



DataLyzer FMEA supporting different industry standards



Including, but not limited to:

AIAG VDA

AS13004

IEC 60812



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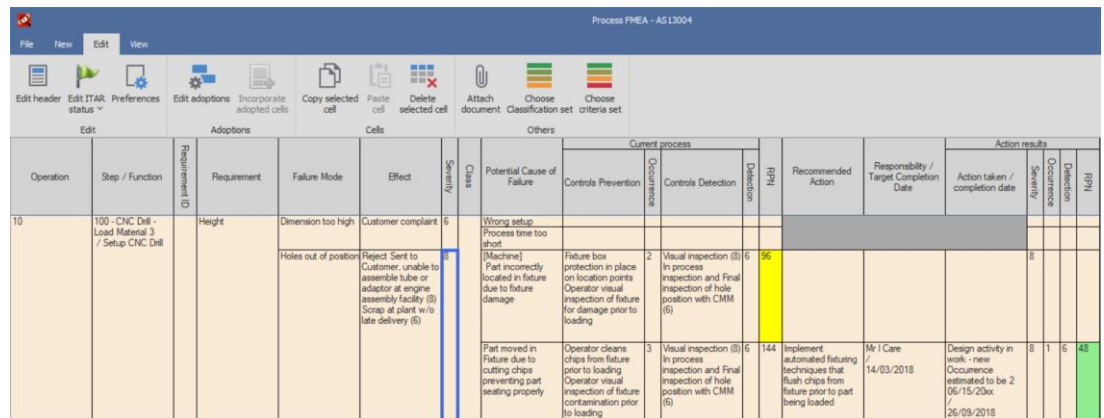
DataLyzor FMEA supporting different industry standards

INTRODUCTION

DataLyzor FMEA supports many industries, including Automotive and Aerospace. These different industries all use a slightly different FMEA format and usually also different ranking criteria. While the exact format may be industry driven or customer driven, what everyone aims to achieve with FMEA is a robust process, with minimal defects and successful prevention of risk for the end customer. Over the years the FMEA process has expanded and grown. Because formats are getting more complex and many companies supply different industries, it is getting almost impossible to keep supporting the FMEA process with Excel. In this document we show some examples of how DataLyzor FMEA makes it easier to support the FMEA process despite the increased complexity of the formats.

Different FMEA forms

To make sure we can accommodate various industries we have several customization options within DataLyzor FMEA. In the Aerospace industry the most commonly used format for FMEA is the AIAG 4th edition form, with the addition of an Operation column.



Operation	Step / Function	Requirement ID	Requirement	Failure Mode	Effect	Severity	Class	Potential Cause of Failure	Controls Prevention	Current process			Recommended Action	Responsibility / Target Completion Date	Action results					
										Controls Detection	Detection	RPN			Severity	Occurrence	Detection	RPN		
10	100 - CNC Drill - Load Material 3 / Setup CNC Drill		Height	Dimension too high	Customer complaint	6		Wrong setup Process time too short												
				Holes out of position	Reject Sent to Customer, unable to assemble tube or adaptor at engine assembly facility (5) Scrap at plant w/o late delivery (6)	6		[Machine] Part incorrectly located in fixture due to fixture damage	Fixture box protection in place on location points Operator visual inspection of fixture for damage prior to loading	2	Visual inspection (5) In process inspection and Final inspection of hole position with CMM (5)	6	96							
					Part moved in Fixture due to cutting chips preventing part seating properly	3		Operator cleans chips from fixture prior to loading Operator visual inspection of fixture contamination prior to loading	Operator cleans chips from fixture prior to loading Operator visual inspection of fixture contamination prior to loading	3	Visual inspection (5) In process inspection and Final inspection of hole position with CMM (5)	6	144	Implement automated fixturing techniques that flush chips from fixture prior to part being loaded	Mr I Care / 14/03/2018	Design activity in work - new Occurrence estimated to be 2 05/15/20xx / 25/09/2018	8	1	6	48

Figure 1 AS13004 example

In the picture above the AIAG 4th edition form is shown, with an added Operation column. As AS13004 also requires a different set of ranking criteria, there is an option to create and switch ranking criteria sets.

