ACME Manufacturing Inc.

TPM WORK ORDER REQUEST FORM

Date: ☐☐☐☐☐☐ Production line name: _____

Equipment name: _____

Equipment number: ☐☐☐☐☐☐ Department: _____

Category of work order request: Safety: ☐ Cleaning: ☐ Lubrication: ☐ Bolting: ☐ Liquid Leakage: ☐

Gas Leakage: ☐ Mechanical/Electrical Defects: ☐ Process Improvements: ☐ Inspection: ☐ Other: ☐

Description of problem/work order: _____

_____

_____

Work order request originated by: _____

Label Tag Number: ☐☐☐☐☐ Requested completion date: ☐☐☐☐☐☐

Work order assigned to: _____

Work order corrective action taken: _____

_____

_____

Attached Picture:

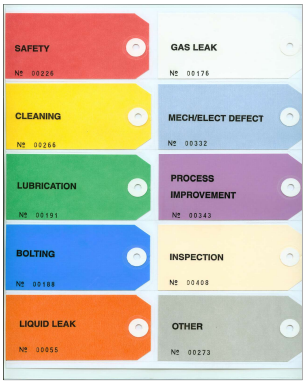
Work order completed by: _____

Completion Date: ☐☐☐☐☐☐

This is a TPM work order form that I devised. During TPM Step 8 Sub-step 1 'Initial Cleaning' a machine or process line is picked for this project - worst first, usually a high runner or one having a lot of downtime problems - then I invite as many volunteers that will be willing to get dirty, I train them for about 2 hours on what we are going to do and then we descend upon the machine and clean it from top to bottom.

The idea of this event is that we are going to be working together as a team and finding problems as we clean the machine from safety points to installed metrology points such as flow meters and gauges that has no standards called out for them, to cleaning points to process improvement points. There are 10 categories in all in which the appropriate point is identified, a tag attached to it and an instant photograph is taken it and then glued to the work order and filled out for later evaluation.

Below are the 10 TPM label which I designed and had made. It not unusual to have over 200 hundred work orders come out of an 'Initial Cleaning' event. That's when the real challenge starts - fixing every abnormality that was found…



5S JOB CYCLES FOR MAINTENANCE DEPARTMENT WORK AREA

ACME Manufacturing Inc.

ESTABLISHED ON 11/01/07				5S PILLAR					JOB CYCLE FREQUENCY											
NO.	PERSON/S RESPONSIBLE	SHIFT	5S JOB CYCLE	SORT	SET IN ORDER	SHINE	STANDARDIZE	SUSTAIN	WEEKLY	DAILY/SHIFT	DAILY/SHIFT	OTHER	ALLWAYS	MOHTHLY						
1	ALL	ALL	SORT OUT FROM TARGET AREA ANY ITEMS THAT ARE NOT NEEDED FOR MAINTENANCE OPERATIONS (RED TAG)	X					X											
2	ALL	ALL	RETURN ALL HAND AND POWER TOOLS TO THEIR RESPECTIVE STORAGE LOCATIONS		X					X										
3	ALL	ALL	TIDY WORK IN PROGRESS PROJECTS ON BENCH TOPS AND ON FLOOR		X					X										
4	ALL	ALL	RETURN ALL EQUIPMENT MANUALS TO THEIR RESPECTIVE STORAGE LOCATIONS		X					X										
5	ALL	ALL	ENSURE COMPUTER DESK IS NEAT AND CLEAN AND FREE OF CLUTTERING ITEMS THAT DO NOT BELONG THERE		X					X										
6	ALL	ALL	SWEEP BENCH WORK TOPS			X				X										
7	ALL	ALL	SWEEP FLOOR			X						X								
8	ALL	ALL	EMPTY SHOP TRASH DUMPERS			X						X								
9	ALL	ALL	EMPTY OIL PIGS CONTAINER			X														
10	ALL	ALL	EMPTY OIL PIGS			X														
11	ALL	ALL	CONGRATULATE YOUR TEAM.. JOB WELL DONE					X					X							
12	ALL	ALL	ACE THE AUDIT WITH A BETTER THAN 80%					X						X						
									NOTE:	NOTE:	NOTE:	NOTE: AS NEEDED	NOTE:	NOTE:	NOTE:	NOTE:	NOTE:	NOTE:	NOTE:	NOTE:

This is a 5S job cycle document that I created in MS Excel.

