as the consequences of the failure mode.

Describe the impact on the next level of product integration (internal or external), end user, vehicle operator (external) and legislation (provisions), if this applies, the client should specify which users. Report or experience enabling the exposure that has such an effect may affect security. The goal is to predict the impact of errors in a manner corresponding to the level of team knowledge. Error mode can have several consequences for internal and external clients. OEM manufacturers can share influence with suppliers and tax providers through design cooperation. The severity of the effects of the failure is assessed on a ten -point scale in accordance with Table D1. Examples of the effects of errors for the end user/vehicle: non -profiness/friction, squeaking/rattling, bad appearance, e.g. peaks, colors, colors, cosmetic sounds of corrosion, e.g. noise transmitted by liquids, jerking/rattling, unpleasant smell, roughness in touch, Increased effort. influence the action, broken, unusable electromagnetic compatibility (EMC) external leakage causing power loss, irregular action, irregular action, irregular action, irregular action, irregular action, irregular action. , unstable, unstable, damaged, loss of condition pay attention to driving or braking: in some cases the team may not know the analysis that may not know this analysisIf this information is not known, such as catalog parts, standard products, Tier 3 components, this information should be defined in terms of function and room properties. In these cases, it is the responsibility of the system integrator to select the right part of the application such as cars, trucks, maritime, agriculture. Another column is listed in the evaluation tables for "commercial or product group samples". 2.4.6 Failure method. The method of failure is defined as a way that an element cannot respond or provides a programmed function. Failure methods are caused by functions. Failure methods should be explained in a technical way and should not be defined as visible symptoms for the customer. When preparing DFMEA, we assume that the design is made for design and assembly is done. In cases where past data shows that there are deficiencies in the production process, exceptions can be made depending on the discretion of the team. Although the examples of component fault modes are not limited to these: correct component fault broken component broken component corrected fracture loose oxidized parts formation level fault mode samples are not limited to these: Â ¢ â ¢ â ¢ â ¢ â ¢ â ¢ â ¢ Complete inadequate structural support to maintain the loss of structural support. No signal / signal / intermittent voltage provides insufficient pressure / voltage insufficient pressure / voltage provides inadequate pressure / signal / voltage / voltage / voltage insufficient Provides pressure / signal / voltage. Load / temperature / vibration - 49 - 2.4.7 The cause of fault is a sign of failure, why it may cause failure. This is a mechanism of failure.

The result of the case is the bankruptcy procedure. If possible, define each possible cause for each fault mode. Why should it be as short and complete as possible for the correction efforts (controls and actions) to be directed to appropriate reasons. The types of potential assets and the relevant reasons for fault, without restriction, may be the following: wrong geometry, the wrong surface process for application, the wrong surface process, inadequate movement specification, false friction specification, material, insufficient lubricity, inadequate assumptions, incorrect algorithm, wrong algorithmSoftware functionality, incorrect maintenance instructions, etc.) System interaction (mechanical interfaces, fluid flows, heat sources, controller feedback, etc.) Variation in time (efficiency, effort, material instability, muddy, wear, corrosion , chemical oxidation, electrical migration, etc.)). , overload, etc.) external environment (heat, cold, humidity, vibrations, road debris, road rooms, etc.) Error or behavior of the vehicle operator (poor equipment, poor pedal, excessive speed, towing, bad Type of fuel, maintenance damage, etc.) Differences (changes in tolerance) lacks durable construction for production (the geometry of parts causes certain parts or vice versa, certain lack of design characteristics, construction of the shipping container causes scratches or glued parts, the treatment parts cause damage, etc.) which are missing code / damaged code / data) a detailed description of the cause of the failure allows you to apply more precisely the control of the determination PRVA. The analysis of the structure, the analysis of the functions and the analysis of the defects can be recorded as indicated in the spreadsheet below. 2.4.8. Once the analysis of the structure, the analysis of functions and the analysis of failures, the structure of the wood or the spreadsheet can be summarized, it can be different views. - Figure 2.4-7 Structure of the calculation sheet DFMEA 1. Next level higher 1. Function and higher level function and requirement 1. Effects of the failure of the following level element and / or the window of the window of the window of the window of the window of Final window The user increases and decreases (FE). Depending on the parameter of the window lifting engine pair, it is very low in the image. The pairs of electromagnetic electricity converters connect the switching system with spaced coils (L1, 3 and 2 instead of L1, 2 and 3), an image of the angular focus element 2 Image 2.4-9 operation of the product - Views of the Error Table - Table and 3. Next level or characteristic type [Geometry, Material, 3. Function and requirement of a subsequent lower level or 3.

Subsequent lower failure (FC) - Surface finish, covering , etc.] Characterization of the base of the brushes or the accommodation of the characteristics of the characteristics transfers the forces between the spring and the body of the engine to maintain the spring system of the brush in position X, Y, Z (supportPicture. Control List"Proof of material" or "isolated lessons" are not completely clear instructions.

The DFMEA team should also consider the design area as a precaution. - 53 - Examples of current preventive measures: ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ Electromagnetic Compatibility Directive, Directive 89/336/EEC System design and tolerance according to modelling. Analysis of the calculation procedure of the concepts for determining the projection requirements Published standards for the design of the heat transfer class of the fiber class in the drawing of the technical characteristics of the sensor. Mechanical backup design (tolerance) with ability to verify design standards and materials (internal and external) improved experience documentation records, lessons learned, etc. from similar designs, error protection (eg Poka Poka-Yoke eg part geometry prevents mis-orientation) This is largely identical to the design tested in the previous application and has proven performance. (However, as the duty cycle or operational conditions change, the temporary element requires re-inspection to ensure that detection controls are adequate.) Compliance with best practice is verified by detection monitoring after the end of mitigation. 2.5. Current FMEA determination tests are planned activities (or activities that have already been completed), not potential activities that may never be performed. Existing detection tests should be clearly and comprehensively described.

A list of items such as "test" or "laboratory test" is not a relatively clear indication of the identification of control items. References to specific tests, test plans, or test procedures, when applicable, indicate that the FMEA team has determined that the test will indeed find the type or cause of the rejection, if that is the case (e.g., Test #1234 "Test Test", 6.1 . point).). Examples of current control items: - 54 - Functional control of explosive environment tests - Testing of research experiments Measurement of output voltage, which allows to determine the cause of rejection, the type of rejection or consequences of rejection is introduced."Recognition Controllers" column.

