Engineering Orientation Guide

Last Updated: 8/14/25

Table of Contents

[Introduction to TMA 2](#_Toc102629129)

[Welcome! 2](#_Toc102629130)

[About THK Manufacturing 3](#_Toc102629131)

[Fundamentals of THK Employees 3](#_Toc102629132)

[TMA Member Orientation 5](#_Toc102629133)

[Meet our TMA Core Members 5](#_Toc102629134)

[TMA Policies 6](#_Toc102629135)

[TMA Process Flow 7](#_Toc102629136)

[Production Training Guide 8](#_Toc102629137)

[Engineering Division 8](#_Toc102629138)

[Engineering Duties 8](#_Toc102629139)

[Engineering Development 9](#_Toc102629140)

[Procedures 10](#_Toc102629141)

[Engineering Safety Documentation 15](#_Toc102629142)

[Useful Engineering Resources 17](#_Toc102629143)

[Human Resources 23](#_Toc102629144)

[Break and Lunch Schedule 23](#_Toc102629145)

[2025 Holiday Schedule 24](#_Toc102629146)

[Evacuation & Emergency Action Plans 24](#_Toc102629147)

[TMA Phone List 25](#_Toc102629148)

# Introduction to TMA

## Welcome!

New THK Member,

I would like to formally welcome you to the THK family and especially to the Engineering/Maintenance Department. I appreciate your interest in what we produce here and the efforts that you are going to make to support our facility and accomplish our department’s goals.

I am particularly excited for the new skills that you are going to acquire and the new friends that you will make being part of our work family. This is an exciting time here as we grow our facility and add new technology.

This notebook is meant to be a resource for you as you begin your work life. It is also a way of keeping the lessons you are about to learn organized and easy to refer to.

As you begin your engineering career here, there are some suggestions I would make that should help you be successful:

1. Always keep safety in mind, be aware of your surroundings and others
2. Communication is the key to success. If you don’t know, ask
3. Always act professionally and remember that people outside of the engineering department are our customers
4. Respect our team and the wisdom and contributions of senior members
5. Maintain a clean and orderly work environment in the office and on the floor – this contributes to efficiency and safety
6. Take notes for personal development
7. Always offer to get involved – showing up early and staying late shows initiative and builds trust in the team
8. Remember the goal – helping production reach their targets allows us all to receive a good paycheck.

Good luck and work safe.

Chris Fisher

Engineering Manager

## About THK Manufacturing

As a world leader in Linear Motion, we provide innovative products to the world and generating new trends to contribute to the creation of an affluent society.

Our company name, T.H.K., stands for "Toughness", "High Quality", and "Know-how". We aim to contribute to the improvement of society and development of industry by focusing on these three principles in our technology, development, and product manufacturing processes. THK is the leading manufacturer of Linear Motion Guides, ball screws, bearings and joints, which are used in various types of industrial, robotic and production machinery. THK holds an outstanding competitive advantage over other manufacturers of linear motion systems due to its highly innovative and technical manufacturing solutions. THK is an Equal Opportunity Employer.

THK Corporate Philosophy

*“Providing innovative products to the world and generating new trends to contribute to the creation of an affluent society.”*

2025 THK President’s Policy

*Transform into a manufacturing and innovative services company (Phase IV)*

* *Increase sales per person by 10%*
* *Increase operating income per person by 20%*
* *Increase the speed of all activities by 50%*

*– President Teramachi, CEO (Mr. T)*

Fundamentals of THK Employees

Company name

Description automatically generated

At THK, we play an important role in the social and economic development of society. THK adheres to high ethical standards and expects all employees to do that same. The 10 principles set forth below are to be followed by all THK employees:

