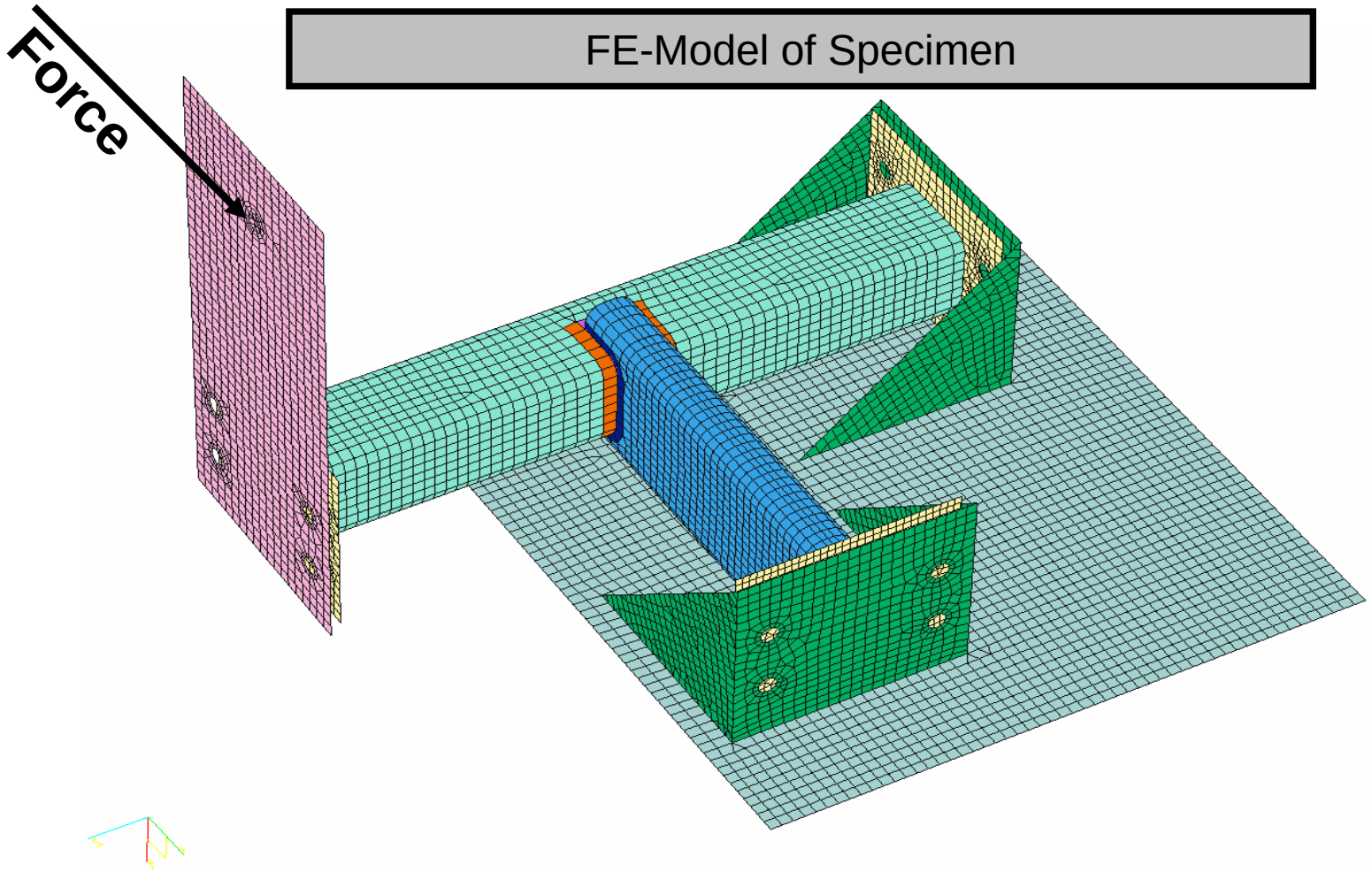
DAIMLERCHRYSLER

MAGNA STEYR
ENGINEERING CENTER STEYR

SAE FD&E Weld Challenge 2, Ajay Vittalam, 4/14/04

FE-Model of Specimen



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Gerald Schwarz, Magna Steyr, femfat.usa@magnasteyr.com

Date: 04/01/2004

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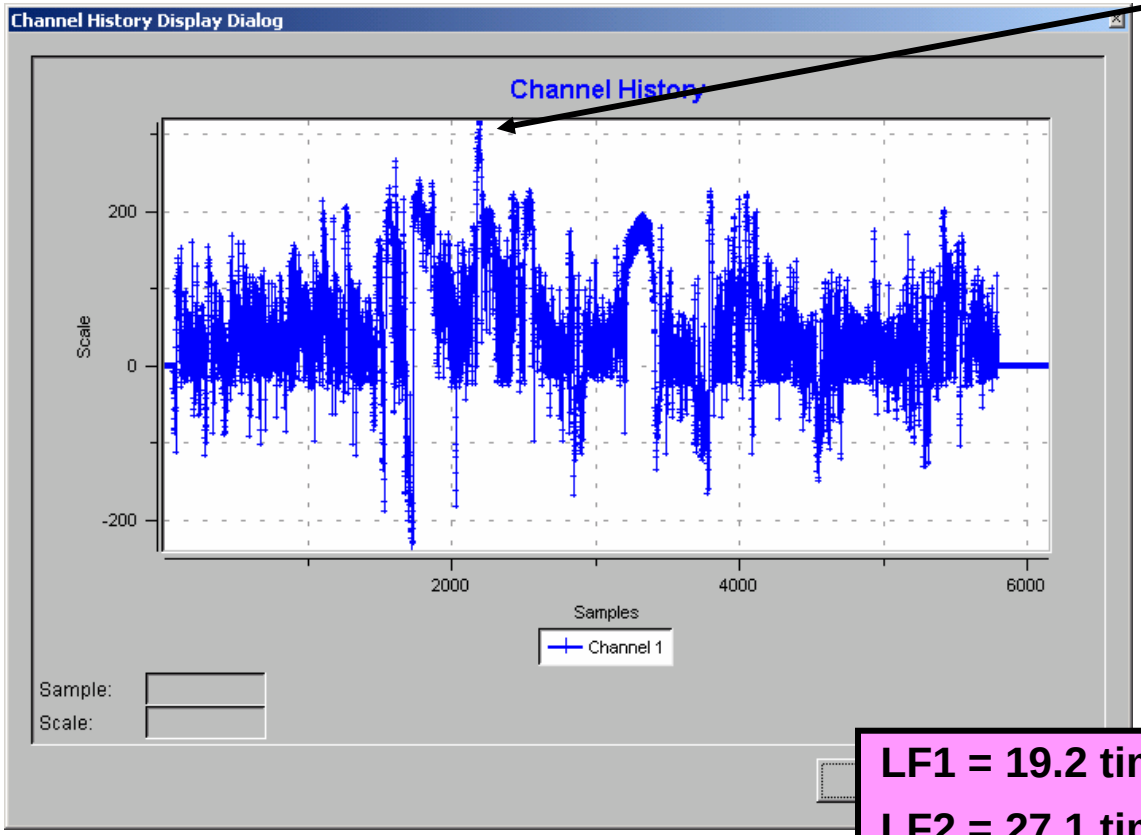
Real Load History

