MEIJI UNIVERSITY

MALAYSIA JAPAN VISIONARIES CONFERENCE 2024

Panel Session
University of Tokyo
15.09.2024

14 years of building Robust Quality Engineering in Malaysia

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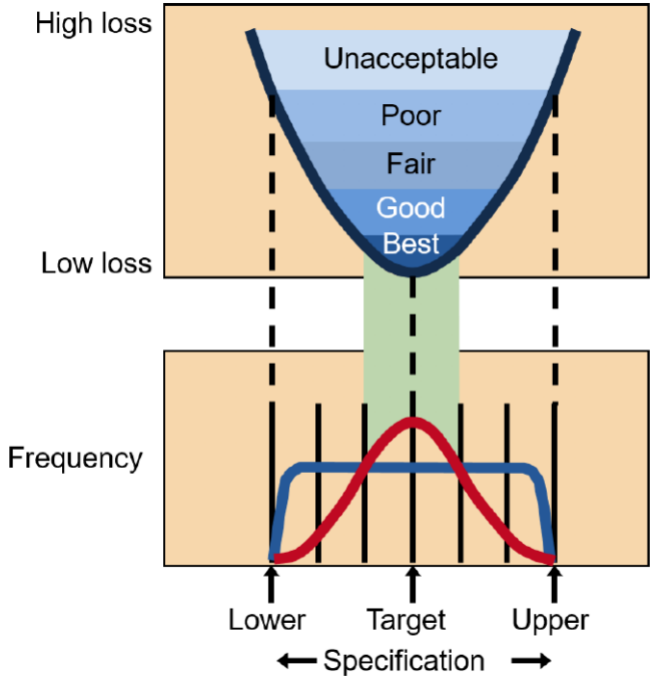
[6 years in Proton Bhd, 30 years in UTM Malaysia]

Dr Genichi Taguchi Quality Philosophy and His Taguchi Methods

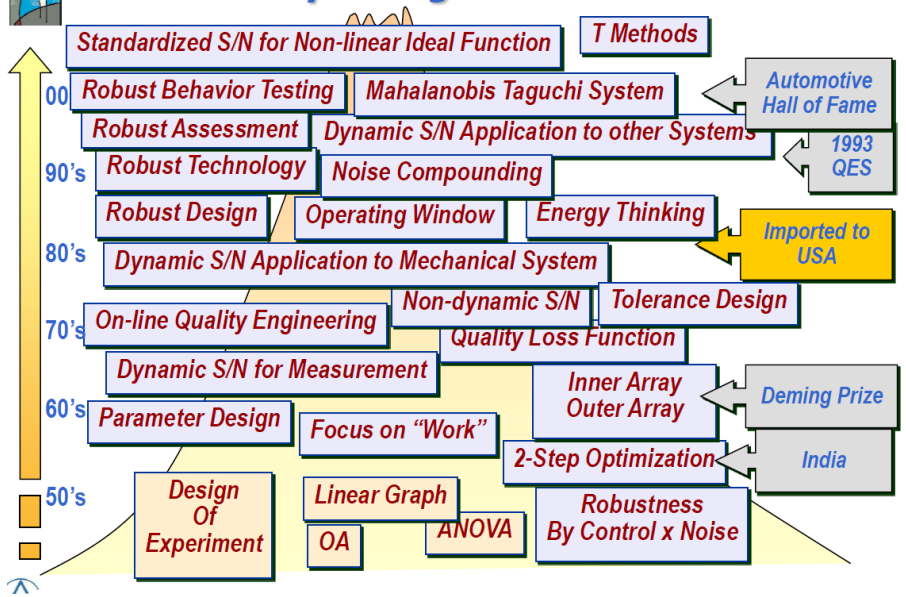
Dr. Taguchi to USA - Early 80's

- In early 80's, Dr. Taguchi got involved with three US companies, **Xerox, Ford and Bell Laboratories.** Xerox discovered his methods through Fuji Xerox and Ford from their supplier Nippon Denso.
- In 1981, under a guidance from Dr. Deming, Ford Motor Company established Ford Supplier Institute, to train its supplier companies. FSI became ASI in 1985.
- In 1981, Dr. Taguchi offered a lecture at the Bell Labs, then asked them to bring the most difficult problem. They brought 256k IC Photolithography Window Size problem.

Quality Loss Function = Loss to Society



History of Taguchi Method



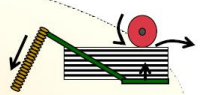
1980's Paper Feeder by Xerox

Operating Window Concept

1 Hr Robust Assessment Test

Noise Compounding

M = Roller Angular Displacement → Paper Feeder → y = Paper Linear Displacement



Noise Compounding

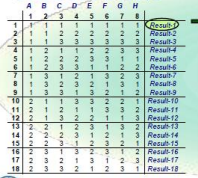
N1 = Noise Condition which tends to miss-feed
= Slippery & Heavy Paper + Worn Roller + High Humidity

N2 = Noise Condition which tends to multi-feed
= Coarse & Light Paper + New roller + Dry

