

~~# New #~~

Chapten-09

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Quality Management

What is Quality?

- * Quality refers to the characteristics of a product or service that defines its ability to consistently meet or exceed customers expectation.
- * Quality revolution started in Japan after world war ii.
- * Increased quality means decreased cost.
- * Honda and Toyota accounts for 20% of the automotive sales in USA.

କୋମ କେବୁ ପରେ କୌଣସି ହିଁ ପଢା commonly considered quality aspects

- * Performance - appropriate functionality.
- * Conformance - products response to specifications
- * Reliability - probability of performance.
(କର୍ମଚାରୀ ଆନନ୍ଦପାତ୍ର ହେଲୁ କାହାରେ)
- * Durability - longevity (ଦୀର୍ଘବିର୍ଯ୍ୟ କିମ୍ବା ଉତ୍ସବରୁକୁ
ବନ୍ଧୁର ଜୀବନ)
- * Innovative feature - more than normal
need. ଅମନ୍ତା କୁଣ୍ଡଳ ଟିକ୍ଟା କୁଣ୍ଡଳ କେତେବେଳେ
ବେଳେକେ ଆବଶ୍ୟକ ହେବାରେ
- * Service after Sale - customer care
କୁଣ୍ଡଳରୁ କୋଣ ଆବଶ୍ୟକ କିମ୍ବା କୁଣ୍ଡଳ କୁଣ୍ଡଳରୁ
- * Maintenance and serviceability - self
maintenance. କୋଣ ଆବଶ୍ୟକ କିମ୍ବା
କୁଣ୍ଡଳ କୁଣ୍ଡଳ କୁଣ୍ଡଳ କୁଣ୍ଡଳ କୁଣ୍ଡଳ
- * Ease of use - ପାଇସା / କାର୍ଯ୍ୟ / କୋଣାଲାଙ୍ଘ
କୁଣ୍ଡଳ କିମ୍ବା କାର୍ଯ୍ୟ କରାବାରୁ
- * Aesthetics - ବାହୀରେ ବିନ୍ଦୁକୁଣ୍ଡଳ କିମ୍ବା କାର୍ଯ୍ୟ
- * Others. (ଅନ୍ୟାନ୍ୟ କାହିଁ କାହିଁ)
Ex: Laptop - Portability.

* কোনো কোম্পানি failure by any chance আসে কখনোকখন কাজ দায়, and somehow কোম্পানির হতে, তা কোম্পানির সাথে, failure এর user রয়েছে কোম্পানি identity

Cost of Quality

কোম্পানির লেন্ড
External Failure

Cost of
Quality

Cost of control
(Conformance)

Prevention

Appraisal

Cost of failure
to control
(Nonconformance)

Internal
failure

Planning
Documentation

Trained workers
Monitoring
Good machineries
Good Raw material

External
Failure

Prevention

কুড়া
গুড়া
গুড়া
গুড়া
গুড়া
গুড়া
গুড়া

* Quality Inspector,
Check করে বিশ্বাল দেখে
identify করে, কেবল চোখ

কুড়া গুড়া, দেখে কুড়া

বলে Internal failure, কুড়া দেখে

কুড়া কুমড়া দেখে, visually
identify কুড়া কুড়া।

দেখো আজাদী, sample
নিয়ে Ratio করে দেখো

check করে দেখো

ওয়েবে Problem এর কথা দেখো

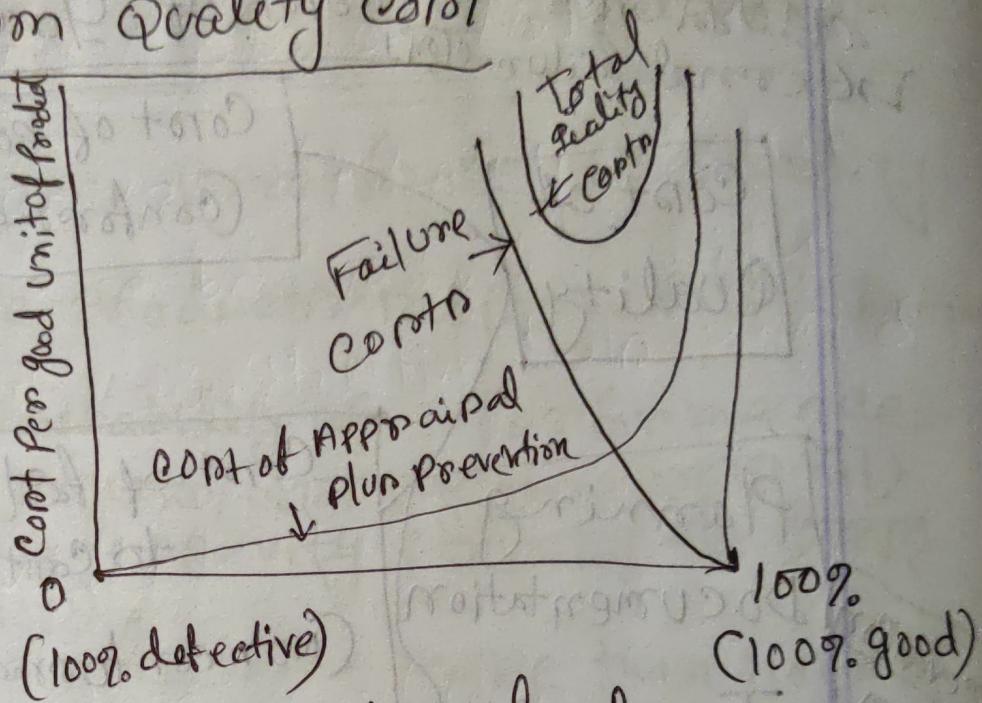
ওয়েবে কুড়া Appraisal.

