



ICON OEM Inc.

Engineering-Quality-Logistics

**SUPPLIER
DEVELOPMENT
ENGINEERING**

DRIVING CONTINUOUS
IMPROVEMENT THROUGH
PROCESS EVALUATION & DATA
ANALYSIS

SUPPLIER DEVELOPMENT ENGINEERING

DRIVING CONTINUOUS IMPROVEMENT THROUGH PROCESS EVALUATION & DATA ANALYSIS



- WAREHOUSING, IMPORT & FULFILLMENT CENTERS
- MANUFACTURING PARTNERS
- OFFICE LOCATIONS
- QUALITY & ENGINEERING SUPPORT (NA & ASIA)

FOR SUPPLIERS:

- ON – SITE QUALITY AUDITS
- ON – SITE PROCESS & PRODUCT EVALUATIONS
 - OEE
 - SCRAP / DEFECTIVES ANALYSIS
 - EQUIPMENT EVALUATION
- DETAILED REPORTING OF FINDINGS & RECOMMENDATIONS
- REPORTING TO YOUR CUSTOMERS AS REQUESTED
- AVAILABILITY TO BE RECOGNIZED ON THE IDEAL OEM WEB SITE
- AVAILABILITY OF ISO 9001 AUDITING

FOR OEM'S

- ON – SITE SUPPLIER QUALITY AUDITS
- SUPPLIER EVALUATION FOR BUSINESS CONSIDERATION
- ON – SITE PROCESS & PRODUCT EVALUATIONS
 - OEE
 - SCRAP / DEFECTIVES ANALYSIS
 - EQUIPMENT EVALUATION
- DETAILED REPORTING OF FINDINGS & RECOMMENDATIONS
- REPORTING TO YOUR SUPPLIERS AS REQUESTED
- AVAILABILITY TO IDEAL OEM'S TOP RATED SUPPLIERS BY COMMODITY

FOR ALL

- UTILIZE IDEAL OEMS DIVERSE EXPERIENCE IN:
 - METALS - CASTING, FORGING
 - PLASTICS
 - POWDERED METALS
 - FABRICATION
 - ELECTRICAL COMPONENTS
 - FASTENERS
 - INSPECTION (MANUFACTURING & CONTAINMENT)
 - ASSEMBLY

Introduction

Simply stated, SD&E is breaking down every phase of entire manufacturing process to its most base levels and finding a “better way”.

In reality, every single day we ourselves manage processes.....

From brushing your teeth, dressing yourself & preparing your morning coffee to driving to and from work and parking your vehicle you are completing processes. We take them for granted because we do them day after day after day.

Sometimes, performing the same job day in and day out can become routine as well and we stop looking for better ways to perform these tasks and often settle for the “status quo”.

Some everyday routines that could serve as examples of processes -

Waking up
Making the bed
Shaving
Showering
Getting dressed

Waking up
Making coffee
Starting the car
Driving to work
Parking your vehicle

Starting a computer
Sending an e-mail
Shutting the computer down
Driving home
Unlocking the door

Walking the dog
Preparing dinner
Turning the television on
Getting ready for bed
Setting the alarm



noun, plural proc·ess·es •

[*pros-es-iz, -uh-siz, -uh-seez or, especially British, proh-ses-iz, proh-suh-seez*].

- 1 a systematic series of actions directed to some end:
to devise a process for homogenizing milk.



MANUFACTURING PERFORMANCE THROUGH THE USE OF
DETAILED OBSERVATIONS, DATA COLLECTION AND DATA ANALYSIS.

What is Supplier Development Engineering?

Historically, SD (Supplier Development) has been used as a tool to try to assist problem manufacturers improve their products to an acceptable level of quality.

In truth, Supplier Development has been underutilized due to the inability of manufacturers & OEM (Original Equipment Manufacturers) to allocate the resources, training or possess the process knowledge required to accurately identify, report and support resolution of ongoing manufacturing problems. It is most often viewed as “trouble shooting” and does not truly support Continuous Improvement.

In order to promote Continuous Improvement, manufacturers need to be able to focus on all aspects of the manufacturing processes and understand cause & effect and how they impact the “big picture” of their respective businesses. Many times, manufacturing managers and supervisors can get lost in the day-to-day battles of just making the process work and be able to ship product.

True SDE (Supplier Development Engineering) evaluates many different aspects of manufacturing processes and utilizes data collected to show how process variations and inconsistencies can negatively impact the entire business, from safety, cost, delivery performance, profitability and even morale.

**IMPROVE MANUFACTURING PERFORMANCE THROUGH THE USE OF
DETAILED OBSERVATIONS, DATA COLLECTION AND DATA ANALYSIS.**

Preparing for an SDE Event

Prior to visiting a manufacturer, you should learn as much as possible about their operations. This helps provide insight as to how their business functions and how they prioritize business decisions.