LF1 - Max 6109 lbs
LF2 - Max 8618 lbs



LF1 = 19.2 times load history
LF2 = 27.1 times load history

FEM FAT FATIGUE FE - METHOD

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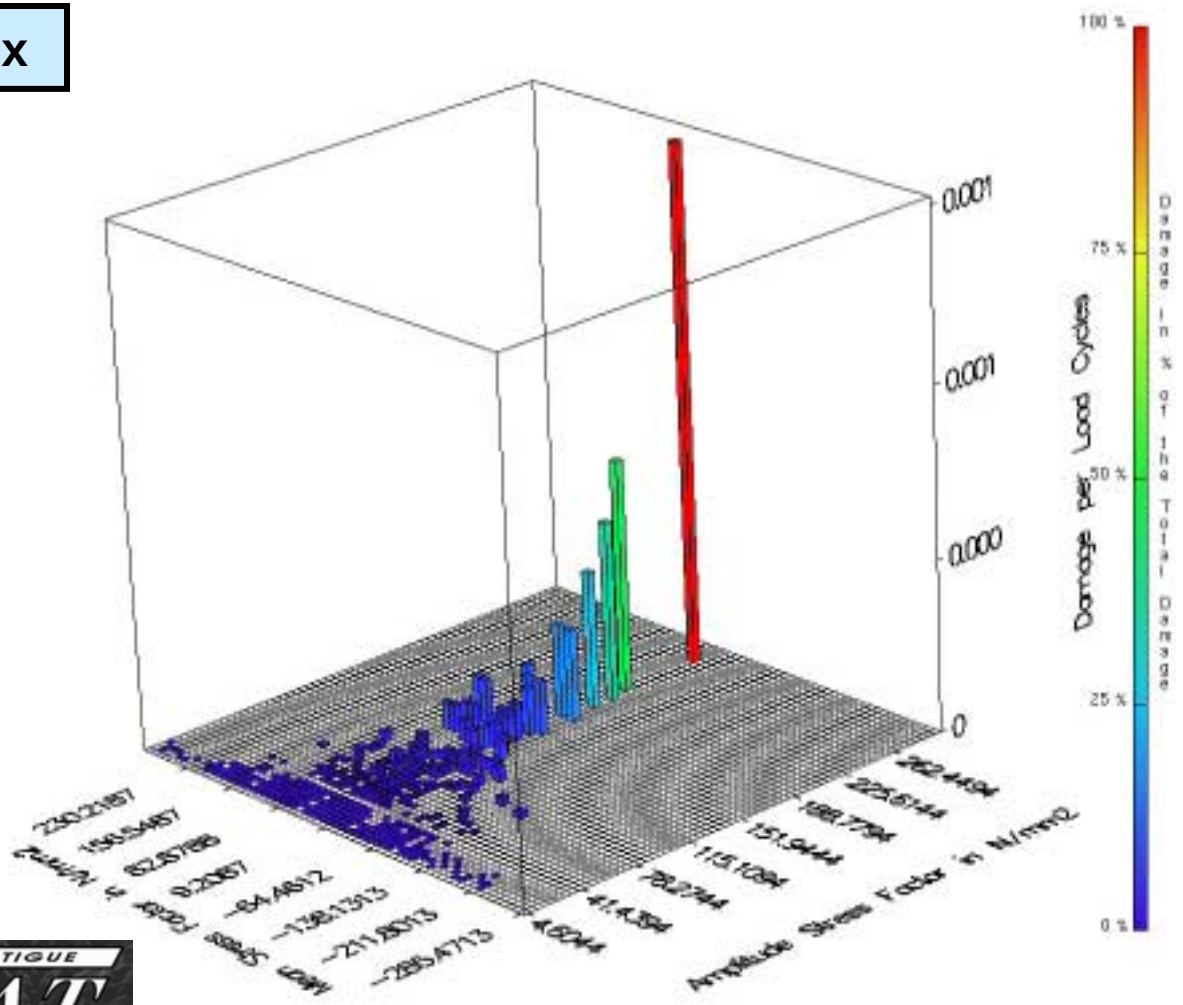
Rainflow Matrix



