SIX-SIGMA APPLICATION IN TIRE-MANUFACTURING COMPANY A CASE STUDY

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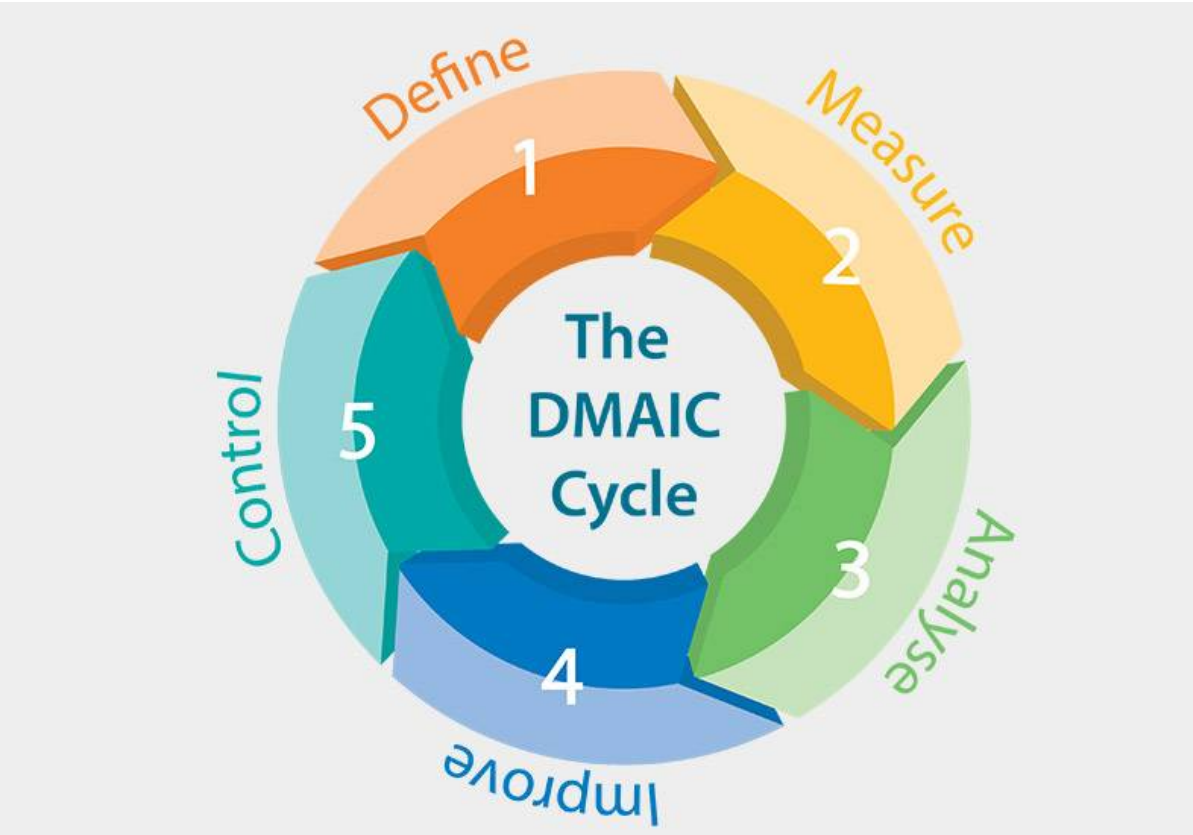
WHY SIX SIGMA

- To over come the barriers
- Six Sigma Approach –DMAIC
- The DMAIC model is very similar to the

