

## Evaluation of Individuals Based on the Extended Tolerance

### Classification by Using Q-DAS® Products

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The evaluation of part measurements included in Q-DAS® products is implemented based on the summarized evaluation results of individuals.

The following criteria serve as a basis for evaluation:

- Evaluation inside/outside the specification

	Range	Color	period
			10
Specification limit			
			0

- Evaluation based on the definition of ranges with definable classifications

	Range	Color	period
	> 100%		10
	> 80%		8
	> 60%		6
	> 40%		4
	> 20%		3
	> 0%		2
Specification limit			
	<= 0%		1
	<= -10%		0

6 Number of ranges outside a specification limit  
2 Number of ranges inside a specification limit

- Evaluation inside/outside the specification considering the measurement uncertainty.

	Range	Color	period
			10
	+ U		5
Specification limit			
	- U		1
			0

The awarding of points and the definition of the colors can be adapted to each single range individually. In addition, you may weigh the single characteristics classes in the evaluation.

Characteristic class weights

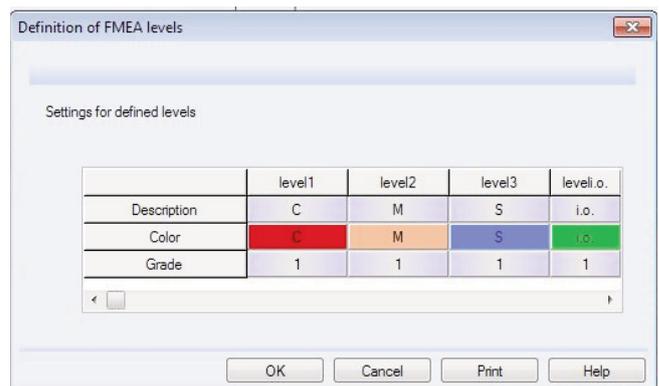
Charact. Class	unimportant	of sec. importance	important	significant	critical
Weighting	1	1	1	1	1

The evaluation based on the definition of ranges with definable classifications has been realized successfully in a customer project; however, after the process had reached a certain condition, the classification was no longer sensitive enough to allow for precise evaluations and reactions. In this case, it is important to consider the aspect of evaluating measured values by means of saved classifications (comparable to the meaning or severity of the consequences of error from the customer's point of

view in an FMEA environment) together with the tolerance capacity. A classification of deviations should be feasible for each element of the created matrix. Hence, the definition of the parts evaluation available in the adjustable evaluation methods was extended in a way that these requirements can be indicated:



In this very example we created 7 sections for the tolerance utilization and 10 FMEA classes including 3 evaluation levels. You may save an individual points rating and the corresponding color to each level.



The company guidelines specify different reactions for the respective levels C-M-S (C = critical failure, M = major failure, S = standard failure). Each employee involved in the manufacturing process knows these reactions.

Moreover, a new K-field (K2190) was defined allowing for the categorization of a characteristic according to the FMEA classes (0-10). Since you want to continue using the existing datasets, this classification must be added to the characteristics data successively. In order that you do not have to adapt all the characteristics of a certain

Characteristics Statistics - Design 6

Char.No.	Char.Descr.	i	Characterist.	n=*
81	Lägeriktighet plan 3075 Rel G540.Z	0	0	61
80	Lägeriktighet plan 3075 Rel G540	0	0	61
49	Lägeriktighet plan 3300 '1' Rel. G540	0	0	18
48	Lägeriktighet plan 3300 '1' Rel. G540	0	0	18
53	Lägeriktighet 2 3300 '1' Rel. G540.Z	0	0	15
52	Lägeriktighet 2 3300 '1' Rel. G540	0	0	15
51	Lägeriktighet 1 3300 '1' Rel. G540.Z	0	0	15
50	Lägeriktighet 1 3300 '1' Rel. G540	0	0	15
45	Lägeriktighet håll 309 Rel. G530	0	0	15
59	Lägeriktighet 5 3300 '1' Rel. G540.Z	0	0	13
58	Lägeriktighet 5 3300 '1' Rel. G540	0	0	13
55	Lägeriktighet 3 3300 '1' Rel. G540.Z	0	0	12
54	Lägeriktighet 3 3300 '1' Rel. G540	0	0	12
46	Lägeriktighet håll 309 Rel. G530.X	0	0	12
38	Diameter håll 503	0	0	12
35	Diameter håll 502	0	0	11
76	Planhet 3300 '2' Ref 100mm	0	0	10

