MANUFACTURING INSIGHTS

Total Productive Maintenance Blitz - TPM

SCENE 1.
MI FBI, CGS: FBI warning
white text centered on black to blue gradient

SCENE 2.
MI DRL, CGS: DRL screen
white text centered on black to blue gradient

SCENE 3.
MI AME, CGS: AME screen
white AME logo on black to blue gradient
TPM03A, edited peter carey narration
MI BLU, blue background

NARRATION (VO):

PRODUCED IN COOPERATION WITH THE ASSOCIATION FOR MANUFACTURING EXCELLENCE.

SCENE 4.
MI SME, SME logo open, with music

SCENE 5.
MI OPEN, MI open, with music
MI BOX, inset box for MI open
TPM05A, CGS: Total Productive Maintenance Blitz
white text, centered
TPM05B, SME4402, 04:48:48:00-04:49:03:00
pan, workers in TPM blitz training
TPM05C, SME4405, 07:04:48:00-07:05:02:00
zoom in, workers marking up diagram
TPM05D, SME4403, 05:44:28:00-05:44:40:00
workers cleaning inspecting equipment
TPM05E, SME4407, 09:34:38:00-09:34:48:00
workers brainstorming chute idea
TPM05F, SME4396, 01:09:36:00-01:09:52:00
wide, forging cell
TPM05G, SME4403, 05:37:00:00-05:37:08:00
workers cleaning inspecting reject conveyor

MUSIC UP AND UNDER

NARRATOR (VO):

MANUFACTURING INSIGHTS, MANUFACTURING ENGINEERING MAGAZINE'S VIDEO SERIES FOR PROCESS IMPROVEMENT. THIS PROGRAM HIGHLIGHTS THE METHODS AND BENEFITS OF TOTAL PRODUCTIVE MAINTENANCE, OR 'TPM', BY FOLLOWING A CROSS FUNCTIONAL TEAM FROM THE MODERN DROP FORGE COMPANY AS THEY IMMERSE THEMSELVES IN A FOUR-DAY TOTAL PRODUCTIVE

MAINTENANCE KAIZEN BLITZ WITHIN ONE OF THEIR CHALLENGING MANUFACTURING CELLS.

SCENE 6.
TPM06A, SME4402, 04:50:29:00-04:50:37:00
zoom out, Tony writing equipment scope on white board
TPM06B, SME4402, 04:52:24:00-04:52:31:00
Tony writing equipment scope on white board, alternate shot
TPM06C, SME4403, 05:22:13:00-05:22:23:00
zoom out, inspecting equipment
TPM06D, SME4404, 06:16:46:00-06:16:55:00
Kara at fishbone diagram with root cause sticky
TPM06E, SME4404, 06:34:23:00-06:34:35:00
zoom out, conveyor idea being brainstormed
TPM06F, SME4408, 10:26:15:00-10:26:23:00
team implementing chute idea
TPM06G, SME4408, 10:49:35:00-10:49:45:00
welding heat shield

NARRATION (VO):

DURING THIS 'TPM' BLITZ, THEY ESTABLISHED WHICH EQUIPMENT TO FOCUS ON, IDENTIFIED POTENTIAL PROBLEMS, DETERMINED THE ROOT CAUSES FOR UNDERPERFORMING EQUIPMENT, AND THEN BRAINSTORMED IDEAS FOR IMPROVEMENTS.

THE TEAM THEN QUICKLY IMPLEMENTED OVER 50 OF THEIR IDEAS.

SCENE 7.
TPM07A, SME4404, 06:31:18:00-06:31:29:00
people discussing diagram
TPM07B, SME4418, 18:21:12:00-18:21:24:00
zoom out, exit conveyor from furnace
TPM07C, SME4418, 18:12:14:00-18:12:19:00
billet falls down chute, picked by end effector
TPM07D, SME4418, 18:15:58:00-18:16:08:00
billet placed in press, preformed, removed
TPM07E, SME4418, 18:05:41:00-18:05:48:00
billet pushed onto reject conveyor

NARRATION (VO):

NOT ALWAYS STRAIGHTFORWARD OR EASY, THIS FOCUSED 'TPM' BLITZ LEAD TO DRAMATIC, LASTING IMPROVEMENTS IN THE WORK AREA FOR MODERN DROP FORGE PERSONNEL AND EQUIPMENT, RESULTING IN THE COMPANY SAVING OVER $50,000 PER YEAR BY REDUCING PRODUCTION DOWNTIME BY 50%, AND SCRAP BY 10%.

--- TOUCH BLACK ---

SCENE 8.
TPM08A, SME4403, 05:34:53:00-05:35:05:00
zoom out, workers inspecting sensor lens, writing down corrective action
TPM08B, SME4403, 05:36:10:00-05:36:20:00
zoom out, loose sensor
TPM08C, SME4403, 05:40:40:00-05:40:50:00
zoom out, tagging sensor
TPM08D, SME4396, 01:19:12:00-01:19:33:00
zoom out, workers at hammer press

NARRATION (VO):

TOTAL PRODUCTIVE MAINTENANCE IS A MANUFACTURING IMPROVEMENT METHODOLOGY THAT INCREASES PRODUCTION AND REDUCES WASTE THROUGH CONTINUOUS IMPROVEMENT, AND ATTENTION TO THE CONDITION OF MACHINES AND

PROCESSES. IT IS A CRITICAL ELEMENT FOR ANY SUCCESSFUL LEAN ENTERPRISE THAT RELIES HEAVILY ON PRODUCTION MACHINES AND EQUIPMENT.

SCENE 9.
TPM09A, SME4397, 02:16:02:00-02:16:16:00 zoom out, modern drop forge sign in front of building
TPM09B, still, multiple connection rod forgings
TPM09C, still, original facility
TPM09D, still, small cutter forging
TPM09E, still, structural forging
TPM09F, still, crankshaft forging
TPM09G, SME4422, 19:11:45:00-19:12:01:00 zoom out, forging operation using hammer press
TPM09H, SME4422, 19:04:00:00-19:04:10:00 wide, forging operation using programmable forging presses
TPM09I, SME4422, 19:08:22:00-19:08:55:00 wide, forging operation using programmable forging presses
TPM09J, CGS: Aerospace
Mining
Railroad
Recreational Vehicles
Agriculture
TPM09K, SME4418, 18:27:23:00-18:27:39:00 zoom in, forging operation

NARRATION (VO):

THE MODERN DROP FORGE COMPANY SPECIALIZES IN HIGHLY ENGINEERED, FORGING-BASED SOLUTIONS, AND HAS BEEN FAMILY OWNED AND MANAGED SINCE 1914. THEY PRODUCE FORGINGS THAT RANGE FROM LESS THAN ONE POUND, UP TO 80 POUNDS, AND THEIR HAMMER CAPACITY IS 3,000 TO 8,000 POUNDS. THEY ALSO OPERATE 2,500 TO 4,000 TON PROGRAMMABLE FORGE PRESSES. MODERN DROP FORGE SERVES MANY INDUSTRIES INCLUDING AEROSPACE, MINING, RAILROAD, RECREATIONAL VEHICLES AND AGRICULTURE. THEIR DEDICATION TO LEAN MANUFACTURING, AEROSPACE AND ISO 9001 STANDARDS SUPPORTS THEIR COMMITMENT TO HIGH PRODUCT QUALITY, LOW COST, AND ON-TIME DELIVERY.

SCENE 10.
TPM10A, SME4397, 02:13:35:00-02:13:52:00 pan, Modern Drop Forge complex
TPM10B, SME4422, 19:10:18:00-19:10:47:00 wide, hammer press operation
TPM10C, SME4401, 03:32:55:00-03:33:18:00 Pat Thompson on-camera
TPM10D, CGS: Pat Thompson,
General Manager & CFO
Modern Drop Forge Company
MI LTD, lower third background

NARRATION (VO):

LIKE MANY COMPANIES, MODERN DROP FORGE STARTED ITS LEAN JOURNEY SEVERAL YEARS AGO. THEY QUICKLY REALIZED THAT LEAN THINKING NOT ONLY GAVE THEM A MARKETPLACE ADVANTAGE, BUT THAT IT WAS AN ECONOMIC AND COMPETITIVE NECESSITY. PAT THOMPSON,

GENERAL MANAGER AND CFO OF MODERN DROP

FORGE EXPLAINS THEIR LEAN ORIGINS...