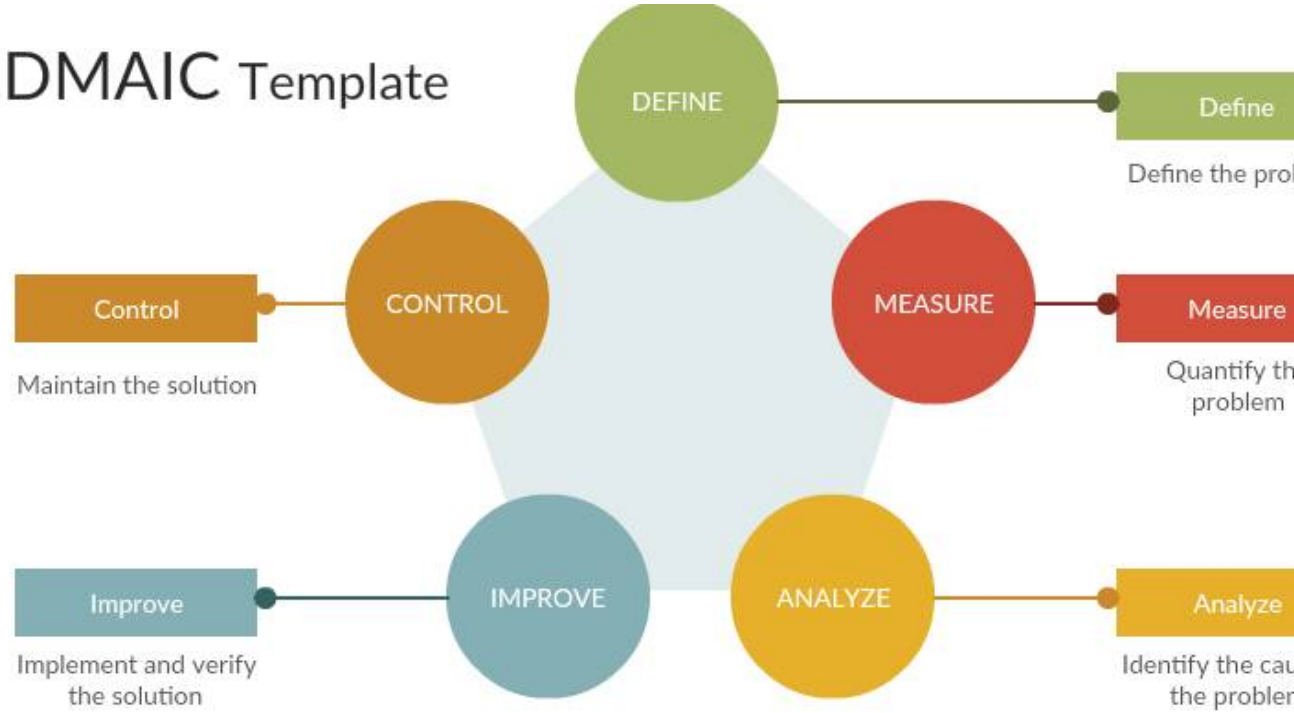
  PDCA (Plan-Do-Check-Act) or

  PDSA (Plan-Do-Study-Act)



DMAIC- PROCESS

- problem identification –in define
- gathering the specification data – in measure
- six sigma quality tools-in analysis and improvement steps
- process control charts- in control