How long have they been in business?

This can usually be found on-line or at the company website.

Who are their top customers?

This can usually be found on-line or at the company website.

What is their financial standing?

This can usually be found on-line at a financial review site such as Dun & Bradstreet.

Is the company union affiliated?

If yes, which union and what are the current terms regarding contract expiration?

Does the company have any accreditations?

ISO, TS, etc.



KNOWLEDGE TRULY IS POWER – PREPARE WITH AS MUCH BACKGROUND INFORMATION AS POSSIBLE.

SDE Event Protocols

It is highly recommended that an NDA (Non-Disclosure Agreement) be executed with the manufacturer prior to completing the review. The NDA allows the sharing of information and protects the parties from having proprietary information released to competitors, etc.

Familiarize yourself with the Safety Rules and Regulations for the manufacturer. Follow all safety protocols including PPE (Personal Protective Equipment), restricted areas and machine guarding / safety features, emergency exits, etc.

Respect and follow instructions from the manufacturer regarding interaction with their manufacturing staff. Try not to interrupt production or interfere in any way with the manufacturing process. If you need a process to hold temporarily for questions or other data collection, always ask the manufacture's representative first.

After the process reviews are complete, discuss any concerning or different conditions you noted. Document the manufacturers response(s) for later reference. Do not offer a final determination on site. Evaluate the information collected before reporting back.

Complete the reporting in a timely manner. (a maximum of two weeks for the final report distribution). Have a clear understanding of who the customer has authorized to have copies of the report and distribute as such. Assure that the report has all pertinent information included (data summation, graphs, charts, pictures, anything that helps tell the story in the report).

FOLLOW ALL ESTABLISHED PROCEDURES FOR COMPLETION OF THE STUDY.

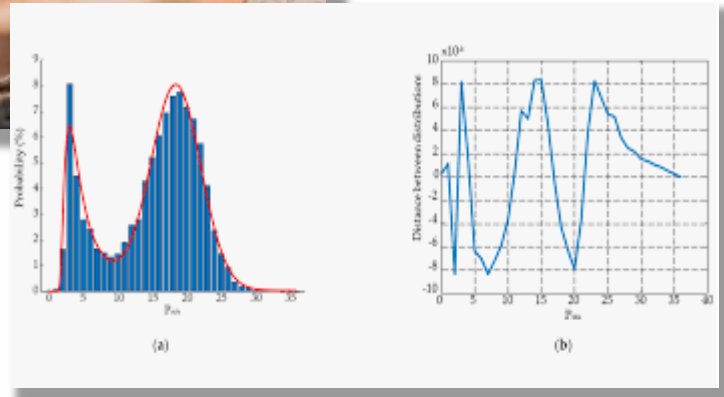
Study



Document



Evaluate



HOW DO WE GET THERE FROM HERE?

Study



Studying a manufacturing process from start to finish can help you understand the complete Process Flow and how each step affects the following step until the finished product is ready for shipment.

Some processes may take place in a different part of a factory or possibly even at a different location. These are often secondary operations (processes) performed by a separate business.

It is also helpful if you complete these studies across shifts. This helps you identify the ways different operators can have affects on the over all process.

Remember the operators usually understand their processes better than their managers.

HOW DO WE GET THERE FROM HERE?

STEP I: STUDY



During the Study part of the SDE Project:

- 1) Always be Safety aware. Immediately notify the manufacturers management representative if you see a potential safety problem. *If you are concerned for your own safety, contact your management immediately, do not proceed without consultation.*
- 2) Watch each step of the process intently. Watch for even the slightest of variations between cycles.
- 3) If there is more than one operator, watch to see if operators are doing the same things each time. Look for consistency between operators (this can include multiple machines as well).
- 4) Perform Time Studies following the normal process.
- 5) If allowed, take multiple pictures and videos to reference later.

HOW DO WE GET THERE FROM HERE?

STEP I: STUDY

Document



A critical part of SDE is documentation.

Documentation can come in many forms;

Hand-written notes

Hand drawings & sketches

Photos & videos**

Recording**

**Always request permission before photographing or video recording a manufacturers process. An executed NDA will cover these areas.

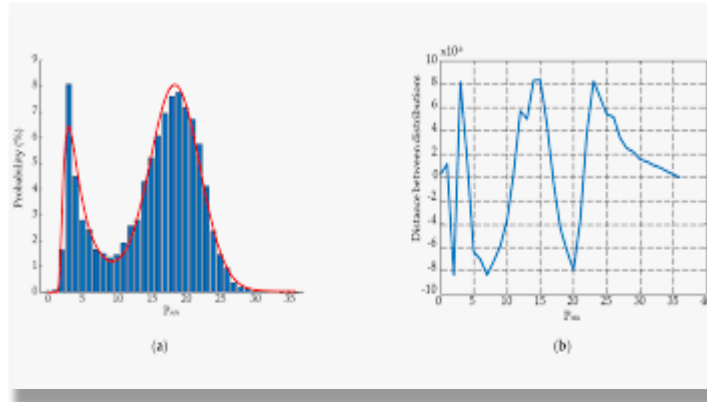
Write down questions that can be followed up on after leaving the manufacturing area.