FEMFAT FE-METHOD FATIGUE

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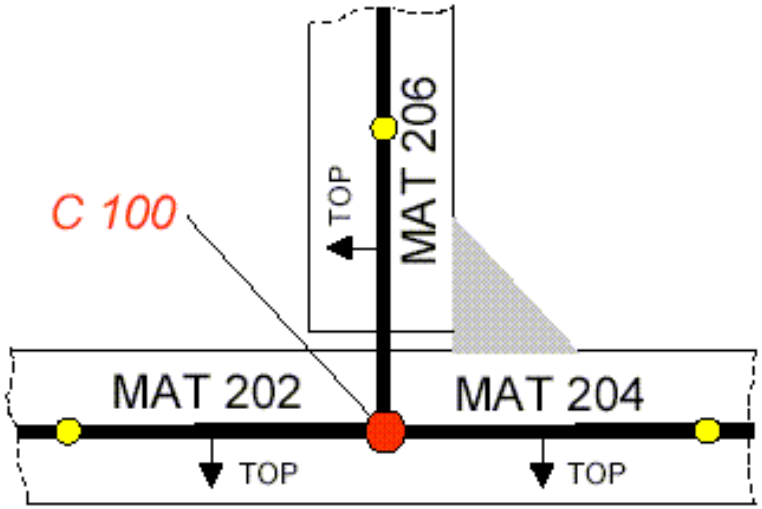
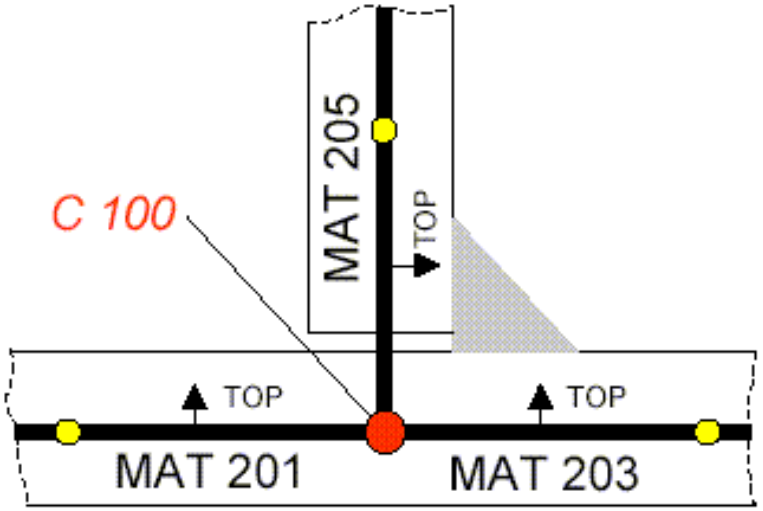
FEMFAT Weld Modeling Guidelines

e.g. T – Weld
Welded on one side (outside)





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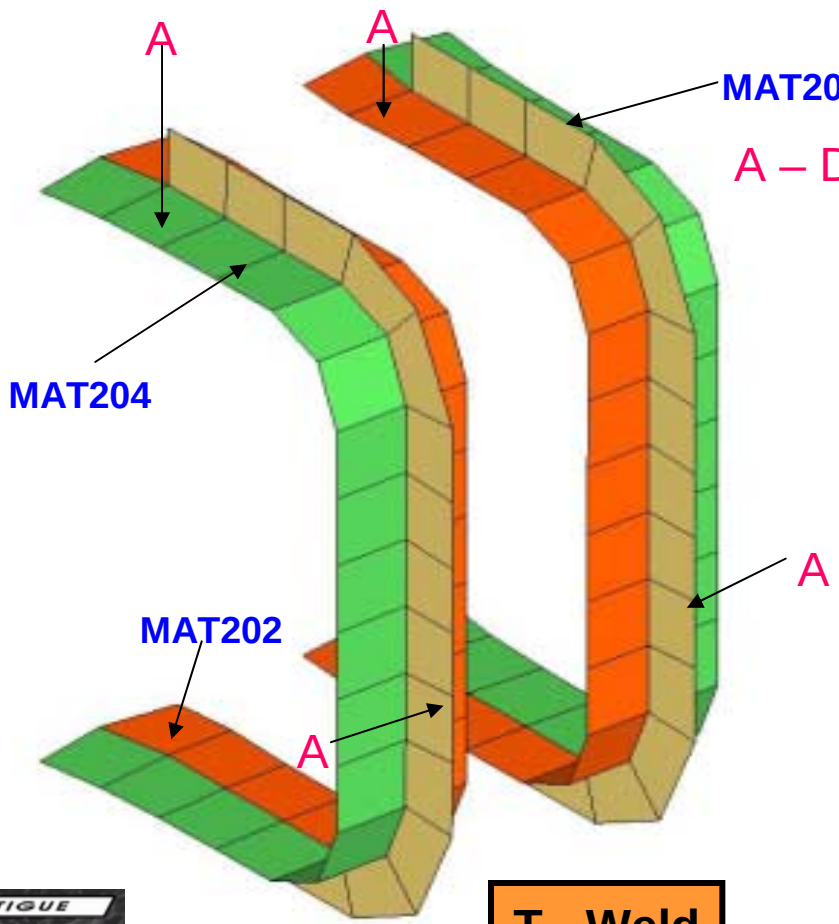

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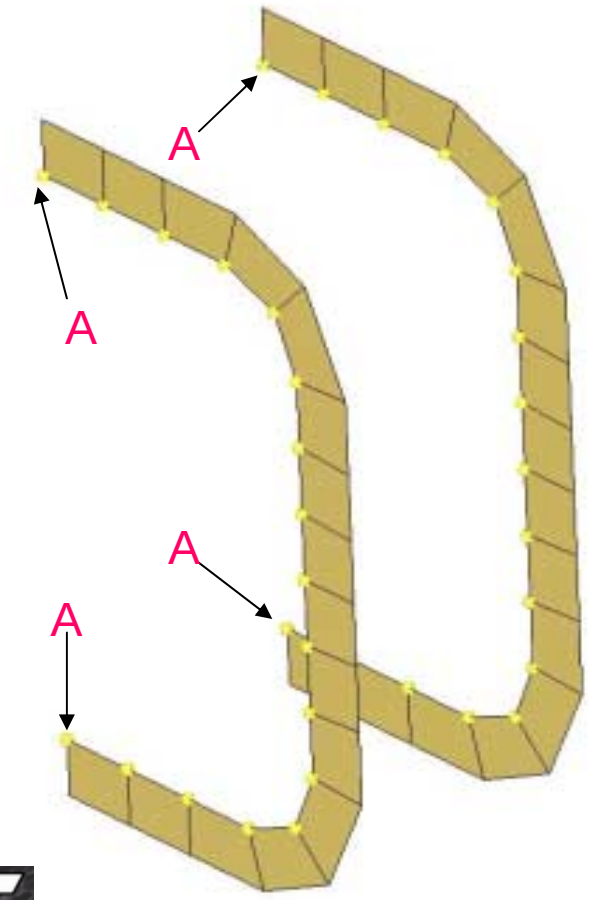

