Welcome to Standard Work
presented by
Barrow Advanced Manufacturing

Standard Work

Objectives of Standard Work Training

Concepts of Lean Manufacturing

Concepts of Standard Work

Elements of Standard Work

Standard Work Documentation

Profit Equations

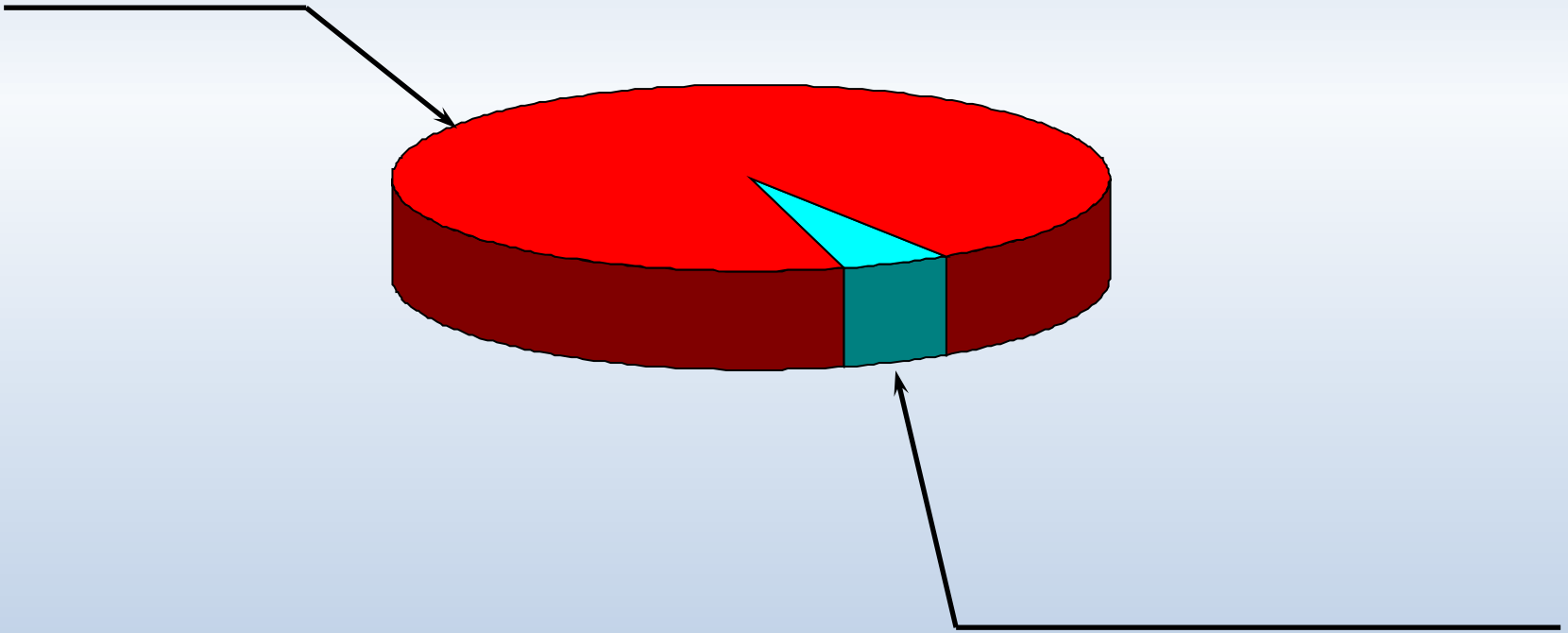
- Old

Cost + Profit = Selling Price

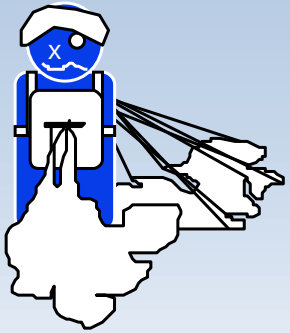
- New

_____ _____ - _____ = _____

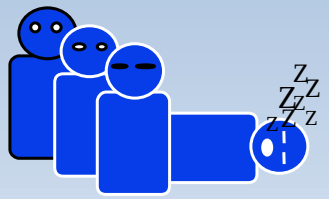
What % is Value-Adding?