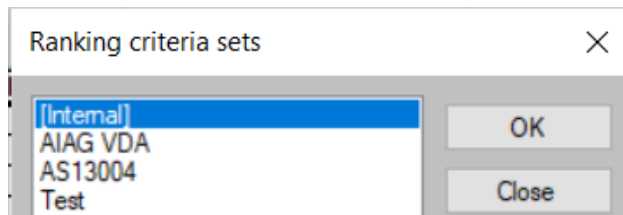
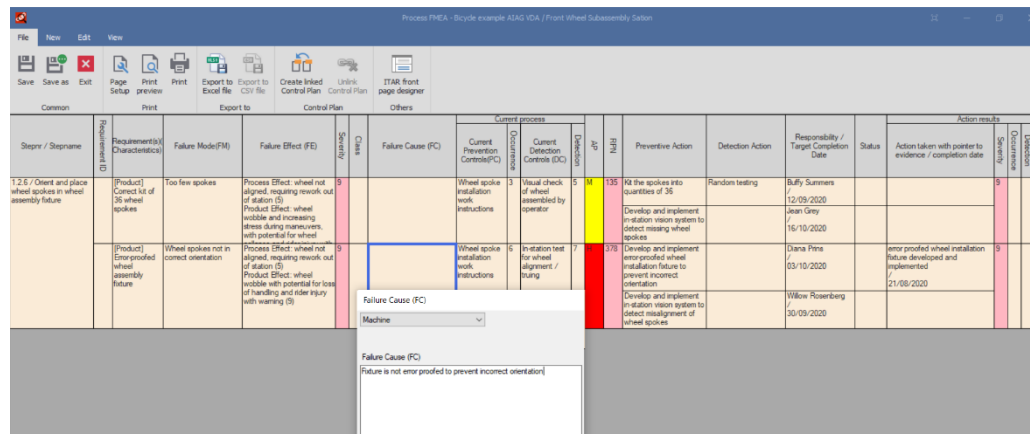


Figure 2 Ranking Criteria sets

The AIAG VDA format differs from the AIAG 4th edition in many respects. Several columns are added, Action Priority replaces RPN and new ranking criteria tables are introduced. To accommodate this, we have implemented a new template in DataLyzer FMEA, where the new columns are automatically applied. We have decided to combine certain columns, to keep the FMEA readable, as well as understandable for people who are used to working with the AIAG 4th edition, whilst still supporting all required new information.



Step# / Stepname	Requirements (Characteristics)	Failure Mode (FM)	Failure Effect (FE)	Claim	Failure Cause (FC)	Current Prevention Controls (PC)	Current Detection Controls (DC)	Risk	Preventive Action	Detection Action	Responsibility / Target Completion Date	Status	Action results
1.2.6 / Orient and place wheel spokes in wheel assembly fixture	Product: Correct list of 35 wheel spokes Process: Error proofed wheel assembly fixture	Too few spokes Wheel spokes not in correct orientation	Process Effect: wheel not aligned, requiring rework out of station (S) Product Effect: wheel wobble and increasing stress during maneuvers, with potential for wheel failure Process Effect: wheel not aligned, requiring rework out of station (S) Product Effect: wheel wobble with potential for loss of handling and rider injury with warning (S)	Severity: 9	Failure Cause (FC) Machine	Wheel spoke installation work instructions	Visual check of wheel assembled by operator	5 10	Rt the spokes into quartets of 35 Develop and implement in-station vision system to detect missing wheel spokes	Random testing	Buffy Summers 12/09/2020 Joan Grey 16/10/2020		Action taken with pointer to evidence / completion date
				Severity: 9	Failure Cause (FC) Fixture is not error proofed to prevent incorrect orientation	Wheel spoke installation work instructions	In-station test for wheel alignment / truing	5 10	Develop and implement error proofed wheel installation fixture to prevent incorrect orientation Develop and implement in-station vision system to detect misalignment of wheel spokes		Dana Frits 03/10/2020 Walter Rosenberg 30/09/2020		error proofed wheel installation fixture developed and implemented / 21/08/2020

Figure 3 AIAG VDA FMEA example

As shown in the picture above, we have chosen to use only one column for the characteristics. In every characteristic cell there is a checkbox to state whether this concerns a product or process characteristic. This will help prevent empty rows, or rows with the same information. As is also shown in the picture above, we have decided against changing the order of the failure chain. This is because the order in which the form is filled out has not changed, and some of the new alternative forms also keep this order.