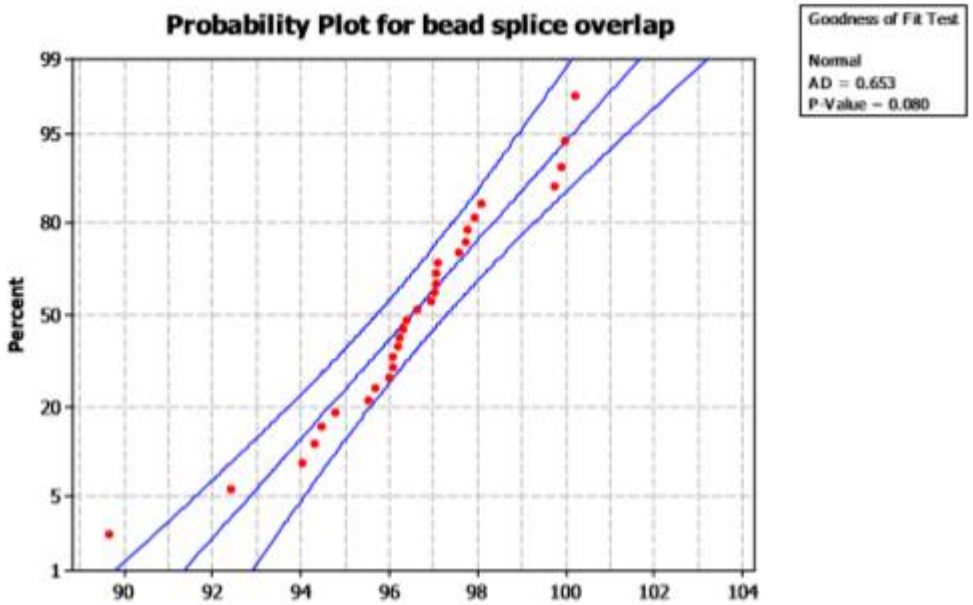
COMPANY PROFILE

- Company A was the leading Indian tire manufacturing who started exclusive branded outlets of truck tire
- company established a special tubes plant in the year 1996
- In year 2004, company initiated production of high-speed rated tubeless radial tires for passenger cars.

IMPLEMENTATION OF DMAIC METHODOLOGY

- Problem definition
- Establishment of measures
- Data analysis
- Improve
- Control

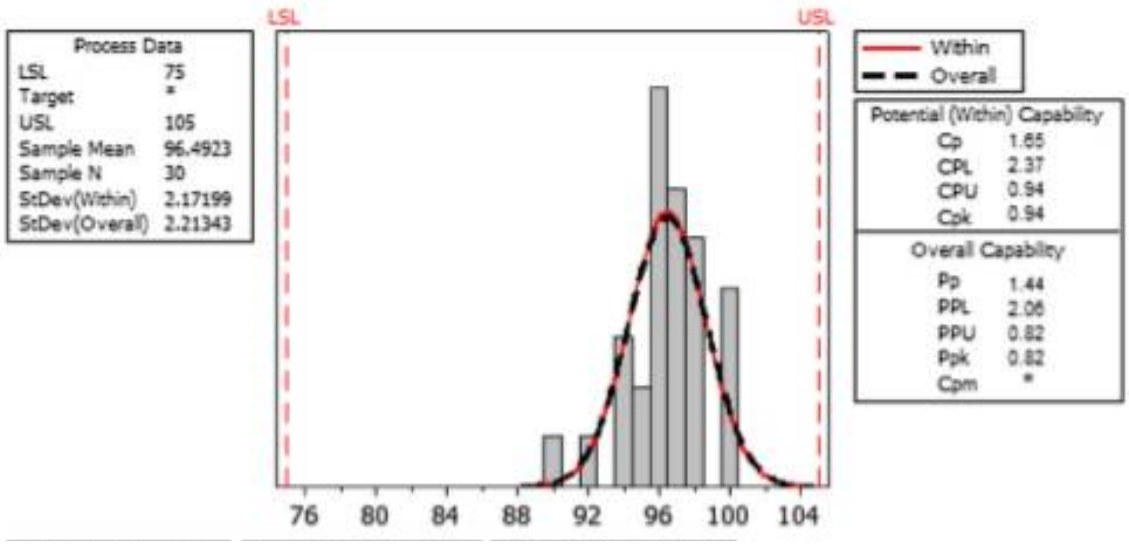
Main specification range of bead splice to be produce	90 ± 15 mm
Average bead splice of tire	97 mm
Material loss due to Shifting of Splice from Target Specification	93–100 kg/m