Waste In Manufacturing

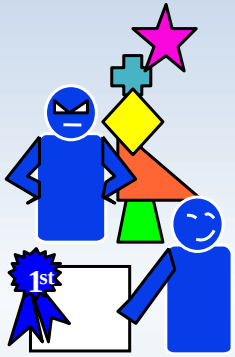


Quality Defects

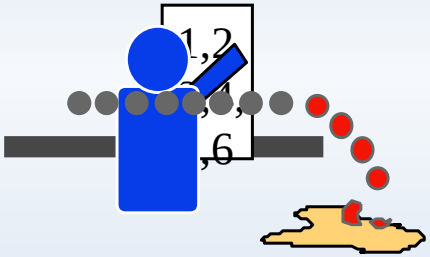


Waiting

Transportation

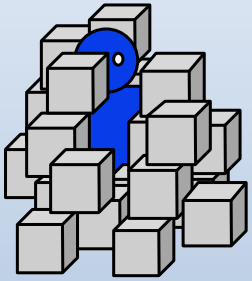


Unused Creativity



Overproduction

Motion

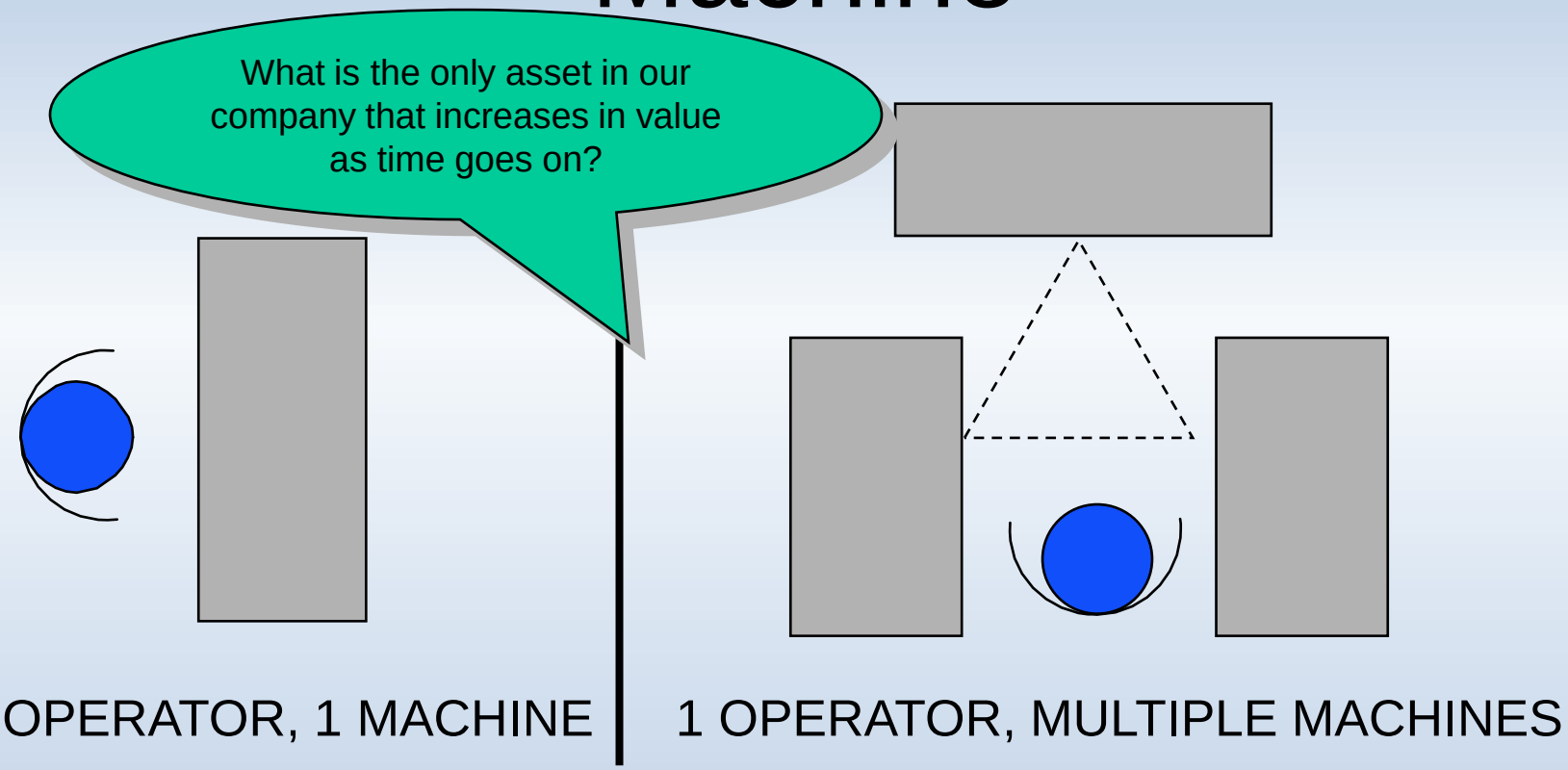


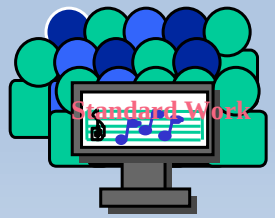
Inventory

Process

26

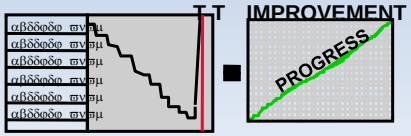
Separate Operator From Machine



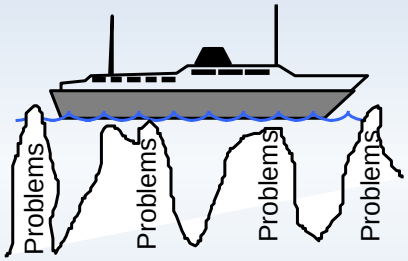


Concepts of Standard Work

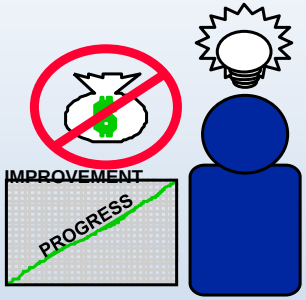
- Orientation Toward Improvement



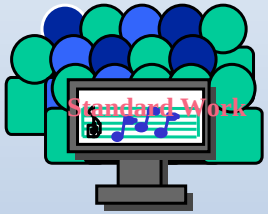
- Exposes Problems



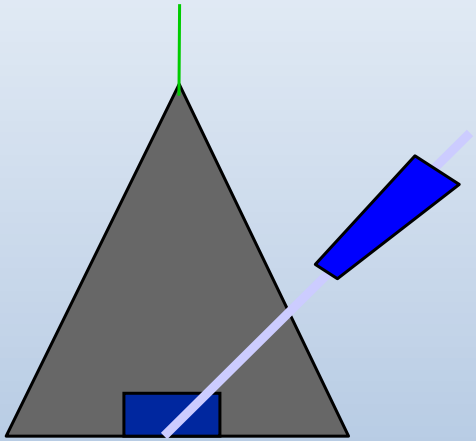
- Kaizen



- Orchestrates consistent effort

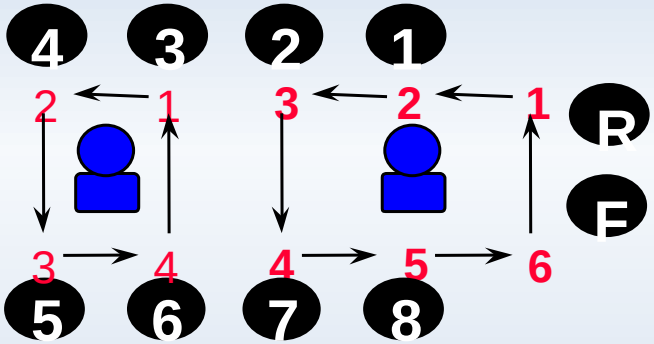