000 MINS		000 MINS	
LINE ?		LINE ?	
TASK COMPLETED BY SHIFT		TASK COMPLETED BY SHIFT	
1	2	3	4
TASK COMPLETED BY: _____ DATE: _____/_____/_____ TIME: _____ AM PM		TASK COMPLETED BY: _____ DATE: _____/_____/_____ TIME: _____ AM PM	
TASK DESCRIPTION		TASK DESCRIPTION	
GR-OP-FT1-JB 000.00 STANDARD WORK NAME & IDENTIFIER ROUTING NUMBER HERE		GR-OP-FT1-JB 000.00 STANDARD WORK NAME & IDENTIFIER ROUTING NUMBER HERE	

An improvement over the 5S job cycle forms are these 5S kanban cards. They are printed back to back on color paper which signifies the frequency at which to task is to be done e.g. blue kankan cards means the tasks is to be done once each shift. They are printed back to back so they can be flipped over for multiple shifts, laminated and cut to 11” inches in height by 4” inches in width.

The person who carries out the task looks at the task description - which whatever it is should be to a documentary standard - goes to the information center to find the standard task, carries it out, then signs and dates the card circling the shift it was completed on 1st, 2nd, 3rd or 4th shift and places the card back into a time card rack of the same color.

The person carrying out the task for the next shift wipes out the last shift person’s name, date, shift, time and writes his/her own after they have completed the task.

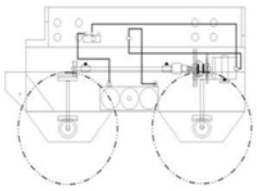
FORMING TEAM 2 TRAINING WALL - LINE TECHNICIANS

TASK / NAME	GR-OP-FT2-JB 0001.00 Programming Production Case Counters	GR-OP-FT2-JB 0002.00 Changing Vacuum Blower Filter Cartridge	GR-OP-FT2-JB 0003.00 Mac Valve Testing Procedure	GR-OP-FT2-JB 0004.00 Receiver Hopper Screen Filter Inspection-Clean-Installation	OP-FT2-JB 0005.00 Changeover Procedure Tapehead	GR-OP-FT2-JB 0006.00 Vacuum Blower Cartridge Filter Replacement	GR-OP-FT2-JB 0007.00 Cleaning Vacuum Blower Cartridge Filters	GR-OP-FT2-JB 0008.00 Inspection Cleaning Receiver Hopper Screen Filter Assembly	GR-OP-FT2-JB 0010.00 Rebuild Procedure Mac Valves	GR-OP-FT2-JB 0011.00 Exchanging In-Line Dust Filter Bag Assembly	GR-OP-FT2-JB 0012.00 Cleaning In-Line Dust Filter Bag Assembly	GR-OP-FT2-JB 0009.00 Tool Changeover Procedure Little David Tape Machine
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE		ACME		ACME		ACME	ACME	ACME	ACME	ACME	ACME	
JON JOE												
JON JOE												

Everything you do should have a standard to it and affected personnel trained to that standard, from sweeping the floor to setting up 10 thousand tons die press. A visible record in the form of a training wall or board should have something like the document that I created here. It should be displayed prominently in gemba and not kept in a training data base where no one can see it.

The standards with their respective alpha numerical classifiers and identifiers are at the top of the document with the names of the associates to the left column and a company logo placed in that cross reference cell that signifies as to whether or not that associate has been trained to that standard.

I added a list filter to this MS Excel spreadsheet so that sorting the names of the associates doesn't mess the record keeping of the training of who to what, keeping the standard and company logo aligned to the associate…