1. In developing, producing, selling, and offering products and services useful and safe to society, the THK Group will strive to satisfy customers and earn their trust.
2. The THK Group will engage in fair, transparent, and free competition and will transact business in an appropriate manner. In addition, we will maintain normal, healthy relationships with governments and administrative bodies.
3. The THK Group will communicate with its shareholders and other stakeholders and will actively disclose corporate information in a fair manner. Further, we protect and control various kinds of information, including personal and customer information, in a thorough manner.
4. The THK Group will respect employee diversity and the character and individuality of each employee. We will ensure safe and comfortable working conditions, provide education and training, and help employees achieve comfort and prosperity.
5. The THK Group will recognize that environmental issues constitute a common challenge for the entire human race. We regard the effort to deal with environmental problems as an essential requirement for our activities and existence as a business enterprise, and we will actively and voluntarily pursue such efforts.
6. Acting as a good corporate citizen, the THK Group will proactively engage in CSR activities
7. The THK Group will resolutely oppose criminal organization that threaten order and security in civil society and thoroughly refuse and connection therewith.
8. In accordance with the globalization of our business activities, the THK Group will comply with the laws and regulations in each country and region; respect various international standards, such as a human rights; and contribute to the growth of the local economies of each country and region involved, while taking their cultures, their customs, and the interests of stakeholders into consideration.
9. The members of the THK Group’s top management recognize that their role is to embody the spirit of this charter. By setting an example for others, they will ensure that the charter is thoroughly exercised internally, by all employees in our group companies, and make suggestions to our business partners. In addition, top management will continually elicit opinions from both within and outside the THK Group and establish effective internal systems.
10. Should a situation arise that involves a violation of this charter, the THK Group’s top management will resolve the situation, ascertain the cause, and work to prevent any recurrence. The top management will fulfill its accountability obligation by promptly and accurately disclosing relevant information, and after determining, the authority and responsibility of those involves, impose strict but fair disciplinary measures upon the parties responsible, including any members of top management involved.

For more information, refer to the “Fundamentals for the THK Group Employees” handbook.

# TMA Member Orientation

THK was established in Japan in 1971 with 47 employees. THK has since expanded to 11,700 employees and has grown on a global scale, making its mark all over the world. THK Manufacturing of America (TMA) was founded in 1997 and started producing parts in 1998. At that time, both linear motion (LM) and link ball (LB) equipment and offices were in the current LB building. TMA expanded its linear motion side in 2001 and die cast was added in 2007, making TMA what it looks like today. TMA is a major supplier for US automakers and other well-known brands like Ford, GM, Honda, Toyota, GE, HAAS, Fanuc, Abbott, etc. TMA is a one-of-a-kind place to work because it is the only THK facility that combines both LM and LB into one operative building. Our goal at TMA is to create a healthy and a safe work environment so that we may continue to make TMA a dynamic resource for THK as a whole and make a positive impact on our community.

2025 TMA President’s Policy

*“Increase productivity by 10%.” – President Sugimoto (Toshi)*

## Meet our TMA Core Members

## TMA Policies

As a TMA employee, the policies and guidelines listed in this section must be adhered to.

|  |  |
| --- | --- |
| Environmental Policy  ***C: Continual Improvement***  ***O: Obey the Law***  ***R: Reduce, Recycle, Reuse***  ***E: Environmental Awareness*** | Quality Policy  *“At THK quality is no accident, High Quality is built into our name. As a team we strive to constantly improve our products and services while meeting all applicable requirements and using cutting edge concepts, so we can delight our existing customers, attract new ones, and contribute to society in a meaningful way.”* |

### 5-S

5-S is a 5-step organization method to create an organized, clean and safe work environment. It also contributes to maintaining our quality and improving efficiency. 5-S prevents waste caused from waiting for materials, overproduction, transportation, excessive inventory, inefficient machine processes, production defects, and miscommunication.

1. Sort and separate- All unneeded tools, parts and supplies are removed from the area
2. Set in place- A place for everything and everything in its place
3. Spotless shine- The area is cleaned as the work is performed
4. Standardize- Cleaning and identification methods are consistently applied
5. Sustained self-discipline- Make 5-S a habit and continually improve the workspace

To comply with OSHA standards, certain colors will be used for floor markings. Brady uses the following color recommendations to not only comply with those standards, but also create a comprehensive color scheme for the workplace. Additional information for floor color in the workplace can be found at www.BradyID.com/toughstripe.

|  |  |
| --- | --- |
| Yellow | Aisleways, traffic lanes and work cells |
| White | Equipment and fixtures (workstations, carts, floor stand displays, racks, etc.) not otherwise color coded |
| Blue, green, and/or black | Materials and components, including raw materials, work-in-progress and  finished goods |
| Orange | Materials or product held for inspection |
| Red | Defects, scrap, rework, and red tag areas |
| Red & white | Areas to be kept clear for safety/compliance reasons (e.g., areas in front of  electrical panels, firefighting equipment, and safety equipment such as eyewash  stations, safety showers and first aid stations.) |
| Black & white | Areas to be kept clear for operational purposes (not related to safety  and compliance) |
| Black & yellow | Areas that may expose employees to special physical or health hazards. |