2.5-1. Image. Prevention and detection of FMA in construction 2.5.5. Revision of existing prevention and detection controls should be approved after the effectiveness of existing prevention and detection controls. You can do this by reviewing your order confirmation. Such approval may be documented in accordance with the normal DFMEA team product or other proper project documentation development process. If the control is found to be ineffective, additional measures may be required. When using FMEA records from previous products, cases and findings should be checked because the new product may be subject to different conditions. -55 2.5-2. Image. To understand the design 2.5.6. See each failure mode when assessing risk, evaluate each cause-effect relationship (patterns or fault network). There are risk assessment criteria: Severe (s): medium severity of error effect (O): means to determine the cause of the error (d): means to determine the cause of the error and / or error mode. S and D, assessment images from years 1 to 10 are used; 10 The highest risk investment. Priorities require these reviews separately and with three factors. Note 1: Even if the product/process looks the same, it is not correct to compare FMAA ratings to another team's FMEA ratings because each team's environment is unique and therefore unique and unique is unique and therefore unique so unique Therefore unique, they are unique and therefore their respective individual reviews will be unique (i.e. reviews are subjective). 2.5.7. Severity(s) Severity(s) is a measure of the most severe impact of failure on a given function failure mode. The assessment is intended to prioritize the application of one FMEA and is determined independently of the event or determined. Severity should be assessed based on the significance criteria in Table D1. The table can be extended by adding specific product examples. The FMEA project team should agree on a consistent evaluation criteria and evaluation system, even if it changes to analysis analysis. If necessary, the customer must inform the customer. 2.5.8Effectiveness of preventive control based on evaluation criteria. The evaluations of events should be evaluated in accordance with the criteria of the D2 events table. The table can be integrated using examples of certain products. The team of the FMA project should agree with the evaluation criterion and the evaluation system, which would also be consistent after modifying a single analysis of the project (for example cars, trucks, motorcycles, tractor, golf wheelchair, etc.). The evaluation number of an event is a relative estimate of the FMEA system and may not reflect the actual event. The evaluation of the events describes the possible cause of an error that can occur in the customer's work according to the evaluation table, taking into account the results of the detection detection. For example, for the analysis of evaluation numbers, specialist knowledge, data managers, guarantee databases or other experiences in similar products can be used. As for the cause of failure, this occurs in view of the effectiveness of existing prevention control. The accuracy of this evaluation depends on how much preventive control has been described. Questions like this can be useful for a team to determine the correct evaluation of events: in this sector? Is the article a portable product or similar to an item at the previous level? How are significant changes compared to the previous element of the previous level? Is the article brand new? What is the application or what changes in the area? Was the technical analysis (e.g. reliability) was used to evaluate the estimated comparative impact of the program events? Has preventive control been implemented? Was the strength of the product demonstrated during the product development process? - 57 - 2.5.9 evidence (d) evidence (d) The evaluation is calculated for a measure of the identification management measure in order to reliably view the cause of the error or the method of error before the product comes released. The assessment of recognition is an assessment associated with the most effective control of the control.

The detection is a relative evaluation in the single FMEA and is determined regardless of gravity or the event. The detection should be assessed in accordance with the criteria of Table D3. This table can be expanded with examples of conventional identification methods in companies.

FmeaThe team must agree with the evaluation criterion and a coherent evaluation system, even if they are adapted to the analysis of individual products. Initially, the note is detected by the forecast of the effectiveness of any control that is not proven. The performance can be checked and re -evaluated after the detection control is completed. However, the completion or cancellation of detection verification (such as a test) can also affect the estimation of the impact. When determining this respect, you should consider questions such as the consequences: What is the profile of the use/use cycle required to detect bankruptcy? What sample size is necessary to detect the failure? Does the test procedure detect this cause/failure mode? Table D1 DFMEA product severity of general assessment criteria. Impact of the gravity of the bankruptcy potential classified on the basis of what the end user may succumb - 58 - SEV 10 severity criteria affects the safe operation of the vehicle and/ or other vehicles, operator's health or passengers) or road or pedestrian users . 9 Failure to summarize the regulations. 8 Loss of the basic functions of the vehicle necessary for normal driving in the planned period. Empty, as long as the service user is completed by the company's line user or 7 degradation of the basic function of the vehicle required for normal driving. 6 FUNCTION FUNCTION. 5 Degradation of the comfort function. 4 Quality perceived by appearance, sound or tactile unacceptable for most customers 3 features perceived by the appearance, sound or wallpaper unacceptable to many customers 2 features perceived by appearance, sound or taxed taxable for some customers for some customers 1 without noticeable.

Table D2 D2 DFMEA A potential event or in accordance with the criteria of the product product speech for potential bankruptcy lead to the bankruptcy method in relation to prevention control, assessed for the planned duration of the service (qualitative assessment) produced in the company (new design, applications or cases of use) the best use product denunciation practices, design principles, business standards, learned lessons, sector standards, material specifications, governmental regulations and the effectiveness of prevention tools, including computer assistance engineering, mathematical modeling, research and research and research and simulation tolerances accumulate in white as long as They will not fill examples of the company's ranges or productsThe occurrence of experience with product 10 during the expected duration can be determined at the moment, no preventive control or occurrence during the expected life of the product is not the first application of the new technology somewhere without operational experience and/or under the uncontrolled operation conditions. The cases of use or operating conditions are very different and cannot be reliable in a reliable way. There are no standards and proven procedures must be identified only. The analysis is unable to predict performance on the field. - 59 - Extremely high. 9 very frequent events during the scheduled service duration of the object. 8 high frequency during the expected service duration of the object.