ওয়েবে কুড়া easier.

Optimum Quality Cost

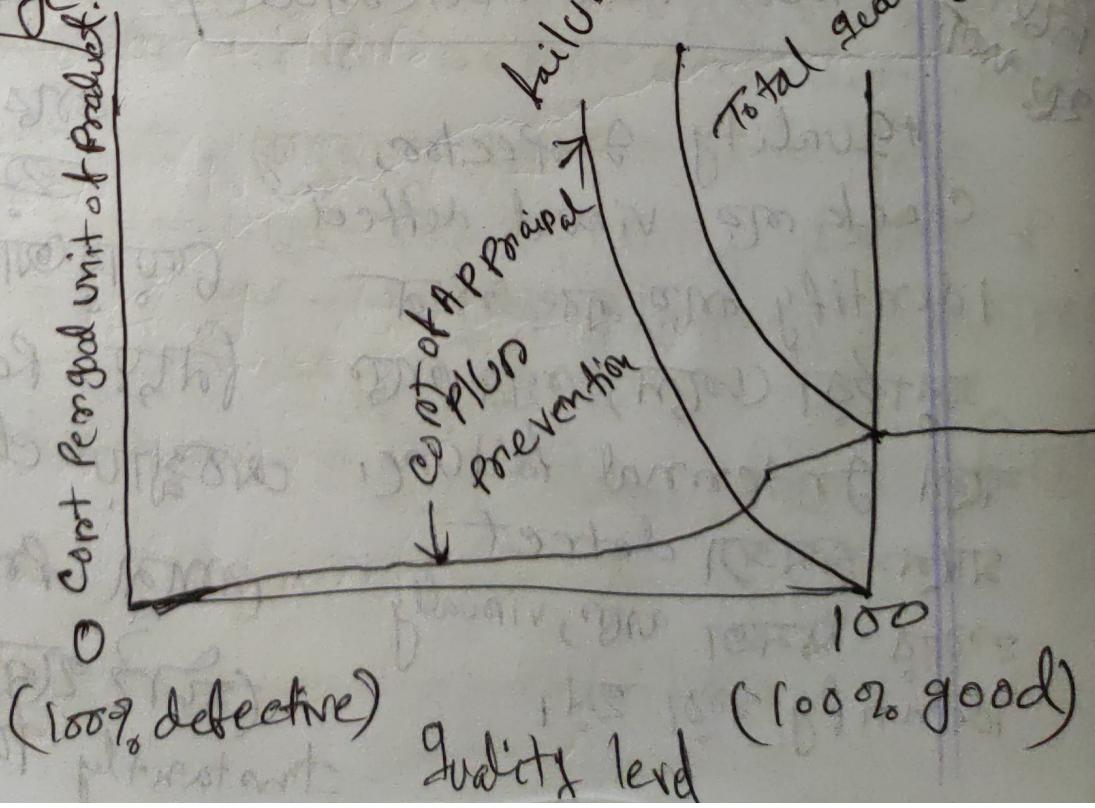
1st Image:

Juran model



Alternative model.

2nd Image:



Evolution of Modern Concepts

- * Early stage: Inspection based Quality
(corrective action took place at the end of the production line, when wastes are already created)
- * The next stage: Statistical Quality Control (sample based inspection system instead of heavy inspection - Random samples are taken to test the level of quality of a process)
- * The third stage: Quality Assurance
- * Last and current stage:
Total Quality Management (TQM).
T - Total
Q - Quality M - Management.