*(Brady, n.d.)*

### Kaizen

Kaizen means “Improvement” or “continuous improvement” in Japanese. We strive to improve ourselves in everything we do. If you have any ideas or suggestions that could improve your work area and/or TMA’s efficiency, please share your ideas by turning them into leads, supervisors or human resources. Ideas can also be turned into the TMA resource center. Here at TMA, no idea is too small and we never stop improving ourselves. Targets of kaizen:

* Continuous improvement of efficiency
* Reduction of downtime
* Expansion of kaizen activity
* Improve and maintain a level of inventory accuracy
* 100% commitment to the continuous improvement of quality

## TMA Process Flow

### Link Ball (LB)

1. Raw aluminum is received in the form of ingots
2. Ingots are sent to die cast where they are melted in a furnace
3. The are molded into castings and the excess is trimmed and melted down again for reuse
4. The raw casting then goes through an assembly process

### Linear Motion (LM)

|  |  |
| --- | --- |
| Rail Production | Block Production |
| 1. Rails are received in the rough shape according to the required part type and size 2. Rails are heat treated so that the outside of the rail is hardened, but the inside remains soft enough to drill 3. After heat treat, rails can warp so they are sent to straightening to get rid of any bends that have developed 4. Mounting holes are drilled either to the normal standard or customer specification 5. Rails are cut into the length specified by the customer with their designated G-dimensions 6. Rails are surface ground to create a smooth, finished shine on the top and bottom 7. They are then sent to groove grinding, where specially made grinding wheels grind the areas where bearing will come in contact with them | 1. Blocks are received pre-cut and in bar stock depending on the part type and size. 2. Bar stock blocks are cut into individual blocks 3. Top, front and back holes are drilled in the machining center 4. Blocks are heat treated in a carburizing oven. They are heated to 900 °C with carbon-containing propane gas for several hours all the way through so holes cannot be drilled after this process. 5. Blocks are surface ground on the top and sides. 6. They are then sent to block groove grinding where specially made grinding wheels grind the areas where bearing come in contact with them. 7. Depending on the product, the block may need injected with a plastic resin for those that have caged ball-bearings |
| Combined Sets | |
| 1. Blocks and rails are matched according to their order 2. Blocks and rails go through a wash cycle 3. The sets are sent to the Green Room for assembly where the proper bearings and endcaps are added according to customer specification 4. The sets are inspected thoroughly by our quality department 5. Finished sets are sent to wrap and pack where they are packaged for shipment 6. Finally, the guides are sent to the customer by their designated promise date. | |

## Production Training Guide

At TMA we train our employees in a way that contributes to the corporate philosophy, “Providing innovative products to the world and generating new trends to contribute to the creation of an affluent society.” TMA production members are trained according to the following guidelines:

|  |  |
| --- | --- |
| What to do: | What not to do: |
| * Wear PPE in the workplace   + Safety glasses, gloves and steel-toed shoes * Complete training log prior to running machines and equipment * Help Production * Perform machine maintenance checks * Read and follow machine work instructions * Run machine as described in the machine manual * Load/Unload machine carefully * Clean machines as needed * Perform quality inspections * Listen to operators * Take notes * Write down suggestions for improvement * Complete daily reports | * Sign Production paperwork * Fix machines * Approve quality of product * Interfere with Production (slow them down) * Do anything that may be unsafe |

While engineers are allowed to do some things that are not permitted to production members such as fixing machines, engineers are still expected to follow the same safety regulations and protocols and seek approval from their supervisor before performing tasks that do not comply with the typical guidelines of a TMA production member.

# Engineering Division

## Engineering Duties

Engineers are responsible for new electrical and mechanical equipment modifications, robotic automation, production start-ups, layout analysis and efficiency/quality improvements. In order to complete these tasks, the maintenance department may need to get involved. Their primary responsibilities are to install, maintain and fix company equipment. Production is in charge of making sure that their equipment is running as intended and to take care of it to the best of their abilities. In the event that an operator’s machine fails, he/she will contact either engineering for program failure or maintenance for component failure to fix it. Production is not responsible for fixing their own machine.