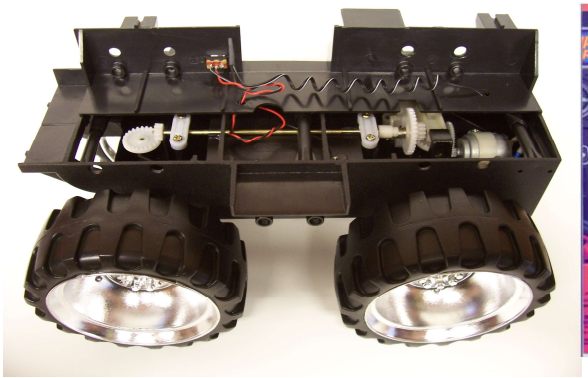
P-M ANALYSIS WORK SHEET						
SNCR NAME & NUMBER: *N/A*				TOPS LEADER NAME & FUNCTION: *Fred Webberking (Engineering)*		
PROCESS NAME & NUMBER:				TOPS MEMBERS NAMES & FUNCTIONS: *John Doe (Engineering) Tom Jones (Maintenance) Jane Doe (Machine op*		
EQUIPMENT NAME & NUMBER: *Toy Truck Production Process 101*				*Maggie May (Quality)*		
PRODUCT/PART NAME & NUMBER: *Acme ATV/SUV 4 X 4 Wheel Drive Toy Truck*						
QUALITY CHANGE CHARACTERISTICS: *No change in condition from previous efforts to eliminate problem*						
DATE: 02 / 14 /06						
PHENOMENON: *After power is switched on the truck moves forward a little, then stops*				SPECIAL NOTES: *Would like to resolve problem before series volume production starts on 05.01.06*		
CURRENT STATUS: *Awaiting resolution to problem*						
	CONSTITUENT CONDITIONS		PRIMARY 5Ms CORRELATIONS		SECONDARY 5Ms CORRELATIONS	
RESULTS OF PHYSICAL ANALYSIS	WBS # ITEMS (MUST BE ILLUSTRATED)	STANDARD VALUES	WBS # ITEMS (MUST BE ILLUSTRATED)	STANDARD VALUES	WBS # ITEMS (MUST BE ILLUSTRATED)	STANDARD VALUES
There is unsustainable motor torque to overcome resistance from the drive chain, vehicle weight and tire tread resistance to the ground to maintain motion *(Drive system load is too much for the motor torque)*	