Seven Basic Tools of TQM

As much as 95% of Quality related problems can be solved with fundamental quantitative tools listed below:

- ① Check Sheet
- ② Stratification analysis
- ③ Histogram
- ④ Pareto analysis
- ⑤ Process flow chart
- ⑥ cause-effect diagram
- ⑦ Scatter diagram
- ⑧ control chart

Difference Between Quality Assurance and quality control

Criteria	Quality Assurance (QA)	Quality control (QC)
Definition	QA is a set of activities for ensuring quality in the process by which products are developed.	QC is a set of activities for ensuring quality in products. The activities focus on identifying defects in the actual products produced.
Type of action	Proactive	Reactive
Responsibility	Everyone on the team involved in developing the product is responsible for quality assurance	Quality control is usually the responsibility of a specific team that tests the product for defects.
QA tool	QA is managerial tool	QC is a correction tool.

Paint job quality control checklist

Job: 629555

Inspector: AI Kyden

Problem	Frequency
chip	HHH HHH HHH
Bubble	HH
Run	HHH H
Scratches Scrapes	
Inadequate Coverage	HHH HHH HHH HHH
Other	

(80-20 RULE) PARETO ANALYSIS

Efforts 20%
Success 80%

maximum wealth at the minimum token cache,
and minimum wealth at the maximum token cache

Vital Few \leftrightarrow Trivial Many

Defect type	Frequency
Wrong dimension	55
Wrong material	100
Scratch	30
Yo Yo	70
Wear	10
Others	25

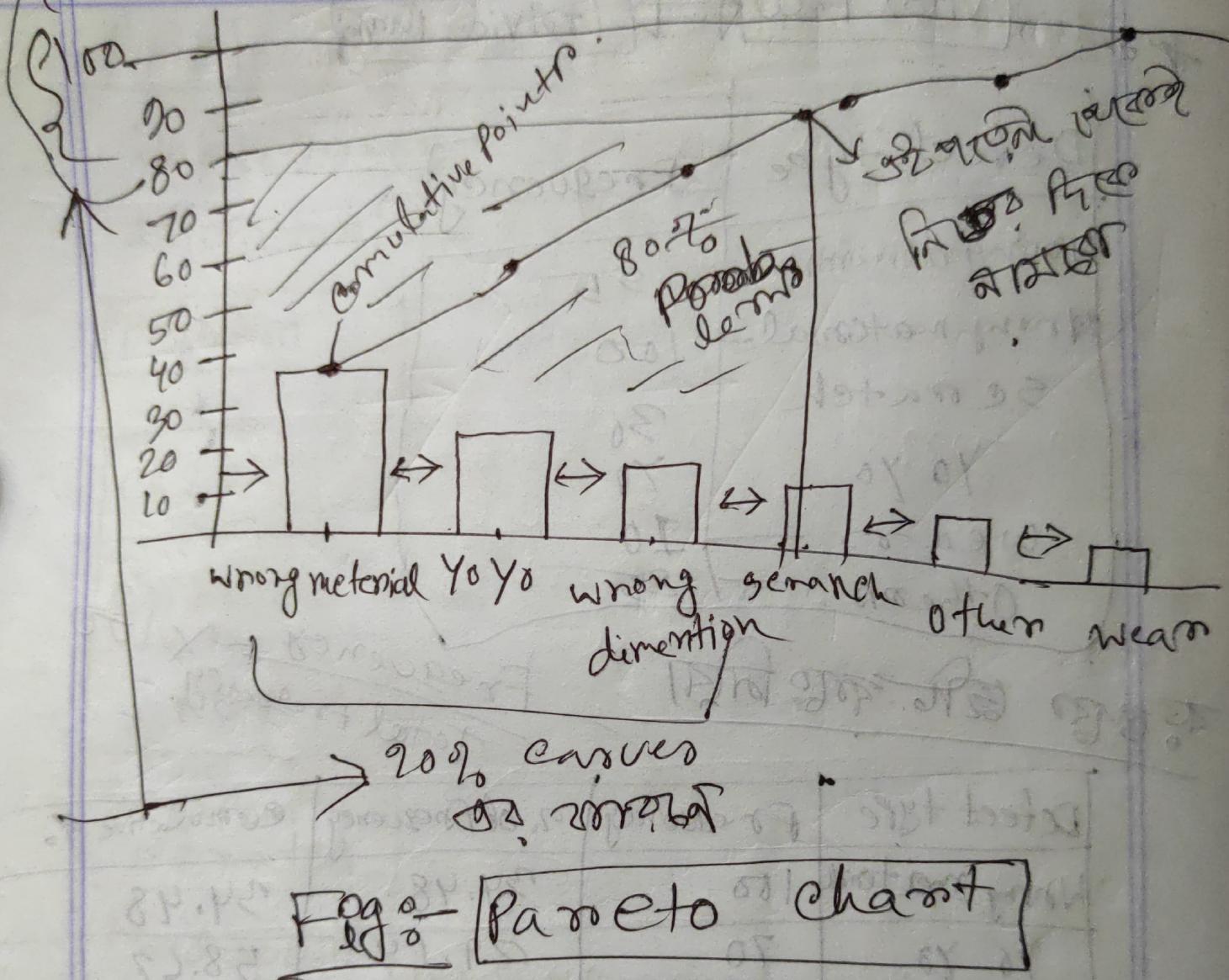
$$\text{Frequency} = \frac{\text{Frequency}}{\text{Total Frequency}} \times 100$$