## Engineering Development

|  |  |  |
| --- | --- | --- |
| Department Culture | Responsibility and Skill | Profitability and Contribution |
| * Excellent attendance * Great work ethic * Understanding of break times * Shows knowledge and understanding of all company safety protocols * Understanding of all departmental duties * Teamwork and customer service oriented * Be professional. Moderate the usage of cell phones, social media, and follow up of personal interest during work hours. | * Shows excellent time management while multitasking various projects and tasks * Expresses a sense of ownership and urgency within related departments * Excellent decision-making skills * Full development of skills and training * Displays drive to grow and improve | * Understanding of the full financial impact of sales, scrap, labor, and quality. * Full utilization of knowledge and skills to be a resource within the company * Ability to show leadership throughout the company combined with the ability to develop leadership within others |

### Skill Matrix

Every quarter acquired skills will be recorded in a skill matrix that displays an engineer’s growth over time and goals for the future. Skills are broken out into disciplines: process, quality, mechanical, electrical, industrial and administrative. The required level of experience will be listed as basic, intermediate or advanced.

* Basic: Working knowledge and can execute simple actions effectively
* Intermediate: Theoretical working knowledge and can execute more detailed actions
* Advanced: Significant theoretical and practical application experience; can train others.

Based on the engineer’s knowledge of a certain skill, they will be given a score of 0-3 for that ability.

* 0: No knowledge
* 1: Has seen but cannot do alone
* 2: Can do alone
* 3: Can train others

Projects that have contributed or will contribute to the means of acquiring a skill will be recorded in the skill matrix according to what month they occurred or will occur throughout the year.

## Procedures

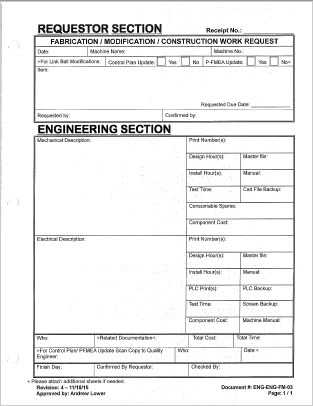
### Request a maintenance work order

1. Go to EPAC login or ls851vs06a\EPAC9.
2. Login with username (first 3 letters of your first name) and password (last 4 digits of your SSN).
3. Select “Service Request” from the drop-down menu.
4. Fill in “Asset,” “Description,” and “Code” fields.
   1. Asset is the machine number, description is what is wrong with the asset, and code is either marked “U” for machine running or “D” for machine down.
5. Attach any helpful documentation that maintenance may need.
6. Click “Save Request”
7. Open request and print out a copy
8. For LB work orders, place copy in the file organizer outside of the LB office. For LM work orders, place copy in the file organizer on the bulletin board outside the supervisors’ office.
9. When the work order is completed, maintenance will seek you out for your signature confirming the work order’s completion.

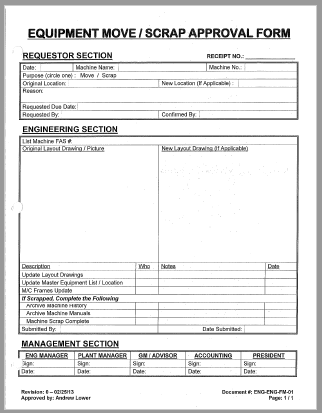
### Starting a new project

1. When starting a new project, first record the project in your personal Microsoft Project.
2. Fill out the project priority, requestor, task name, start date and any notes required.
3. Sub-tasks can be created and nested under the overall project.
4. As the project is completed, record the status and completion date of each sub-task until the entire project is completed.
5. Follow the mod sheet or move/scrap procedure after a project is completed. A modification sheet must be filled out for all mods and a move/scrap form must be filled out for all moves and scraps.