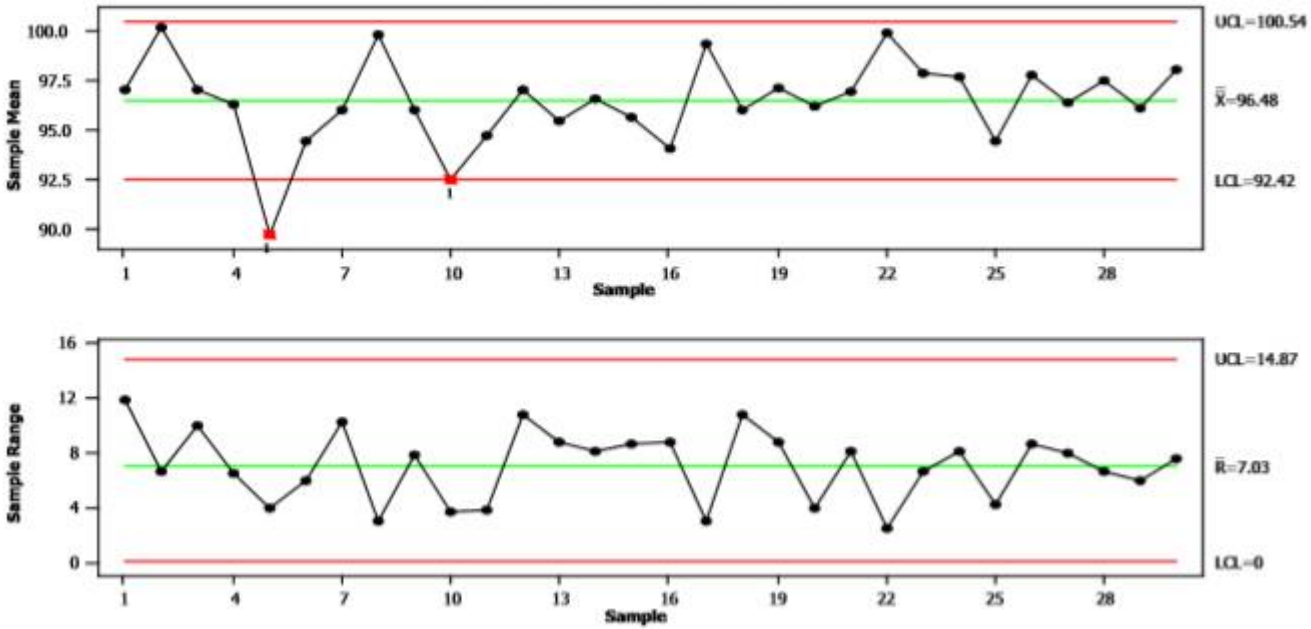
S. no.	Observations
1	97.04
2	100.22
3	97.07
4	96.32
5	89.63
6	94.29
7	96.01
8	99.88
9	96.08
10	92.40
11	94.76
12	97.02
13	95.51
14	96.63
15	95.69