কৃতিত্ব কোর্ট কর্মসূচি

Defect type	Frequency	% of frequency	Cumulative %
Wrong material	100	34.48	34.48
Yo Yo	70	29.14	58.62
Wrong dimension	55	18.97	77.59
Scratch	30	10.34	87.93
Others	25	8.62	96.55
Wear	10	3.45	100
Total	290		100.00

$$(80+20)$$

Frequency (ପ୍ରତିବର୍ଷ କିମ୍ବା ବର୍ଷାରେ ଘଟନାର ପରିମାଣ)



Fog - Pareto chart

* The raw material need hard pressing after discharging, but it was not done properly.

Cause effect Diagram

* In BSRM Steel Mill they face a problem called "Roof Leakage". So they identified some causes that may be the reasons behind the problem. Those are, (7)

* 3 Persons needed to operate the process. But 2 persons were available.

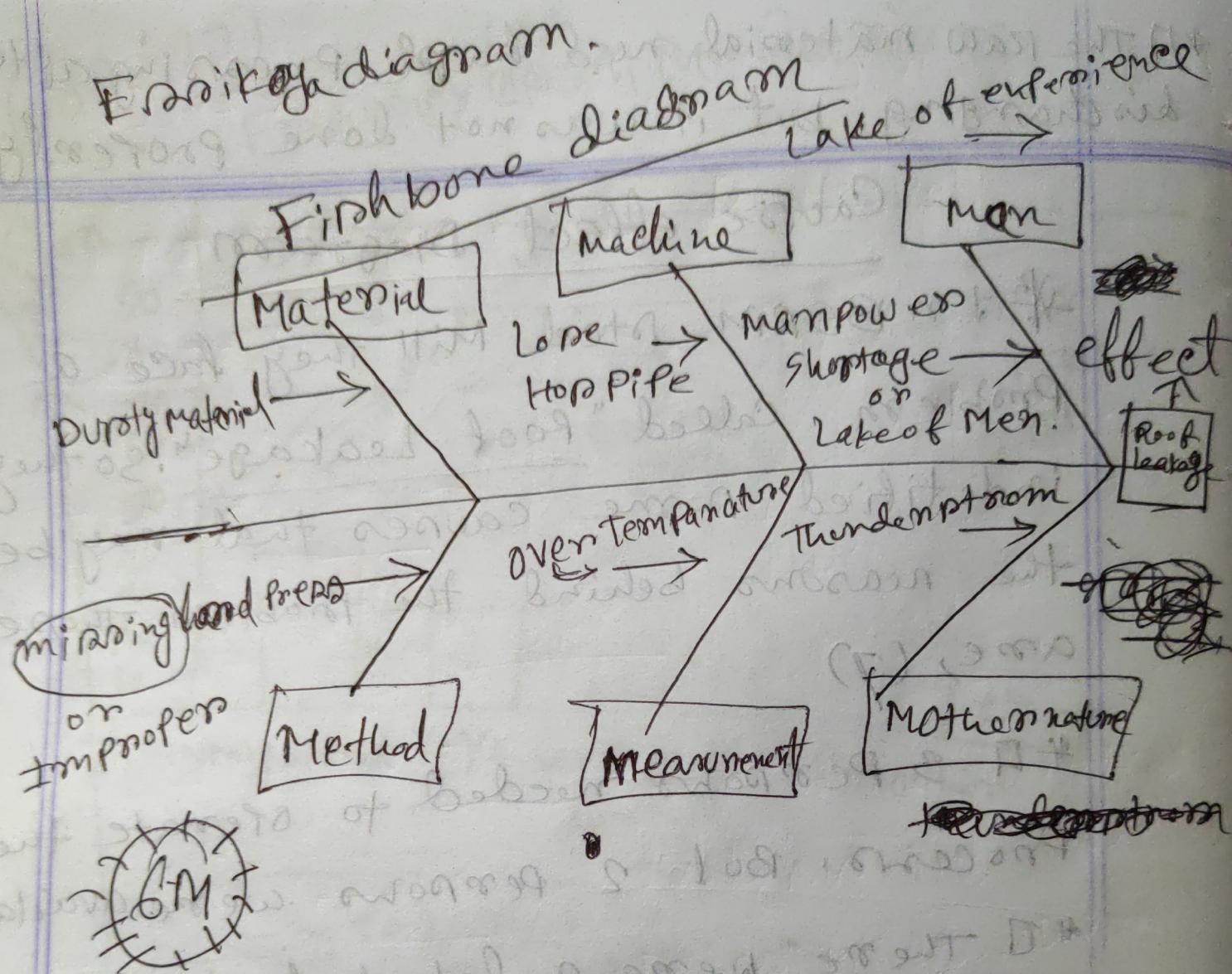
* There were a lot of dust in raw material.