A – Set C101
End nodes of weld

Rest of the highlighted
Nodes in Set C100

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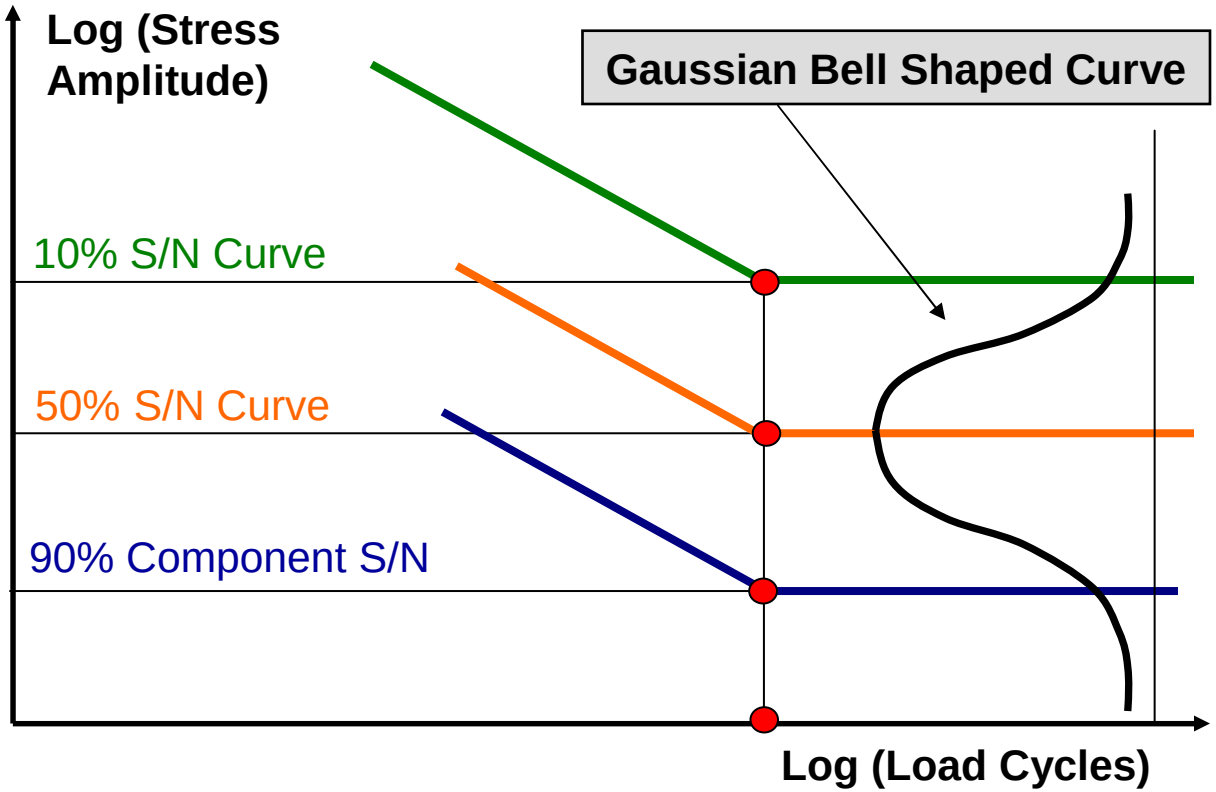

Sigma ±	Survival Probability %	Defects per Million
1	68.26	317,400
2	95.46	45,400
3	99.73	2,700
4	99.9937	63
5	99.999943	0.57
6	99.9999998	0.003

$$\text{Range of Dispersion } Ts = \frac{\textbf{Endurance Limit 10\%}}{\textbf{Endurance Limit 90\%}} = 1.45$$

Recommended for seam welds by **Haibach**, Betriebsfestigkeit, Verfahren und Daten zur Bauteilberechnung, 2. Aufl. 2002. 500 S. SPRINGER, BERLIN / VDI

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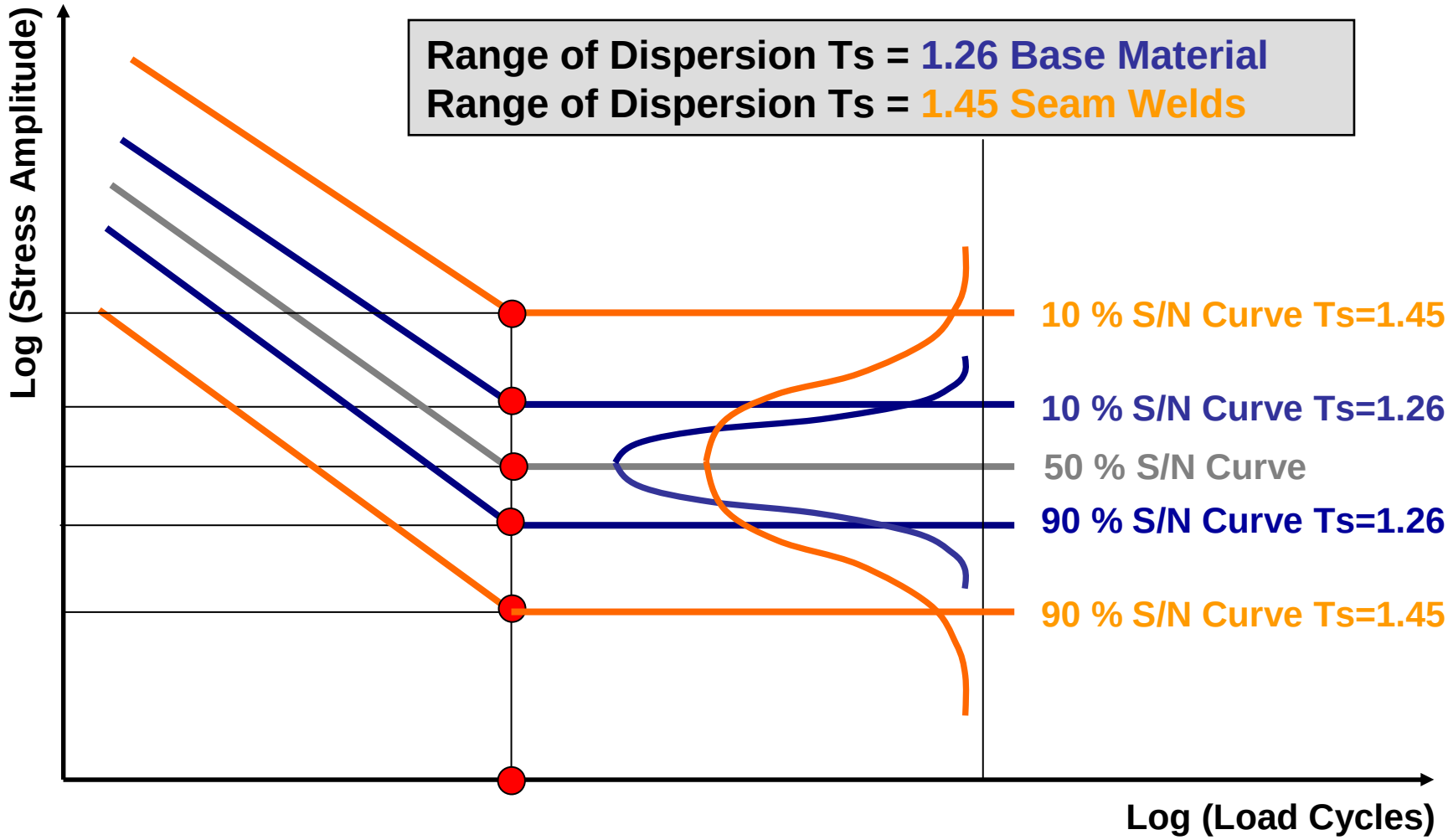