Elements of Standard Work

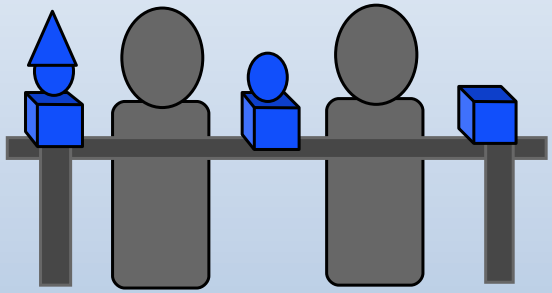


Elements of Standard Work

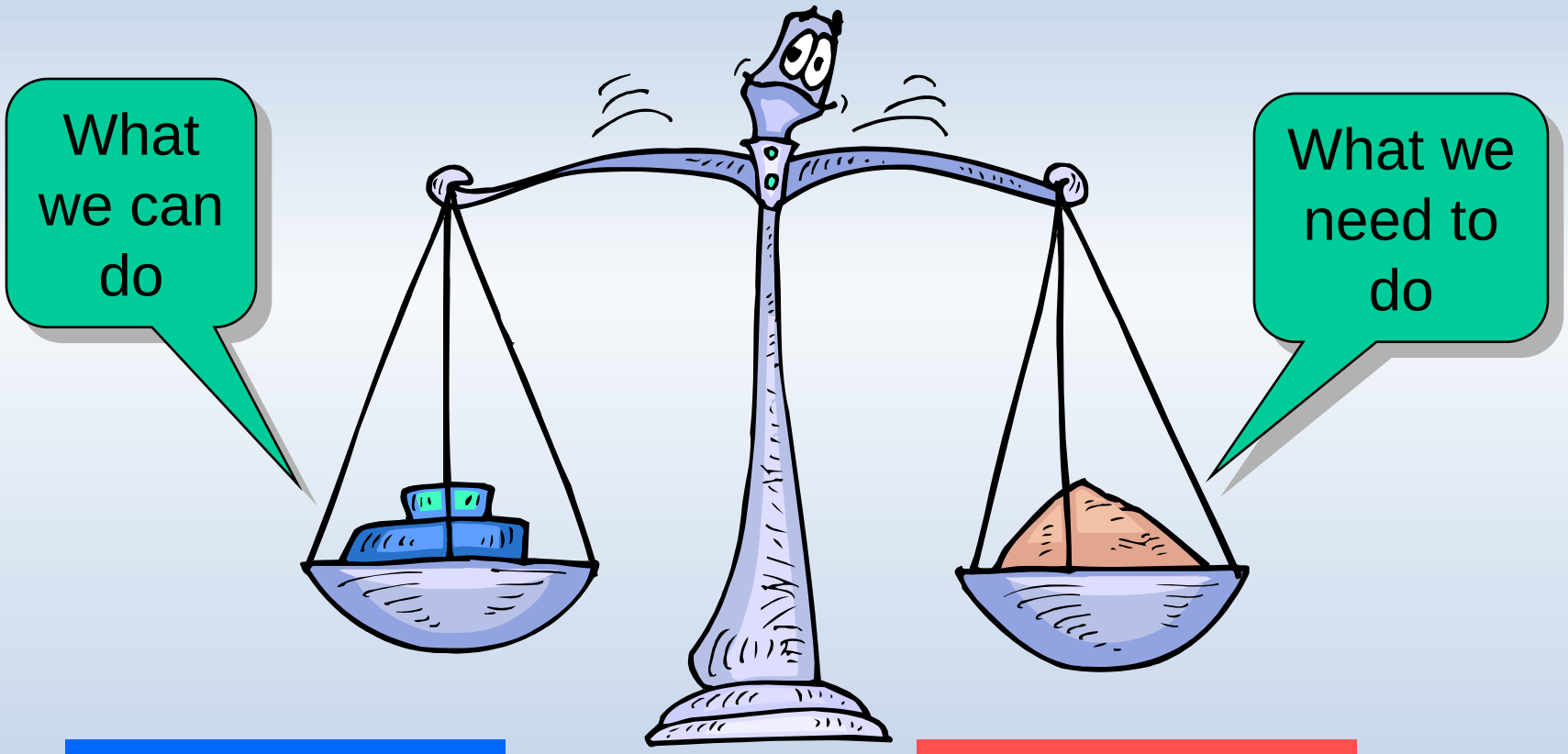
- Takt time
- Work Sequence

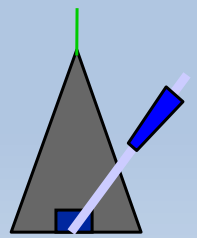


- Standard Work in Process (WIP)



Cycle Time vs. Takt Time





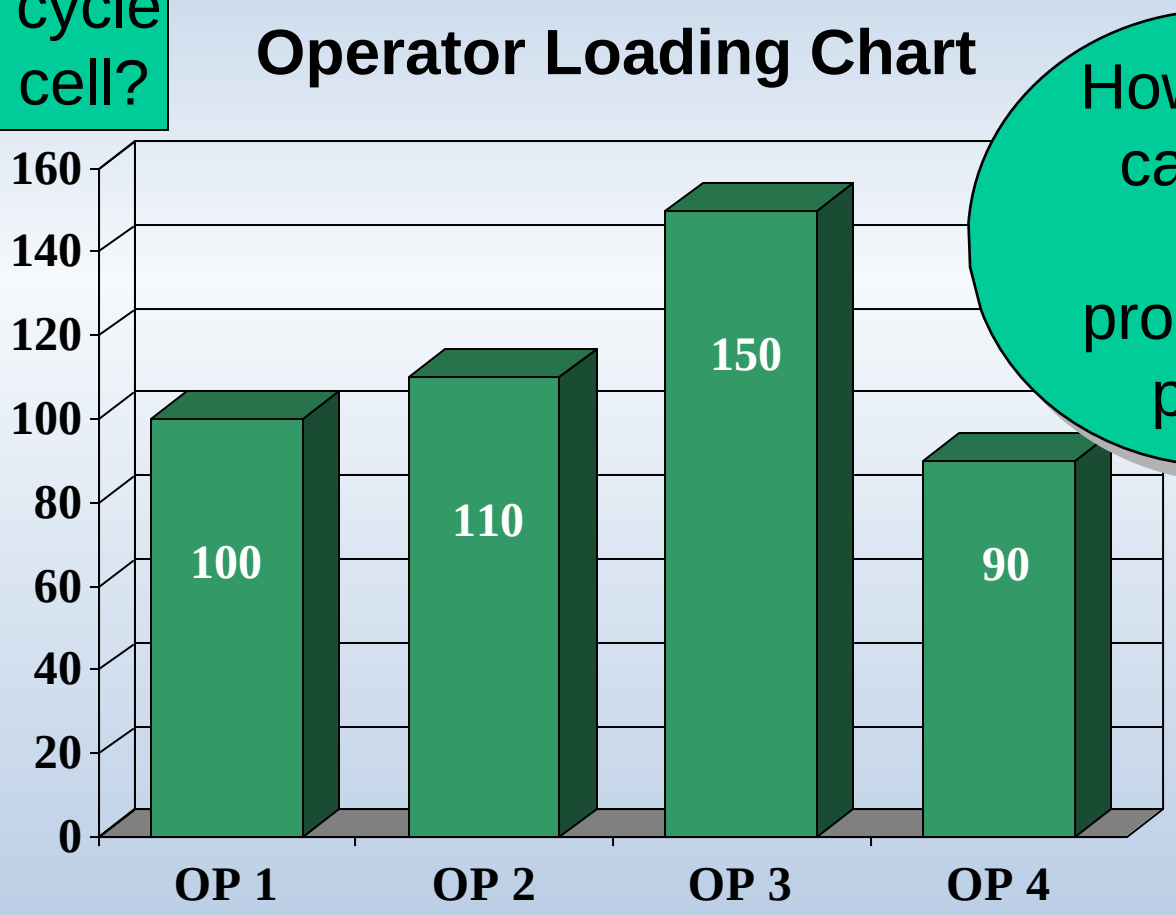
Work Sequence

Work Sequence – The specific order in which an operator performs the manual steps of the process.

- May be different than process sequence
- Focus on the Work Sequence helps spot waste and stabilize the process
- Requires multi-skilled operators

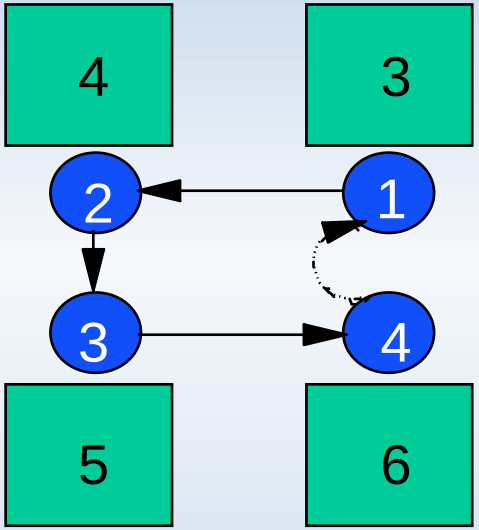
Calculating Cycle Time

What is the cycle time of this cell?

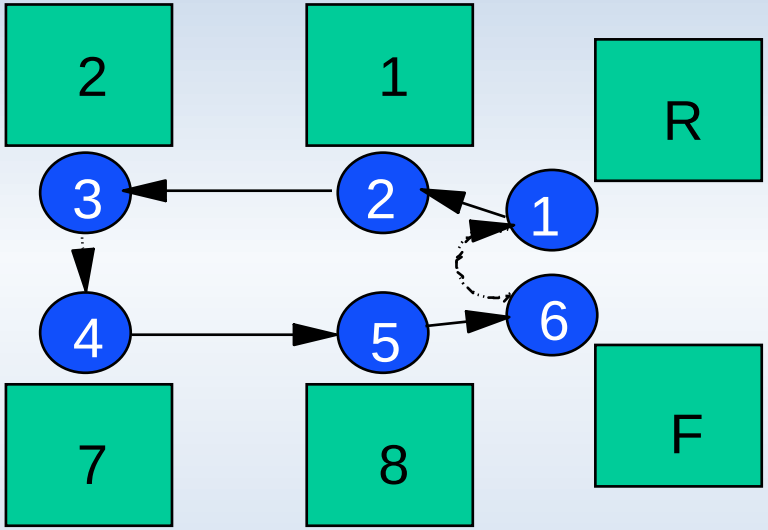


How often can the cell produce a part?