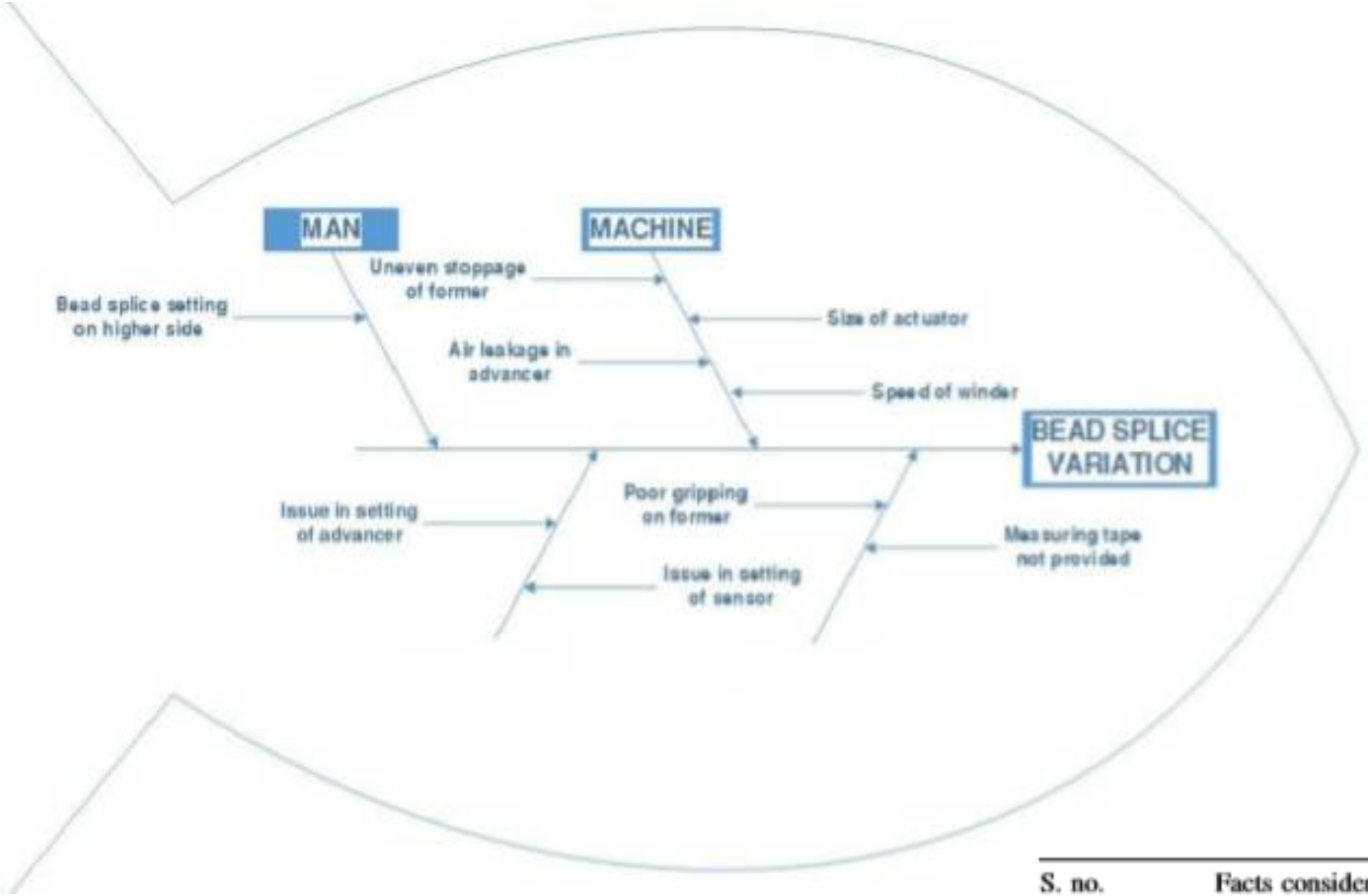
S. no.	Observations
16	94.01
17	99.75
18	96.07
19	97.11
20	96.24
21	96.94
22	99.98
23	97.94
24	97.75
25	94.44
26	97.72
27	96.40
28	97.55
29	96.17
30	98.09