7 incidence of medium -alta during the expected service duration of the object. 6 average event during the scheduled service duration of the article. 5 4 3 - 60 - First use of design in technical innovations or materials in the company. A new case of use or modification of the work cycle/operating conditions. Previously not verified. First use of design with technical innovations or materials for the new application. New application or modification of the work cycle / operating conditions. Previously not verified. New design based on technologies and similar materials. New application or modification of the work cycle / operating conditions. Previously not verified. Such as previous projects that use existing technologies and materials. Similar use with changes in the work cycle or operating conditions. Previous tests or practices on the field. Average event during the expected service duration of the object. Detailed changes in the previous design using proven technologies and materials. Application, work cycle or similar operating conditions. Tests or previous experiences on the field or a new design with experiences related to errors. Low average frequency during the expected service duration of the object. Almost identical design with short -term exposure. Similar use with a slight change of work cycle or operating conditions. Previous tests or practices on the field. Less incidence during the expected service duration of the object. Detailed changes to the known proposal (the same application, with small changes in the work cycle or operating conditions) and tests or terrain experience in comparable operating conditions or recently developed success for this proposal. The first application of new standards without experience. The purpose of the analysis is not to determine the services based on specific requirements. Few existing standardsThe best practices that are not directly used in this project. Analytics is not a reliable field performance indicator. Standards, best practices and design principles apply to reference projects, but not for innovation. The analysis ensures a limited image of performance. There are standards and design rules, but this is not enough to guarantee a lack of failure. The analysis offers some possibilities to prevent design failures for reasons that take into account the conclusions drawn from previous projects. The best practices are overrated in the case of this project, but they have not yet been verified. The analysis allows you to detect deficiencies in the system/component associated with the consequences of rejection and gives an idea of performance. The design of its predecessors and modifications of the new design correspond to the best practices, norms and specifications. The analysis allows you to detect deficiencies in the system/component related to the type of failure and indicates the likely matching of the structure. The project should be consistent with standards and the best practices, taking into account the conclusions drawn from previous projects. The analysis allows you to find deficiencies in the system/component related to the reason for rejection and predict the test procedure. 2 1 Very rare phenomenon in the expected period of use of the product. Almost identical mature project with a long -term party exhibition. The same application, with a comparable work cycle and working conditions. Field trial or work experience in comparable working conditions.

The possibility of refusal is practically excluded due to the preventive control and history of trouble -free serial production. Identical mature project. The same application, work cycle and working conditions. Experience in tests or in the field in comparable working conditions or a mature construction with many years of experience in trouble -free serial production in comparable working conditions. Adjusting the production project. The project must meet standards and the best practices, taking into account the conclusions drawn from previous projects, with a significant dose of certainty. The analysis allows you to detect deficiencies in the rejection system/component and indicates trust in accordance with the project. It is confirmed that the construction is in line with the standards and advanced practice, taking into account the conclusions drawn, effectively preventing the occurrence of a failure. The analysis can ensure high certainty that rejection cannot occur. Note. Rooms 10, 9, 8, 7 can be turned off due to activities aimed at verifying the process before the start of mass production. DrawingDfmea perception perception perception perception perception for each activity of perception, performed before the delivery of design to production. As part of the assessment of the definition of it, it should also be taken into account before the time of detection control (before or after the technical version). Perception of a capacity 10 Absolute uncertainty 9 is very far 8 criteria of remote perception 7 Very low commercial elections or a test of the product range or test procedure. The testing procedure is not intended for a specific detection of the cause and/or fault mode. The control procedure, check or verification, sample size, problem profile, etc. To determine the cause or fault mode. remotely connected.

The ability to control the detection to determine the cause or malfunction mode is very low, depending on the verification or verification procedure, sample size, profile tasks, etc.

Procedure for verification or verification, sample size, task profile, etc. The reason for the error or error mode is average. Size, profile of the task, and so on. Task profile, etc. 3 High 2 very high 1 reason or ability to control detection to detect a failure, almost accurate procedure or verification check, in accordance with the size, the mode is very high samples, the profile of the problem, etc. The design of the Accounted corresponds Standards and best practices, taking into account the courses and actions of perception studied for previous generations. 2.5.10 The priority of action (AP) previous guidelines of AMDEC recommend using RPN to determine the priorities of the action. Nevertheless, they did not focus on the details of the rational/logic, which are valid for all combinations S, O, D and RPN. The AP table provides logical parts for 1000 possible combinations S, O. and D for AMDE command. It contains an explanation based on logic for each level of priority of action. Actions can be hierarchical because of separate ratings of each of S, O, D and meanings.The value to determine the possible need to reduce risk. The rational/logical details published in previous FMEA guides are used and assembled into a single table. Companies may use one system to evaluate operational priorities, rather than different systems required by different customers. As the table has been designed to work with the severity, incidence and detection tables listed in this manual, if your organization decides to change tables S, O, D, for specific products, processes or projects, the table should be carefully reviewed . Note. Since the DFMEA, PFMEA, and FMEA-MSR rating tables differ, they are linked to three tables. High priority (h): - 62 - highest priority.

The team must identify appropriate actions to improve prevention and/or detection controls or justify and document why current controls are appropriate. Medium Priority (M): Medium action priority.

The group must identify relevant measures to improve and/or check the Company's discretion or discretion to justify and document why the inspections are appropriate. Priority: low low priority. The team could determine actions to improve prevention or detection. It is recommended that management review at least the possible effects of a priority 9-10 and medium priority high priority failure, including all recommended actions.

This is not a priority for high, medium or low risk, it is a priority for the need for risk reduction measures.

At least, it must be included that "no other measures are required".

- 63 - Figure 2.5-3 - 64 - DFMEA priority Figure 2.5-4 Figure 2.5-5 DFMEA analysis Reference risk DFMEA - 65 - 2.6. FMA Design Step 6: Optimization 2.6.1. The purpose of optimizing the project is to determine the risk of reducing operations and evaluate the effectiveness of these actions. The main goals of design optimization are: distribution of responsibility and time to implement time effective. Implementation and documentation. Evidence of the measures taken on the effectiveness of the measures taken.