Be as detailed as possible.

HOW DO WE GET THERE FROM HERE?

STEP TWO: DOCUMENT

Evaluate



The Evaluation part of SDE is where all of the studying and documentation come together to help tell a story.

Data collected during the study can be analyzed and compared to things that were seen during the process review, helping to explain the story.

Properly completed evaluations can guide a manufacturer down the path to improvement(s). Those improvements can help direct corrective actions like the examples below;

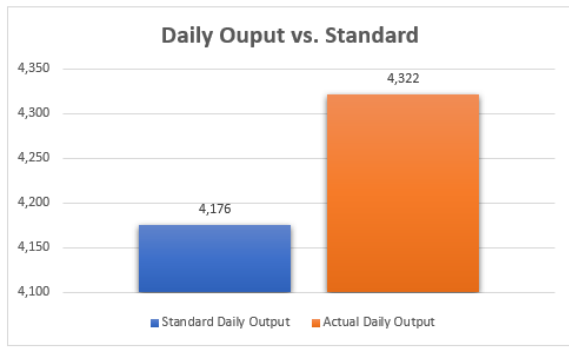
- Equipment relocation
- Process Flow
- Associate Training
- Process parameter change(s)
- Product design change(s)

HOW DO WE GET THERE FROM HERE?

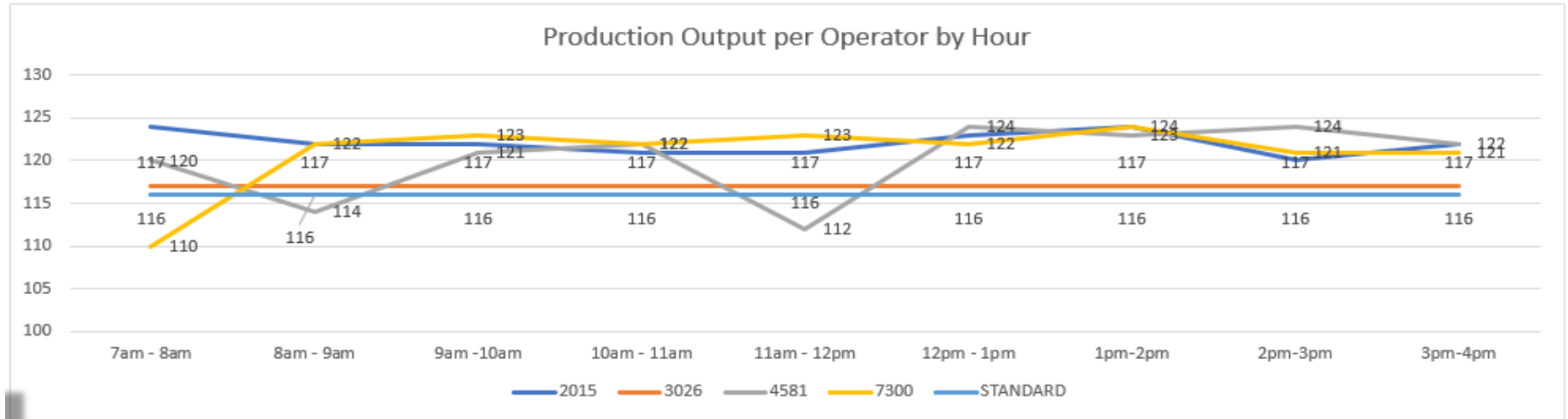
STEP 3: EVALUATE

Evaluate

Based just on end of day data, the process was performing adequately. The manufacturer would like to recognize more profit, however.



When completing the evaluation, use any statistical tools possible. Statistical Analysis of process information presents the actual story, not a perceived story.



What could the *perceived* reasons for variation between operators be?

2015 – “Steady guy, does his hours and leaves.”