Operator Flow vs. Part Flow



Operator #2

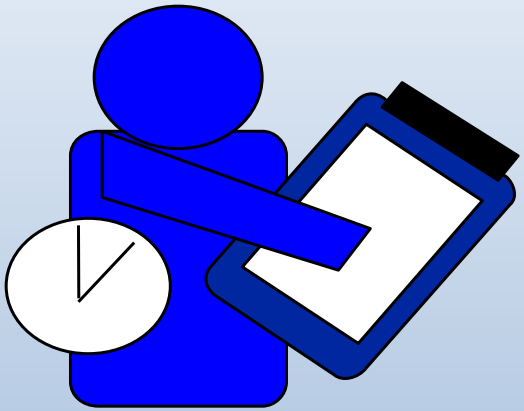


Operator #1

Operator does not flow the same as the part.

Why would the operator and part flow be different?

Standard Work Documentation

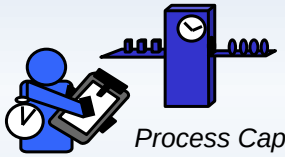


Standard Work Documentation

- Time Observation Form……

Time Observations

- Process Capacity Table……

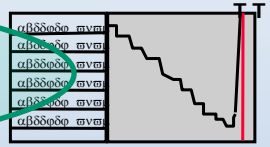


Process Capacity

- Standard Work Sheet…..

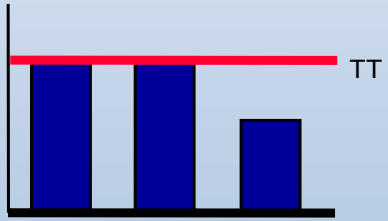
Standard Work Sheet

- Standard Work Combination Sheet……..



Standard Work Combination Sheet

- Operator Loading Chart….



Operator Loading Chart

Time Observation Form

- One sheet per operator
- Focuses on manual and walktime elements
- Three key steps
  - Identify work elements
  - Determine observation points
  - Time each element with a running clock
- Keep on file for reference

TIME OBSERVATION FORM

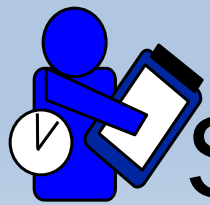
Process for Observation	Post-It (raw material to finished goods)										Observation Date	4/23/2003	Analysis Number	4
											Observation Time	7:52 AM	Observer	ME

No.	Component Task	1	2	3	4	5	6	7	8	9	10	Lowest Elemental Time	Adjustment	Adjusted Elemental Time
	Pick up raw material, unload / load, cycle start	5												
		5												
	Walk	8												
		3												
	Unload / load, cycle start	12												
		4												
	Quality Check	15												
		3												
	Walk	19												
		4												
	Unload / load, cycle start, put down cycle start	23												
		4												
	Walk	28												
		5												
Time for 1 Cycle														

Use a running clock

Identify elements And start / stop points

Calculate elemental times later



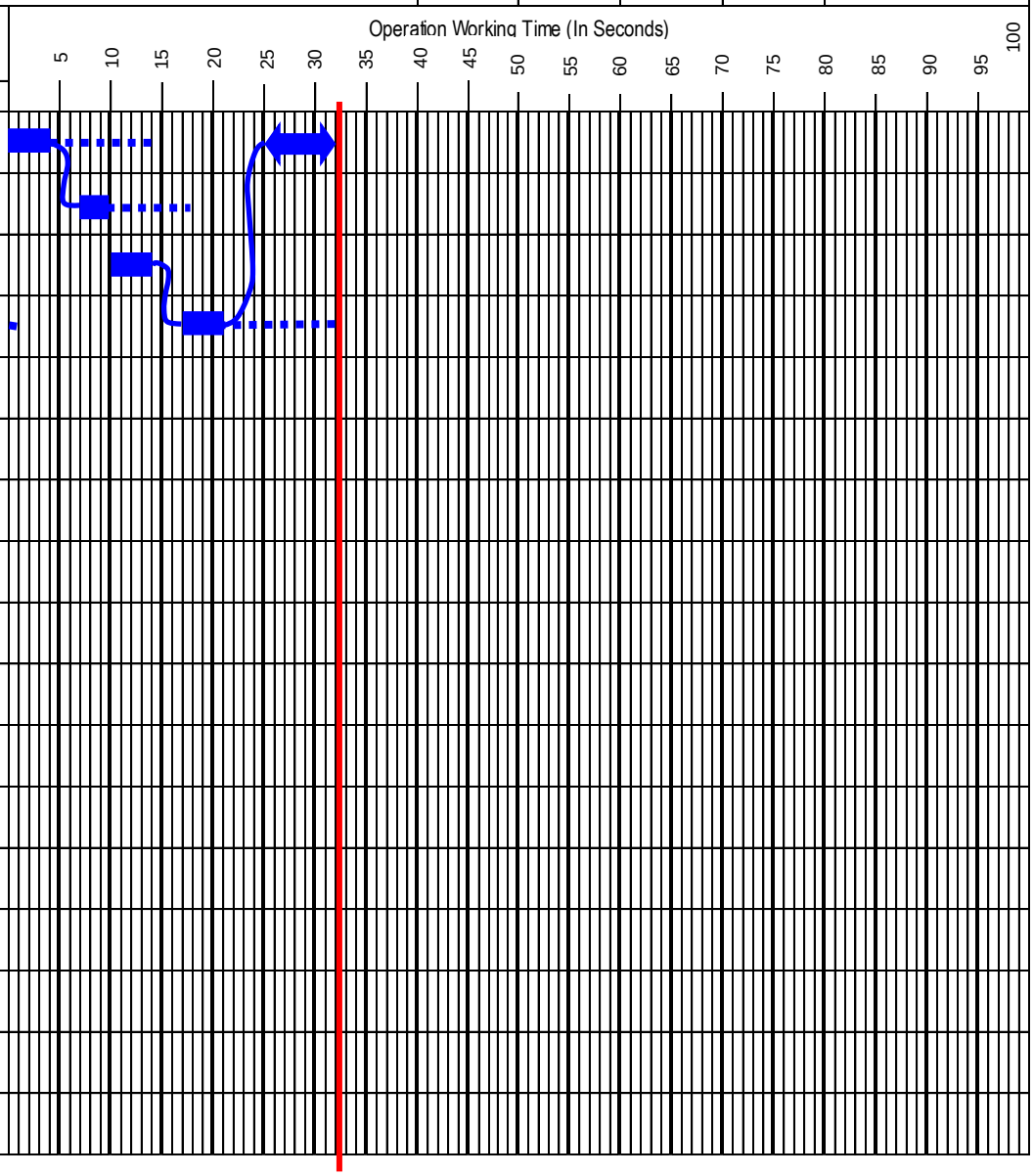
Standard Work Combination Sheet

- One sheet per operator
- Combines manual, automatic machine and walk elements
- Plotted against TAKT Time
- Post at start point of each operator sequence

STANDARD WORK COMBINATION SHEET

Model No. and Name			Date Prepared		Quota Per Shift		Manual Work
Work Sequence			Group		TAKT Time	32"	Machine Work / Walking