Table of characteristics

Part number	Part description	Characteristic Number	Characteristic Description	Group type	Characteristic Type	Classification of the characteristic	Record
1.47	1858297	Block_D13	47	Lägeriktighet håll 309 Rel. G530.Y	no group	variable	0
1.48	1858297	Block_D13	48	Lägeriktighet plan 3300 '1' Rel. G540	no group	variable	0
1.49	1858297	Block_D13	49	Lägeriktighet plan 3300 '1' Rel. G540.Z	no group	variable	0
1.50	1858297	Block_D13	50	Lägeriktighet 1 3300 '1' Rel. G540	no group	variable	0
1.51	1858297	Block_D13	51	Lägeriktighet 1 3300 '1' Rel. G540.Z	no group	variable	0
1.52	1858297	Block_D13	52	Lägeriktighet 2 3300 '1' Rel. G540	no group	variable	0
1.53	1858297	Block_D13	53	Lägeriktighet 2 3300 '1' Rel. G540.Z	no group	variable	0
1.54	1858297	Block_D13	54	Lägeriktighet 3 3300 '1' Rel. G540	no group	variable	0
1.55	1858297	Block_D13	55	Lägeriktighet 3 3300 '1' Rel. G540.Z	no group	variable	0
1.56	1858297	Block_D13	56	Lägeriktighet 4 3300 '1' Rel. G540	no group	variable	0
1.57	1858297	Block_D13	57	Lägeriktighet 4 3300 '1' Rel. G540.Z	no group	variable	0

type of part, special configurations have been saved to the "Characteristics statistics" graphic. Now it shows only the characteristics whose K-field 2190 is still empty. In addition, the characteristics are sorted by the number of tolerance violations. Thus all the missing information can be supplemented very efficiently by means of the table of characteristics. As soon as all the missing information is added, you may evaluate the data directly by using qs-STAT® or O-QIS.

The following graphics are available for evaluation:

- Characteristics-related summary of measurements displaying the characteristics indicating the most CMS violations first.

In addition, the graphic shows the CMS classes corresponding to the respective characteristics. This graphic makes it quite easy to identify the characteristics' main errors in case there are already several part measurements available.

- Points rating referring to single measurements: You display the results referring to the respective measured part. Once again, the corresponding classes are easy to identify.

Tabular points rating

i	Date/Time	0.00 %	77.22 %	22.78 %	Points
60	16.12.2010 16:16:02	0.00 %	77.22 %	22.78 %	16.00
61	20.12.2010 13:55:00	0.00 %	97.47 %	2.53 %	2.00
62	21.12.2010 09:06:48	0.00 %	88.87 %	10.13 %	8.00
63	23.12.2010 13:02:49	0.00 %	84.81 %	15.19 %	12.00
64	27.12.2010 17:11:31	0.00 %	84.81 %	15.19 %	12.00
65	29.12.2010 15:34:16	0.00 %	97.47 %	2.53 %	2.00
66	03.01.2011 16:41:37	0.00 %	97.47 %	2.53 %	2.00
67	04.01.2011 16:50:27	0.00 %	88.87 %	10.13 %	8.00
68	10.01.2011 11:42:47	0.00 %	100.00 %	0.00 %	3.00
69	11.01.2011 13:21:21	0.00 %	100.00 %	0.00 %	0.00
70	17.01.2011 13:38:35	0.00 %	100.00 %	0.00 %	0.00
71	20.01.2011 11:31:09	0.00 %	100.00 %	0.00 %	0.00
72	21.01.2011 08:35:36	0.00 %	100.00 %	0.00 %	0.00
73	24.01.2011 11:54:42	0.00 %	97.47 %	2.53 %	2.00
74	26.01.2011 07:52:25	0.00 %	96.29 %	3.80 %	3.00
75	28.01.2011 10:59:08	0.00 %	100.00 %	0.00 %	0.00
76	03.02.2011 09:21:48	0.00 %	100.00 %	0.00 %	0.00
77	04.02.2011 09:18:26	0.00 %	96.29 %	3.80 %	3.00
78	07.02.2011 11:48:04	0.00 %	100.00 %	0.00 %	0.00
79	08.02.2011 11:02:49	0.00 %	100.00 %	0.00 %	0.00

Characteristics Statistics - Design 8

Char.No.	Char.Descr.	n=	Value char. individuals	Histogram individuals
80	Lägeriktighet plan 3	61	23	32
78	Rakhet 8 3300 '2' R	10	7	3
81	Lägeriktighet plan 3	61	2	49
79	Parallellhet 3300 '2'	0	0	0
78	Max Rakhet 3300 '2'	0	0	0
77	Rakhet 9 3300 '2' R	0	0	0
75	Rakhet 7 3300 '2' R	0	0	0
74	Rakhet 6 3300 '2' R	0	0	0
73	Rakhet 5 3300 '2' R	0	0	0
72	Rakhet 4 3300 '2' R	0	0	0
71	Rakhet 3 3300 '2' R	0	0	0

- Examining the table of individuals for all characteristics.