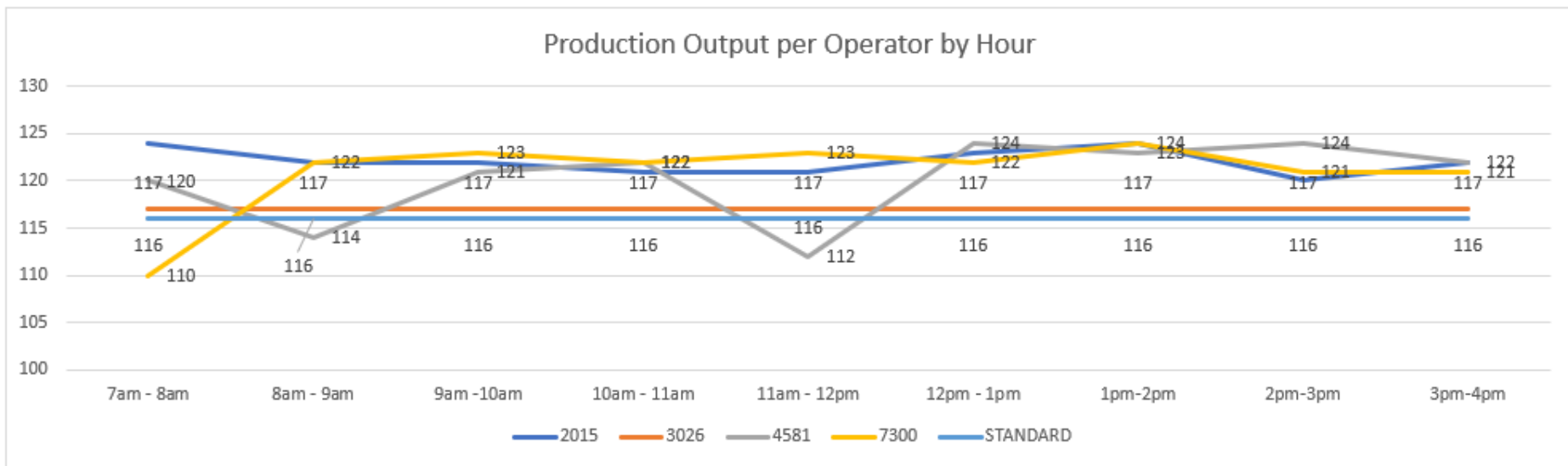
3026 – “Gets their numbers so we just leave them alone”

4581 – “Just inconsistent because she is new.”

7300 – “Never starts on time, probably hungover.”

HOW DO WE GET THERE FROM HERE?

STEP 3: EVALUATE



What were the actual reasons for the variation between operators?

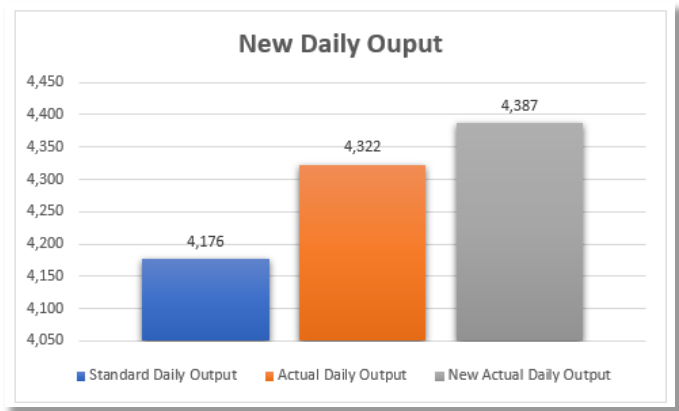
- 2015** – Steady, consistent output daily – Operator 2015 has 10 years experience.
- 3026** – Experienced operator, but makes just enough parts to meet the standard.
- 4581** – Newer operator, was leaving early for break and lunch, against normal policy.
- 7300** – Experienced employee. Loses production because pervious shift did not clean up.

HOW DO WE GET THERE FROM HERE?