Step No.	Description of Operation	Time		
		Manual	Auto	Walk
1	Pick up, unload / load, cycle start	4	10	3
2	unload / load, cycle start	3	8	
3	Quality check	4		3
4	unload / load, cycle start, put down part	4	12	5
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				

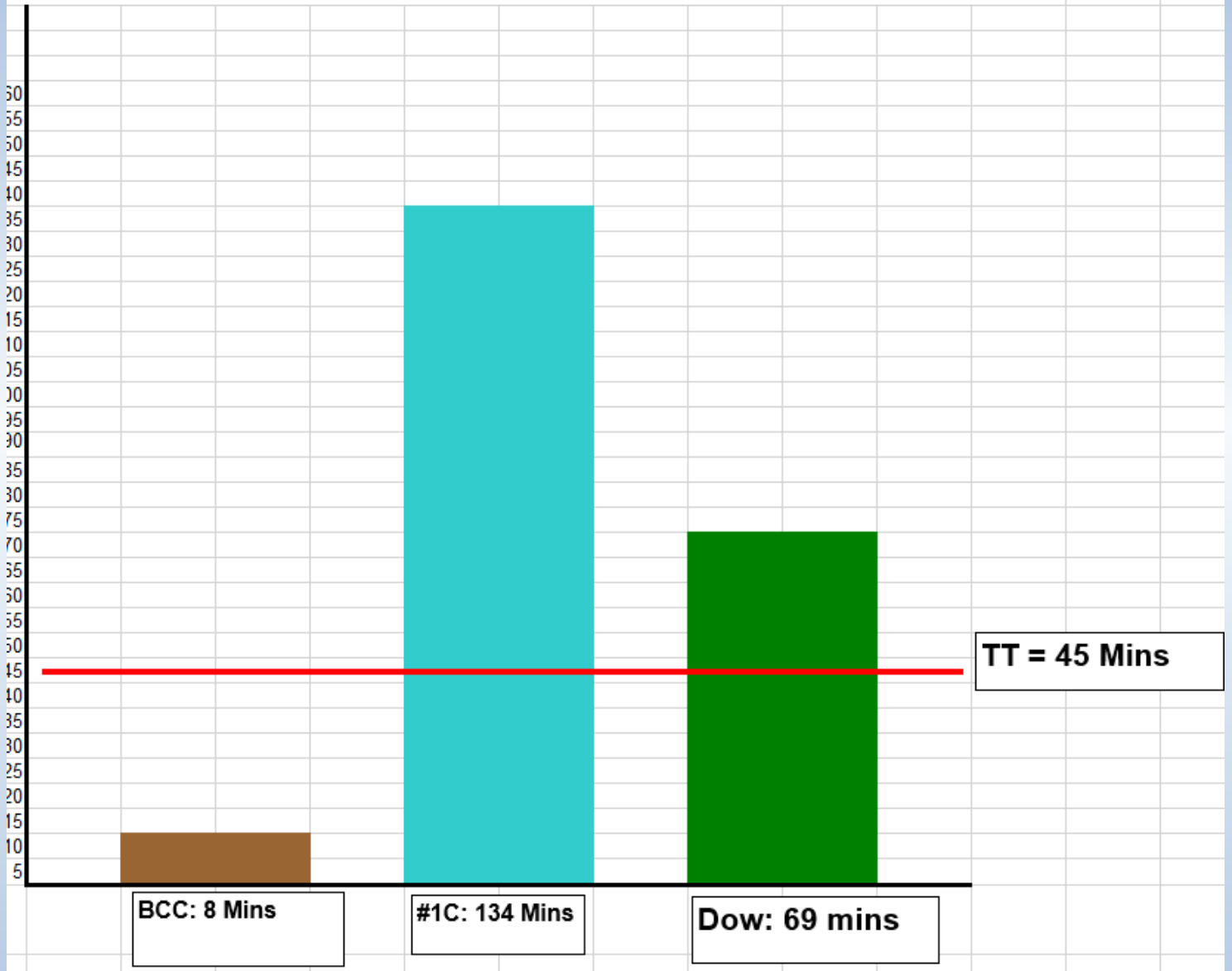


Standard Work Sheet

- One sheet per operator
- Overhead view of the cell or operations
- Shows process and work sequence
- Also documents:
  - Standard WIP
  - Safety precautions
  - Quality checks
- Post at start point of each operator sequence

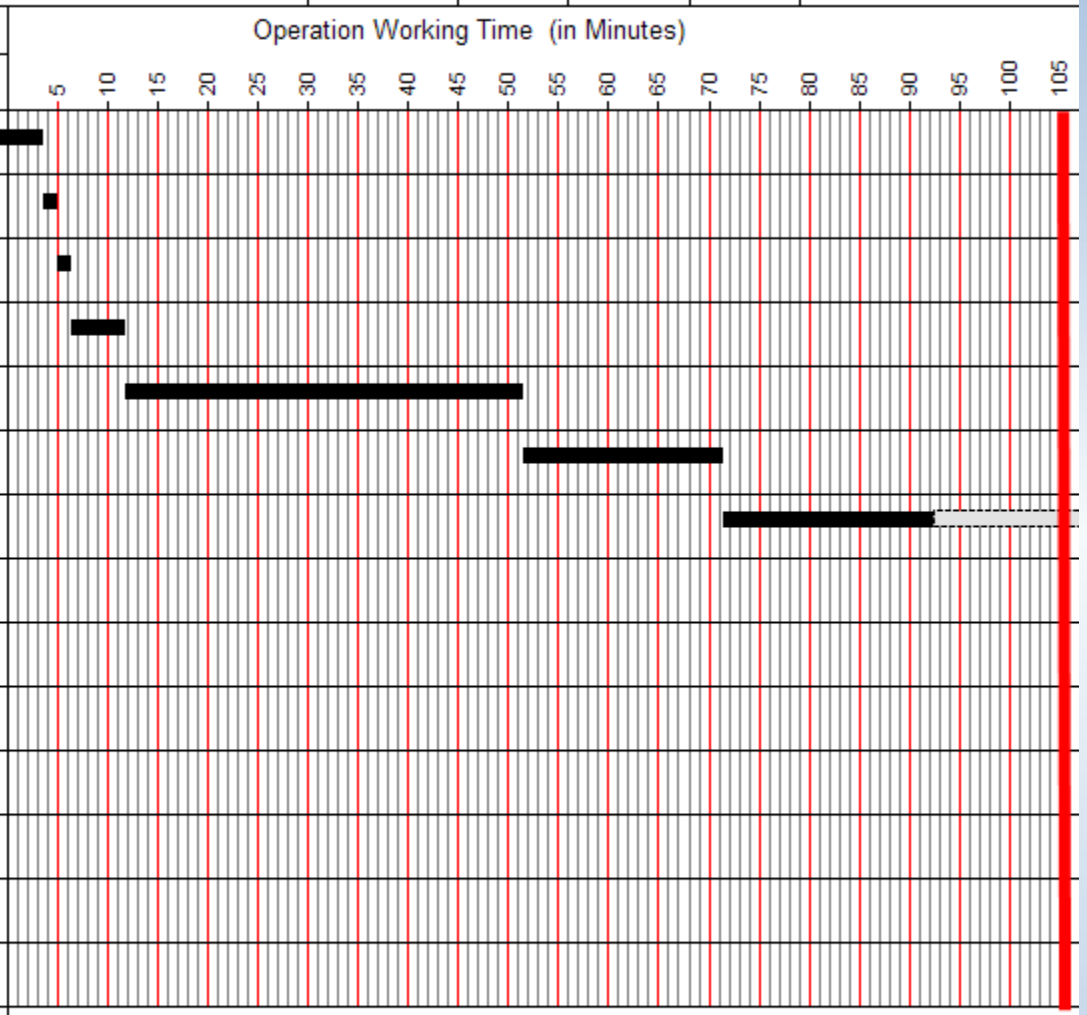
Standard Work Samples
presented by
Barrow Advanced Manufacturing