The implementation risks re -re -re -re -re -re -re -re -re -re -implementation to make continuous improvement of the proposal basis to clarify product requirements and prevent / detect Optimization detection is the main goal of developmentThis reduces risk and improves customer satisfaction by improving design. At this stage, the team controls the results of the risk analysis and steps to reduce the likelihood of failure or to increase the resistance of the determination to determine the cause or error regime. You can also assign activities that improve design, but you do not always reduce the risk assessment level. Actions are not possible activities that can never be implemented, but a commitment to take specific, measurable and accessible steps. It is not intended to be used for planned activities as they have been documented in the inspection or examination of the actions and are already taken into consideration in the first risk analysis. If the team decides that there is no other precaution, the column is not written to show that the "no" or "risk analysis is completed. Design Changes (FC). Increase the ability to determine the cause of malfunction or damage mode (FC or FM). In case of an offer. Changes, all related structural elements are re -evaluated. All FMEA phases are reviewed for these sections. This is necessary, because the first analysis is necessary.

It is no longer valid, because it is based on another design concept. The person responsible provides the business situation. If the action is approved, this person is responsible for the implementation of the action. The date of the actions is documented for the real completion date of the philosophy and discovery.

Completion data should be realistic (for example , the process was not approved before production starts According to the product development plan before). 2.6. Action (optional) suspended decision was defined, but has not yet been determined. A document is prepared on the decision -making. In the prediction of the application (optional), the activity was sentenced to death, but has not yet been applied. Completed completedTo implement, and their effectiveness has been proven and documented. The final evaluation has been carried out. The rejected status is rejected as a result of the decision not to proceed with the action. This can happen when cost, implementation time, or business strategy risk is higher than technical risk. The FMEA is not considered complete until the team has assessed the priority of action for each point and has acknowledged the level of risk or formed the completion of all activities. Completion of all activities must be documented prior to the AME control check (or discharge). If no action is taken, the priority for action will not be reduced and the risk of failure will be transferred to product design. Actions are open loops that must be closed in writing. 2.6.4 The performance rating, event and detection values are re-evaluated and the new action priority can be set.

The new activity receives a priority score as a productivity forecast. - 67 - However, performance remains implemented until effectiveness is verified. After testing, the initial assessment should be confirmed or adjusted as indicated. The state of the activity then changes from installing to completing. The reassessment should be based on the effectiveness of the preventive and detection actions taken, while the new values are based on the definitions provided by FMA events and detection tables. 2.6.5 The constant improvement of the DFMEA is a historical input to the project.

Therefore, the main difficulty, the event and detection figures (s, o, d) do not change after measurements have been taken. The completed analysis becomes a repository that allows you to capture the progress of design solutions and design improvements. However, the initial S, O, D ratings may be modified to use the Basic, Family, or General DFMEAs as the information is used as a starting point for specific application analysis. Figure 2.6-1. - 68 - Optimization of the DFMEA table with a new risk assessment Figure 2.6-2. Optimizing DFMEA reports with a new risk assessment - 69 - 2.7 FMEA documentation The FMAA request and the results should be summarized in the report. This report can be used for internal communication or between companies. It also ensures that all details of the analysis andThe development company remains the property. The layout of the document can be specific to the company. Content may contain: ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ FMA - Score Chart Summary Summary N/A/D - Priority Results and Analysis - Conclusions must meet the requirements of the intended reader and can agree on the details. among the participating countries.

- 70 - 3 Process FMAA (PFMEA) Execution process on FMAA Six levels. These six steps provide a systematic approach to the analysis and consequences of the failure method and are record analyses. Figure 3-1.

3.1. FMEA steps FMEA process 1st step. Volume definition 3.1.1. The purpose of the process is to describe which products/processes should be included or excluded to account for the PFMEA project. The process takes into account the fact that all installation processes can be analyzed or re-analyzed using PFMEA. This process allows the organization to review all processes at a high level and make a final decision on which process will be reviewed. The overall benefit of scope is to focus on the highest priority processes. The main objectives of the process volume are: • • • • • Project identification • Which part of the process/process is analysed? The project plan is a list of possible team members, project plan, etc. (5.) Define the boundaries of the analysis, what is included?

Determine the relevant insights and determine, for example, which information should be used. Best practice, guidelines, standards, error protection methods, etc.

The scope should be determined at the beginning of the process to ensure consistent direction and direction as the entire process line, an item/process item. Factory processes that affect product quality and can be considered in the PFMEA analysis: receiving, parts and materials, supply, delivery, production, assembly, packaging, labeling, transportation, storage, maintenance process, etc. ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ <¢ ¢ ¢ ¢ enth immense ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ hus Ervation HEN HEN OF THE TOON ¢ i Ervation HEN HEN OF THE TOON Ervation HEN HEN OF THE TOON Always are new products and processes. Product changes or changes upon changesOperating conditions Modified requirements (laws/regulations, standards/regulations, customers, recent developments) Production experience, Farm problems at the table or in the field/Guarantee process errors that can create a danger. Results of the internal surveillance of the products Ergonomic problems continuous improvement The header of the PFMEA document must be completed during the framing. The header contains the following basic information on the scope of the PFMEA: Name of the company: Name of the company PFMEA Location of the installation: What is the location of the installation -Geographical indication of manufacturing and/ or unique identifier of the line name of the customer: name (s) of the customer (s) for this document and systems/subsystems/for the year of component/part/platform year of original vehicle model and/or vehicle program, if applicable subject: name of the PFMEA project start date PFMEA: start date of the PFMEA project organization and may include representatives of customers and suppliers; Team members can be internal or external to the PFMEA organization Revision date: Revision of the Single Single PFMEA document (last date on which it was modified) PFMEA identification number: Single identification number of the PFMEA document Level of confidentiality: PFMEA owns the specified confidentiality level, for example for internal, exclusive and confidential commercial use.

- 74 - 3.2. AMDEC Phase 2 process: Structural analysis 3.2.1. Objective The objective of analyzing the process structure is to identify and divide the production system into process elements, process stages and process work units. The main objectives of the analysis of the process structure are: • System structure for the elements of the product or process • Visualization of the scope of the analysis • Identification of the stages of the process • Base of the analysis stage FUNCTIONAL • PROCESS A functional diagram or a tree structure helps define the process. and provides a base for structural analysis. The formats may vary from one business to another, including the use of symbols, the type of symbols and their meaning. An AMDE of processes must represent the flow of the process as it exists physically when it "travels the process" and describe the product flow through the process. Functional analysis (step 3) should not start as long as structural analysis (step 2) is not completed.