STEP 3: EVALUATE

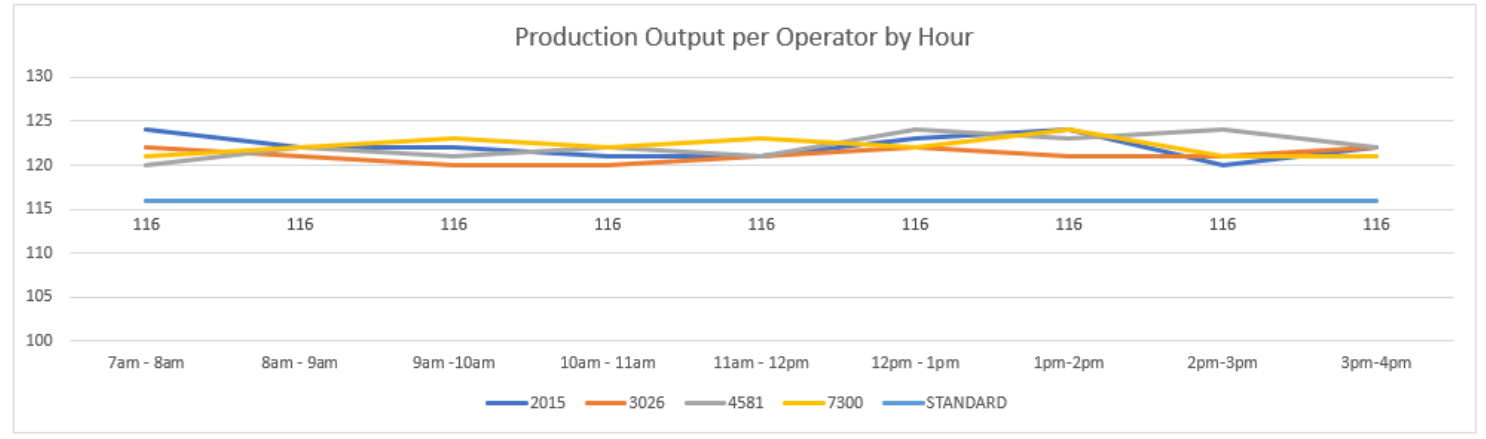
Evaluate

A 5.1% Increase in output was achieved after actions were taken. In this case at a \$25 per unit selling price, the company recognized a \$406k increase annually in sellable products produced.



How were the inconsistencies addressed?

- 2015** – Steady, consistent output daily – Operator 2015 has 10 years experience. – Operator volunteered to assist in the training of newer staff members.
- 3026** – Experienced operator, but makes just enough parts to meet the standard. – Operator was thanked for their effort and applauded for their consistency.
- 4581** – Newer operator, was leaving early for break and lunch, against normal policy. – Operator was re-trained in the operations policies.
- 7300** – Experienced employee. Loses production because pervious shift did not clean up. – Previous shift supervision was reminded to assure the work area was clean & ready for the next shift to start up.



HOW DO WE GET THERE FROM HERE?

STEP 3: EVALUATE



History: The Supplier was having difficulty in making timely shipments and providing quality parts to their customer. The SDE Team visited the manufacturing facility and began a week-long study of their processes.

The SDE Team attended manufacturing operations on both first and second shifts. Interviews with the machine operators helped determine causes and provide insights for improvements.

Initial time studies on the machine cycles proved accurate to what the manufacture had estimated in their original quotations. With that established, further investigation was needed.

The first shift suffered high scrap rates and a high occurrence of downtime events. After reviewing the information, it was determined that the second shift stopped the machine for 5 minutes each hour to perform in-process maintenance and adjustments while the first shift staff was running non-stop. The 5 minutes downtime each hour allowed the team to run the other 55 minutes without downtime and with minimal to no scrap.

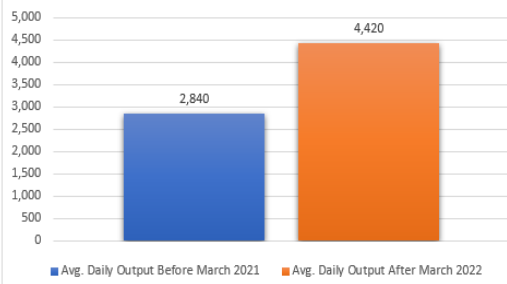
The first shift had excessive downtime and high scrap due to equipment malfunctions. They struggled through every day failing to meet the quantities needed to fulfill their customers requirements. Once we established the root cause and implemented new SOP's (Standard Operating Procedures), their net production output increased by 67%, downtime decreased by more than 50% and scrap reduced from an average daily percentage of near 20% to less than 2%.

Additionally, we were able to develop multiple design changes that further improved their productivity, delivery performance and also improved their profitability.

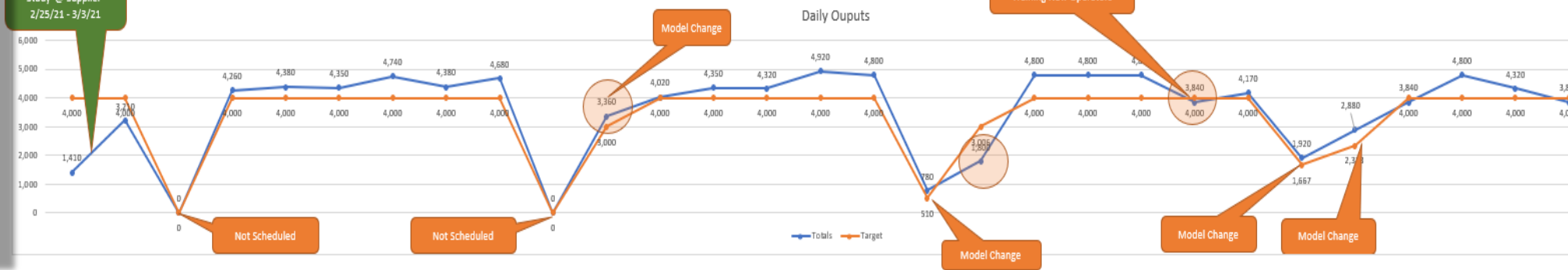
CASE STUDY #1

As previously described, the manufacturer showed significant increases in outputs and efficiencies as well as seeing a significant reduction (89%) in scrap percentages.
Update: 7 months after the initial visit, the manufacturer has maintained a perfect delivery record and experienced only one minor quality concern.