* Electricity was off due to thunderstorm.

* Highest temperature of ~~molten~~ metal should have been 1670 degree Celsius, but it was 1750.

* A machine ~~hose~~ pipe was loose.

* The operators had only 3 months experience in the steel sectors.



⇒ জোনাল প্রেস থেকে এটি কোর্ট
করতে ও সেকে ফিল্টার ফিল্টার,

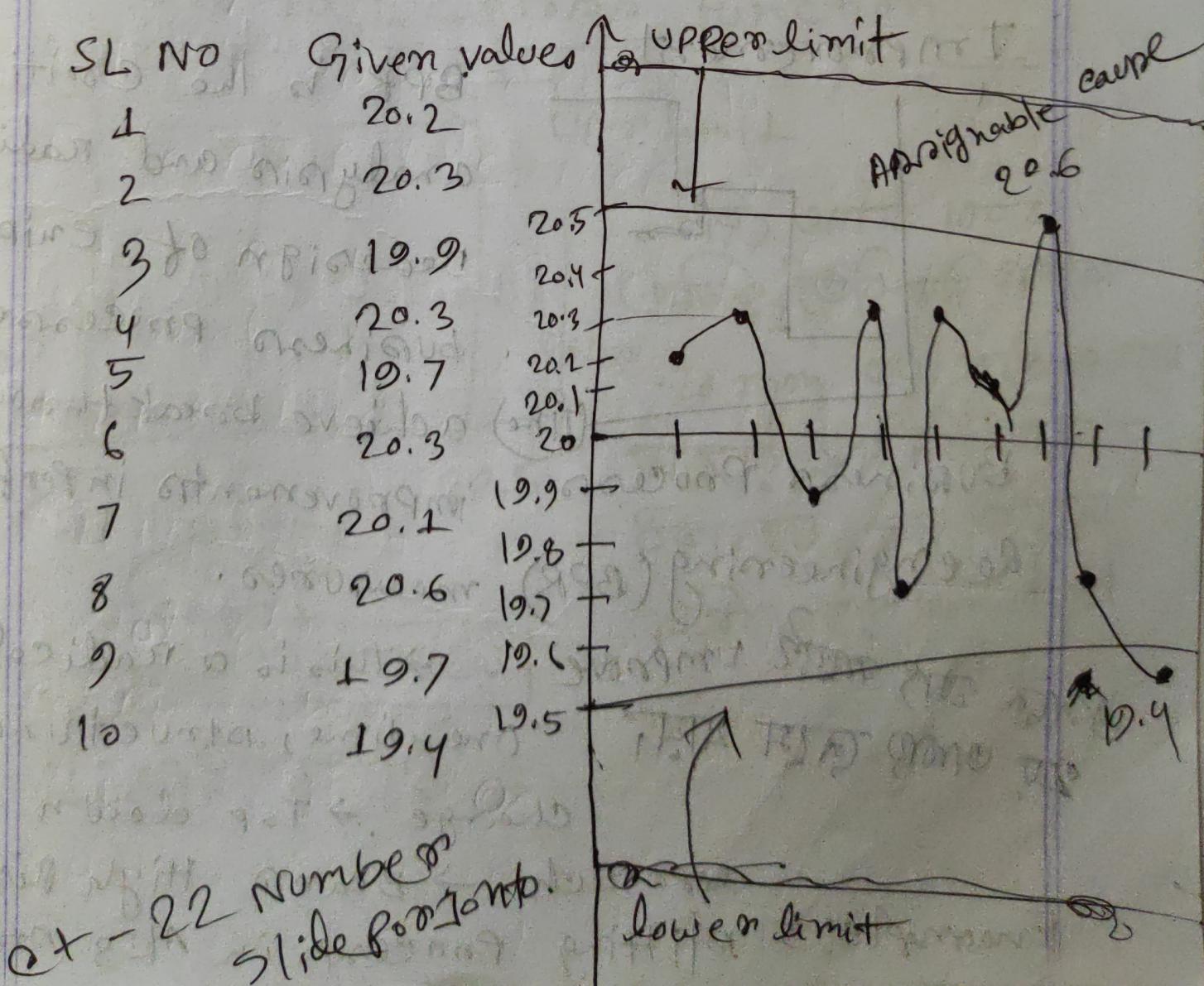
Control chart

2015 upper limit

195 lower limit

Specification limit 20 ± 0.5

all the products must be inside this limit. any product outside the limit will be considered as a rejected product.