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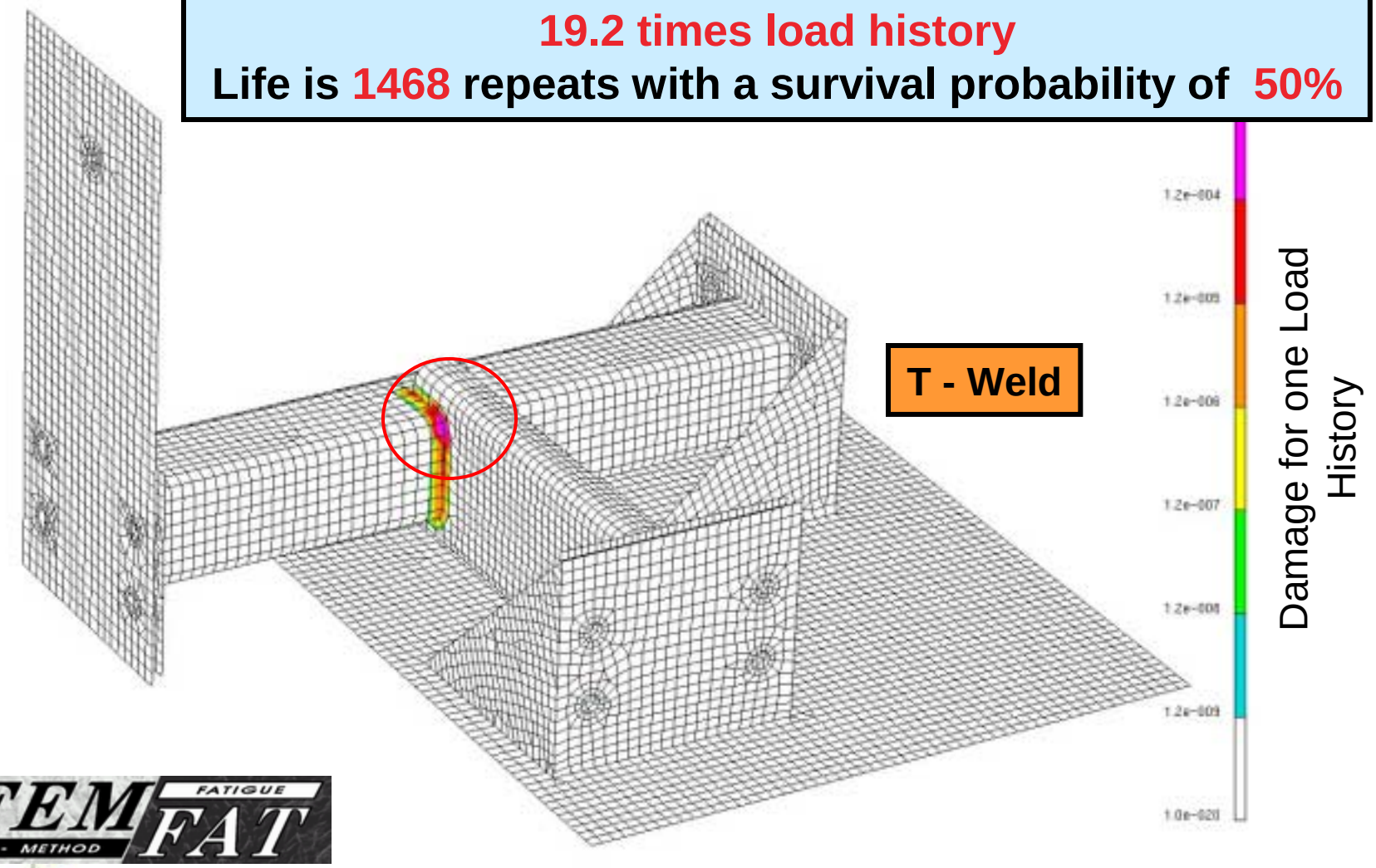
19.2 times load history