SCENE 11.
TPM11A, SME4401, 03:01:50:00-03:03:00:00
Pat Thompson on-camera

PAT THOMPSON (ON-CAM):
We deal with a lot of different industries. Our customers are typically #1 and #2 in their industries, so we are challenged on a daily basis to perform at a very high level. A number of our customers were certainly asking us to embrace Lean manufacturing. We have always had continuous improvement at Modern in some fashion. What we didn't want to do was have to respond to every customer's demands. So we took a step back and said what is it Modern wants to do. We need to do our own Lean manufacturing. So we had a number of people that went out around the countryside, so to speak, and visited a number of customers and companies that were doing Lean manufacturing, and decided what we saw was a better approach than what we were doing, and that we needed to do a more comprehensive approach to Lean manufacturing.

SCENE 12.
TPM12A, SME4422, 19:14:08:00-19:14:20:00
zoom out, hammer press operation
TPM12B, SME4403, 05:41:52:00-05:42:13:00
worker pulling on loose chain during inspection

NARRATION (VO):

MANY COMPANIES SEE THE NEED FOR LEAN TO IMPROVE QUALITY, ON-TIME DELIVERY, SERVICE LEVELS, AND TO REDUCE COSTS. FOR COMPANIES THAT RELY HEAVILY ON THEIR EQUIPMENT OR MACHINES, A GOOD 'TPM' PROGRAM IS INDISPENSABLE.

SCENE 13.
TPM13A, SME4401, 03:19:43:00-03:21:20:00
Pat Thompson on camera

PAT THOMPSON (ON-CAM):
To TPM, my first advice would be you have to have a plan for your Lean journey, or TPM alone will not be successful. You can't ask your employees and managers to put effort into changing a certain aspect of how you run your business, in this case how you handle your equipment, and not have other aspects of your business change in a similar fashion. So I would recommend that you have a total plan as to how you are going to be a Lean manufacturer, and TPM be one of the building blocks. The second recommendation would be that you implement 5S first, before you implement

TPM. 5S is a wonderful tool. You can almost be a Lean manufacturer with 5S if you take it to its highest level, but 5S is not just about cleaning equipment and picking up paper around a plant. It is really more about workplace organization and safety, and leads right into an excellent TPM program, because you clean your equipment every day and notice leaks and things like that.

SCENE 14.
TPM14A, still, 5S at MDF
TPM14B, still, 5S at MDF
TPM14C, still, 5S at MDF
TPM14D, SME4403, 05:21:42:00-05:21:56:00
Mike inspecting furnace conveyor
TPM14E, SME4411, 18:13:10:00-18:13:34:00
Kara Zilis on camera
TPM14F, CGS: Kara Zilis
Total Productive
Manufacturing Coordinator
Modern Drop Forge Company
MI LTD, lower third background
TPM14G, still, 5S at MDF
TPM14H, still, 5S at MDF

NARRATION (VO):

'5S' IS COMMONLY CONSIDERED A FUNDAMENTAL BUILDING BLOCK FOR A SUCCESSFUL LEAN ORGANIZATION. IT BUILDS IN THE DISCIPLINE REQUIRED TO ENACT OTHER LEAN TOOLS LIKE 'TOTAL PRODUCTIVE MAINTENANCE'. BUT FOR MODERN DROP FORGE, 'TPM' GOES FAR BEYOND EQUIPMENT MAINTENANCE, AS KARA ZILIS, THEIR TOTAL PRODUCTIVE MANUFACTURING COORDINATOR EXPLAINS...

SCENE 15.
TPM15A, SME4411, 18:08:52:00-18:09:31:00
Kara Zilis on-camera
TPM15B, SME4410, 13:40:15:00-13:40:24:00
zoom out, fixing conveyor

KARA ZILIS (ON-CAM):

At Modern Drop Forge, we decided we didn't want to go with the total productive maintenance. We were afraid our employees would automatically assume that that means it's only about maintenance. (stammer) To stop that thinking, we changed the title to total productive manufacturing. That assures everybody that this is about everybody, this is not just about maintenance. This affects operators, our quality, management… this affects everybody.

SCENE 16.
TPM16A, SME4410, 13:32:18:00-13:32:50:00
zoom out, forging operation
TPM16B, CGS: Operators
Supervisors
Maintenance Staff
Management
Scheduling
Tooling
Engineering
Purchasing

NARRATION (VO):

JUST WHO IS AFFECTED WHEN A MACHINE BREAKS DOWN? THE OBVIOUS INDIVIDUALS AFFECTED ARE THE OPERATORS, SUPERVISORS, AND MAINTENANCE STAFF, BUT UPON FURTHER

Sales
Shipping
Customers

SCRUTINY A SINGLE MACHINE BREAKDOWN CAN IMPACT ALL THE WAY THROUGH THE COMPANY AND TO THE CUSTOMER.

SCENE 17.
TPM17A, SME4403, 05:41:26:00-05:41:39:00
workers inspecting the furnace exit conveyor

NARRATION (VO):

FOR THIS REASON, IT IS VITAL TO GET TO THE ROOT CAUSE OF A BREAKDOWN IN ORDER TO MAKE LASTING REPAIRS AND IMPROVEMENTS TO THE EQUIPMENT.

SCENE 18.
TPM18A, SME4403, 05:06:22:00-05:06:35:00
workers inspecting conveyor
TPM18B, SME4410, 13:44:04:00-13:44:25:00
zoom out, worker cutting plate off machine

NARRATION (VO):

BUT GETTING TO A PROBLEM'S ROOT CAUSE IS NOT EASY FOR EVERYONE, ESPECIALLY IF THOSE EFFORTS REQUIRE CHANGES TO DAILY ACTIVITIES. LIKE ANY INITIATIVE SUCH AS 'TPM', THERE MAY BE SOME INITIAL RESISTANCE.

SCENE 19.
TPM19A, SME4411, 19:04:00:00-19:04:26:00
Tom Olenik on camera
TPM19B, CGS: Tom Olenik
Maintenance Superintendent
Modern Drop Forge Company
MI LTD, lower third background

TOM OLENIK (ON-CAM):
When we first started our TPM program, we did run into resistance. With change, any time you come into a huge change like that, you are going to experience resistance. I guess the best way we overcame it was with more training. The more we trained and the more successes we got out of the events, the more people started to realize that it was good thing and it could be more beneficial to the company.

SCENE 20.
TPM20A, SME4401, 03:07:59:00-03:08:44:00
Pat Thompson on camera

PAT THOMPSON (ON-CAM):
Employees in general embrace change, they like things to be better, they like to be involved, and they like their ideas to be used. I would say in general the biggest change tends to be from managers and the senior people in an operation, because they have a tendency to lose some of their control of the operation. The employees in general do like it because they gain more control and improvements are made in the day to day operations, which is where they

are at.

SCENE 21.
TPM21A, SME4412, 15:10:11:00-15:10:25:00
pan, union guys discussing equipment repair

NARRATION (VO):

UNIONS ARE ALSO SEEING THE BENEFITS OF TOTAL PRODUCTIVE MAINTENANCE AND LEAN MANUFACTURING.

SCENE 22.
TPM22A, SME4401, 03:08:59:00-03:09:36:00
Pat Thompson on camera

PAT THOMPSON (ON-CAM):

Every environment where you have a union is a little bit different. In our environment we didn't have any particular issues at all. Our employees were very positive, the union was very positive. In general when you are looking to make improvements like that and standardize your activities, it's pretty easy to get on board.

