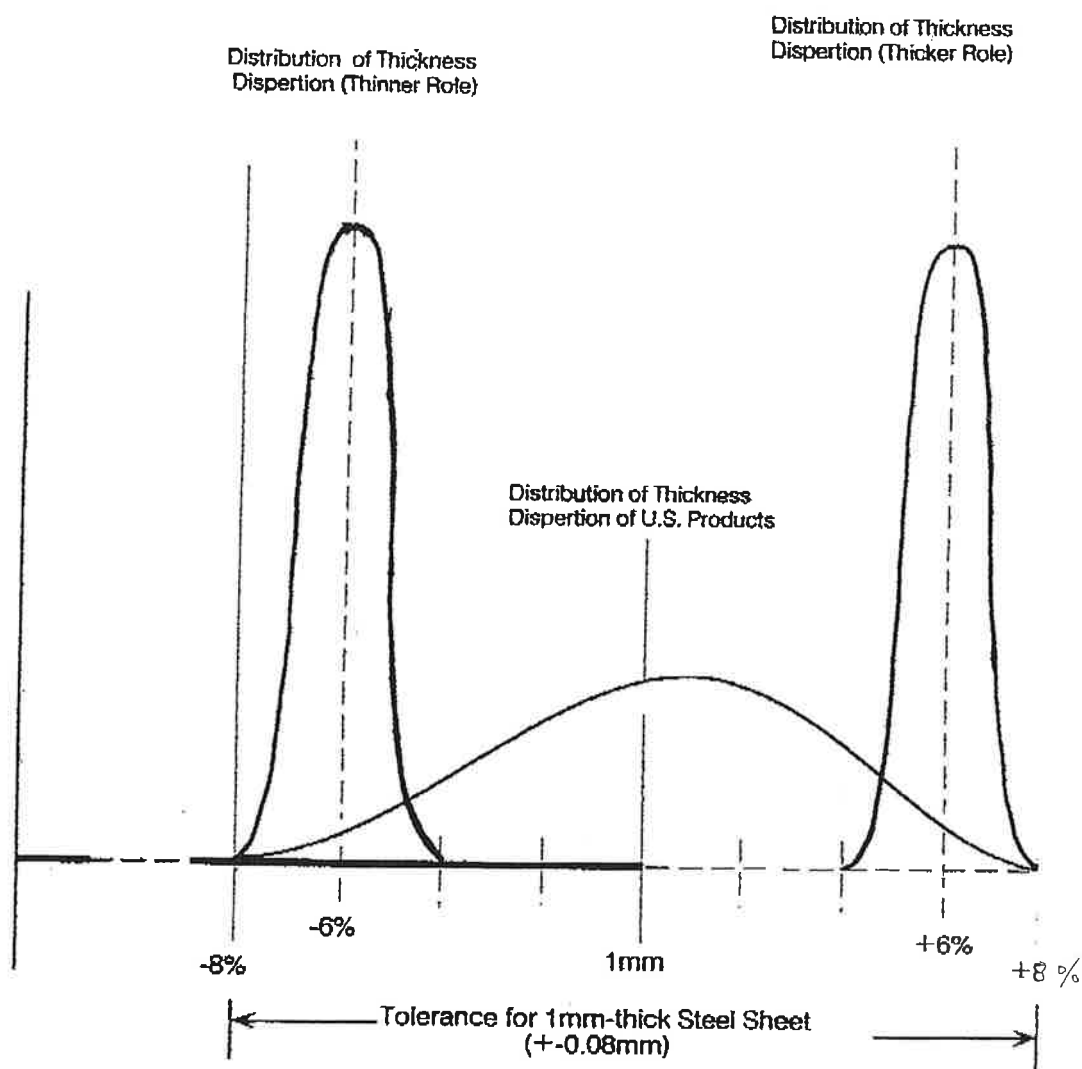


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Comparison of the Thickness Tolerance of Steel Products between Japan and U.S.



Note: Generally Japanese steel sheet are controlled to 1/3-1/4 as thick as JIS (Japan Industrial Standard) (+/-0.02mm-+0/015mm), whereas U.S. tolerance disperses to the fullest possible extent.

Source: Interviews with Japanese Car Manufacturers and Parts Manufacturers operating in the U.S., Japanese Steel makers, U.S. and European car manufacturers. (1989-1990)

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Reliability of Parts and Products

R: Reliability of the completed product

$$R = r^n$$

r: Reliability of each part

n: Number of parts

n \ r	99.999	99.99	99.90	99.50	99.00	95.00
10	99.99	99.9	99.00	95.11	90.44	59.87
20				90.46		35.85
30				86.04		21.46
40				81.18		12.85
50				77.83		7.69
60				74.03		4.61
70				70.41		2.76
80				66.96		1.65
90				63.69		0.99
100	99.90	99.01	90.48	60.58	36.60	0.59
250	99.75	97.53	77.88	—	8.11	—
500	99.50	95.12	60.65	—	0.66	—
1,000	99.01	90.48	36.95	—	0.004	—

Source: Nagaigawa Masakatu, Skill Kanri

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Reductin of Production Lead Time at Japanese Company K

(Comparison of Processing Time and Stopage Time in Second)

Production Line A:
Rim, Body

Production Line B:
Body

Process Analysis Plan :

Process	1971	1983
Molding	60	60
Storage	216,000	7,200
Coating	40	40
Finish	10	0
Storage	28,800	0
Drying	1,800	1,800
Storage	28,800	14,400
Coating	10	10
Storage	28,800	0
Assembly	100	100

Process	1971	1983
Shirring	2	2
Storage	28,800	0
Processing	12	12
Storage	14,400	0
Plating	3,600	*0
Storage	28,800	0
Assembly	8	8
Storage	14,400	0
"Kashime"joining	8	8
Storage	14,400	0
Assembly	100	100

Results of Improvement

	1971	1983
Processing	2,020	2,010
toppage	302,400	86,400

	1971	1983
Processing	3,730	130
Stoppage	100,800	0

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Note1(): Pocesses has been saved by changing materials in Zn plating to zinc coated steel plate.

*Note2 : At Company K, belt conveyer production which dominated as of 1969, was replaced by standing work in 1970 and 1971, which required small-group work at work tables. Then fullscale process improvement started. This comparison is based the conditions that prevailed in 1971.

*Source : Toshio Horiike, Mini-setsubi, Nagarasagyo niyoru Dokika Seisan (synchronized production by mini-equipment and concurrent work), (JMA Journal, may 1983)