You show the classification of each measured value for all characteristics.

all characteristics

Char.No.	Char.Descr.	n=	0	1	2	3	4	5	6	7	8	9	10
57	Lägeriktighet 4 3300 '1' Rel. C	119	0	0	0	0	0	0	0	0	0	0	0
58	Lägeriktighet 5 3300 '1' Rel. C	119	0	0	0	0	0	0	0	0	0	0	0
59	Lägeriktighet 1 3300 '1' Rel. C	119	0	0	0	0	0	0	0	0	0	0	0
60	Planhet 3300 '2'	119	0	0	0	0	0	0	0	0	0	0	0
61	Parallellhet 3300 '1' Rel. C	119	0	0	0	0	0	0	0	0	0	0	0
62	Distans 1 - 42mm plan 3300	119	0	0	0	0	0	0	0	0	0	0	0
63	Distans 2 - 42mm plan 3300	119	0	0	0	0	0	0	0	0	0	0	0
64	Distans 3 - 42mm plan 3300	119	0	0	0	0	0	0	0	0	0	0	0
65	Distans 4 - 42mm plan 3300	119	0	0	0	0	0	0	0	0	0	0	0
66	Distans 5 - 42mm plan 3300	119	0	0	0	0	0	0	0	0	0	0	0
67	Distans 6 - 42mm plan 3300	119	0	0	0	0	0	0	0	0	0	0	0
68	Planhet 3300 '2'	119	0	0	0	0	0	0	0	0	0	0	0
69	Rakhet 1 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
70	Rakhet 2 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
71	Rakhet 3 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
72	Rakhet 4 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
73	Rakhet 5 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
74	Rakhet 6 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
75	Rakhet 7 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
76	Rakhet 8 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
77	Rakhet 9 3300 '2' Ref 100mm	119	0	0	0	0	0	0	0	0	0	0	0
78	Max Rakhet 3300 '2' Ref 100	119	0	0	0	0	0	0	0	0	0	0	0
79	Parallellhet 3300 '2' Ref 100	119	0	0	0	0	0	0	0	0	0	0	0
80	Lägeriktighet plan 3075 Rel. C	119	0	0	0	0	0	0	0	0	0	0	0
81	Lägeriktighet plan 3075 Rel. C	119	0	0	0	0	0	0	0	0	0	0	0

- Display in the parts protocol: The rating can also be displayed in the parts protocol and thus e.g. it may help to evaluate the last measurement in the CMM-Reporting.

Parts protocol

Char.No.	Char.Descr.	i	x	x	x
20	Distans 5 - 12mm 500 '2'	119	11,9109		S
21	Distans 6 - 12mm 500 '2'	119	11,9220		S
35	Diameter håll 502	119	18,0094		lo
38	Diameter håll 503	119	18,0025		lo
45	Lägeriktighet håll 309 Rel. G5	119	0,1121		S
46	Lägeriktighet håll 309 Rel. G5	119	169,9117		lo
47	Lägeriktighet håll 309 Rel. G5	119	93,9924		S
48	Lägeriktighet plan 3300 '1' Re	119	0,1744		lo
49	Lägeriktighet plan 3300 '1' Re	119	181,9128		lo
50	Lägeriktighet 1 3300 '1' Rel. C	119	0,1161		lo
51	Lägeriktighet 1 3300 '1' Rel. C	119	181,9419		lo
52	Lägeriktighet 2 3300 '1' Rel. C	119	0,0406		lo
53	Lägeriktighet 2 3300 '1' Rel. C	119	181,9797		lo
54	Lägeriktighet 3 3300 '1' Rel. C	119	0,1403		lo
55	Lägeriktighet 3 3300 '1' Rel. C	119	181,9299		lo
56	Lägeriktighet 4 3300 '1' Rel. C	119	0,1611		lo
57	Lägeriktighet 4 3300 '1' Rel. C	119	181,9195		lo
58	Lägeriktighet 5 3300 '1' Rel. C	119	0,1744		lo
59	Lägeriktighet 5 3300 '1' Rel. C	119	181,9128		lo
67	Distans 6 - 42mm plan 3300 '1'	119	41,9385		S
68	Planhet 3300 '2'	119	0,0670		lo
76	Rakhet 8 3300 '2' Ref 100mm	119	0,0134		lo
78	Max Rakhet 3300 '2' Ref 100	119	0,0167		lo
80	Lägeriktighet plan 3075 Rel. C	119	0,2695		M
81	Lägeriktighet plan 3075 Rel. C	119	175,8652		M