SCENE 23.
TPM23A, SME4402, 04:03:20:00-04:03:35:00
pan, team in lean event
TPM23B, SME4405, 07:41:00:00-07:41:21:00
zoom out, overall equipment effectiveness on screen

NARRATION (VO):

ALL COMPANIES HAVE DISTINCT METHODS OF CHOOSING EQUIPMENT FOR A 'TPM' EVENT, AND SELECTING THE RIGHT EQUIPMENT IS AS IMPORTANT AS SELECTING THE RIGHT TEAM. ONE METHOD IS TO REVIEW 'OVERALL EQUIPMENT EFFECTIVENESS', OR 'OEE', DATA.

SCENE 24.
TPM24A, SME4405, 07:42:02:00-07:42:31:00
zoom out, Dan reviewing OEE worksheet

NARRATION (VO):

'OVERALL EQUIPMENT EFFECTIVENESS' IS A POWERFUL MEASUREMENT TOOL USED TO HELP PINPOINT PROBLEM AREAS AND EQUIPMENT, ALLOWING TEAMS TO CONCENTRATE ON THE MOST IMPORTANT ELEMENTS OF MAINTENANCE AND PERFORMANCE IMPROVEMENT.

SCENE 25.
continue previous shot
TPM25A, CGS: OEE
TPM25B, CGS: OEE %
TPM25C, CGS: Availability %

NARRATION (VO):

'OEE' IS THE OVERALL PERCENTAGE OF A PIECE

TPM25D, CGS: Performance %
TPM25E, CGS: Quality %

OF EQUIPMENT'S AVAILABILITY, PERFORMANCE, AND PART PRODUCTION QUALITY MULTIPLIED TOGETHER.

SCENE 26.
TPM26A, CGS: Availability Breakdown
TPM26B, CGS: Availability Breakdown %
TPM26C, CGS: Performance Breakdown
TPM26D, CGS: Performance Breakdown %
TPM26E, CGS: Quality Breakdown
TPM26F, CGS: Quality Breakdown %
TPM26G, CGS: Availability %
TPM26H, CGS: Performance %
TPM26I, CGS: Quality %
TPM26J, CGS: OEE % total

NARRATION (VO):

'OEE' TAKES INTO ACCOUNT THE TIME THE EQUIPMENT IS AVAILABLE FOR USE, WHETHER IT IS RUNNING AT THE RATE THAT IT IS SUPPOSED TO, AND THE QUALITY LEVEL OF THE PARTS PRODUCED. THESE PERCENTAGES ARE THEN MULTIPLIED TOGETHER TO CREATE A RATING BY WHICH PRODUCTION EQUIPMENT IS EVALUATED FOR POTENTIAL IMPROVEMENT ACTIVITIES.

SCENE 27.
TPM27A, SME4402, 04:50:37:00-04:50:51:00
zoom out, Tony writing equipment scope on white board
TPM27B, SME4405, 07:38:23:00-07:38:36:00
zoom out, workers reviewing data

NARRATION (VO):

FOR THEIR 'TPM' EVENT, MODERN DROP FORGE CONSIDERED MANY FACTORS WHEN THEY CHOSE THEIR EQUIPMENT, INCLUDING REVIEWING THEIR VALUE STREAM MAP, 'OEE' DATA, AND OTHER RESOURCES.

SCENE 28.
TPM28A, SME4411, 18:09:59:00-18:10:39:00
Kara Zilis on camera

KARA ZILIS (ON-CAM):
We chose conveyors for this event, even though conveyors was actually our fourth highest cause of downtime. The other items, such as hammer down time, we already have a group working on focusing on those issues and trying to make those improvements. The second group, quick changeover, is already working on trying to reduce our setup times. Then the third highest item was for furnace repairs, and we also have a team that's working on not only improving our furnace repairs, but how we can make them more efficient for changeovers as well.

SCENE 29.
TPM29A, SME4396, 01:43:52:00-01:44:06:00
wide, conveyors moving rejected billet to

NARRATION (VO):

scrap bin
TPM29B, SME4396, 01:38:20:00-01:38:59:00
wide, furnace conveyor moving billet to production conveyor, and then scrap bin conveyor, edit at multiple points
TPM29C, SME4407, 09:44:28:00-09:44:40:00
workers troubleshooting stopped conveyor

CONVEYANCE IS WIDELY CONSIDERED TRANSPORTATION WASTE IN LEAN. MODERN DROP FORGE IS FULLY AWARE OF THIS AND IS ALWAYS LOOKING FOR WAYS TO REDUCE WASTE. IN THE MEANTIME, THESE CONVEYORS ARE A NECESSITY AS THEY MOVE THE VERY HOT BAR STOCK BILLETS FROM ONE OPERATION TO THE NEXT, INCREASING FLOW. CURRENTLY, THESE CONVEYORS ARE AN INTEGRAL PART OF THEIR PRODUCTION PROCESS. IF A CONVEYOR STOPS, THE CELL STOPS.

SCENE 30.
TPM30A,SME4402, 04:48:48:00-04:49:03:00
pan of group in initial training

NARRATION (VO):

AFTER DETERMINING THAT THEY WOULD FOCUS ON FOUR CONVEYORS AND ONE HYDRAULIC BENDING PRESS, THE TEAM BEGAN THE TRAINING PORTION OF THEIR KAIZEN EVENT.

SCENE 31.
TPM31A, SME4402, 04:21:27:00-04:21:48:00
pan, team in initial meeting with Tony

NARRATION (VO):

INITIALLY, THE TEAM COVERED FUNDAMENTAL ‘TPM’ CONCEPTS AND HOW TO APPLY THEM, TO ENSURE A BASIC UNDERSTANDING OF THE TOOLS THAT THEY’D BE USING DURING THE EVENT.

SCENE 32.
TPM32A, SME4402, 04:12:37:00-04:12:53:00
zoom out, John Simon giving lessons learned example
TPM32B, SME4402, 04:15:46:00-04:15:58:00
tilt, lessons learned example
TPM32C, SME4402, 04:17:04:00-04:17:18:00
pan, group covering lessons learned

NARRATION (VO):

ADDITIONALLY, SOME OF THE TEAM MEMBERS HAD BEEN PART OF PREVIOUS ‘TPM’ AND KAIZEN EVENTS, SO THEY PROVIDED THEIR ‘LESSONS LEARNED’- COVERING THE PAST ITEMS THAT WORKED, AND THOSE THAT DIDN'T. THIS ALLOWED THE ENTIRE TEAM TO FOCUS ON

IMPROVEMENT - NOT ONLY IMPROVEMENT OF THEIR EQUIPMENT, BUT ALSO THEIR 'TPM' OR KAIZEN EVENT PROCESSES AND METHODOLOGIES.

SCENE 33.
TPM33A, SME4405, 07:35:53:00-07:36:08:00
zoom out, Kara reviewing OEE value stream information
TPM33B, SME4405, 07:39:55:00-07:40:08:00
c.u. Pareto analysis printout of breakdowns

NARRATION (VO):

IN PREPARATION FOR THE INITIAL EQUIPMENT CLEANING AND INSPECTION, THE TEAM REVIEWED THEIR 'OEE' INFORMATION TO IDENTIFY THEIR BIGGEST, MOST IMPORTANT LOSSES FIRST.

SCENE 34.
TPM34A, SME4396, 01:13:52:00-01:14:34:00
zoom out, workers at hammer forging part
TPM34B, CGS: Breakdowns
Setup & Adjustment Times
Idling & Minor Stoppages
Speed Reductions
Quality Defects
Startup Losses

NARRATION (VO):

IN MANUFACTURING, THE 'BIG SIX' LOSSES INCLUDE:

BREAKDOWNS,

SETUP AND ADJUSTMENT TIMES,

IDLING AND MINOR STOPPAGES,

SPEED REDUCTIONS,

QUALITY DEFECTS,

AND STARTUP LOSSES.