As manufacturers often deliver to multiple industries, it is possible to choose which template to use in every document. It is very easy to switch templates, and no conversion is needed when the document already exists. The picture below gives an indication of the ease of switching document templates. This also means it is equally easy to switch back to AIAG 4th edition for example.

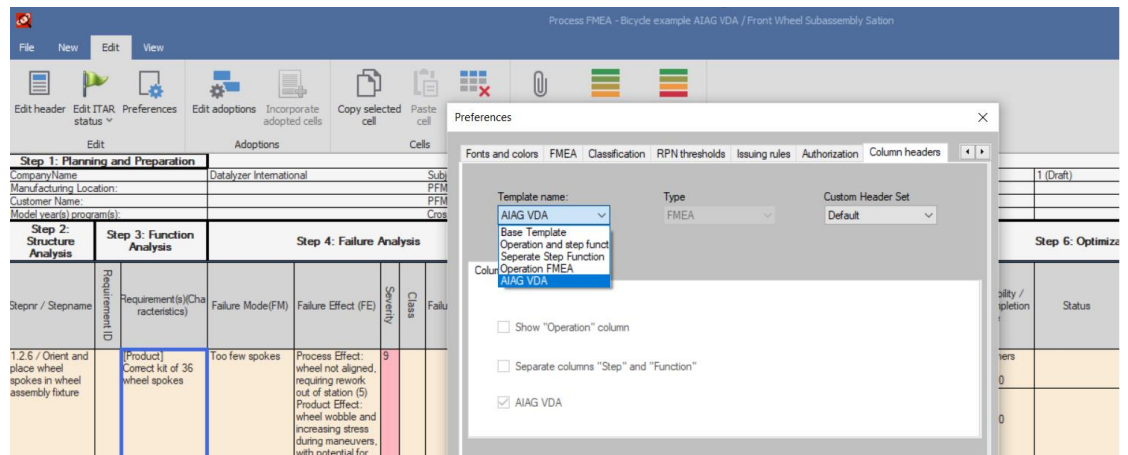


Figure 4 Templates in DataLyzer FMEA

The AIAG VDA FMEA also introduced the 4Ms in the FMEA form. However, using the 4Ms in the second step will cause many empty lines or lines with the same information. To prevent this we use Cause Categories. In the Cause column you can simply add the 4Ms by choosing from a dropdown menu, as shown in figure 3.

Different terminology in different industries

On occasion customers will require specific naming of headers and columns in the FMEAs. To accommodate this we not only offer our own templates, but the user can create their own, with different names for both headers and columns. Creating a custom column header set is possible for any language, and to make it completely flexible it will use the default names when no information is entered. Figure 5 shows the edit screen. Same as templates, it is possible to switch instantly within a document. In figure 4 the option to switch column header sets is shown.