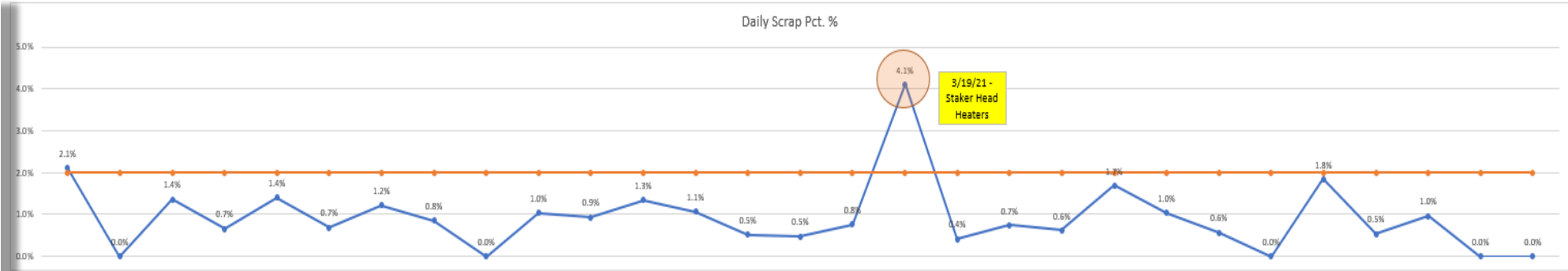
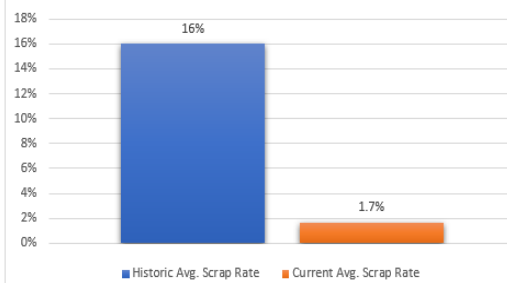
Average Daily Output



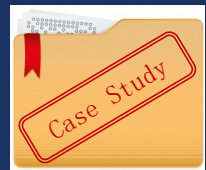
SDE Study Completed
 Study @ Supplier-
 2/25/21 - 3/3/21

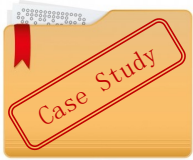


Average Daily Scrap Rate



CASE STUDY #1 – DATA PRESENTATION





History: The manufacturer was having difficulty in making timely shipments. Deliveries were consistently missed, incomplete or included incorrect parts. The quality performance at their customer was very good.

The SDE Team attended manufacturing operations on both first and second shifts. Interviews with the machine operators helped determine causes and provide insights for improvements.

Initial time studies on the machine cycles proved accurate to what the manufacture had estimated in their original quotations, however variations between shifts and operators was causing high fluctuations in part outputs. With that established, further investigation was needed.

The first shift operators were consistently outperforming those of second shift. Downtime seemed excessive as well.

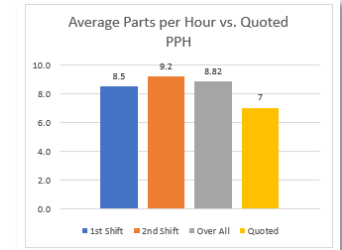
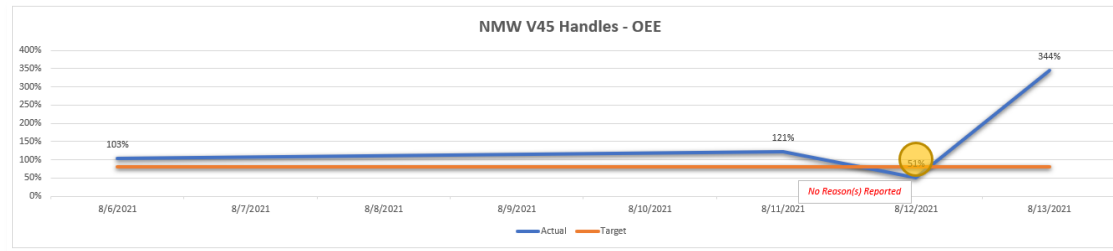
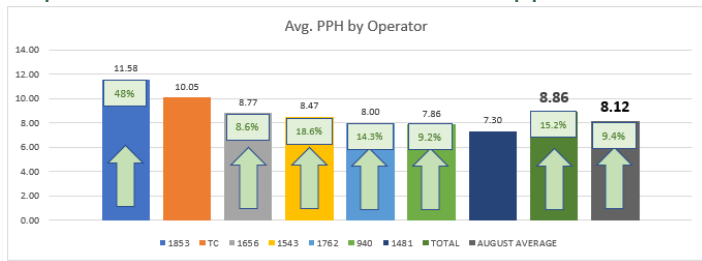
Upon completion of the study, the following items were confirmed:

- 1) Different operators used different processes to run the machines. Some operators showed better results by as much as 45%.
- 2) Parts flow was not conducive for smooth operations.
- 3) Machine & equipment position was inefficient as well as ergonomically difficult for the operators.
- 4) Supply of manufacturing components were difficult to reach and required frequent machine stopping to re-supply parts.
- 5) A significant amount of time & effort was spent on applying a chemical to improve the process.