3.2.2. Process flow diagram A process flow diagram is a tool that can be used as an input in a structure.Figure 3.2-1 Process flow diagram - 75 - 3.2.3 Tree structure A tree structure contains hierarchical system elements and clarifies dependencies through structural connections. This graphical structure allows you to understand the relationships between process items, process stages, and process work items. Each of these is a constitutive element to which features and bugs are later added. Figure 3.2-2. An example of a structure analysis using a PFMEA process element of a structure tree (electric motor assembly line) is the top level of the structure tree or process flow diagram and the PFMEA. It can also be viewed as the end result of the successful completion of all steps of the process. - 76 - Figure 3.2-3. Process element The process phase forms the basis of the analysis. A process stage is a work or production station.

Figure 3.2-4. Process Phase A process work item is the lowest level of a process flow or tree structure. Each work item is the name of a major category of possible causes that can affect the operation of the process. The number of categories can vary from 4m, 5m, 6m etc. companies. And this is usually referred to as the Ishikawa approach. A process step can have one or more categories, each of which is analyzed separately. See 3.4-7 for more information on how to use 4M to determine the root cause.

cause of error. 4M categories: Materials Materials (indirect) Environment (environment) There may be other categories, but they are not limited to: Measurement Method - 77 - Structural Analysis (Phase 2) 1. System Element Process, Subsystem, 2 Process Part or Name 2 Process Phase N. Station and Active Electric Motor Item Name [OP 30] Left Operator Electric Motor [OP 30] Insertion Process Insertion Process Standard Machine Bearing Insertion Process (Pressing) Figure 3.2-5. Figure 3.2-5.

- 78 - 3. Work process element: [man, machine, indirect material, environment, etc.] Example of a structural analysis using spreadsheets 1. Process element: Highest level of integration within the framework of the analysis. 2. Process phase: Element in the foreground. This is an element to consider in the bankruptcy chain. 3. Work Process Element: an element that is at the next construction level of the base element. 3.3. Process phase 3: functional analysis 3.3.1. Purpose The purpose of the process function analysis is to ensure that product/process functions/requirements are correctly mapped. main goalsFunctional analysis: and element management functions (see "Six stages") A set of customer functions (external and internal) with related requirements basis for error analysis 3.3.2 Function A function describes what an element or action is to do. Each process element or process step can have more than one function. Before starting a functional analysis, information collected may include, but is not limited to: product and process characteristics, product/process requirements, manufacturing environmental conditions, cycle time, worker or operator safety requirements, environmental impact, etc. is important for functional analysis to identify the necessary positive characteristics and requirements. The functional description must be clear. A suggested phrase is to use an action verb followed by a "noun" to describe a measurable function of the process (do it). The function must be "current time"; It uses the base form of the verb (to deliver, to drink, to arrange, to collect, to pass). Examples: drilling holes, applying glue, inserting a pin, welding brackets. A process element function starts at a higher level and refers to a process element in a structural analysis. As a general explanation, features can be considered an internal feature, an external feature, a customer-facing feature, and/or an end-user feature. Example: Assembling components The function of a process step defines the functions of the final product produced at the station. An example.

Column Casing Press Sintering Bed - 79 - The machining work element function represents the process step input to create a process/product property. Example: Get a sintered bed from a sample by hand. Example: rush to the poles with the camp enclosure to logically link function and structure, ask questions like: What is going on? How to achieve product/process requirements - left to right (work item process step process process process) “Why? Why Product/Process Requirements Need to be Implemented - Right to Left (Process Process Element) 3.3 3.3 .3 Requirement(s) A requirement relates to the performance of a process function and can be estimated or measured.

Requirementsgroups: product features and process features. Product specifications are specified, for example, in a product drawing or specification sheet. Geometry, material, surface finish, coatings etc.

Process functions determine product properties. Project documentation includes legal requirements (eg lead-free material), industry requirements (eg yarn quality), customer requirements (eg quantity) and internal requirements (eg cleanliness of parts). Product properties can be measured after the product is manufactured (eg void). The PFMEA

form does not require a specific quantitative value. Process specifications are shown in production drawings or specifications (including operator operating instructions, installation instructions, error control procedures, etc.). Process properties can be measured during product manufacture (eg compressive strength). The PFMEA form does not require a specific quantitative value. Requirements can be obtained from a variety of external and internal sources. Legal requirements: Compliance with established safety and environmental regulations. Industry norms and standards: â¢ eg. ISO 9001, VDA 6.3, SAE J, etc. Customer requirements • - 80 - (according to customer specifications), eg. compliance with required quality, production of product in time x and quantity y (capacity z/h) Internal requirements • eg. Product production in the technological cycle, compliance with expected production costs (eg scrap limited, no corrective action), production system principles, process quality and cleaning instructions 3.3.4 Visualization of functional relationships Functional interaction Process elements, process step functions and work element functions should be visualized using communication : Functional network, functional structure, functional tree, functional matrix, and/or functional analysis, depending on the software tool used to perform the PFMEA. For example, functional analysis is included in a spreadsheet if the spreadsheet is used to perform a PFMEA. Figure 3.3-1 Example of functional analysis using a structure tree - 81 - Figure 3.3-2. A spreadsheet functional analysis example using column header numbering (1, 2, 3) and color coding is included to help illustrate the congruence between structural analysis and relevant functional analysis content.