### Filling out a mod sheet

1. Download a blank modification sheet from the resource center.
2. Fill out the date, machine name, machine number, item, due date and the requestor that was listed in the MS project. Confirmed by is always the department manager.
3. Go to the mod excel sheet and record your mod in a new row with the same information recorded on the mod sheet.
   1. The Excel sheet can be found in the Engineering drive (U:\Engineering Div\Fabrication Modification Construction Request). Select the corresponding year.
4. Take the mod number from the left and use it as the receipt number on your mod sheet in the top right corner.
5. Fill in the mechanical description on the mod sheet for all mechanical modifications with pictures, drawing numbers, files, hours spent completing the mechanical portion and the estimated component cost(s).
6. Do the same thing for the electrical description if applicable.
7. At the bottom fill in your name, relevant documentation, total cost, total time spent completing the mod and the finished day.
8. Mod sheets need to be signed by the requestor and checked and signed by the engineering supervisor.
9. If a return on engineering investment (ROEI) is obtained from the mod, the value should be recorded in the mod excel sheet.
10. After the form has been completely filled out and the mod excel sheet has been filled in, turn the form into the mod sheet folder located next to the engineering supervisor’s desk.

### Filling out a move/scrap form

1. Download a blank move/scrap approval form from the resource center.
2. Open the machine move/scrap sheet.
3. Similar to a mod sheet, the receipt number is taken from a new row in the move/scrap approval excel sheet.
   1. The Excel sheet can be found on the Engineering drive (U:\Engineering Div\Machine Move Scrap Approval)
4. Fill out the requestor section. The requestor is typically the engineering supervisor and it’s confirmed by the department manager.
5. In the engineering section, the machine FAS# are any silver asset numbers attached to the machine. If no FAS# are associated or found, mark with “N/A.”
6. Email accounting for the residual value of the asset(s). Attach the email with the residual value to the scrap/move form when it is submitted for signing.
7. Include pictures of the asset and snip of the building layout with the asset in view. For scraps, the new layout drawing does not need filled out, but for moves, include an updated AutoCAD layout with the moved asset.
8. In the lower part of the engineering section, mark who is supposed to complete the listed items with their initials in the “Who” section. When the item is completed, write the completion date for each item on the right.
   1. The engineer submitting the scrap form is in charge of updating the layout drawings, the master equipment list, archiving machine history and manuals, and making sure the items have been scrapped/moved.
      1. Update Layout Drawings: Open the latest building layout and move/delete the necessary asset(s). Save a new layout copy titled with the date and a short description of the changes.
      2. Update Master Equipment List/Location: Open the master equipment list and remove or change the location(s) of the asset(s)
      3. Archive Machine History/Manuals: Put into designated storage
      4. Machine scrap complete: Inform facilities of scrap/move and confirm that asset(s) were scrapped/moved.
   2. M/C Frames is updated by the LM VP.
   3. EPAC is updated by the EPAC engineer.
9. When the engineering section has been completed, sign and date the section.
10. Signatures of approval need to be collected from the President, VP, Plant Manager, LM VP, and accounting.
11. After the management section has been filled out, the item can be scrapped/moved and the completion date can be recorded in the machine move/scrap sheet.
12. For some moves and scraps, a mod sheet can also be filled out. Follow the mod sheet procedure.

### Filling out a machine installation form

1. Download the machine installation form from the resource center.
2. Similar to a mod sheet, the receipt number is taken from a new row in the mod excel sheet.
   1. U:\Engineering Div\Fabrication Modification Construction Request
3. Fill out the top section while following the same machine name/number format as listed in the master equipment list.
4. Add a new line to the master equipment list and fill in the machine code, number, name, manufacturer, type serial number, manufacturing date, receiving date, location, price and any notes. The asset number will be assigned at a later date.
   1. U:\Engineering Div\Master Equipment List
   2. When editing, always save as a new file using today’s date and asset being added
5. In the following section, mark who is responsible for each description item by putting their initials under “WHO.”
6. Record the cost of each item, the completion date that the item is done and any needed notes.
   1. The engineer in charge of the machine install will be responsible for the layouts, scheduling, install, data registration, documentation and functionality checks.
   2. The only things the engineer is not responsible for is LOTO procedures/arc flash labels (completed by maintenance manager), M/C frames update (completed by the vice president), EPAC registration (completed by EPAC engineer), and WIFI registration (completed by IT).
7. When each line item is completed, fill out the bottom section with the name of the engineer in charge, the total cost, completion dates, the amount of time spent on the machine install, and signatures from both the requestor and the maintenance person/engineer who checks that all the line items have been completed correctly.
8. Make sure the mod sheet and master equipment list have been filled out completely.
9. Turn in the completed machine install request to \_\_\_\_.
10. Additional information can be found in the reference section.