SCENE 35.
TPM35A, SME4405, 07:50:40:00-07:50:53:00
Tony passing out autonomous maintenance worksheet
TPM35B, SME4405, 07:53:39:00-07:54:02:00
zoom out, autonomous maintenance worksheet to group discussion

NARRATION (VO):

THE TEAM ALSO REVIEWED THE INFORMATION RELATED TO THE EQUIPMENT HISTORY, INCLUDING THEIR AUTONOMOUS MAINTENANCE WORKSHEETS, MAINTENANCE WORK ORDER INFORMATION ON PAST BREAKDOWNS AND REPAIRS, FINANCIAL OR BUDGET INFORMATION FROM MAINTENANCE, AND 'CMMS', OR 'COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEM' REPORTS.

SCENE 36.
TPM36A, SME4405, 07:52:18:00-07:52:39:00
zoom out, Mike discussing AM

NARRATION (VO):

DISCREPANCIES WERE NOTED AND IMPORTANT ITEMS NEEDING SPECIAL ATTENTION DISCUSSED, AS THE TEAM FINALIZED THEIR REVIEW OF MATERIALS FOR THE INITIAL EQUIPMENT CLEANING AND INSPECTION.

SCENE 37.
TPM37A, SME4403, 05:38:23:00-05:38:37:00
electrical panel being locked and tagged
TPM37B, SME4403, 05:39:00:00-05:39:12:00
zoom out, electrical with lock out tag out

NARRATION (VO):

BEFORE ENTERING THE CELL, PROPER LOCK-OUT, TAG-OUT PROCEDURES WERE PERFORMED TO ENSURE THE EQUIPMENT WAS SAFE TO WORK AROUND.

SCENE 38.
TPM38A, SME4403, 05:25:31:00-05:25:46:00
inspecting loose pneumatic hose on bending press
TPM38B, SME4403, 05:14:12:00-05:14:19:00
conveyor plate being inspected
TPM38C, SME4403, 05:02:40:00-05:02:51:00
tag placed on bending press

NARRATION (VO):

THE INITIAL CLEANING AND INSPECTION PROVIDED THE TEAM A HANDS-ON OPPORTUNITY TO SEE THE EQUIPMENT UP CLOSE – A CHANCE TO 'UNDERSTAND' THE EQUIPMENT BETTER. THE GOAL BEING TO INCREASE UNDERSTANDING OF THE EQUIPMENT AND IDENTIFY POTENTIAL ISSUES, NOT PERFORM A COMPLETE OVERHAUL.

SCENE 39.
TPM39A, SME4402, 04:54:48:00-04:55:05:00
worker being trained on checklist
TPM39B, SME4403, 05:15:41:00-05:15:48:00
Joe filling out checklist form during inspection

NARRATION (VO):

TEAM MEMBERS WERE TRAINED IN THE USE OF STANDARDIZED CHECKLISTS TO UTILIZE DURING THE EQUIPMENT INSPECTION.

SCENE 40.
TPM40A, SME4402, 04:56:33:00-04:56:41:00
worker looking at checklist
TPM40B, ANI: checklist page peel onto gradient background
TPM40C, CGS: Air & Pneumatic Systems
Covers & Access Panels
Ducting & Wire Guides

NARRATION (VO):

THESE STANDARDIZED CHECKLISTS INCLUDED ITEMS TO INSPECT SUCH AS:

AIR & PNEUMATIC SYSTEMS,

Electrical Systems	COVERS & ACCESS PANELS,
Fasteners	
Filters	DUCTING & WIRE GUIDES,
Flow	
Fluid Systems	ELECTRICAL SYSTEMS,
Gages	
Hydraulic Systems	FASTENERS,
Level Indicators	
Lubrication Systems	FILTERS,
Mechanical Systems	
Monitoring Systems	FLOW,
Piping & Tubing	
Valves	FLUID SYSTEMS,
Safety & Machine Guards	
	GAGES,
	HYDRAULIC SYSTEMS,
	LEVEL INDICATORS,
	LUBRICATION SYSTEMS,
	MECHANICAL SYSTEMS,
	MONITORING SYSTEMS,
	PIPING & TUBING,
	VALVES,
	AND SAFETY & MACHINE GUARDS.

SCENE 41.
TPM41A, SME4403, 05:07:40:00-05:07:56:00
Mike looking at materials, writing up information
TPM41B, SME4403, 05:09:12:00-05:09:26:00
Joe opening panel, pulling operating manual for inspection

NARRATION (VO):

ALL PERTINENT EQUIPMENT DRAWINGS, MANUALS, BLUEPRINTS, WIRING OR SYSTEM DIAGRAMS AND OTHER DOCUMENTATION WERE UTILIZED DURING THE INITIAL INSPECTION. IN SOME CASES, THE ORIGINAL EQUIPMENT MANUFACTURER OR A REPAIR COMPANY HAD TO BE CONTACTED AHEAD OF TIME TO PROCURE THESE ITEMS.

SCENE 42.
TPM42A, still, maintenance tag
TPM42B, SME4403, 05:12:10:00-05:12:33:00
writing up maintenance tag

NARRATION (VO):

TEAM MEMBERS WERE ALSO TRAINED IN THE USE OF MAINTENANCE TAGS TO IDENTIFY AND MARK UP POTENTIAL SHOP FLOOR MAINTENANCE

ISSUES.

SCENE 43.
continue previous shot
TPM43A, SME4403, 05:12:58:00-05:13:10:00
tag attached to control panel
TPM43B, SME4403, 05:19:09:00-05:19:19:00
Kara logging tags
TPM43C, SME4403, 05:20:38:00-05:20:47:00
tag being examined
TPM43D, SME4403, 05:19:32:00-05:19:53:00
zoom out, John filling out tag

NARRATION (VO):

TYPICALLY, WHEN A MAINTENANCE ISSUE WAS IDENTIFIED, THE TEAM MEMBER FILLED-OUT THE TAG AND ATTACHED IT TO THE PIECE OF EQUIPMENT. THE TAG INFORMATION WAS THEN RECORDED ONTO THE MAINTENANCE TAG LOG SHEET. THE IMPORTANCE OF TRACKING THESE TAGGED ITEMS CAN NOT BE STRESSED ENOUGH, BOTH FOR ASSESSING DURING THE IMMEDIATE KAIZEN EVENT, AND FOR INGESTION INTO A 'CMMS' FOR FUTURE ACTION.

SCENE 44.
TPM44A, SME4403, 05:16:36:00-05:16:53:00
cleaning conveyor
TPM44B, SME4403, 05:32:31:00-05:32:54:00
cleaning conveyor

NARRATION (VO):

TEAM MEMBERS WERE ASSIGNED CLEANING SUPPLIES WITH THE IDEA THAT THEY TRY TO GET THE EQUIPMENT BACK TO A 'LIKE NEW' CONDITION.

SCENE 45.
TPM45A, SME4403, 05:01:57:00-05:02:11:00
Tony taking pictures of conveyor
TPM45B, SME4403, 05:15:03:00-05:15:10:00
Tony taking pictures of Mike
TPM45C, SME4412, 15:27:06:00-15:27:20:00
pan, photos handed out at debriefing meeting

NARRATION (VO):

BEFORE AND AFTER PHOTOS WERE TAKEN DURING THE EVENT. THEY HELPED DOCUMENT THE CURRENT CONDITION, GIVING THE TEAM AN OPPORTUNITY TO DISCUSS ISSUES OR PROBLEMS. THE PHOTOS ALSO MADE IT EASIER TO SHARE INFORMATION AND BEST PRACTICES.

SCENE 46.
TPM46A, still, press needing repair
TPM46B, still, conveyor with broken weld
TPM46C, still, reject conveyor motor melted power cable
TPM46D, still, gage needing labeling
TPM46E, still, oil filter needing

NARRATION (VO):

THE PHOTOS FOCUSED ON ITEMS NEEDING ATTENTION OR REPAIR, SAFETY ISSUES, AND

labeling

EQUIPMENT REQUIRING LABELS OR COLOR-CODING.