In this section, we work from left to right and ask "How does a high-level function activate lower-level functions?" you answer the question. - 82 -Procea-FMEA Step 4: Error Analysis 3.4.1. The purpose of process failure analysis is to determine the causes, ways and effects and show this in a report so that the risk can be assessed. The main objectives of the process error analysis are: ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ I Work item identification of possible errors/cases assigned to the work item error process and error steps that the customer can share the function of the network) with his supplier and with his supplier as part of the cooperation with the process design. Error structures by linking errors in the bug loop. The basis of error logging in the form of FMEA. An error analysis (structural analysis/step 2 and functional analysis/step 3) is performed for each element/step of the process. 3.4.2. The process steps are derived from the product properties and the process. Examples are: type of error error (FE) of Earch (FM) Cause (FC) - 83 - 3.4-1. Image. Theoretical error chain model 3.4.4. The error network and circuit analysis from the process units are derived and fail in the circuit (EG Error/Error/Error in trees/Bug structure) are created by the functional analysis (see Figure 3.3-1). The focus of the error structure is the error mode with related errors and the causes of the errors. Depending on the Focus focus, failure can be viewed as impacting failure as a failure mode or as a cause of failure. The types of errors, the causes of errors and the consequences of errors are entered in the relevant column on the page in the form of the FMA. The cause of failure with failure mode should be the question: why is failure mode? Failure effects combine with a failure mode, the question would be what happens in this failure mode? Figure 3.4-2 - 84 - An example of failure analysis based on the structural tree, Figure 3.4-3. The connection between the error analysis after again after the head numbering (1, 2, 3) and the color labeling according to the information according to the functional analysis of the information, begins to create an error chain. 1. The smallest effects (Fe): failure effectWith the function of the function Function First function. Note for Ride users: Potential Failure Mode can have more than one failure effect.

Failure effects are grouped in the table to avoid duplicating the same failures and causes. 2. Damage regime (FM): - 85 - with method (or type) of damages related to the analysis of the functional functional function of the process. Note for the region of attention network: Users are advised to start from the failure mode and then identify related effects of failure, using the function information section Functional Element Function Analysis section #1. 1, since some or all of the categories can be used. 3. Cause of failure (FC): cause of failure related to the third function of the function of the function Function Function Function Function Function. 3.4.5. The effects of the effects of errors refer to the possibilities of the process element (system, subsystem, part of the process or name). The effects of failure should be described taking into account what the client may notice or experience. PFMEA should clearly identify errors that may affect safety or in regulations may not be sufficient. Customers can be: â â â â `` `` `Kliens Gravitational: 1. Plant: Effects of the bankruptcy regime assuming the defect is in the plant (what operation will be carried out by the plant, for example a factory (that the operating machine, such as orders) 3. Full of a vehicle user: the impact of the process (The vehicle will specify the example: the window rises too slowly) Fault effect The lack of gravity: 1. Product processing : impact of the failure regime, leading to the final result of the vehicle user (which occurs in the event of engine failure) Carrying out the characteristics and effects of the failure of PFMEA, improve the communication of the impact of production on the operation of the product Depending on the failure and its consequences - 86 - the following questions need to be asked to determine which group of failure effects is used: 1. The error regime has been physically eliminatedDoes it cause treatment or possible damage to equipment or operators? This includes the inability to assemble or add an equivalent component to a later customer. If so, PFMEA describe the impact on production and/or "delivery to the factory". If not, go to the question 2. Examples may be: • ¢ vel vel vel Object X damages the Operator's Operator on the customer's website 2. What is the potential impact on the end user? Take into account the events related to the element of the process that will cause the end user noticed or experienced events, regardless of planned or introduced inspections, including errors or errors. This information can be available in DFMEA. If the effect is sent from DFMEA, the product effect should be adapted to PFMEA with the appropriate DFMEA. Note.

In some cases, the analysis group may not be aware of the influence on the end user (e.g. catalog parts, ready products, level 3 components). If this information is unknown, the effects should be defined using a subordinate function and/or process specification. If so, indicate the potential impact on the "process element" and "final" PFMEA. If not, go to question 3. - 87 - examples can be: irregular idle, irregular, hard - bad appearance of the system is limited or does not work. Lack of user's final control over the vehicle effect on end users' safety, what to do if it was previously found that the impact of the failure reached the destination. User? The impact of current or receiver changes should also be taken into account. Describe PFMEA production effects in "Factory" and/or "sent to the factory". Examples: â <â â â assume that the main product design is correct;If design issues escalate into process issues, these issues should be escalated to the design team for resolution. Assume that the failure mode can occur, but not necessarily. Bankruptcy methods should be defined in technical terms, not as a significant symptom of the client. Confirmation of the inaccuracy of bankruptcy methods can be implemented by aggregating past, rejection or waste and examining past relationships. Sources of this should also include: 88 - comparison of similar processes and review of customer requests (end user and downstream operations) for similar components. Potential bankruptcy methods have different categories: Loss of function/lack of function: Partial function missing - Loss of function/function does not correspond to excessive deterioration of the function of the function - very high. Procyteral operation operation operation wave performance, very late, very deep, missing or typical error modes which may be typical error modes other than positions. The end of the dirty surface is very dirty, the pins of the non-sticking connector which are very smooth, pass the part that is not in place or reject a good part, the controllable work beacon checks the missing beacon of the 'ECU Meured flashing blinking.

with faulty software. 3.4.7 Failure reason: The failure reason indicates why the error mode may occur. The result of the cause is the error mode. Where possible, determine all possible production or assembly production for each failure mode. The reason should be included as strictly and comprehensively as possible to ensure that the efforts (checks and actions) are for the right reasons. Typical reasons for bankruptcy may include, but are not limited to, the classic 4M Ishikawa). Machinery/equipment: robot, suit tank, injection molding machine, spool holder, examination apparatus, devices, etc. Indirect material: oil, assembly grease, washer concentration, (support operation) and so on. Environmental Treatment/Environment: Environmental conditions such as heat, dust, pollution, lighting, noise. - 89 - Note: Assume the correct incoming countries/materials when preparing the FMEA. An exception may be made by the FMEA team when historical data indicates deficiencies in the quality of incoming parts. ATo uncover/discover the causes of failure, you should have a facilitator to guide the team through "funding reflection questions". These questions can have enough categorization issues to keep experts thinking in the process while keeping the number of questions manageable. Questions can be process specific and divided into 4 million categories.

The first list of questions can be generated by checking the reason column of the available pfmeas. Example - assembly process: 3.4.7.1 MAN 1.