Other Philosophies of TQM: KAIZEN

KAI = change

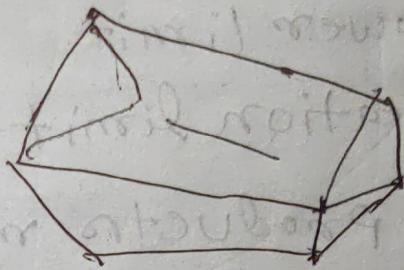
Zen = Good

agen, small

Improvement 2600

ମନ୍ଦିର ପ୍ରକଟନାରେ, BPR
ଭାରତ, ମୁଖ୍ୟମନ୍ତ୍ରୀଙ୍କୁ ହୁଏ।

Drop test.

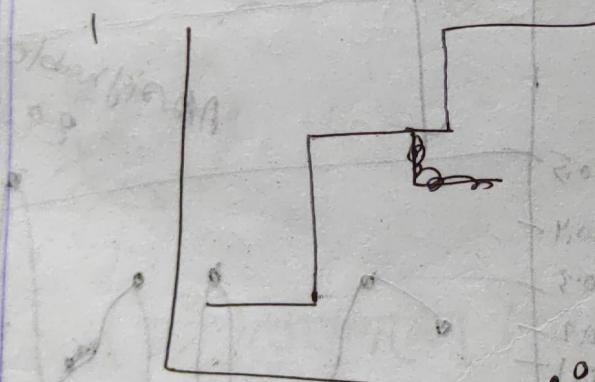


4ton

~~kaizen~~ ~~sato~~
kaizen ~~sato~~
~~sato.~~

BPR C 100-
C 100 13

Improvement



BPR is the critical analysis and radical redesign of existing business processes to

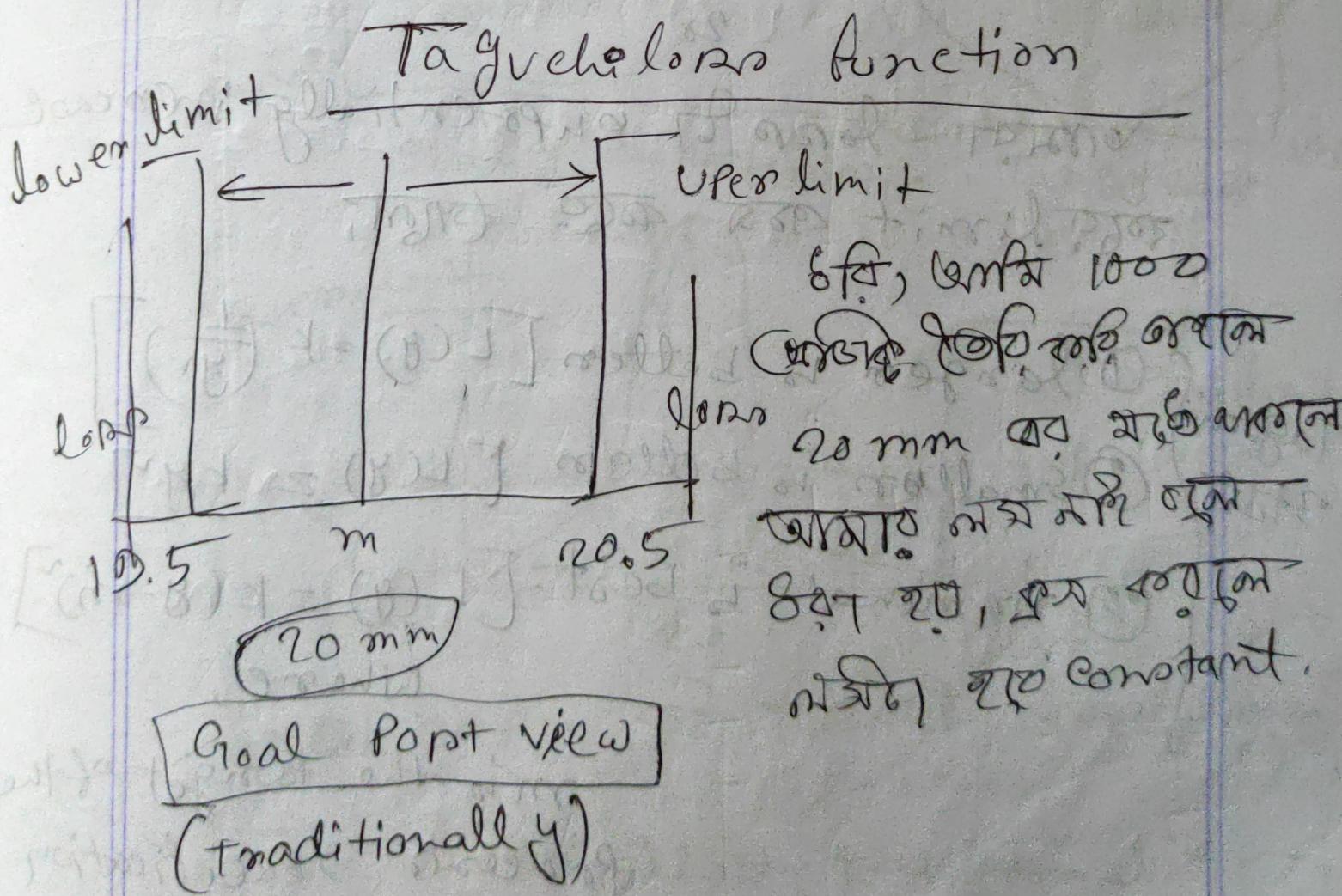
Business Processes) achieve breakthrough improvements in performance reengineering (BPR) measures.