2 Step Optimization

Step-1: Maximize O.W.
Step-2: Adjust Spring Force

Control Factors



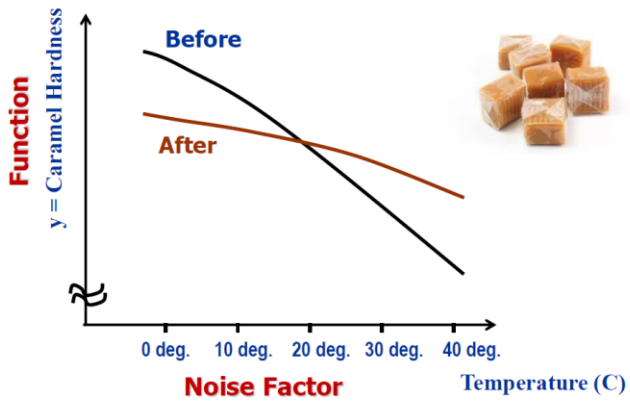
For each run of L18, measure the following:

fx = Force to start feeding one by one, say 4 sheets
fz = Force to start multi-feed/ paper jam

1948 Morinaga Company

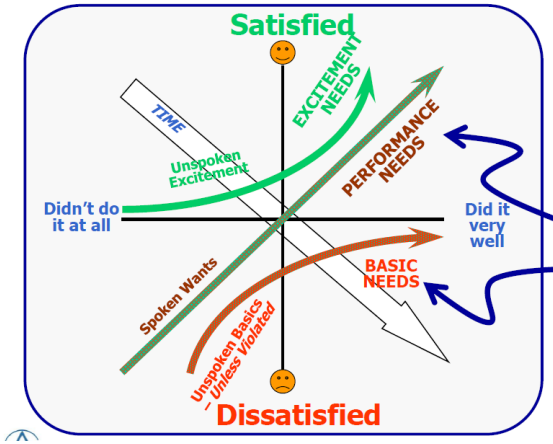
- Caramel Candy Hardness

Concept of Robust Design



Customer Wants and Needs

The Kano Model



Basic Needs and Performance Needs
Focus of
Robust Engineering
&
Quality Loss Function

Calculation of S/N Ratios and Means

Notice that the 18 Signal-to-Noise Ratios vary from 36 db to 50 db – a swing of 14 db. The Number 10 combination is the worst. Number 6 is the best with a variability range of less than ¼ of that for Number 10.

	A	B	C	D	E	F	G	H										
	1	2	3	4	5	6	7	8	P1	P2	P3	P4	P5	P6	P7	Sigma	Mean	S/N
1	1	1	1	1	1	1	1	1	10.18	10.18	10.12	10.06	10.02	9.98	10.20	0.087	10.11	41.31
2	1	1	2	2	2	2	2	2	10.03	10.01	9.98	9.96	9.91	9.89	10.12	0.078	9.99	42.19
3	1	1	3	3	3	3	3	3	9.81	9.78	9.74	9.74	9.71	9.68	9.87	0.064	9.76	43.65
4	1	2	1	1	2	2	3	3	10.09	10.08	10.07	9.99	9.92	9.88	10.14	0.096	10.02	40.36
5	1	2	2	2	3	3	1	1	10.06	10.05	10.05	9.89	9.85	9.78	10.12	0.129	9.97	37.74
6	1	2	3	3	1	1	2	2	10.20	10.19	10.18	10.17	10.14	10.13	10.22	0.032	10.18	50.03
7	1	3	1	2	1	3	2	3	9.91	9.88	9.88	9.84	9.82	9.80	9.93	0.048	9.87	46.34
8	1	3	2	3	2	1	3	1	10.32	10.28	10.25	10.20	10.18	10.18	10.36	0.071	10.25	43.21
9	1	3	3	1	3	2	1	2	10.04	10.02	10.01	9.98	9.95	9.89	10.11	0.070	10.00	43.13
10	2	1	1	3	3	2	2	1	10.00	9.98	9.93	9.80	9.77	9.70	10.15	0.157	9.90	35.99
11	2	1	2	1	1	3	3	2	9.97	9.97	9.91	9.88	9.87	9.85	10.05	0.071	9.93	42.88
12	2	1	3	2	2	1	1	3	10.06	9.94	9.90	9.88	9.80	9.72	10.12	0.139	9.92	37.05
13	2	2	1	2	3	1	3	2	10.15	10.08	10.04	9.98	9.91	9.90	10.22	0.120	10.04	38.46
14	2	2	2	3	1	2	1	3	9.91	9.87	9.86	9.87	9.85	9.80	10.02	0.069	9.88	43.15
15	2	2	3	1	2	3	2	1	10.02	10.00	9.95	9.92	9.78	9.71	10.06	0.129	9.92	37.70
16	2	3	1	3	2	3	1	2	10.08	10.00	9.99	9.95	9.92	9.85	10.14	0.097	9.99	40.23
17	2	3	2	1	3	1	2	3	10.07	10.02	9.89	9.89	9.85	9.76	10.19	0.147	9.95	36.60
18	2	3	3	2	1	2	3	1	10.10	10.08	10.05	9.99	9.97	9.95	10.12	0.067	10.04	43.48
																Average	9.98	41.30