Can a defective part be used from a part in the process? Part 2 not applicable? 3. Can parts be loaded incorrectly? 4. Can parts be damaged - from receipt to use? 5. Can we use wrong material? 3.4.7.2 Machine 1. Can automatic operation be interrupted? 2. Can the entered data be entered incorrectly? 3. Can the machine work in manual mode without automation? 4. Is there a schedule for approving preventive and detective inspections? 3.4.7.3 Material (intermediate) 1. Can we use too much/too little/no equipment? 2. Can the material be used in the wrong place? 3.4.7.4 Environment 1. 2. Is the lighting appropriate for the task? Can parts used in the process be considered foreign bodies? The explanation of the cause of the error should be clear. Corrupted, damaged, operator failure, application missing or problem, etc. - 90 - 3.4.8 Summary The error may be in structural analysis, analysis and functional analysis, structured tree or multiple table views. Figure 3.4-4 PFMEA Damage Calculation Structure Page-91 Figure 3.4-5 View of the Length Function on the Calculation Page 2nd Operation Step Target No. and Name [OP 30] Fritt Roll Press [Op 30] Fritté Round Press [Op 30] With fried presses. Maximum difference by pressing the frozen plane to reach the axial position for the pole, rolling to reach the axial position for the pole by pressing the wavy plane to reach the axial position for the pole pushing the pole to the maximum difference stage 2 Failure Mode (FM) Cannot achieve the axial position of the sintered bearing, the axial position of too small frying can not be reached, the clearance is too small, the axial position of the dull bearing cannot be reachedVery large gap in the appearance of the functional system in the spreadsheet 3 3. The process element [machine, material (indirectly), environment (environment), etc. Machine) Figure 3.4-7 3. Function or task and characteristics of the work element 3. Cause of failure of the working element.

(FC) Removes a clean layer of Tit from the tray and presses the upper tension on the printing shaft. The bearing in the field conservation competition, which is located in a specific condition of the axial machine, must press a specific axial position in the Corporation Pole nest, the operator adds a sinus deposit, which has previously dropped to the first floor (dirty with dirt -functional representation functional. The purpose of analyzing the risk of process risk is to assess the severity of the risk , speeches and determining and determining the need for priorities.

The main goals of the process analysis are: determining the definition of the definition of control (current and/or planned) control (existing and/or planned), prevention (current and/or planned) identify and determine the evolution of each chain Failures Cooperation Customer-Dostor (severity) represents two different control groups: existing prevention Controls and existing controls detecting 3.5.2 Defining current preventive inspections (PC) Existing control preventive pressure control promotes optimal process planning to reduce disruption. Description: Eliminate (exclude) The cause of the fault or reduce the frequency of its formation. Examples of preventive monitoring: 3.5.3 Process planning Possible settings of production devices, e.g. disk test according to preliminary principles, AV 17/3B 3.5.4 Detection of the production process of damaged parts produced on site, test stand 25: • ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ I ¢ d e s r e s r e s r or ¢ d e s r or ¢ d e ske or s e ((shit-p e)pted depends (n s ¢erpted ((d e), (dive on (d e). Operator maintenance Conservation Maintenance instructions / Visual machine control based on the effectiveness of ongoing prevention monitoring, the first part of the emission failure assessment after speech.risk evaluation). Current preventive control describes measures that must be implemented in the design process and verified prototype, machine qualification (rafting) and process tests before - 94 - normal production. Preventive control may also include standard work instructions, configuration procedures, preventive care, calibration procedures, errors checking procedures, etc. 3.5.5 Electrical detection (DC) detection detection: Help with automatic or manual methods before the element is left to the process or by sending to the client. Current examples of detection management: • Monitoring and detecting FMEA - 95 - 3.5-2. View. Understanding the map 3.5.6. This can be done during the station viewing (eg lines viewing, walks and regular audits). If this is ineffective, additional measures may be needed. Evaluation and detection assessment should be checked using previous process data as the conditions of the new process may be different. 3.5.7. Even the entire mode, cause and consequence (or failure or network) is evaluated by independent risk. There is a risk assessment assessment criteria: Severe (s): refers to the intensification of the effect of the failure (O): means failure (D): means that the cause of the failure and the cause of the failure/or failure are determined. The number from 1 to 10 is used by S, and D, and 10 means the highest risk investment. Note: FMAA FMAA assessment should not be compared to FMEA assessment, even if the product/process seems to be the same because each team's environment is unique, so their individual assessment will be unique (ie degrees are subjective). 3.5.8. An invasion of surprise is the number of assessments related to the greatest effect of certain effectsModality evaluated phase of the process. This is a relative rating - 96 - based on individual FMEA and is determined regardless of event or detection. The level of severity of the specificity of the process should be determined according to the criteria of the P1 evaluation table. The table can be extended to include specific examples of the company or product line. The assessment of the consequences of failure should be mutually agreed between the client and the organization. Note: If the customer is a subsequent manufacturing or assembly company or product of the product, the severity can be independent of direct knowledge or customer experience. In such cases, the FMEA designer, the extracting technician and/or the subsequent manufacturing or assembly process technician should be consulted to understand the spread of exposure.

3.5. The evaluation number of the event is a relative estimate for the FMEA frame and does not have to reflect a real event. Classification of events describes the probability of errors according to the classification table regardless of the study check. For example, experience or other experience gained by similar processes can be taken into account when evaluating the evaluation numbers. In order to determine this classification, it is necessary to consider the following questions: process steps? What are the field experience with a similar process?

Is the process portable or similar to the previous process? What are the importance of changes in the current production process? Is the process brand new? What is the environmental change? Are proven procedures already introduced?

Are there standard instructions? (For example, work instructions, installation and calibration procedures, preventive maintenance, error control and process monitoring procedures) Was technical error control solutions? (eg product or process design, design and tool design, established process sequence, production control, machine and SPC mapping) 3.5.10 Survey d) Survey is an evaluation related to the prediction of the most efficient process control by type. the above -mentioned sensesmanagement. Discovery is a relative assessment within individual FMEAs and is determined independently of gravity or occurrence. Detection must be estimated on the basis of the criteria listed in Table P3.

The table can be supplemented by examples of current business detection methods. The definition of the term "compliant product control" used in P3 and 4 tables is to have controls/systems/procedures that control non -compliant products so that the probability that the product leaves the system is very low. Inspections begin from the moment when the non-compliance of the product is determined until the final elimination. These tests generally go beyond those applied to products not compatible with a higher level of identification. Once an intact control has been implemented, efficiency can be verified and reassessed.