*1 Motor torque output is less than the standard value* 		*1-1 Not enough voltage applied to motor*		*1-1-1 Not enough voltage applied to motor* *1-1-2 Defective contact between batteries and metal contact points in battery box* *1-1-3 Defective contact between metal contact points in the battery box and reverse switch* *1-1-4 Defective contact point within reverse switch* *1-1-5 Defective contact point between reverse switch terminal and cord*	
			1-2 Underpowered motor		*1-2-1 Worn motor brush* *1-2-2 Defective coil insulation/short/open circuit* *1-2-3 Galled or worn motor bearings* *1-2-4 Bent or loose motor bearings*	
	2 Drive system load is too great		*2-1 Motor output shaft and center gear inp*		*2-1-1 Loose motor mounts* *2-1-2 Loose motor bracket mount* *2-1-3 Adjustment error when tightening motor bracket mount* *2-1-4 Loose center gearbox mount*	

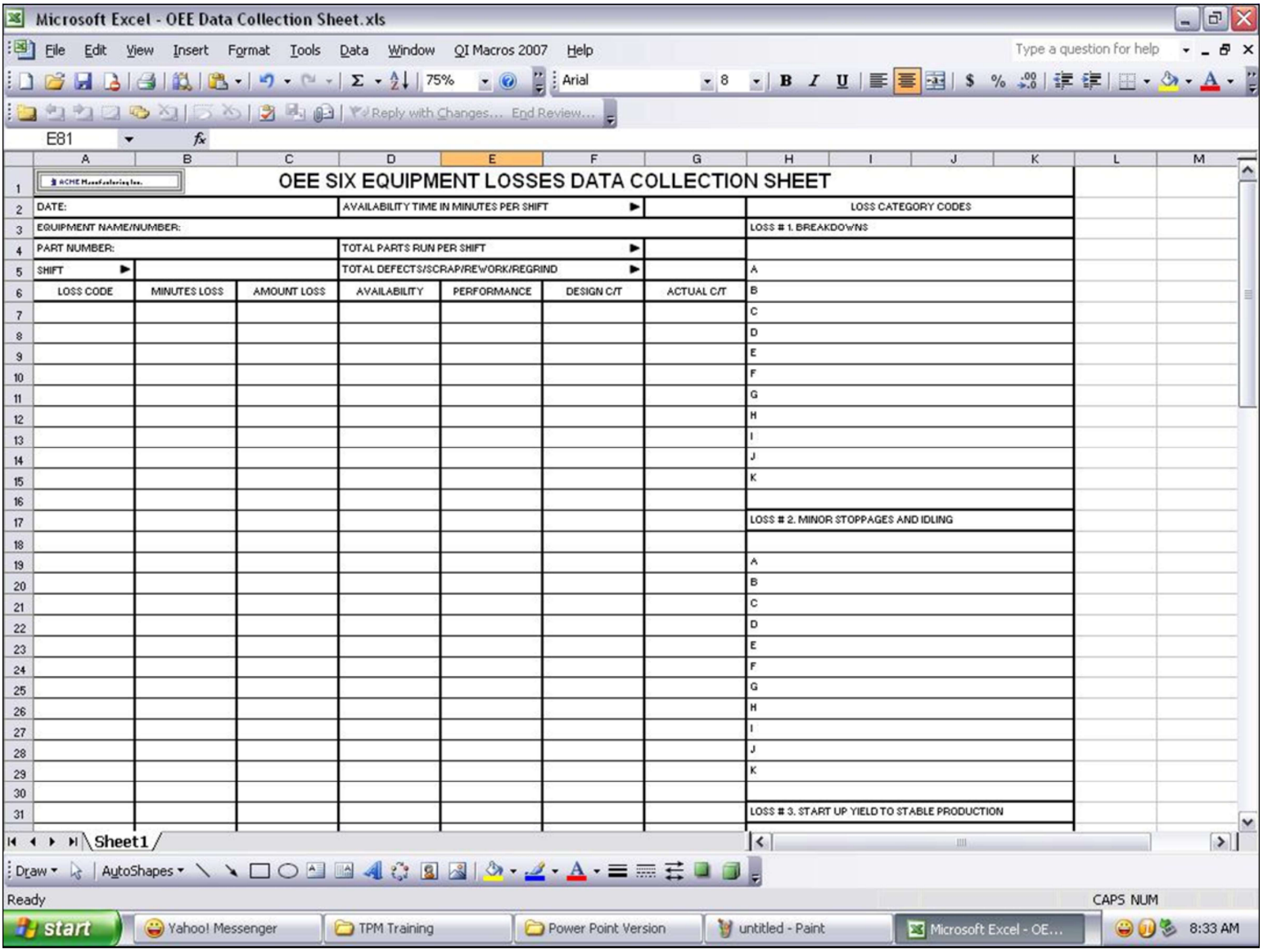
Root cause analysis… I have enough experience in this field of study that I have developed my own training materials and teach it to others. The two that I use the most are 8D and P-M Analysis. 8D is a well structured disciplined approach that is very good I have found for CARs Corrective Action Request from customer complaints, also known as SNCR Supplier Non-Conformance Report.