Operator Loading Chart

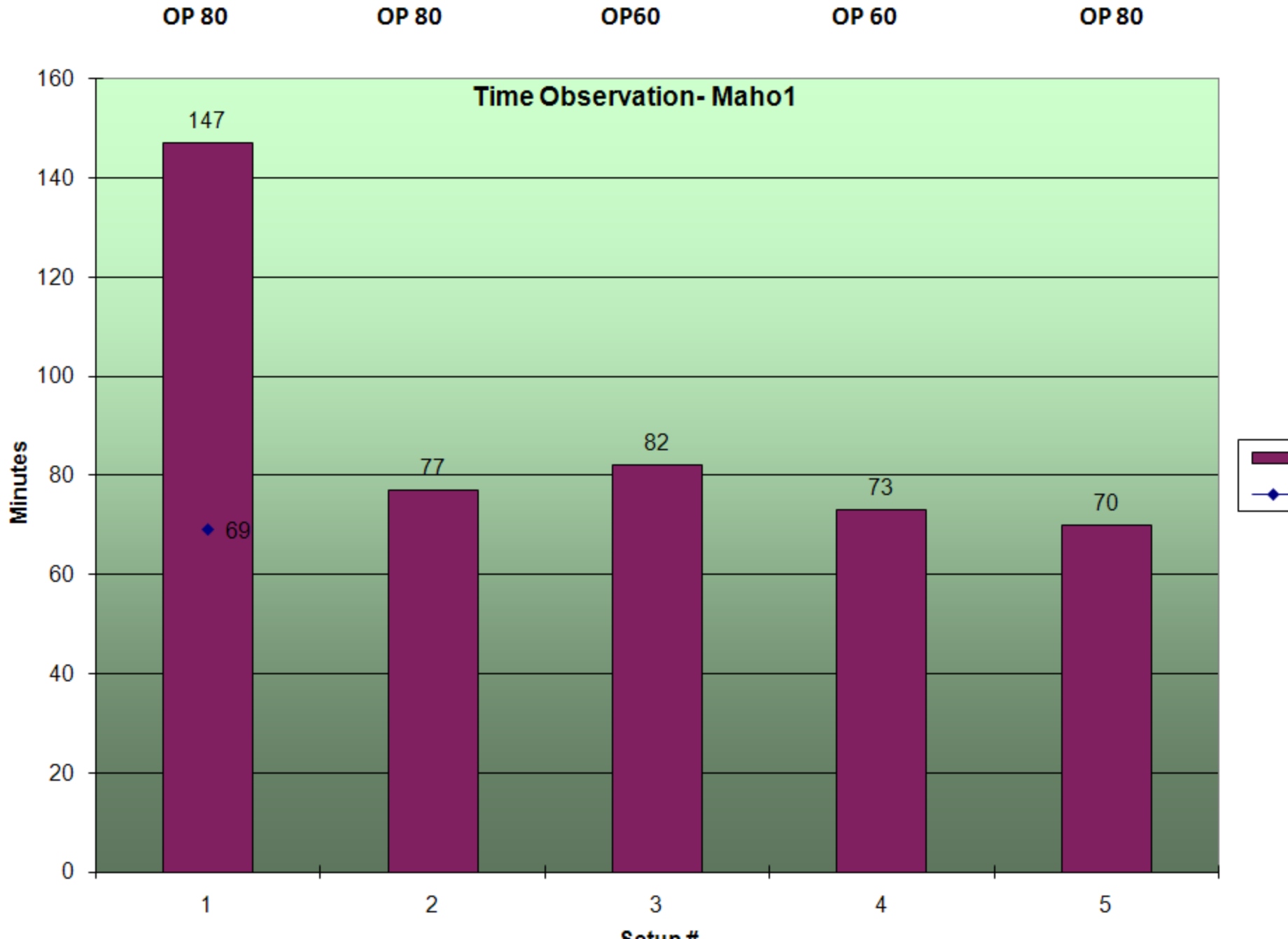


ID	Maho 1	Standard Work Combination Sheet	Date:	6/17/2008	Quota per Shift	3500 lbs	Man
Wrk Seq			Team Name		TAKT Tim	4800	Mach
							Walk

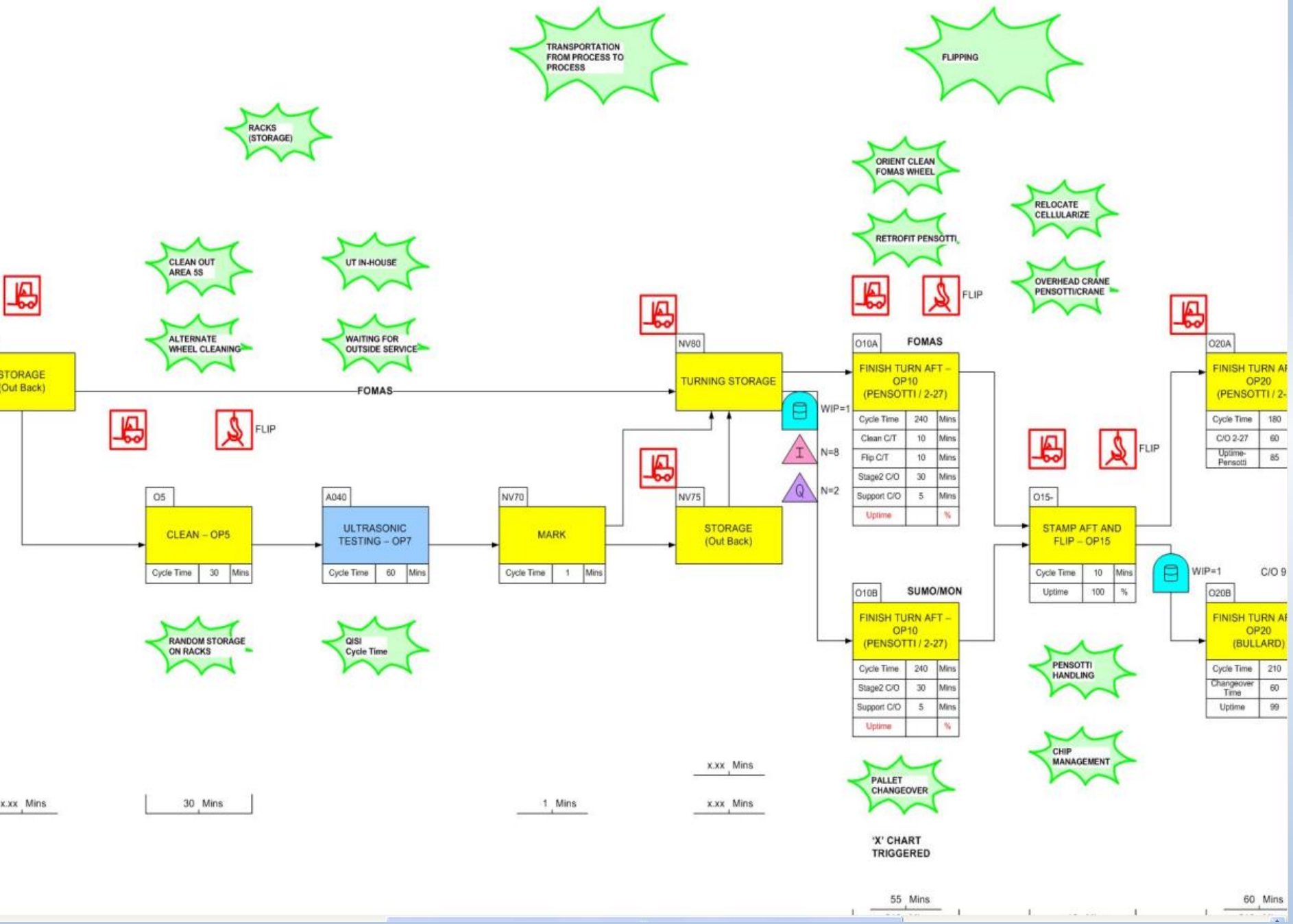
Step No.	Operation Description	Time		
		Man.	Auto	Walk
1	Identify job, clean & stone table	4.8		
2	Locate job file & S/U instructions	1.4		
3	Review instructions	1.2		
4	Load program, change macros, constants per S/U sheet	5.2		
5	Load fixture & indicate, set axis	38.0		
6	Load tools	19.2		
7	Probe tools & start mach	20.0	1200.0	
8	0			
9	0	0.0		
10	0	0.0		
11	0	0.0		
12	0	0.0		
13	0	0.0		
		90	X	0