Life is 1468 repeats with a survival probability of 50%



FEMFAT FATIGUE FE - METHOD

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*** Details next page**

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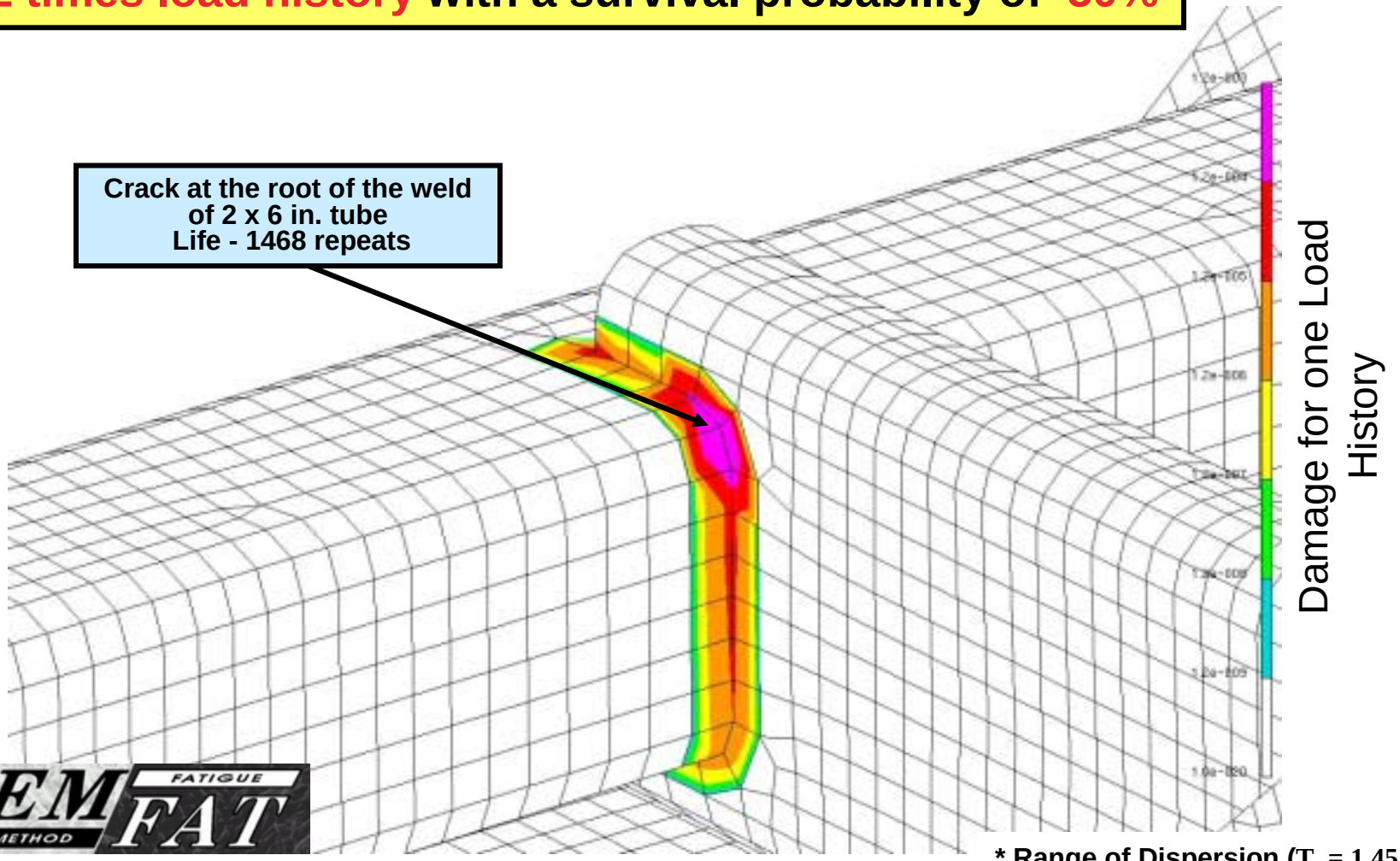
19.2 times load history with a survival probability of 50%



FEMFAT FE - METHOD FATIGUE

*** Range of Dispersion (T_s = 1.45)**

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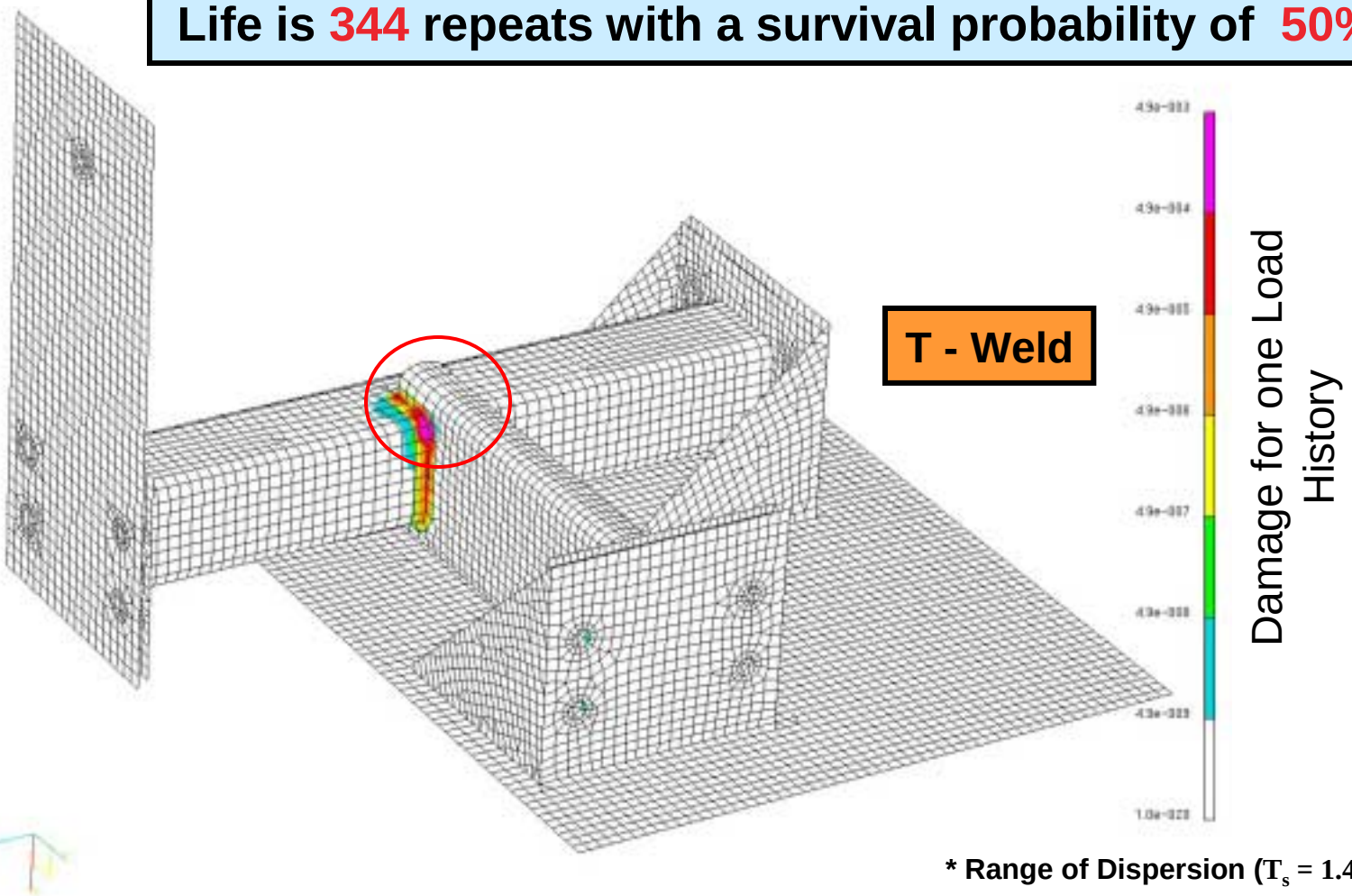
27.1 times load history