Back in 2003 I was working for a company that was launching multiple new products and unfortunately we had many CARs and SNCRs. I've done more 8Ds than I care to remember…P-M Analysis is a chronic failure and defects root cause analysis tool that is a little more, how shall I say, getting into the muck of things. It is better suited and learned to use by maintenance technicians and operations personnel as it was specifically developed for teams working on TPM implementation.

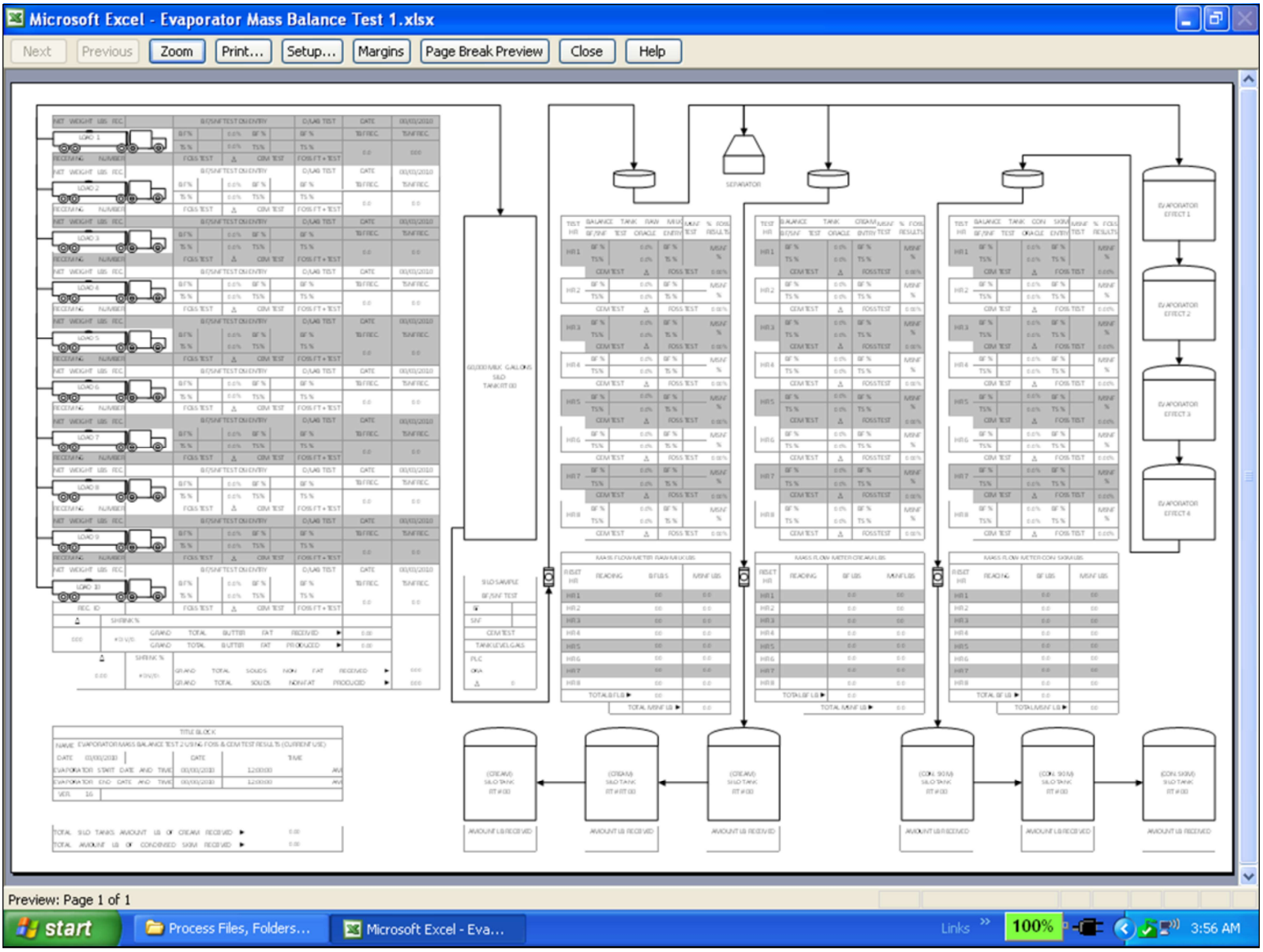
The diagram above shows the P-M Analysis work sheet and my own filled in training example of a problem under study, which is a toy truck. I've deliberately installed a problem in the toy for participants to examine for causal factors.

I had to buy five of these toy Monster trucks from Toys R Us as I destroyed four of them in the process of making my cut-a-way model - see inset…





This is my own designed OEE data collection sheet. It captures the big six equipment losses categories and is printed on 11 X 17 ledger size paper in portrait used with a ledger clipboard - those are actually available - enough space to keep you going for a full day's worth of data collection.