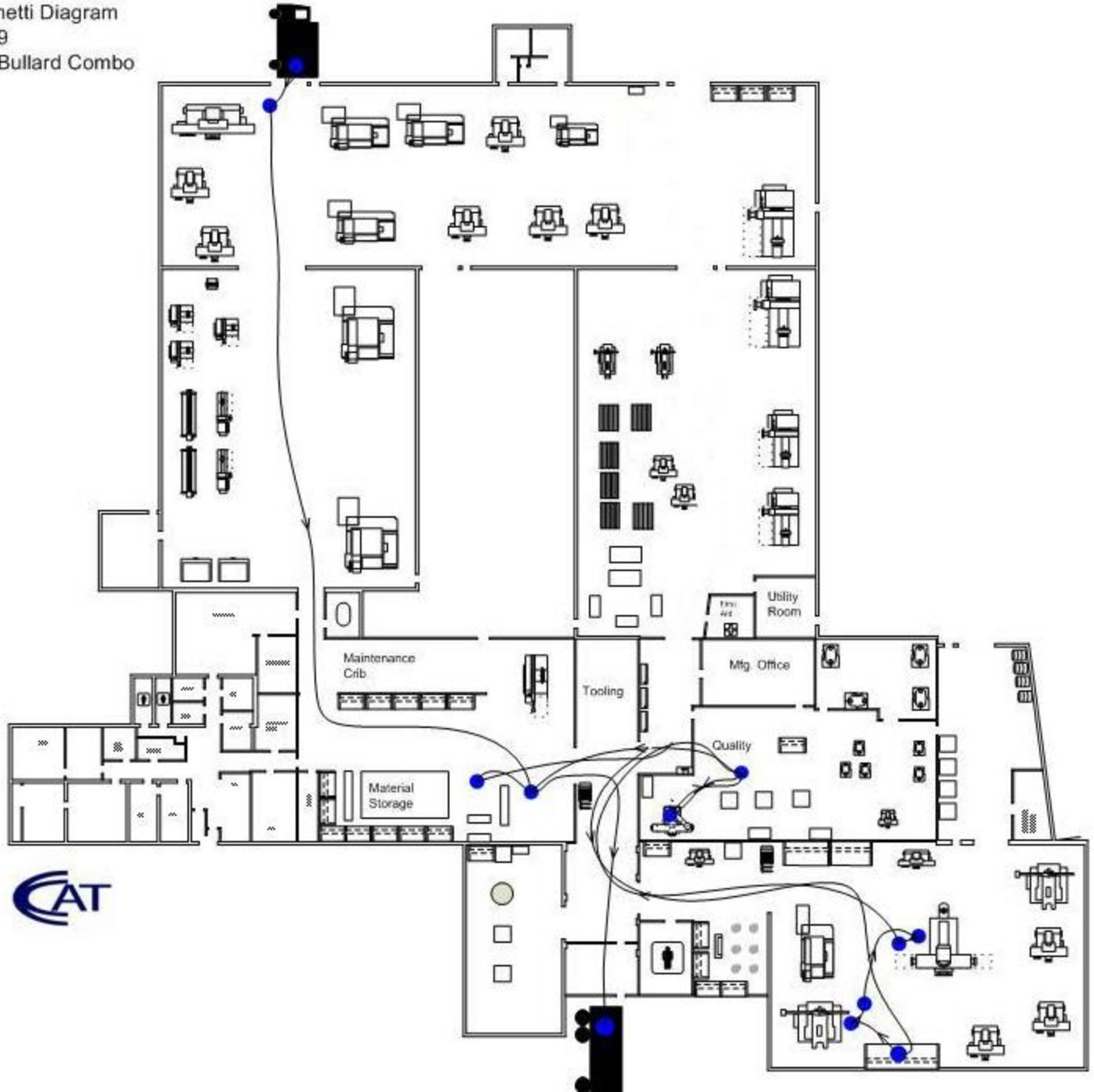
TAKT = 4800 min
Process = 1900 min
Best Process = 1269 (21 hours)
Available time = 58 hours


OP 80
OP 80
OP60
OP 60
OP 80
Time Observation- Maho1
160
140
120
100
80
60
40
20
0
Minutes
147
69
77
82
73
70
1
2
3
4
5
Setup #

Value Stream Map


TRANSPORTATION FROM PROCESS TO PROCESS
FLIPPING
RACKS (STORAGE)
ORIENT CLEAN FOMAS WHEEL
RETROFIT PENSOTTI
RELOCATE CELLULARIZE
OVERHEAD CRANE PENSOTTI/CRANE
CLEAN OUT AREA 5S
UT IN-HOUSE
ALTERNATE WHEEL CLEANING
WAITING FOR OUTSIDE SERVICE
FLIP
FOMAS
STORAGE (Out Back)
NV80
TURNING STORAGE
WIP=1
N=8
N=2
O10A
FOMAS
FINISH TURN AFT – OP10 (PENSOTTI / 2-27)
Cycle Time 240 Mins
Clean C/T 10 Mins
Flip C/T 10 Mins
Stage2 C/O 30 Mins
Support C/O 5 Mins
Uptime %
O20A
FINISH TURN AF OP20 (PENSOTTI / 2-
Cycle Time 180
C/O 2-27 60
Uptime-Pensotti 85
O5
CLEAN – OP5
Cycle Time 30 Mins
A040
ULTRASONIC TESTING – OP7
Cycle Time 60 Mins
NV70
MARK
Cycle Time 1 Mins
NV75
STORAGE (Out Back)
O15-
STAMP AFT AND FLIP – OP15
Cycle Time 10 Mins
Uptime 100 %
WIP=1
C/O 9
O10B
SUMO/MON
FINISH TURN AFT – OP10 (PENSOTTI / 2-27)
Cycle Time 240 Mins
Stage2 C/O 30 Mins
Support C/O 5 Mins
Uptime %
O20B
FINISH TURN AF OP20 (BULLARD)
Cycle Time 210
Changeover Time 60
Uptime 99
RANDOM STORAGE ON RACKS
QISI Cycle Time
PENSOTTI HANDLING
CHIP MANAGEMENT
PALLET CHANGEOVER
'X' CHART TRIGGERED
x.xx Mins
30 Mins
1 Mins
x.xx Mins
x.xx Mins
55 Mins
60 Mins

Sterling Engineering
7E Spaghetti Diagram
April 2009
Penzotti-Bullard Combo



Colored Magnet System

- No magnet means not received yet.
- Red magnet means received but not cleaned or UT.
- Yellow magnet means received and cleaned but not UT.
- Green magnet means ready for machining.