Process Capability of Bead Splice



Xbar-R Chart of Data

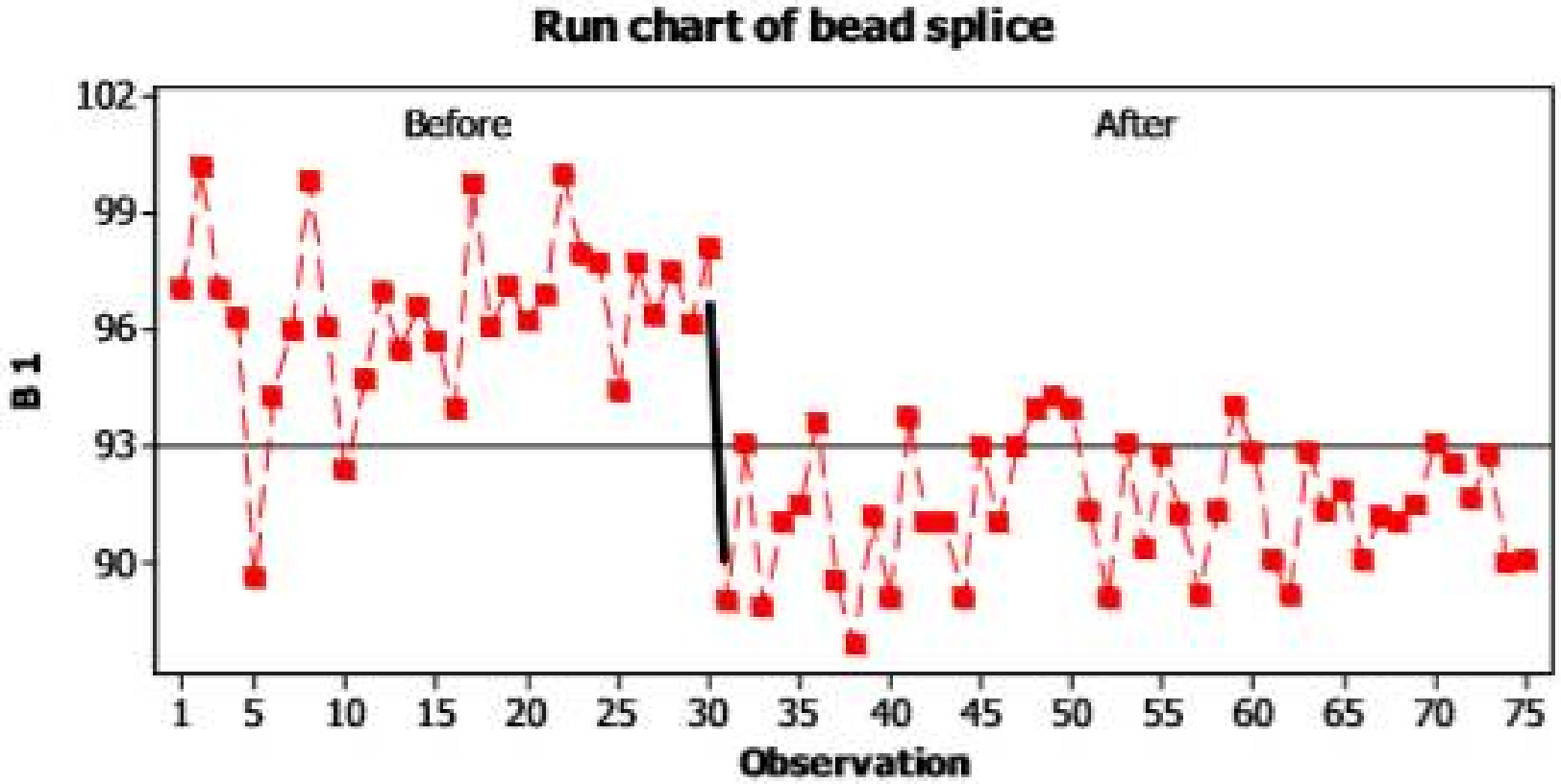




S. no.	Facts consider for improve	Arrangements
1	Point on higher side	1. Check bead splice after setup
		2. Set advancer as per guideline to get target v
		3. Set proximity as per guideline of former dia
2	Point on lower side	1. Measuring tape for every line
		2. Follow-up should be done on time-to-time b

S. no.	Observations
1	89.0
2	93.1
3	88.9
4	91.1
5	91.5
6	93.6
7	89.6
8	87.9
9	91.2
10	89.1
11	93.8
12	91.1
13	91.1
14	89.1
15	93.0
16	91.1
17	93.0
18	94.0
19	94.3
20	94.0
21	91.4
22	89.1
23	93.1