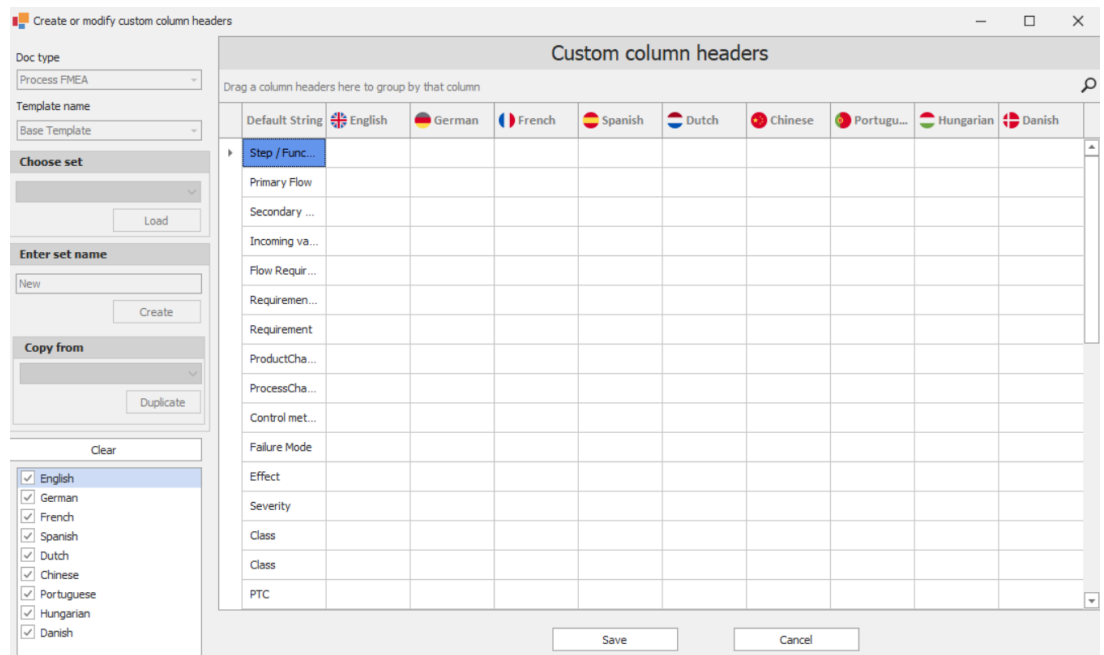


Figure 5 custom column headers

Working with reference FMEAs

In the Aerospace industry working with reference FMEAs is already standard practice and now in the AIAG VDA manual there is a lot of emphasis on the use of reference FMEAs as well. Working with reference FMEAs in Excel is not possible. This means that a change in a process must be manually updated in all FMEAs which make use of that process. This is taking a lot of time with a large margin for errors.. To support this, DataLyzer FMEA uses adoptions, to link the reference FMEAs to the specific FMEAs. In figure 6 some of the text is in red which means this is adopted text. Usually certain columns, such as Severity, Occurrence and Detection, are left open in the reference FMEA, because they will depend on the specific FMEA. By only filling out the generic information in the reference FMEA, they can be used in many different specific FMEAs.



Process FMEA - Specific FMEA K

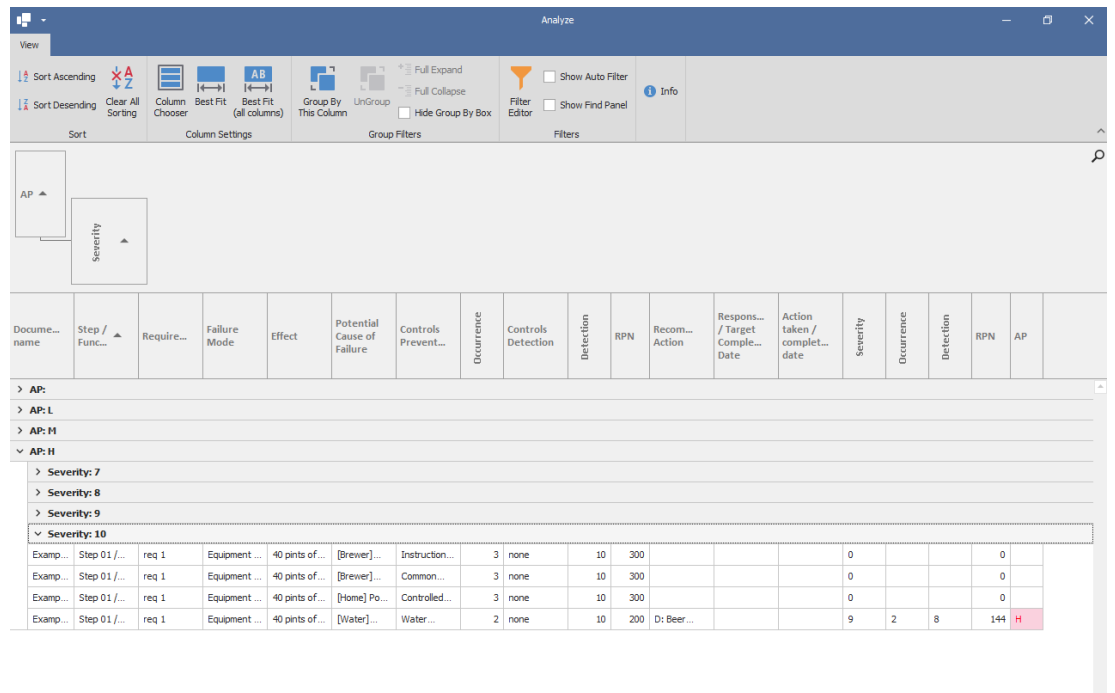
Step / Function	Requirement	Requirement	Failure Mode	Effect	Severity	Class	Potential Cause of Failure	Current process				Recommended Action	Responsibility / Target Completion Date	Action results					
								Controls Prevention	Controls Detection	AP	RPN			Action taken / completion date	Severity	Detection	AP	RPN	
/ Transport from previous operation	Mix of parts	Wrong parts					Procedure / Instruction not followed	Check if part type match with order											
		Machine has been set up wrong					Wrong set up instructions used	Check if set up instructions match with part type / order											
		Parts not properly cleaned / preserved					Wrong setup	Check if washing program matches the workinstruction											
							Level of corrosion inhibitor to low	Weekly check as part of the Daily Check Procedure (DCP)											