New 7E Wheel Storage Area

Before SW

Pensotti

4- Axis

66” Bullard

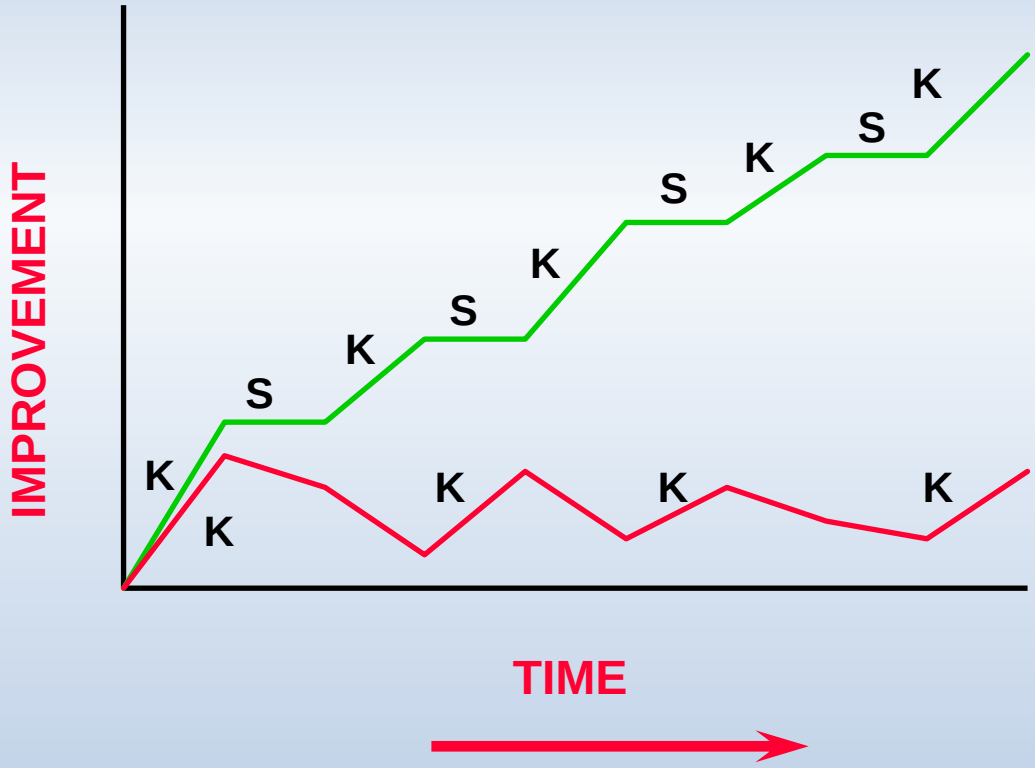
After SW

Pensotti

4- Axis

66” Bullard

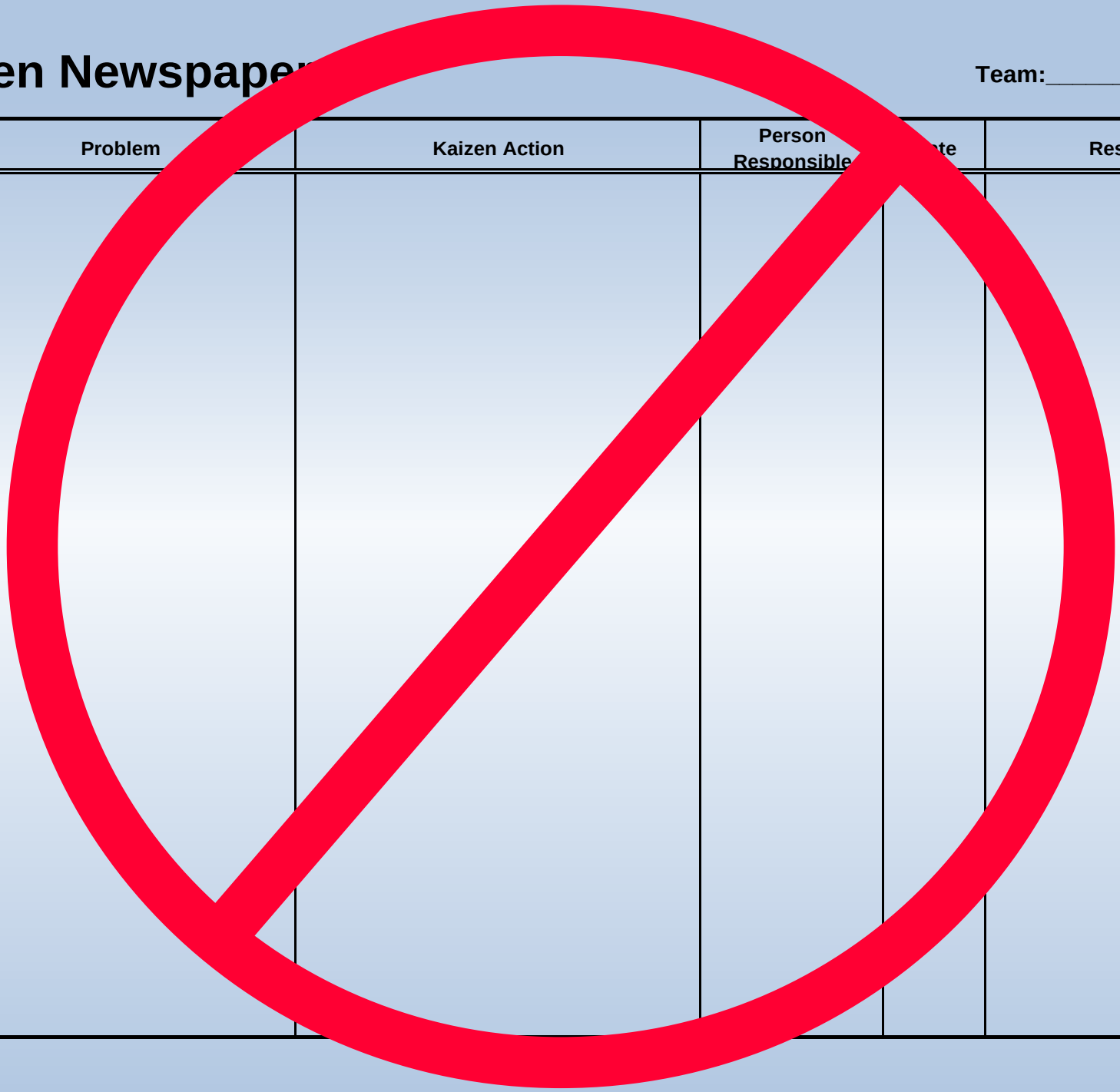
Standardization drives to sustaining results



Kaizen Newspaper

Team:_____

Item	Problem	Kaizen Action	Person Responsible	te	Result



My pleasure and honor to have worked with you today

Q&A

BAM