SCENE 47.
TPM47A, SME4403, 05:46:14:00-05:46:23:00
pan, group discussion of equipment
TPM47B, SME4403, 05:54:27:00-05:54:45:00
zoom out, Mike's TPM notes as he discusses findings

NARRATION (VO):

AFTER THE EQUIPMENT CLEANING AND INSPECTION PHASE OF THE 'TPM' EVENT, THE TEAM HAD A DEBRIEFING MEETING TO TALK ABOUT WHAT THEY HAD ALL DISCOVERED WHILE OUT ON THE SHOP FLOOR.

SCENE 48.
TPM48A, SME4404, 06:10:10:00-06:10:23:00
zoom out, group writing up potential cause post-it notes
TPM48B, SME4404, 06:20:25:00-06:20:36:00
zoom in, Kara placing potential cause post-it on fishbone diagram

NARRATION (VO):

THIS INFORMATION WAS THEN USED TO GENERATE POTENTIAL CAUSES OF BREAKDOWNS BEFORE DETERMINING SOLUTIONS. A FISHBONE OR CAUSE & EFFECT DIAGRAM WAS USED TO QUICKLY CATEGORIZE THESE POTENTIAL CAUSES.

SCENE 49.
TPM49A, SME4404, 06:26:38:00-06:26:49:00
pan, fishbone diagram filled with post-it notes
TPM49B, SME4404, 06:29:45:00-06:30:00:00
zoom out, group discussing conveyor

NARRATION (VO):

NOW THAT THE TEAM HAD A MUCH BETTER UNDERSTANDING OF THE CURRENT STATE, ISSUES, POTENTIAL CAUSES OF BREAKDOWNS, AND OTHER 'OEE' LOSSES, THEY BEGAN THE PROCESS OF GENERATING IDEAS TO FIX AND IMPROVE THE EQUIPMENT.

SCENE 50.
TPM50A, SME4406, 08:03:43:00-08:04:03:00
pan, team writing down ideas on post-it notes
TPM50B, SME4406, 08:04:50:00-08:05:04:00
zoom out, Mike filling in post-it note
TPM50C, SME4406, 08:07:42:00-08:08:04:00
John looking at board to get more ideas

NARRATION (VO):

THEY STARTED WITH A 'SILENT BRAINSTORMING' CHALLENGE, ALLOWING EACH MEMBER TO COME UP WITH AS MANY IDEAS AS POSSIBLE ON THEIR OWN. THEY WERE LIMITED TO ONE IDEA PER POST-IT NOTE, AND PERMITTED ACCESS TO ALL

THE DATA AND INFORMATION POSTED AROUND THE ROOM FOR INSPIRATION.

SCENE 51.
TPM51A, SME4406, 08:13:16:00-08:13:47:00
John & Joe giving Kara post-it notes to put on board
TPM51B, SME4406, 08:38:00:00-08:38:13:00
Dan giving Kara post-it note to put on board
TPM51C, SME4406, 08:29:34:00-08:29:46:00
alternate shot, zoom out, post-it notes filling board
TPM51D, SME4406, 08:24:22:00-08:25:13:00
alternate shot, team members giving Kara post-it notes to put on board
TPM51E, SME4406, 08:29:07:00-08:29:22:00
alternate shot, Kara posting post-it notes on board

NARRATION (VO):

AFTERWARDS, A 'ROUND-ROBIN' TECHNIQUE WAS USED TO POST THE IDEAS. STARTING AT ONE END, EACH MEMBER WAS ASKED TO PRESENT ONE OF THEIR IDEAS. IF ANOTHER MEMBER HAD THE SAME IDEA, THEY WERE ASKED TO DISPOSE OF IT TO REDUCE REDUNDANCY. IF ANYONE HAD A SIMILAR IDEA AND IT MADE SENSE TO GROUP IT WITH THE INITIAL IDEA, IT WAS. THIS METHOD ALSO ALLOWED TEAM MEMBERS TO GENERATE ADDITIONAL IDEAS TO BUILD UPON OTHERS. THIS EXERCISE CONTINUED AROUND THE ROOM UNTIL ALL THE IDEAS WERE POSTED.

SCENE 52.
TPM52A, SME4406, 08:42:43:00-08:42:54:00
team organizing post-it notes from side
TPM52B, SME4406, 08:40:17:00-08:40:36:00
zoom out, post-it notes being organized
TPM52C, SME4406, 08:45:25:00-08:45:41:00
zoom in, post-it notes organization finalized

NARRATION (VO):

AFTERWARDS, THE TEAM CREATED AN 'AFFINITY DIAGRAM' FROM THE IDEAS. THIS AFFINITY DIAGRAM ALLOWED THE TEAM TO CATEGORIZE THE IDEAS INTO COLUMNS CONTAINING 'NATURAL' GROUPINGS. ONCE GROUPED, THE COLUMNS WERE NAMED WITH A SHORT IDEA DESCRIPTION IN THE HEADER.

SCENE 53.
TPM53A, SME4406, 08:52:35:00-08:52:57:00
Kara drawing horizontal lines for A, B, & C ideas
TPM53B, SME4406, 08:52:59:00-08:53:18:00
pan, A ideas
TPM53C, revised scene 53 narration
TPM53D, SME4406, 08:54:46:00-08:54:58:00
pan, board containing A, B, & C ideas
TPM53E, SME4406, 08:49:15:00-08:49:21:00

NARRATION (VO):

NEXT THE TEAM CATEGORIZED THEIR IDEAS AS: 'A' IDEAS, WHICH THE TEAM COULD COMPLETE BY THEMSELVES; 'B' IDEAS, NEEDING ASSISTANCE FROM DEPARTMENTS NOT

A written on idea
TPM53F, SME4406, 08:51:45:00-08:51:54:00
zoom out, A written on idea
TPM53G, SME4406, 08:48:36:00-08:48:42:00
B written on idea
TPM53H, SME4406, 08:49:25:00-08:49:42:00
zoom out, B written on idea
TPM53I, SME4406, 08:50:08:00-08:50:28:00
zoom out, C ideas being discussed

REPRESENTED ON THE TEAM; 'C' IDEAS, NEEDING MANAGEMENT'S APPROVAL, AND 'D' IDEAS, WHICH WERE IDEAS THAT COULDN'T BE IMPLEMENTED IMMEDIATELY, AND PUT ON A FUTURE ACTION ITEM LIST. BY USING THIS METHOD, THE TEAM EASILY DETERMINED THAT 70% OF THEIR IDEAS COULD BE IMPLEMENTED BY THEMSELVES.

SCENE 54.
TPM54A, SME4407, 09:01:03:00-09:01:20:00
Tony explaining the Effort & Impact Matrix

NARRATION (VO):

THE NEXT STEP INVOLVED USING AN 'EFFORT & IMPACT' METHOD TO SELECT THE TOP IDEAS TO WORK ON FIRST.

SCENE 55.
TPM55A, SME4407, 09:03:48:00-09:04:14:00
zoom out, small teams adding effort & impact rating to each post-it note
TPM55B, CGS: Effort
Time
People
Budget
TPM55C, CGS: Impact
Quality
Cost
Time

NARRATION (VO):

THE 'EFFORT & IMPACT' METHOD REQUIRED CONSENSUS OF THE TEAM TO DETERMINE HOW MUCH EFFORT IT WOULD TAKE TO COMPLETE EACH OF THE IDEAS, AND WHAT THE OVERALL IMPACT OF COMPLETING THE IDEAS WOULD BE. EFFORT RELATES TO TIME, PEOPLE, BUDGET AND SO ON. WHILE IMPACT RELATES TO QUALITY, COST, TIME, AND SO FORTH.