CASE STUDY #2

Measures taken to improve processes (Diagram on next page):

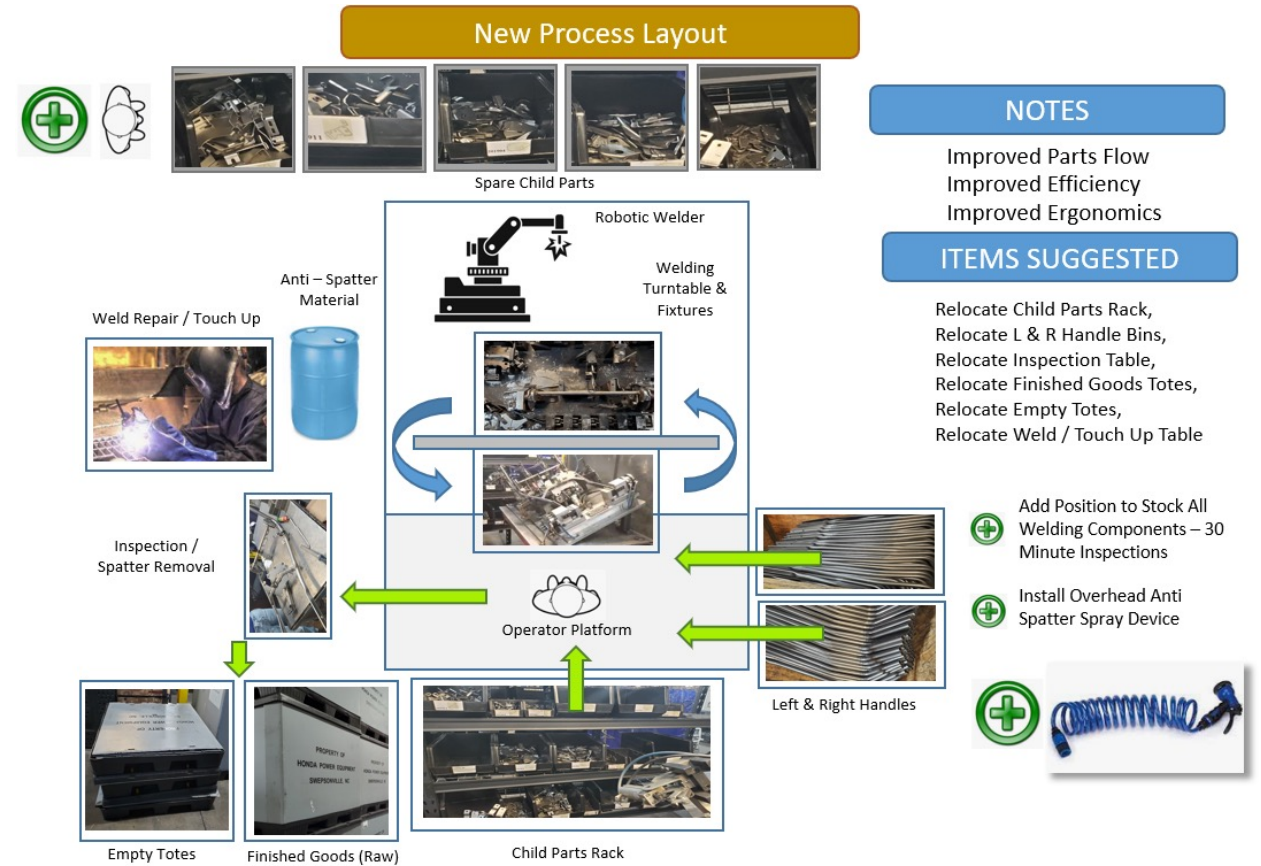
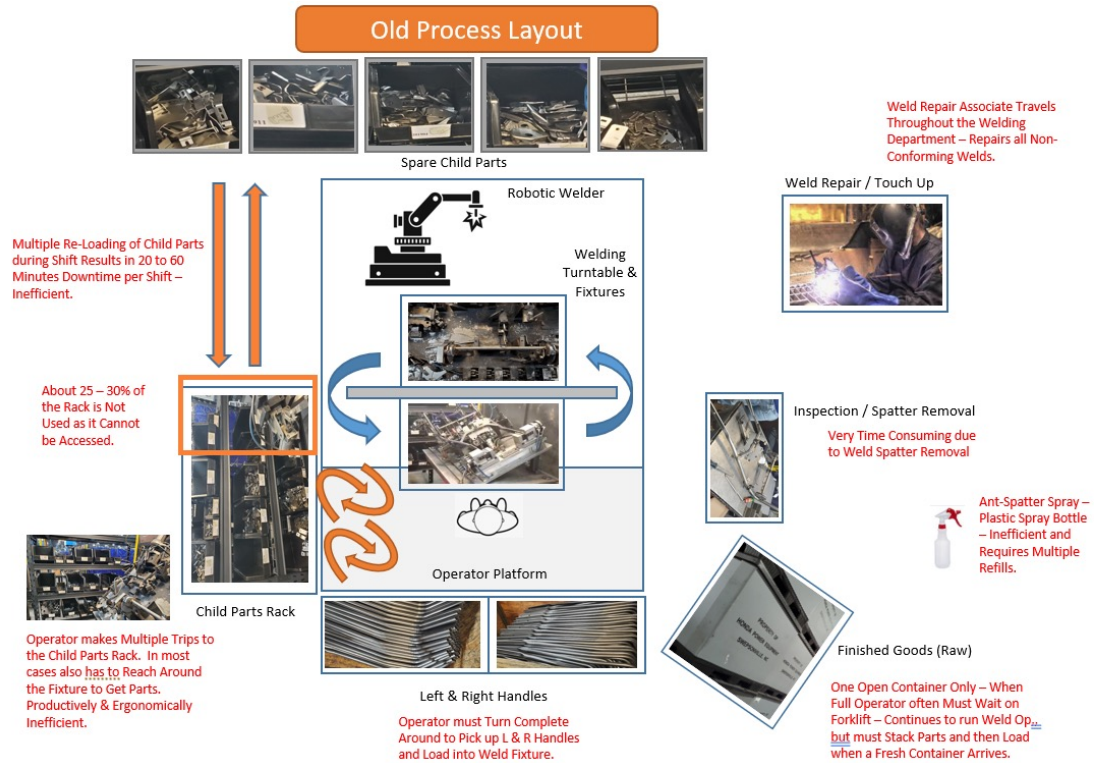
- 1) Different operators used different processes to run the machines. Some operators showed better results by as much as 45%. – It was discovered that one operator, who was shorter in stature, could not install the component parts into a welding fixture without having to climb up on the machine. The operator was moved to a different welding operation that was more accessible for him. The new operator was able to reach the fixtures with little effort.
- 2) Parts flow was not conducive for smooth operations. Larger Component parts stored in locations around the work cell were not set up in a smooth flow causing extra walking and wasted motion, causing slowing of the process. – Component parts were re-located to create a smooth left-to-right flow. Better ergonomics and more efficient.
- 3) Supply of smaller manufacturing components were difficult to reach and required frequent machine stopping to re-supply parts because the parts weren't placed by the operator for easier access and the storage bins were too small to allow a reasonable quantity to be stored in them. - Components and their shelving were re-located next to the operator to improve efficiency and reducing walking distances.
- 4) Machine & equipment position was inefficient as well as ergonomically difficult for the operators. - Inspection and repair stations and packaging containers were moved closer to the operator.
- 5) A significant amount of time & effort was spent on applying a chemical to improve the process. - Overhead spray nozzles were installed to reduce wasted motion and provide more consistent material application.