Transfer of Quality Engineering Knowledge through Partnering with Quality Guru

1st WORKSHOP - Introduction to Robust Engineering using Taguchi Method by **Shin Taguchi**, 21-23 March 2011, Kuala Lumpur, Malaysia

Attended QES Conference in June 2010 – Introduced by Miyagi sensei to Mr Shin Taguchi who is the son of Dr Genichi Taguchi -

April 2013 – 1st ICRQE Kuala Lumpur
October 2014 - 2nd ICRQE Bangalore, India
January 2016 – 3rd ICRQE Mumbai, India
August 2018 - 4th ICRQE Kuala Lumpur
June 2022 – 5th ICRQE Japan (Online)
Sept 2024 – 6th ICRQE Penang Malaysia

SOME KEY RESEARCHERS BENEFITED FROM COLLABORATION FROM 2010- now in UTM, UKM, Uniten, UniMAP, UMPSA, UniKL PG, etc. (MALAYSIAN UNIVERSITIES)

A Quality Career: Dr Rozzeta Dolah Part 1

Minitab Blog Editor | 9/19/2018

Topics: Six Sigma, Data Analysis, Quality Improvement

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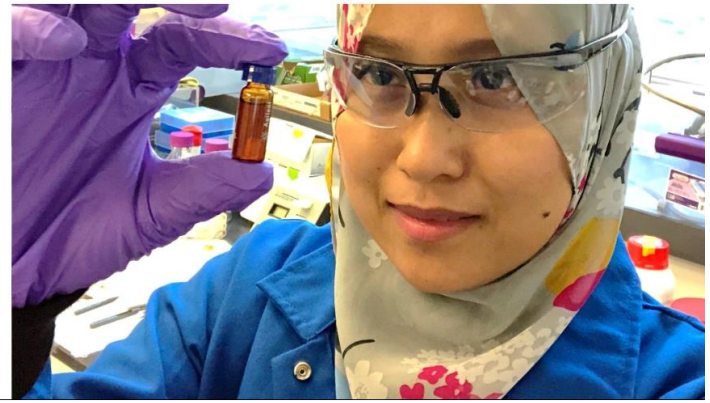

To celebrate Minitab's support of the recent International Conference on Teaching Statistics in Kyoto, Japan, we sat down with Dr Rozzeta Dolah, whose c work in statistics and engineering has taken her to her native Malaysia, to Japan and then the USA where she

Prof. Ts. Dr. Khairur Rijal bin Jamaludin
PROFESOR (VK07)

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powder metallurgy | metal injection molding | materials processing | quality | taguchi method
lean manufacturing | manufacturing process mechanics | mahalanobis taguchi system

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Nolia Harudin

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Optimization and Prediction… | Machine Learning | Mahalan

TITLE	CITE
Classification performance of thresholding methods in the Mahalanobis–Taguchi system F Ramlie, WZAW Muhamad, N Harudin, MY Abu, H Yahaya, ... Applied Sciences 11 (9), 3906	
Reconstruction of medical images using artificial bee colony algorithm NA Rusdi, ZR Yahya, N Roslan, WZA Wan Muhamad Mathematical Problems in Engineering 2018 (1), 8024762	
Optimal feature selection of taguchi character recognition in the mahalanobis-taguchi system using bees algorithm F Ramlie, KR Jamaludin, R Dolah, W Muhamad	

TITLE
Dynamic mechanical properties and thermal proper fiber reinforced unsaturated polyester hybrid compo NIN Haris, RA Ilyas, MZ Hassan, SM Sapuan, A Afdzaluddin, ... Polymers 13 (19), 3343
Classification performance of thresholding methods F Ramlie, WZAW Muhamad, N Harudin, MY Abu, H Yahaya, ... Applied Sciences 11 (9), 3906

TITLE
Classification performance of thresholding methods in the Mahalanobis–Taguc F Ramlie, WZAW Muhamad, N Harudin, MY Abu, H Yahaya, ... Applied Sciences 11 (9), 3906
Binary Bitwise Artificial Bee Colony as Feature Selection Optimization Approac Taguchi's T-Method N Harudin, F Ramlie, WZA Wan Muhamad, MN Muhtazaruddin, ... Mathematical Problems in Engineering 2021 (1), 5592132
Criteria selection for an mba programme based on the mahalanobis taguchi sy kanri distance calculator WZAW Muhamad, KR Jamaludin, F Ramlie, N Harudin, NN Jaafar 2017 IEEE 15th Student Conference on Research and Development (SCOReD), 220-223

6th International Conference on Robust Quality Engineering (ICRQE) : Main Organizer – Inst of Engrg Mathematics, UniMAP from 2nd -3rd September 2024

Key Note by Shin Taguchi
Over 30 papers on Quality Engineering papers
Delegates from Japan, Malaysia, India mainly.

Some Key Success Factors

- Long-term thinking with flexibility (structure, finance, resources)
- Collaborate with the right people with similar dream and vision
- Conscious efforts taken to ensure sustainability
- Always positive and sincere in the cooperation and joint activities