SCENE 56.
TPM56A, SME4407, 09:06:29:00-09:06:38:00
team discussing, writing effort impact on post-it note
TPM56B, SME4407, 09:05:48:00-09:06:01:00
c.u., writing effort impact on post-it note

NARRATION (VO):

THE TEAM WORKED IN SMALL GROUPS TO RATE BOTH THE EFFORT & IMPACT OF EACH IDEA, DESIGNATING FOR BOTH A SIMPLE RANKING OF EITHER 'LOW', 'MEDIUM', OR 'HIGH'.

SCENE 57.
TPM57A, SME4407, 09:08:22:00-09:08:45:00
team determining effort & impact

NARRATION (VO):

TPM57B, SME4407, 09:09:04:00-09:09:18:00
wide, team determining effort & impact

AFTER THE TEAM DETERMINED THE EFFORT & IMPACT FOR EACH IDEA, THEY SELECTED THE TOP IDEAS. THESE WERE TYPICALLY THE IDEAS DESIGNATED AS 'LOW' EFFORT & 'HIGH' IMPACT. THE TOP IDEAS WERE ALSO CHOSEN ON THE BASIS THAT THEY COULD BE COMPLETED DURING THE KAIZEN EVENT.

SCENE 58.
TPM58A, SME4407, 09:14:18:00-09:14:26:00
small team removing preform chute
TPM58B, SME4407, 09:25:20:00-09:25:28:00
small team discussing furnace conveyor
TPM58C, SME4408, 10:04:56:00-10:05:09:00
small team working on reject conveyor motor

NARRATION (VO):

AFTERWARDS, THE TEAM BROKE UP INTO SMALLER GROUPS AND THEY ALL BEGAN WORKING TO IMPLEMENT THEIR TOP IMPROVEMENT IDEAS.

SCENE 59.
TPM59A, SME4396, 01:38:51:00-01:40:28:00
wide, furnace conveyor moving billet to scrap bin conveyor, and then production conveyor, edit at multiple points

NARRATION (VO):

THE TEAMS MADE MANY IMPROVEMENTS TO THE FURNACE EXIT CONVEYOR.

SCENE 60.
continue previous shot
TPM60A, SME4407, 09:45:01:00-09:45:16:00
team discussing conveyor chute design
TPM60B, SME4407, 09:43:33:00-09:43:56:00
alternate shot, team discussing conveyor chute design
TPM60C, SME4410, 13:17:55:00-13:18:16:00
billet adjusted, pushed through new chute design
TPM60D, SME4410, 13:09:47:00-13:10:02:00
alternate shot, new chute design being attached, discussed
TPM60E, still, new chute design

NARRATION (VO):

THE CHUTE THAT ALLOWED BILLETS TO GO STRAIGHT FROM THE FURNACE TO THE BENDER WAS NOT ALIGNED CORRECTLY AND WAS MISSING MOUNTING BOLTS. THIS OFTEN CAUSED BILLETS TO JAM. THE TEAM CREATED A NEW CHUTE DESIGN WHERE T-HANDLES WERE INSTALLED TO PERFORM ADJUSTMENTS BASED ON THE PART SIZE WITHOUT TOOLS. THE REDESIGNED CHUTE ALSO CORRECTED THE ALIGNMENT, ELIMINATING ANY JAMS.

SCENE 61.
TPM61A, SME4407, 09:37:07:00-09:37:20:00
team testing conveyor with billet that gets hung up

NARRATION (VO):

ONE OF THE GUIDE PLATES WAS TOO SHORT

TPM61B, SME4410, 13:04:16:00-13:04:22:00
zoom out, plate being fitted
TPM61C, SME4412, 14:03:00:00-14:03:09:00
zoom in, new plate fitted in place
TPM61D, SME4412, 14:16:48:00-14:16:58:00
zoom out, welding plate into position
TPM61E, SME4418, 18:19:42:00-18:19:50:00
plate preventing billet from jamming

ALLOWING BILLETS TO HANG UP IN THE DIVERTER AND GET STUCK. THEY MODIFIED THE SIZE OF THE PLATE AND WELDED IT INTO THE CORRECT POSITION, THUS HELPING PREVENT BILLETS FROM JAMMING IN THE CHUTE.

SCENE 62.
TPM62A, SME4408, 10:15:39:00-10:15:51:00
pan, mesh being traced onto cover to solid cover being cut with an opening
TPM62B, SME4408, 10:15:18:00-10:15:27:00
alternate shot, pan, solid cover being cut with an opening to mesh being traced onto cover
TPM62C, SME4408, 10:24:14:00-10:24:26:00
zoom out, drive chain cover painted with yellow

NARRATION (VO):

TO MAKE IT EASIER TO INSPECT THE CORRECT OPERATION OF THE DRIVE CHAIN, THE SOLID COVER PLATE WAS REPLACED WITH A MESH SCREEN. AFTERWARDS THE COVER PLATE WAS PAINTED YELLOW FOR SAFETY.

SCENE 63.
TPM63A, SME4409, 11:27:26:00-11:27:46:00
pneumatically-actuated piston pulled from conveyor
TPM63B, SME4409, 11:31:06:00-11:31:18:00
new pneumatically-actuated piston installed
TPM63C, SME4409, 11:33:18:00-11:33:27:00
Joe tightening piston support

NARRATION (VO):

A PNEUMATICALLY-ACTUATED PISTON WAS UTILIZED TO MOVE A BILLET INTO THE CROSS-ROLLER. THE TEAM DISCOVERED THAT THE PUSHER ROD WAS MISALIGNED AND LEAKING AIR. THEY REPLACED THE OLD UNIT WITH A NEW ONE, AND RE-ALIGNED IT.

SCENE 64.
TPM64A, SME4396, 01:43:53:00-01:44:05:00
wide, reject diverter pushing hot billet to bin
TPM64B, SME4408, 10:32:24:00-10:32:46:00
reject diverter pulled from conveyor
TPM64C, SME4408, 10:33:59:00-10:34:07:00
Mike holding reject diverter plate
TPM64D, SME4408, 10:39:04:00-10:39:14:00
c.u., bolt welded onto reject diverter
TPM64E, SME4408, 10:39:44:00-10:39:50:00
wide, bolt welding finished on reject diverter
TPM64F, SME4409, 11:17:15:00-11:17:45:00
revised reject diverter located, secured in place
TPM64G, SME4418, 18:04:38:00-18:04:46:00
reject diverter pushing hot billet to bin

NARRATION (VO):

A MAJOR ISSUE WAS DISCOVERED WHEN THE TEAM REALIZED THAT THE REJECTION DIVERTER COULD BE MOUNTED IN THE WRONG POSITION - UPSIDE DOWN OR BACKWARD, CAUSING THE DIVERTER TO MISS A BILLET AND JAM. THE TEAM REWORKED THE DIVERTER AND ERROR-PROOFED IT SO THAT THERE IS ONLY ONE WAY TO INSTALL IT. THE INSTALLATION BOLTS WERE ALSO REPLACED WITH T-HANDLES SO THAT IT CAN BE INSTALLED OR

REMOVED WITHOUT TOOLS.

SCENE 65.
TPM65A, still, reject conveyor motor minus fan
TPM65B SME4396, 01:44:24:00-01:44:38:00 zoom out, wide, hot billet conveyed into reject bin
TPM65C SME4408, 10:05:12:00-10:05:27:00 Joe & Tom working on reject conveyor motor
TPM65D SME4408, 10:25:03:00-10:25:14:00 Joe finishing work on reject conveyor motor
TPM65E SME4412, 15:04:06:00-15:04:23:00 zoom out, hot indicator and temperature strip on motor housing

NARRATION (VO):

ON THE REJECT CONVEYOR, IT WAS DISCOVERED THAT THE ELECTRIC DRIVE MOTOR WAS MISSING THE ENTIRE COOLING FAN UNIT. THIS MOTOR IS MOUNTED DIRECTLY OVER THE REJECT BIN THAT CONTAINS HOT BILLETS, GENERATING A LOT OF HEAT. THE TEAM REPLACED THE ENTIRE MOTOR UNIT AND POWER CORD. THEY ALSO ADDED VISUAL TEMPERATURE MONITORING STRIPS AND A 'HOT!' INDICATOR SO ANYONE COULD QUICKLY, VISUALLY SEE IF THE MOTOR WAS IN THE CORRECT OPERATING TEMPERATURE RANGE.