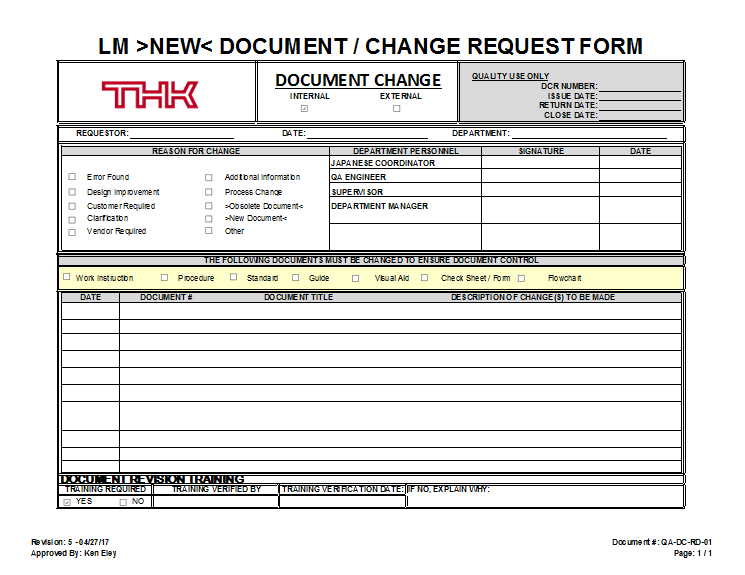
### Purchasing an item for a project

1. Determine parts numbers for the item needed, contact vendors and receive a quote for the item.
   1. For assistance in knowing which vendors to contact or to get company discount, contact engineering support.
2. To make sure that the quote received is a fair deal, seek out multiple quotes for comparison. If needed, make a comparison chart of the quotes.
3. For quotes less than $500, the quote may be sent directly to engineering support for purchase after approval from supervisor. For quotes of $500 or more, an RA must be filled out and approved for purchase. To do this, follow the RA procedure.
   1. If possible, split the quote into multiple smaller quotes to prevent needing to fill out an RA.
4. Save all quotes in a place that can be easily accessed and remembered.
5. Quote will then be sent to purchasing to create a PO which will then be sent to the vendor to order.
6. When the item arrives, it will be delivered to receiving. Items must be logged and signed as “received” in order to complete purchase for the items.
7. Additional information can be found in the reference section.

### Filling out an RA

1. Gather quotes for purchase in PDF format.
2. Open the resource center, go to general and click on “RA Request System- (Fixed Asset)”
3. Click “New Purchase” and fill out the form according to the characteristics of the purchase.
4. Attach the PDF quote.
5. Click “Submit” and record the RA number that is assigned.
6. Go back to the home screen and click “Purchase Request”
7. Click “New Purchase” and located the vendor that you are purchasing the quote from.
8. Fill out the items in green. The line items are taken from the quote.
9. Attach the PDF quote again.
10. Fill in the RA number if it hasn’t automatically filled in already.
11. Click “Submit”
12. Forward RA and attached quote to engineering support for reference.
13. The RA will then go through an approval process. Afterwards, the item(s) in the quote will be ordered.

### Completing a Document Control Request (DCR)

1. Download the blank DCR form located on the resource center.
2. Fill in “Name,” “Date,” and “Area.”
   1. Area is where the document originated or is going to (i.e. Injection Mold, Final Inspection).
3. Check the reason for change (multiple can be selected).
4. Check the type of document you are changing (multiple can be selected).
5. Fill in the “Date,” “Document #,” “Document Title,” and “Description of changes to be made.”
   1. For new documents, unknown document numbers are denoted with Xs. For example, a new visual aid in injection mold would be given the number MFG-IM-VA-XX. Document control will assign a new number to the document.
6. Send the filled out DCR to the Document Control Specialist.
7. They will send the updated form back to you and release the documents listed to the document checkout.
8. Make all document changes and make sure most updated versions have been saved in the checkout.
9. Take updated DCR form along with updated documents to the Japanese Coordinator, Quality Engineer, Supervisor and Department Manager over the area that the documents pertain to and have them approve the changes and sign the DCR.
10. When the DCR has been signed, give it to the Document Control Specialist.
11. The Document Control Specialist will officialize the changes and scan to you training copies of the new documents.
12. Print and fill out a blank training attendance form from the resource center.
13. Train operators, leads and supervisors that the changes pertain to and have them sign the training attendance form.
14. Scan completed training attendance record to the Document Control Specialist
15. They will release the completed documents onto the plant floor when step 14 is complete.
    1. Any changes to the documents made after the release of the training copies will require a new DCR and the repeat of steps 1-11.