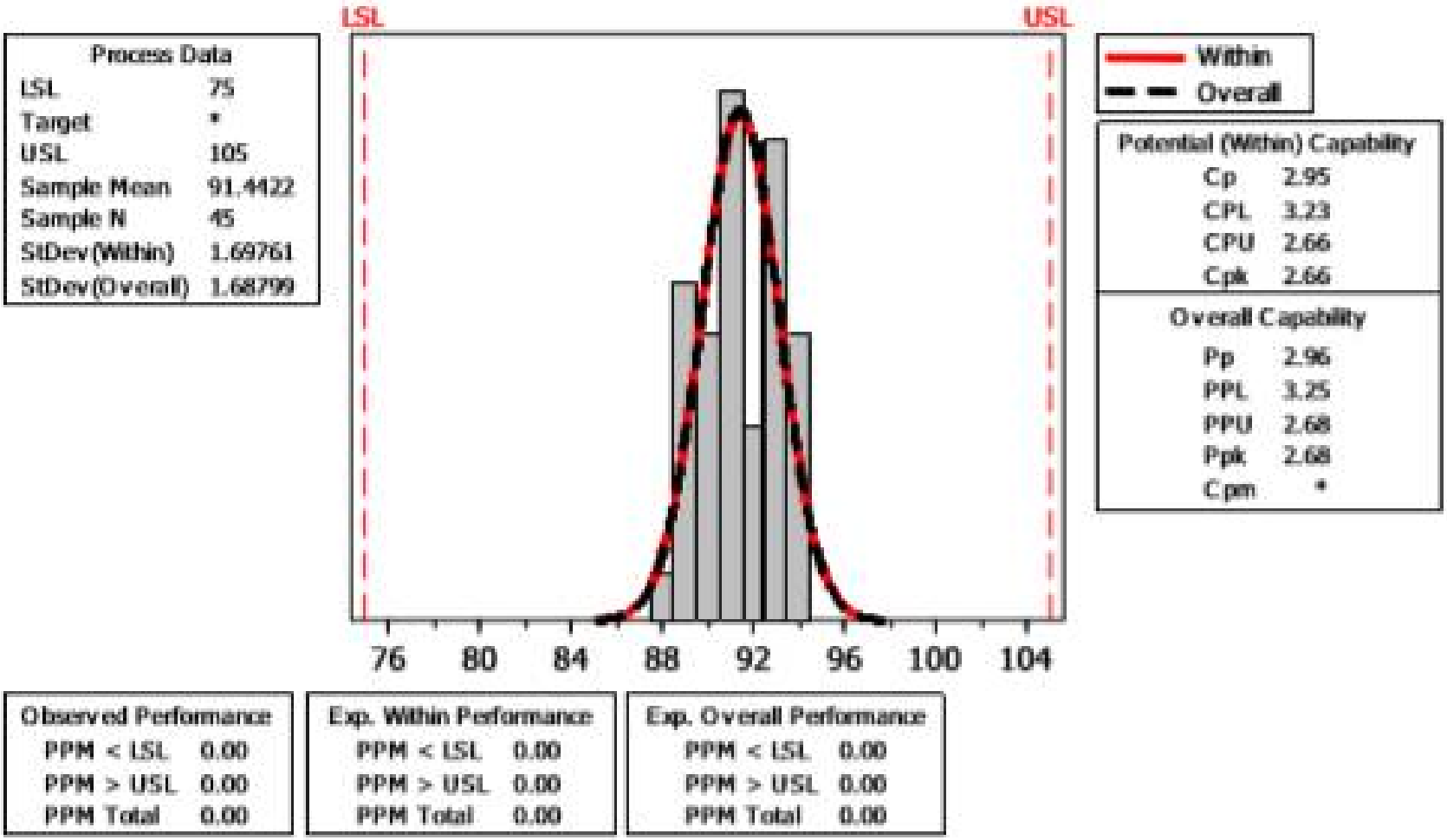
S. no.	Observations
24	90.4
25	92.8
26	91.3
27	89.2
28	91.4
29	94.1
30	92.9
31	90.1
32	89.2
33	92.9
34	91.4
35	91.9
36	90.1
37	91.2
38	91.1
39	91.5
40	93.1
41	92.6
42	91.7
43	92.8
44	90.0
45	90.1



Number of runs about median:	20
Expected number of runs:	38.5
Longest run about median:	20
Approx P-Value for Clustering:	0.000
Approx P-Value for Mixtures:	1.000

Number of runs up or down:	49
Expected number of runs:	49.7
Longest run up or down:	3
Approx P-Value for Trends:	0.427
Approx P-Value for Oscillation:	0.573

Process Capability of Bead Splice - After Improvement



CONCLUSION AND DISCUSSION

- to improve the value of process performance, the root causes of problem were determined with the help of cause and effect diagram
- in the improve phase, statistical analysis was done for identifying the process capability index
- it can be concluded that process performance of a tire-manufacturing plant can be improved significantly by implementing six-sigma DMAIC methodology

REFERENCE

1. Gupta, Vikash; Jain, Rahul; Meena, M. L.; Dangayach, G. S. “Six-sigma application in tire-manufacturing company: A case study” Journal of Industrial Engineering International

2. The Certified Six Sigma Yellow Belt Handbook-by Govind Ramu