Life is 344 repeats with a survival probability of 50%



*** Range of Dispersion (T_s = 1.45)**

*** Details next page**

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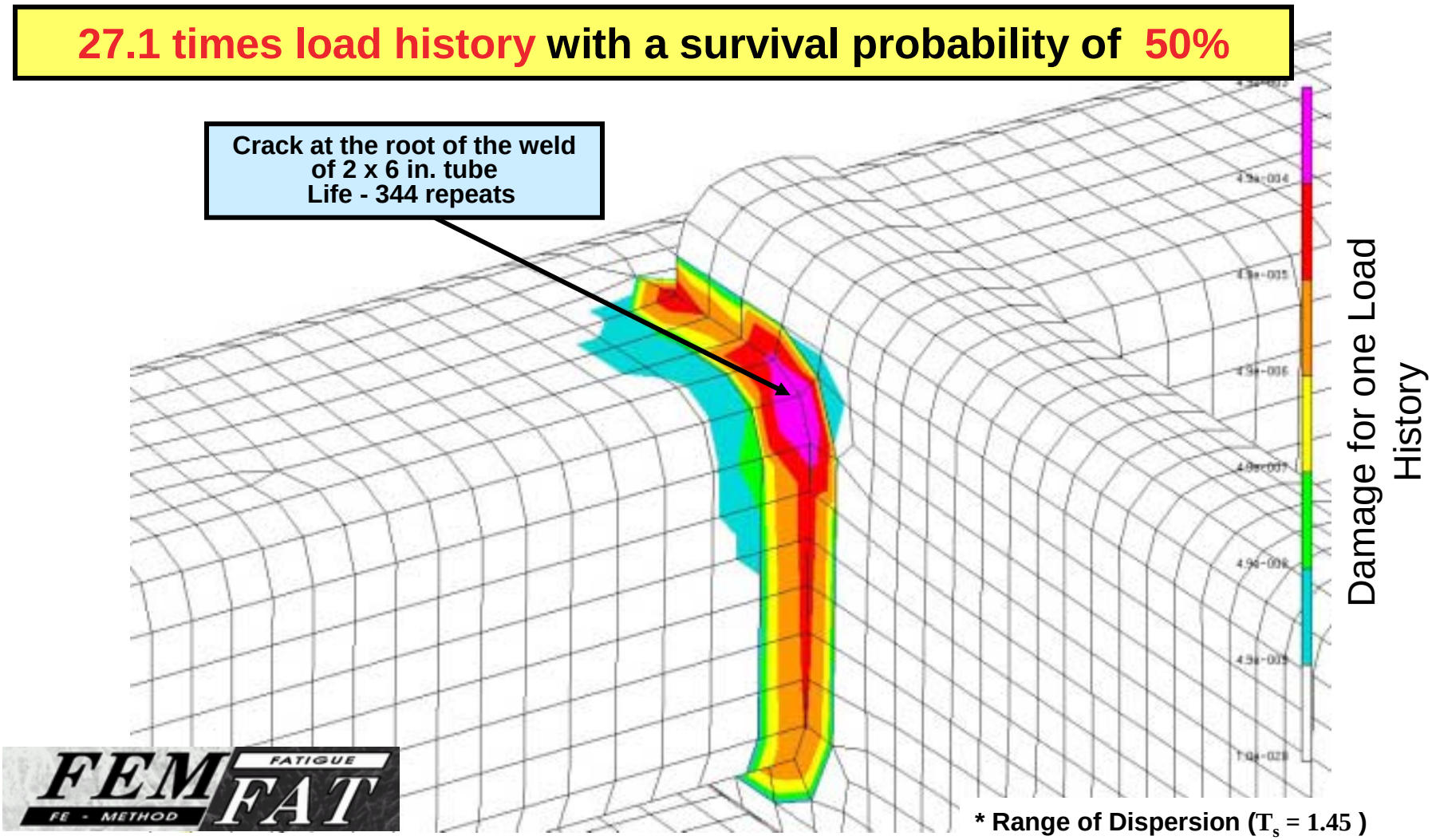
27.1 times load history with a survival probability of 50%



FEM FE - METHOD FATIGUE FAT

*** Range of Dispersion (T_s = 1.45)**

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	Number of repeated Load Histories Crack at Root of the Weld at 2x6 in. tube	
Survival Probability	**LF1-19.2**	**LF2-27.1**
10	3,293	743
25	2,240	515
50	1,468	344
75	969	230
90	671	161
99	357	87
99.9	231	57
99.99	173	42
99.999	133	33