## Engineering Safety Documentation

Safety guidelines for various processes will be listed below. For more information, additional safety guidelines can be found in the engineering training folder (U:\Engineers\Training) and online from specialized, reliable and well-trained companies.

[INSERT ARC FLASH SAFETY]

### Confined Space Safety

Confined spaces are large enough to allow entry of any body part but has limited or restricted entry and exit points. These spaces are not designed for continuous employee occupancy. A permit is required to enter confined spaces because they could have hazardous atmosphere, material or a design that may entrap someone, or provide any other serious safety or health hazard.

1. Know what you are getting into
2. Know how to get out in an emergency
3. Know the hazards and know how they are controlled
4. No smoking in a confined space or near the entrance or exit
5. Attendant must be present at all times
6. Constant visual or voice communication must be maintained between the attendant and entrants
7. No bottom or side entry will be made, or work conducted below the level any hanging material or material which could cause engulfment
8. Air and oxygen monitoring are required before entering a permit-required confined space
9. Ventilation and oxygen monitoring are required when welding is performed
10. All floor or surface openings to confined spaces must be protected by a barricade.

### Machining Safety Guidelines

1. Do not make contact with the revolving cutter.
2. Place a wooden pad or suitable cover over the table surface to protect it from possible damage.
3. Use the buddy system when moving heavy attachments.
4. Do not attempt to tighten arbor nuts using machine power.
5. When installing or removing milling cutters, always hold them with a rag to prevent cutting your hands.
6. While setting up work, install the cutter last to avoid being cut.
7. Never adjust the workpiece or work mounting devices when the machine is operating
8. Chips should be removed from the workpiece with an appropriate rake and a brush.
9. Shut the machine off before making any adjustments or measurements.
10. When using cutting oil, prevent splashing by using appropriate splash guards. Cutting oil on the floor can cause a slippery condition that could result in operator injury.

*(Smithy Machine, n.d.)*

### Welding Safety Guidelines

1. Shop staff approval is required before using any welding equipment. If not welding in a welding permittable area a Hot Work Permit is required.
2. Welders, assistants, and anyone else in the welding area shall wear glasses or shields of recommended shades during welding operations.
3. Inspect all welding equipment to be used, prior to each use, for possible damage.
4. Avoid handling oxygen bottles with greasy hands, gloves or rags. Fatal explosions have resulted from this cause.
5. Always strap tanks to a welding cart or a fixed object. Never allow a gas cylinder to be free standing.
6. Replace the safety cap on all cylinders when not in use.
7. When arc welding, make sure work and/or worktable is properly grounded.
8. Do not arc weld in a wet area.
9. Be alert to possible fire hazards. Move the object to be welded to a safe location, or, remove all flammable materials from the work area.
10. Never weld in the same area where degreasing or other cleaning operations are performed.
11. Keep suitable fire extinguishing equipment nearby and know how to operate it.
12. Shut off the cylinder valves when the job is completed, release pressure from the regulators by opening the torch valves momentarily and back out regulator adjusting valves.
13. Never leave the torch unattended with pressure in the hoses.
14. Utilize all protective equipment and clothing. Do not arc weld with any part of the body uncovered, the arc light is actinic light (excessive ultraviolet) and will cause burns similar to severe sunburn.
15. Never weld inside drums or enclosed spaces without adequate ventilation, or, the use of airline respirators or self-contained breathing apparatus.
16. Check the ventilation system before starting to weld and periodically thereafter to insure adequate performance. Welding fumes should not be allowed to get into the rest of the shop working areas.
17. Never cut or weld any container that has held explosive or flammable materials. Use prescribed methods for cleaning or flooding.
18. Never use wrenches or tools except those provided or approved by the gas cylinder manufacturer to open valves. Never use a hammer to open or close valves.
19. Abide by any other safety measures required for each particular type of welding.
20. Allow for proper ventilation when brazing or soldering. The fluxes are acidic and toxic.
21. Do not weld on painted, galvanized or greasy, oily metals. Not only can the fumes be toxic, but the welds will not be satisfactory and will fail in use.