The following questions must be taken into account to determine this estimate: • What test is the most effective in identifying the cause of failure or failure mode? What use profile/service cycle profile is required for error detection? What sample size is necessary to identify the error? Is the test routine validated to recognize this cause/error mode? Table P1 PFMEA value process general evaluation criterion Grave effects of errors, evaluated for manufacturing, assembly, assembly and end users, as indicated in the following PFMEA process, your final empty user process to fill User (if known) (if known (if known)) (if known to be known (if known) (if known) (if known) (if known) (if known) (if known) (if known known)) (if known) your SEV customer work service - 98 - Severity criteria Criteria Criteria Severity Criteria Currents Examples or product range 10 errors can endanger 9 8 7 6 5 3 3 3 Errors can endanger operators (machine or assembly), assembly, assembly) can have long -term - long -term - possible - possible long -term effects on employees' long -term health affects the safe driving of the vehicle and/or other vehicles, the Sant of the driver or passenger or the road or pedestrian user. Dysfunction can cause the implant to be disaltered. A 100% defective product may have to be thrown. No complications. Failure to comply with this instruction can lead to the non-compliance of the establishment. Stop the plant longer than the complete production layer. ~ Shipping can be set. Repair or replacement on site (assembly by the end user) required for reasons other than non-compliance. Part of the line of line 1 hour ~ The entire production cycle can have a production layer.

Listen so that it is eliminated.possible. Repair of field deviation from the main process or required replacement; Reduced line (assembly of users) with different speed or added than for -UP check. incompatibility. 100% production cycle of the composition up to an hour. You may need to convert offline and accept. Part of the production cycle may be assigned to less than 100% of the product.

High probability that another defective product will be redesigned offline and accepted. Mandatory sorting. There is no stop. 100% production run triggers with defective products can require a significant response plan. Before treating him, she recycled to another defective station. less likely. Sorting is optional. Part of the production cycle that triggers defective products may have a smaller response plan. Other defective products will be recycled. Station before sorting. agreement. A small flaw in a defective product does not trigger any processes, operations plan or response.

The products of other defective operators are unlikely. Sorting is optional. Supplier feedback required. Loss of an essential vehicle function required for normal driving during the planned service life. Degradation of essential vehicle functions necessary for normal driving during the planned life. Loss of comfort function.

Degradation of the comfort function. The quality of appearance, sound, or just about unacceptable for most customers. Quality perceived by the appearance, sound or rough, unacceptable for many customers, perceived, sound or unacceptable by some customers - 99 - 1 The sensitive effect and the defective product starts the reaction of the plan. Unlikely other defective products. Sorting is optional. Research for a NEIN supplier. Table P2 No noticeable effect. Potential PFMEA arises process criteria for potential failure reasons that caused a failure in a manufacturing or assembly plant. Determination of the best assessment of the occurrence, process criteria of the process and control of prevention. There is no need to evaluate and assign measurements to each of the individual factors. Random measurement in relation to process control and prevention (qualitative assessment) OC 10 9 - 100 - assessed during production or assembly, cannot be determined, preventive control or occurrence during production or assembly is not extremely high. at a very high frequencyor assembly. 8 often occurs in production or assembly. 7 Medium -high frequency in production or assembly. 6 Average phenomenon in production or assembly. History Using Process In the Enterprise Process Experience Using Calcified Procedures in Process Design, Validation and Design of Tools and/or Identifying and Effectiveness of Post -Net, Errors and Preventive Maintenance process Without experience. Personalization of a new product. There are no proven procedures and procedures. Limited work experience. The application is very different from the previous application. A well -known but problematic process. The application creates significant procedural challenges. A similar process with signs of incompatibility exceeding an acceptable level. The company has no experience in working with this program. A similar process with some evidence of an uncomfortable. Limited experience in working with this program in the company. Non -specific for the cause of the disorder. Created for this process. The first application of new procedures without experience. There is no reliable prevention of failure. Many existing procedures and proven procedures do not have a direct application in this process. Limited use to prevent the cause of the failure. Procedures and proven procedures apply to the first process, but not for innovation. There is a possibility to avoid the cause of failure. Procedures and proven procedures exist, but the failure is not enough to prevent failure. Company or product series examples of 5 average occurrences during production or assembly. A similar process with a successfully completed process validation. Limited experience with this tool.

4 moderately rare in manufacturing or assembly. New configuration based on a proven process. The application does not pose a significant risk of process problems. 3 rarely occurs in production or assembly. This process has been successfully tested in series production. History of skills within the limits of control. Similar program. 2 It rarely occurs in the production or assembly. 1 The possibility of failure is eliminated by preventive inspections and a history of smooth serial production. There is no failure in series production. He can reveal errors in the process. The process design involves drawing conclusionsDesign. Best practices for this process have been repeatedly evaluated but not yet proven. This indicates that the process will not cause problems. He can find flaws in the process of failure. Previous processes and new process changes follow best practices and procedures. Indicates possible process compatibility. He can find flaws in the process of failure. A process that follows best practices and procedures based on experience from previous processes. It predicts the adequacy of the manufacturing design. The process was tested and weaknesses were found, tested for success with failure. mass production process. The date is expected to be in line with best practice, capacity is within control. Taking into account the experience gained from the relocation application. Previous processes with a high margin of confidence. Demonstrates confidence in design compliance. The cause cannot occur because in a sequential failure the fault cannot occur and is fixed at the factory. Validated process to demonstrate adherence to procedures and best control.

Practice based on what you learn. Note.

10, 9, 8, 7 can be deducted by checking transactions before mass production. Table P3 PFMEA detection detection potential for D process planning detection tests evaluated for each detection step performed prior to product shipment. Discovery controls are organized according to each discovery activity. The frequency should be specified in the FMEA or control plan. Company/Business Unit Material handling procedures are inadequate. Det 10 Ability to define discovery criteria before they are filled by user company or product line instances. The absolute cannot or cannot be detected because the method of failure detection or uncertainty management is undefined or unknown. - 101 - 9 8 7 6 5 4 3 - 102 - Damage cannot be easily detected from a distance. Random Control