FEMFAT FATIGUE FE - METHOD

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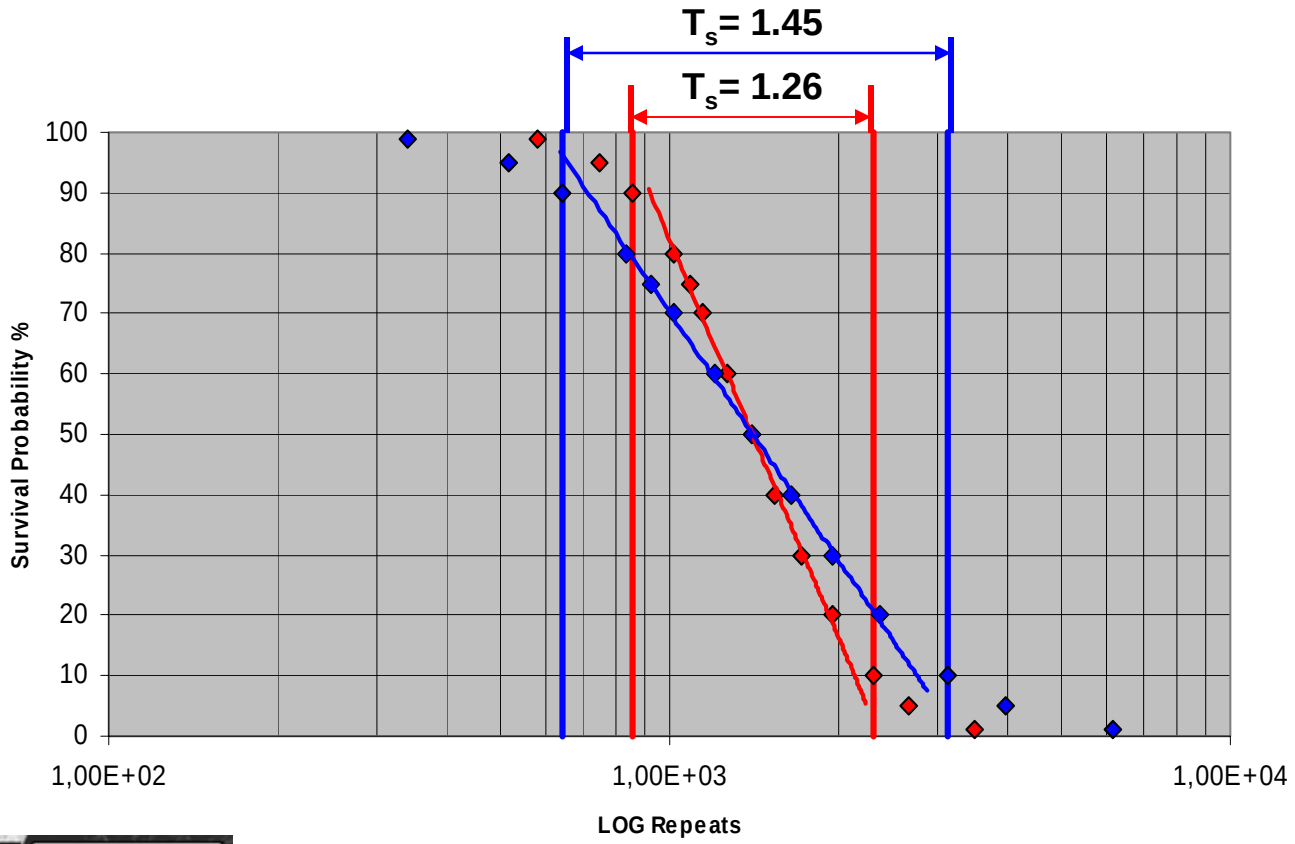
Scaling Factor 19.2 – Range of Dispersion



FEM FAT FATIGUE FE - METHOD

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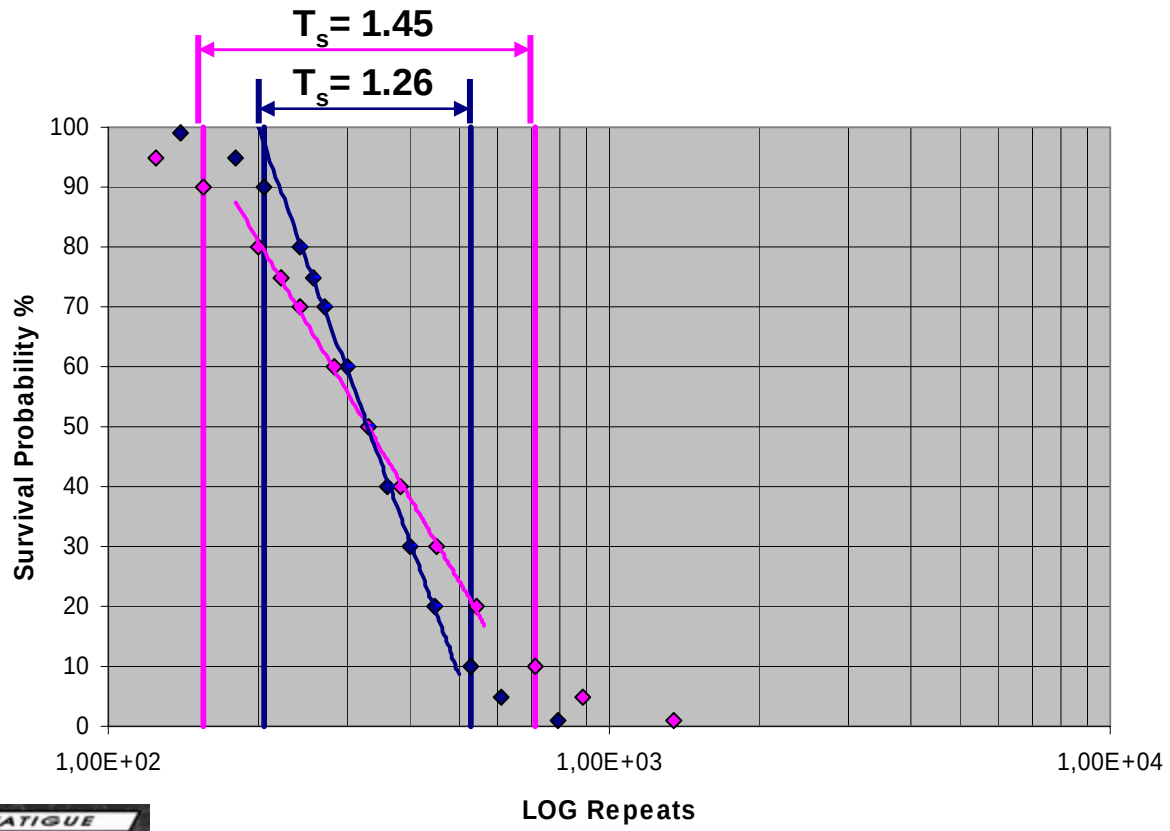
Scaling Factor 27.1 – Range of Dispersion



FEMFAT FATIGUE FE - METHOD

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