Figure 6 Specific FMEA example

Difficulties with risk analysis

While RPN poses certain difficulties, such as which is the correct threshold within your company, the same goes for Action Priority. With only 3 categories, which are very broad, how is it possible to correctly prioritize items that need immediate action. To help with analyzing risk, DataLyzer FMEA introduced an Analyze function, which allows the user to see for example both Action Priority and the highest Severities belonging to that AP score. This is demonstrated in figure 7. There are many more sort options within the Analyze function, which will help show only relevant information to the analysis.

This analysis can be made within a document or also within a group of documents.

Docume... name	Step / Func...	Require...	Failure Mode	Effect	Potential Cause of Failure	Controls Prevent...	Occurrence	Controls Detection	Detection	RPN	Recom... Action	Respons... / Target Comple... Date	Action taken / complet... date	Severity	Occurrence	Detection	RPN	AP
<ul style="list-style-type: none"> > AP: > AP: L > AP: H ▼ AP: H <ul style="list-style-type: none"> > Severity: 7 > Severity: 8 > Severity: 9 ▼ Severity: 10 <ul style="list-style-type: none"> Examp... Step 01 /... req 1 Equipment ... 40 pints of ... [Brewer]... Instruction... 3 none 10 300 0 0 0 Examp... Step 01 /... req 1 Equipment ... 40 pints of ... [Brewer]... Common... 3 none 10 300 0 0 0 Examp... Step 01 /... req 1 Equipment ... 40 pints of ... [Home] Po... Controlled... 3 none 10 300 0 0 0 Examp... Step 01 /... req 1 Equipment ... 40 pints of ... [Water]... Water... 2 none 10 200 D: Beer... 9 2 8 144 H 																		

Figure 7 Analyze function

Difficulty with using Excel

There are several other features which make the FMEA process difficult to support in Excel, to give some examples:

- It is not so straightforward to implement the calculation of the Action Priority. It is not a simple calculation anymore, instead it will depend on the combination of 3 table values and a macro needs to be made.
- In Aerospace FMEA documents fall under ITAR regulation. This means if a user is not allowed to view a document the document must be hidden for that specific user. In Excel the simplest way to manage this is to protect every sheet with a password and provide the password only to groups of users who are allowed access. This is very complicated to manage and even more complicated to maintain.



Switching from Excel to software based FMEA

Especially in industries where the FMEA form has become more complex over the years, we see a lot of companies switching to software. To make a switch to DataLyzer FMEA easy, it is possible to import FMEAs from Excel to DataLyzer FMEA. Ranking criteria tables, Classification symbols, Flow chart symbols can all be imported as well. While in DataLyzer FMEA we support a link between FMEA and Control Plan to ensure the same steps are used in both documents, we recently added a feature to import Control Plans as well, and create a link with the FMEA afterwards. This can only be done if the step / functions in the FMEA exactly correspond to the Part number / name cells in the Control Plan.

Conclusion

Optimizing the FMEA process is becoming increasingly difficult, because FMEA formats are changing between industries and getting more complex. Without an FMEA software solution this is almost impossible to manage efficiently. DataLyzer supports different FMEA formats in a database solution which will assist companies to optimize their FMEA process and ensure an integrated solution in the APQP flow.



ABOUT DATALYZER

Partners in continuous improvement for 40 years, DataLyzer provides a turnkey solution of training and software systems which includes:

- World-class Quality Management Systems consultancy
- Certificated, eLearning training - APQP, FMEA, Gage Management/MSA, Lean, OEE, Six Sigma and SPC etc.
- An integrated, modular suite of world-class software solutions
- Global installation and training services with continuing support and advice.

Software solutions include, Process Flow, FMEA, Control Plan; Ballooning, real-time SPC and OEE, with Gage Management/MSA, Mould Management, Certificate of Analysis (for reports like FAIR, ISIR and PPAP) and now developing CAPA.

We also provide integrated dashboards, providing advanced real-time/in-process, enterprise and supplier performance monitoring, analytics and reporting capability.

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