20. କାହାର ଦ୍ୱାରା ପରିବର୍ତ୍ତନ କରାଯାଇଥାଏ ? → This is a radical, one-time, structural change → Type of action

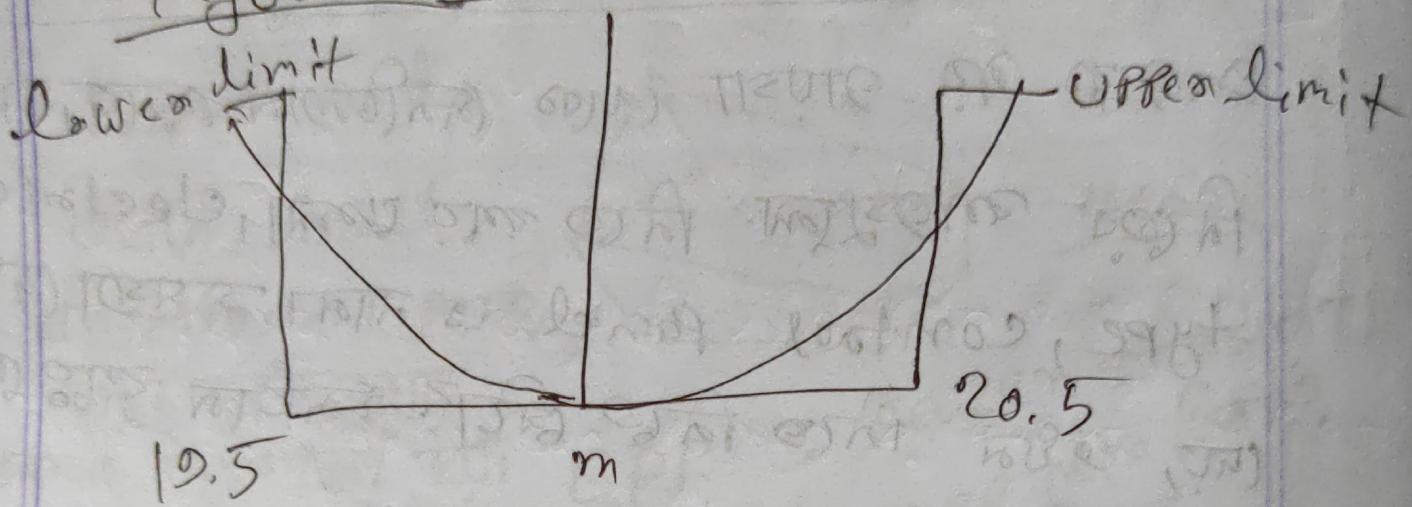
Example: 5 Ditting process in AKS steel.