SCENE 66.
TPM66A, SME4408, 10:43:52:00-10:44:02:00 welding of heat shield
TPM66B, still, heat shield protecting electrical cables
TPM66C, SME4418, 18:03:05:00-18:03:14:00 pan, hot billet passing motor and heat shield as it falls in bin

NARRATION (VO):

THE TEAM FABRICATED A HEAT SHIELD TO HELP REDUCE THE HEAT FROM THE BILLETS GOING DIRECTLY UP TO THE MOTOR AND MELTING THE POWER CORD, POSSIBLY CAUSING A SHORT, ELECTROCUTION, OR FIRE.

SCENE 67.
TPM67A, still, reject conveyor lubrication point
TPM67B, SME4412, 14:04:16:00-14:04:32:00 bending tubing for lubrication manifold
TPM67C, SME4412, 14:26:32:00-14:26:43:00 zoom out, filled lubrication manifold

NARRATION (VO):

THE BEARING LUBRICATION POINTS ON THE REJECT CONVEYOR WERE HARD TO REACH ESPECIALLY THE ONE UNDER THE DRIVE CHAIN. THE TEAM MADE A LUBRICATION MANIFOLD AND FABRICATED TUBING TO ALL THE LUBE POINTS. NOW ALL THE BEARINGS ARE LUBRICATED FROM ONE CONVENIENT LOCATION.

SCENE 68.
TPM68A, SME4396, 01:48:22:00-01:48:38:00 tilt, hydraulic press before cleaning
TPM68B, SME4407, 09:33:50:00-09:34:06:00 team looking at chute, brainstorming solution
TPM68C, SME4412, 15:01:35:00-15:01:45:00 chute CAD redesign
TPM68D, SME4408, 10:23:16:00-10:23:25:00 welding plate onto drop chute
TPM68E, SME4408, 10:26:14:00-10:26:23:00 drop chute with welded plate tested
TPM68F, SME4409, 11:11:44:00-11:12:05:00 drop chute with welded plate tested with live conveyor
TPM68G, SME4409, 11:23:30:00-11:23:39:00 workers discussing new pick point
TPM68H, SME4409, 11:21:06:00-11:21:19:00 chute support ground to provide steeper drop
TPM68I, SME4409, 11:22:12:00-11:22:22:00 altered chute being attached
TPM68J, SME4409, 11:30:40:00-11:30:56:00 new pick point cut in chute
TPM68K, SME4412, 15:08:51:00-15:09:00:00 testing revised chute with preform
TPM68L, SME4418, 18:11:51:00-18:11:59:00 hot preform picked up at new pick point
TPM68M, SME4396, 01:48:01:00-01:48:17:00 zoom out, bending press die

NARRATION (VO):

ONE OF THE BIGGEST REASONS FOR CELL DOWNTIME WAS THE BENDER GOING INTO OVERLOAD CONDITION. THIS OCCURRED WHEN THE PREFORM BILLET WAS NOT PROPERLY PICKED UP IN THE CORRECT LOCATION. THE TEAM DISCOVERED THAT THE CAUSE WAS THE DESIGN OF THE EXIT CHUTE AND PICK POINT. THE TEAM REDESIGNED THE CHUTE AND THE PREFORM PICK POINT. TO ENSURE THE CONSISTENT POSITION OF THE PREFORM, THE CHUTE WAS ALTERED TO PROVIDE A STEEPER DROP AND THE CONVEYOR WAS SLOWED DOWN TO REDUCE ANY JARRING OF THE PREFORM AS IT ENTERED THE CHUTE. THIS VIRTUALLY ELIMINATED ANY IMPROPER PICKS OF THE PREFORM BILLET.

SCENE 69.
TPM69A, SME4409, 11:18:21:00-11:18:33:00 zoom out, valve, thermocouple labeled
TPM69B, SME4409, 11:02:01:00-11:02:17:00 placing label next to oil filter
TPM69C, still, gage with operating range
TPM69D, still, sight glass completely filled
TPM69E, SME4408, 10:45:56:00-10:46:09:00 zoom out, Dan placing labels next to hydraulic press sight glass

NARRATION (VO):

THE TEAM ADDED MANY VISUAL CONTROLS TO THE EQUIPMENT. ON THE BENDER THEY ADDED LABELS TO THE VALVES AND GAGES FOR THE HYDRAULIC UNIT. THE SIGHT GLASS SHOWED THAT THE HYDRAULIC UNIT WAS OVERFILLED WITH OIL - THIS MAY HAVE CONTRIBUTED TO THE LEAKS. AFTER LABELING THE GAGES IT IS NOW MUCH EASIER TO CONFIRM THAT IT IS AT THE CORRECT, CONSISTENT PRESSURE AND LEVEL.

SCENE 70.
TPM70A, still, two lube points on hydraulic press
TPM70B, still, two lube points on

NARRATION (VO):

TWO LUBE POINTS ON THE BACK SIDE OF THE

hydraulic press highlighted with circles
TPM70C, SME4412, 14:01:07:00-14:01:36:00
adding labeling to the lube points on the hydraulic press

PRESS WERE NOT IDENTIFIED. THESE TWO POINTS COULD BE MISSED, POTENTIALLY CAUSING PREMATURE WEAR OR A BREAKDOWN IF NOT LUBRICATED. THE TEAM LABELED THESE WITH ARROWS AND COLOR-CODED THEM FOR GREASE TYPE.

SCENE 71.
TPM71A, SME4412, 15:07:06:00-15:07:20:00
preform dropping into position, end effector picking up preform
TPM71B, SME4412, 14:11:49:00-14:12:01:00
zoom out, John securing guides
TPM71C, SME4412, 14:19:26:00-14:19:38:00
worker securing cover onto chain drive

NARRATION (VO):

AFTER IMPLEMENTATION, THE TEAM TESTED THEIR IDEAS TO ENSURE THAT THEY WORKED CORRECTLY. THEY ALSO ALL PARTICIPATED IN PLACING THE EQUIPMENT BACK INTO POSITION FOR THE FIRST STARTUP AND PRODUCTION OPERATION POST KAIZEN EVENT.

SCENE 72.
TPM72A, SME4412, 15:11:04:00-15:11:15:00
pan of panel group and audience
TPM72B, SME4412, 15:15:47:00-15:18:01:00
zoom out, John talking about breaker roller
TPM72C, SME4412, 15:19:04:00-15:19:29:00
Michael talking about reject chute
TPM72D, SME4412, 15:28:10:00-15:28:23:00
zoom in, Dan talking about labeling
TPM72E, SME4412, 15:28:30:00-15:28:52:00
zoom out, Joe talking, then Dan talking

NARRATION (VO):

AFTER ALL THE TOP IDEAS WERE IMPLEMENTED, THE TEAM COLLECTIVELY REPORTED-OUT FOR MANAGEMENT, CO-WORKERS, AND ADDITIONAL EMPLOYEES. THEY REPORTED ON THE PROJECT AND SCOPE, THE CURRENT OR 'BEFORE' STATE, THE IDEAS THAT THEY HAD BRAINSTORMED, THE CHANGES THEY IMPLEMENTED, AND ANY FOLLOW-UP ACTION ITEMS. EACH TEAM MEMBER PROVIDED AN 'AH-HA' MOMENT - SOMETHING THEY LEARNED, SOMETHING NEW, OR SOMETHING THAT MADE AN IMPRESSION ON THEM DURING THE KAIZEN EVENT.