CASE STUDY #2



Measures taken to improve processes:



CASE STUDY #2



- Supplier Development Engineering is about more than just process improvements. SDE is about helping manufacturers understand their processes from a completely different level and show them how variations in their processes affect their business.
- Often, manufacturers find themselves in day-to-day operational struggles to make sure everything is running as smooth as possible, hopefully meeting their customers' expectations in optimum QCD (Quality, Cost & Delivery). It is easy to lose sight of the intricate details that can be hurting and even helping them.
- Due to resource limitations, it is often difficult to allot time for such functions and the cost of staffing qualified personnel to conduct these projects can also be a financial burden if not utilized efficiently. When a manufacturer elects to purchase such a service from an outside source, it is critical to that business as well as that of the SDE Team to assure accurate and in-depth research and analysis.
- This introduction to SDE and it's potential benefits is to show what a tremendous positive impact an SDE Group can have on a company's bottom line, again, if used properly.
- Additional training for the SDE Team will follow, including:
 - Time Study Completion
 - Company Auditing
 - Value Add Analysis
 - Data Collection
 - Data Compilation & Analysis
 - Statistical Process Control
 - Reporting Findings
 - OEE (Overall Equipment Efficiency)
 - 5 Why Analysis
 - Fishbone Diagrams
 - FMEA (Failure Mode & Effects Analysis)
 - Control Plans
 - Establishing Kpi's (Key Process Indicators)



SDE HAS CONSISTENTLY PROVEN ITSELF AS A VALUE-ADD FUNCTION.



THANK YOU

ALAN BEAL
ICON OEM, INC.