Total Productive Maintenance (TPM)

প্রযোজন করা গায়ের পরে ইলেক্ট্রিলাক্স কর্মসূচি, শান্তি
মিশনের বাণিজ্যিক নিষেধ করা, electric
type, control panel এ নানা ক্ষমতা দেয়
সহ, এখন নিষেধ করিব ক্ষমতার কাছে ফেলা



Taguchi Loss



वर्षां लास्ट उपलब्धी वृद्धि
इन्हें लास्ट करते हैं ताकि,

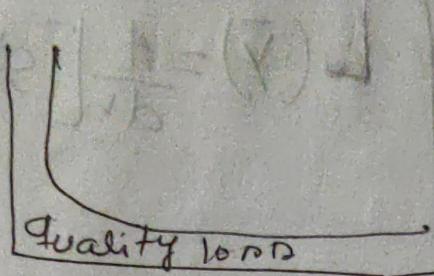
- Taguchi's ① Larger is better. $[L(y) = k \left(\frac{1}{y^r}\right)]$
- 3.8.2 ② Smaller is better. $[L(y) = ky^r]$
- ③ nominal is best. $[L(y) = k(y-m)^2]$

Where,

m is the target of the process specification

①

\$ loss



quality characteristic

②

\$
loss

quality loss

③ \$

quality loss curve

quality characteristic

target value

Lower limit

Upper limit

19.5

20

20.5

Toyota Japan & America

Toyota USA & traditional

$$L(y) = K(y-m)^2 \quad | \quad L(\bar{y}) = \frac{A}{d^2} [S^2 + (y-m)^2]$$

$$= \frac{A}{d^2} (y-m)^2$$

Here,

A = Loss per defect/ loss per complain
 because complain comes because of defect
 of the product) $L(y) = \frac{A}{d^2}$

d = Tolerance limit/ or allowance limit.

y = value of a particular sample (single)

\bar{y} = Sample mean/ Average of the given samples

m = Population mean/ expected values/

targeted value/ specified value/ nominal value.

L = total losses.

$\bar{y} = (y_1 + y_2 + y_3 + y_4 + y_5) / n$ (n = number of samples given)

\bar{y} will be used the formula will be changed

and you need to use 5 as standard deviation.

$$S = \sqrt{\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-1}} \quad i = 1, 2, 3, 4, 5, \dots, n$$

if $n = 5$,

$$S = \sqrt{\frac{(y_1 - \bar{y})^2 + (y_2 - \bar{y})^2 + (y_3 - \bar{y})^2 + (y_4 - \bar{y})^2 + (y_5 - \bar{y})^2}{n-1}}$$

problem
A company X receives an average of 10 complaints per month. In November they received 15 complaints. Management sets an acceptable level at 2. At cost the company \$150 directly per complaint to correct the problems. Find out the losses associated with the fall of quality.

Here, Nominal (Average) value = 10

$y=15$, $A=\$150$, $d=2$

We know,

$$L(y) = k(y - m^*)^2$$

$$= \frac{A}{d^2} (y - m^*)^2$$

$$= \frac{150}{2^2} (15 - 10)^2$$

$$= \$937.5 \quad (\text{Result})$$

We can define a process average loss

$$\text{as: } L = k [s^2 + (\bar{y} - m)^2]$$

* s is Process (Product) standard Deviation.

* \bar{y} (bar) is Process (Product) mean;

Suppose

sample provided

$$8.35 \ y_1$$

$$8.64 \ y_2$$

$$8.49 \ y_3$$

$$8.56 \ y_4 \quad \therefore \bar{y} = 8.454$$

$$8.23 \ y_5$$

$$\bar{y} = \frac{(y_1 + y_2 + y_3 + y_4 + y_5)}{5}$$

$$\therefore s^2 =$$

↓

standard deviation.

$$= 0.1644$$

$$\sqrt{\frac{(8.35 - 8.454)^2 + (8.64 - 8.454)^2 + (8.49 - 8.454)^2 + (8.56 - 8.454)^2 + (8.23 - 8.454)^2}{5-1}}$$

then s is 0.4056 ,

$$L(\bar{y}) = \frac{A}{d^2} [s^2 + (y - m)^2]$$

$$= ?$$

and σ^2 result error,

Introduction to ISO 9000

- * ISO stands for International organization for standardization.
- * In order to create trust among the customers in the area of quality, several rule based compliance systems are in place. ISO 9000 quality management system (QMS) is one of them.
- * ISO 9000 is a set of guidelines as to how the management of an organization, affecting quality of product, or service, should formulate rules and act upon those. It is essentially a management standard, not the product or service standard.

In a metal showpiece manufacturing plant, cost of rework is \$2. Process specification is: $8.5 \pm .05$ units. It was found that the production process mean was = 8.492 and standard deviation was ± 0.016 . Find out the loss due to quality deviation of the manufacturing process.

Solve:-

We know,

$$L(y) = k [s^2 + (y - m)^2]$$

$$= \frac{k}{\Delta} [s^2 + (\bar{y} - m)^2]$$

$$= \frac{2}{0.05} [0.016^2 + (8.492 - 8.5)^2]$$

$$\Rightarrow \$ 0.256 \text{ (Result)}$$