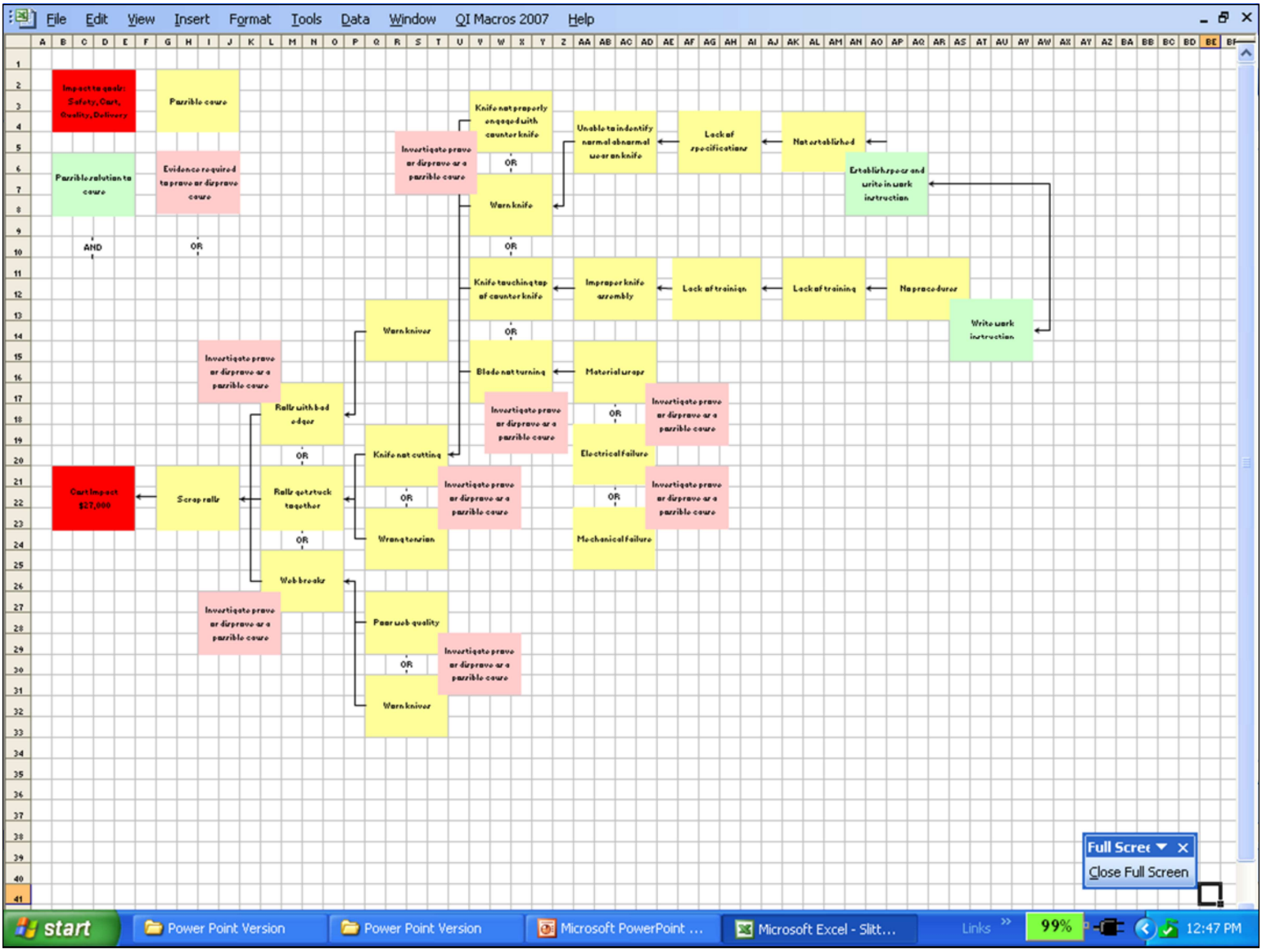
During my employment with Wells Enterprises (Blue Bunny Ice Cream) one of my many contributions was that I performed a DOE (Design of Experiments) to analyze shrink losses in total butter fat and total solids originating from testing equipment used in this very unique processing industry for that purpose. This was my DOE a 4 factor 12 level experiment which revealed where the 'paper losses' were stemming from. This uncovered a 'paper loss' savings of over $300,000.00.

My A3 thinking kept this all on one 11X17 size paper times the factor and levels.

I don't get excited about too many newfangled methods and practices of lean as there's a bazillion of them and with their advocates touting them as the newest and greatest thing that will bring about rapid profits to your business. Having been about lean for over 10 years now and know first hand the challenges of change management – I was cynical, until I was introduced to Cause Mapping.

During my years using and teaching TPM I struggled to get people to use the problem solving management tool. I was teaching them. 8D for me was really only good for external quality escapes, P&M Analysis was esoterically difficult to teach to the uninitiated, don't get me wrong these are good tools and they work, but I couldn't get them to fit into what was needed for team oriented problem solving that people would 'get' and use.

The basic principles of Cause Mapping are 1. Cause and effect relationships, 2. Visual communication and 3. System of causes thinking. 1. Problem, 2, Analysis, 3. Solutions. I become very interested and studied it up and attended as many workshops that I could to learn more and started holding my own workshops to study real problems. I've held 9 Cause Maps to date. Sorry, for me I still haven't found a universal problem solving management tool and recognizing that any person in any function in any department from sales, marketing, research and development, customer service to quality assurance in any business, manufacturing, service, healthcare and retail could use. Each problem is unique and require the unique tool…



The previous slide shows how you build from left to right the causing mapping system using prescribed color coded posit notes. Using posit notes in this manner allows for visual communication and ease of understand the problem and the cause and effect relationships. Like most problem solving workshops it's a team oriented process. What you can't see in the previous slide are the 10 people directly involved in the problem and others as needed from diverse functions to actively participate in building this particular cause map.

I act as facilitator in building the cause map. You take a picture of the cause map on the whiteboard and print it out on 11 X 17 size paper then convert it to an electronic format - this case using the drawing functions of MS Excel or Visio - as shown on this side for progress reviews, record keeping and reporting. Depending on the size of the problem you may have to have several review meetings with the problem solving team to check on assigned tasks and progress. You stop building the cause map when you have enough information on your cause map to solve the problem.

This will be my problem solving tool of choice from now on.

I would like to thank my good friend and former work colleague Chad Sim for his expertise in Cause Mapping and training me in its use.