SCENE 73.
TPM73A, SME4411, 19:01:26:00-19:01:46:00
Dan Eckberg on camera
TPM73B, CGS: Dan Eckberg

DAN ECKBERG (ON-CAM):
Working on the actual physical changes, it was good to be involved with people from different departments, working toward one

Die Designer
Modern Drop Forge Company
MI LTD, lower third background

goal and seeing different points of view. The way someone else sees it compared to the way I see it, it's really good coming together and coming up with a solution.

SCENE 74.
TPM74A, SME4411, 19:06:58:00-19:07:17:00
Tom Olenik on camera
TPM19B, CGS: Tom Olenik
Maintenance Superintendent
Modern Drop Forge Company

TOM OLENIK (ON-CAM):
My favorite part of the event would probably be the cleaning and inspecting, getting a chance to dig into the equipment, finding out what's wrong with it, seeing it in a clean state so you can make your improvements, as opposed to digging through grease and grime. Hopefully after this event we'll keep it that way.

SCENE 75.
TPM75A, SME4411, 19:16:58:00-19:17:24:00
Mike Gass on camera
TPM75B, CGS: Michael K. Gass
Forge Shop Hammer Trainee
Modern Drop Forge Company
MI LTD, lower third background

MIKE GASS (ON-CAM):
Working with everybody in this TPM event we had was great, just to see everybody, what they do. I got some on hands, using saws and things I never used, with other people, the millwrights and stuff like that, the electrical. I think it was great just to have everybody come together with the foremen and superintendent and everybody here, really jumped on a lot of things we needed to get done.

SCENE 76.
TPM76A, SME4418, 18:26:59:00-18:27:20:00
wide, hammer press operation
TPM76B, SME4418, 18:28:54:00-18:29:08:00
alternate shot, zoom out, hammer forging part

NARRATION (VO):

IN ALL, THE TEAM IMPLEMENTED 56 OF THEIR IDEAS; WITH TWO ADDITIONAL LONG TERM IDEAS SLATED FOR FUTURE IMPLEMENTATION. BUT NOT ALL OF THEIR IDEAS LEAD TO IMMEDIATE PERFORMANCE IMPROVEMENTS.

SCENE 77.
TPM77A, SME4417, 16:08:03:00-16:09:15:00
Kara Zilis on camera
TPM14F, CGS: Kara Zilis
Total Productive
Manufacturing Coordinator
Modern Drop Forge Company
TPM77B, chart with cell OEE numbers

KARA ZILIS (ON-CAM):
Once we finished the TPM event we noticed that the downtime on the bending press actually increased. So what we did was we got the group back together to review the changes we made, and we had to tweak some of our ideas in order to see a better improvement. The numbers have not shown that yet, but we are encouraged that they will, based on the tweaking we did. So sometimes you can't always expect 100 percent perfection immediately. Sometimes you need to go back and re-review what you've looked at and the changes you've made and do another root cause as to what

else can we do to make better improvements. Our OEE numbers for this unit are starting to climb. We do a 13-week projection, and within those weeks we still have actual event of zeros for the days of the TPM event. The OEE is not climbing dramatically, but it is definitely going on an upward trend.

SCENE 78.
TPM78A, SME4418, 18:08:01:00-18:08:08:00
hot billet coming out of furnace being conveyed
TPM78B, SME4418, 18:11:07:00-18:11:12:00
preformed billet conveyed and picked up
TPM78C, SME4418, 18:24:44:00-18:24:53:00
preformed billet bent on press

NARRATION (VO):

AFTER ANY 'TPM' EVENT IT'S IMPORTANT TO TRACK IMPROVEMENTS, FOLLOW-UP WITH ANY ACTION ITEMS, AND THEN COMMUNICATE WITH THE TEAM AND OTHER AFFECTED EMPLOYEES AS TO THE STATUS OF THESE CHANGES.

SCENE 79.
TPM79A, SME4417, 16:06:53:00-16:07:32:00
Kara Zilis on camera

KARA ZILIS (ON-CAM):
Since our TPM event, which we held several weeks ago, we have seen a 50 percent drop in our downtime on conveyors. A lot of the activities we did during that event have contributed to that reduction in downtime. That unit runs several different types of jobs, and the activities we did is focused only on two jobs. So it could potentially take us several months to see the impact of all the activities we did, but we are very pleased to see already the 50 percent reduction in downtime.

SCENE 80.
TPM80A, SME4418, 18:28:05:00-18:28:38:00
med, hammer press operation
TPM80B, SME4422, 19:07:09:00-19:07:35:00
zoom out, forging press operation

NARRATION (VO):

THIS 50% REDUCTION IN PRODUCTION DOWNTIME, AS WELL AS A 10% REDUCTION IN SCRAP HAS CONTRIBUTED TO A CALCULATED ANNUALIZED SAVINGS OF OVER $50,000. ADDITIONALLY, MODERN DROP FORGE HAS SEEN MANY OTHER POSITIVE CHANGES COME ABOUT FROM IMPLEMENTING TOTAL PRODUCTIVE MAINTENANCE – CHANGES IN EQUIPMENT, AND MORE IMPORTANTLY CHANGES IN PEOPLE.

SCENE 81.
TPM81A, SME4401, 03:15:52:00-03:17:32:00
Pat Thompson on camera
TPM10E, CGS: Pat Thompson,
General Manager & CFO
Modern Drop Forge Company

PAT THOMPSON (ON-CAM):
Our operators are very involved now in autonomous maintenance and making sure that their equipment is ready to run when they get to work, and they check it out to make sure that everything is OK. I think they have a confidence now under TPM that if things aren't right, while they may have to get along a little bit, that things will be repaired very quickly and get them back to what they need to run properly on a day to day basis. For managers under the TPM program, it's a big change because of the loss of control. Any time you do TPM or any of the Lean manufacturing building blocks, managers have to give up anywhere from a little bit of control to a lot of control, and allow the operators to really handle the business on a day to day basis.

SCENE 82.
TPM82A, SME4417, 16:04:38:00-16:05:35:00
Greg Heim on camera
TPM82B, CGS: Gregory P. Heim
Chief Executive Officer
Modern Drop Forge Company
MI LTD, lower third background

NARRATION (VO):

GREGORY HEIM, CEO OF MODERN DROP FORGE

EXPLAINS SOME OF THE TRANSFORMATION THAT

HE'S SEEN TAKE HOLD BY IMPLEMENTING TOTAL

PRODUCTIVE MAINTENANCE...

SCENE 83.
TPM83A, SME4417, 16:02:49:00-16:04:08:00
Greg Heim on camera
MI CM, credits music

GREG HEIM (ON-CAM):
We repaired based on need and emergency. We didn't have a predictable production maintenance program. We had a very good repair-as-needed program, but we weren't able to predict. Since we implemented TPM, we can predict our maintenance problems, but more importantly, we can plan to run production to schedule. So we achieve better stabilized production schedules, as well as improvement in uptime, from a better planned TPM program.

--- FADE TO BLACK ---

SCENE 84.
continue music, up and under
TPM CRX, CGS, ROLL: credits
white text, fade up mid-screen
MI GD, gradient background

Manufacturing Insights

wishes to thank

the Modern Drop Forge Company

for their participation in this program:

Produced By:
Society of Manufacturing Engineers

Executive Producer:
Kris Nasiatka

Produced & Directed By:
Jerome T. Cook

Written By:
Anthony Manos,
Profero, Inc.

Production Assistance:
Patrick Fitzpatrick,
N-Code
Lance Rosol,
Pixel Perfect Photography

Graphics/Video Editing:
Jerome T. Cook

SCENE 85.
MI LMR, CGS: LMR tech group screen continue gradient background

For further information and discussion on Lean Total Productive Maintenance, please visit SME's Lean Maintenance Reliability Tech Group website at:
www.sme.org/lmr

SCENE 86.
MI SME, SME logo open, with music