## Useful Engineering Resources

### File Locations

Engineering files are located in the U: Drive, maintenance files are located in the J: Drive, and personal storage is located in the N: Drive.

|  |  |  |
| --- | --- | --- |
| File/Group | Use | Location |
| Blank Mod Sheet | Record electrical/ mechanical modifications | Resource Center> Quality Assurance> Document Forms and Templates> ENG-ENG-FM-03~ENGINEERING MODIFICATION REQUEST |
| Mod Excel Sheet | Collected mod sheets | U:\Engineering Div\Fabrication Modification Construction Request |
| Work Order Requests | Maintenance work request | ls851vs06a> EPAC9> Service Request |
| Machine Move/Scrap Sheet | Record machine moves and scraps | U:\Engineering Div\Machine Move Scrap Approval |
| 3D Drawing Files | Storage of official Alibre files | U:\Drawings in Engineering Div\Project Drawings (3D) |
| 2D Drawing Files | Storage of official AutoCAD files | U:\Drawings in Engineering Div\Project Drawings (MC-Elec-Pneum-Hyd) |
| MS Projects | Collection of personal projects | U:\Engineering Div\Project |
| Training Documentation | Collection of helpful training resources | U:\Engineers\Training |
| Production Support | Record of production support | U:\Engineering Div\Fabrication Modification Construction Request |
| Blank DCR | Request document changes | Resource Center> Quality Assurance> Document Forms and Templates> Doc Control Forms> QA-DC-RD-01~LM DCR FORM |
| Document Checkout | Make document changes | N:\Quality Assurance\DOCUMENT CONTROL |
| Scrap/Move Forms | Record asset scraps and moves | U:\Engineering Div\Machine Move Scrap Approval |
| Machine Programs | Modify current machine programs | J:\English Software\Revised |

### Machine Code List

|  |  |  |  |
| --- | --- | --- | --- |
| AX | Dedicated assembly machine | MA | Machining center |
| BF | Barrel polishing machine | MC | Nalife rice board |
| BJ | Jig Bora | ME | milling machine |
| BR | Broaching machine | MG | magnetic polishing machine |
| BU | Buffing machine | MH | horizontal milling machine |
| DA | NC drilling machine | MJ | jig milling machine |
| DB | Deburring machine | MK | keyway milling machine |
| DC | Casting equipment | MP | planer |
| DF | Casting furnace | MU | universal milling machine |
| DR | Drilling machine | MV | vertical milling machine |
| DT | Tapping board | MW | double head milling machine |
| DW | Dedicated drilling machine | MX | chamfer machine |
| DX | Dedicated tapping board | PA | automatic press straightening machine |
| ED | Electric discharge machine | PR | press machine |
| EG | Electrolytic polishing machine | PX | press only machine |
| EW | Wire cutting machine | QA | testing, inspection, measuring equipment |
| GB | Reference surface grinder | QG | surface plate |
| GC | Cylindrical grinder | RP | linear processor |
| GD | Centerless grinder | RS | roll straightener |
| GF | Guide groove wrapping machine | RT | rolling machine |
| GH | Crowning machine | RW | twist correction machine |
| GI | Internal grinding machine | SA | automatic press straightening machine |
| GJ | Jig grinder | SB | shot blast machine |
| GL | Tool grinder | SF | super finishing machine |
| GN | SP nut groove grinder | SG | grindstone cutting machine |
| GP | Dedicated grinder | SH | shaper |
| GR | External grinding machine | SL | slotter |
| GQ | Spherical grinder | SN | sandblasting machine |
| GS | Surface grinder | SS | cutting machine |
| GT | Screw grinder | UC | dust collector |
| GV | V groove grinder | UP | positioning device |
| GX | Other grinders | WE | weld machine |
| HE | Heat treatment related, furnace, etc. | WL | laser welder |
| HG | Gear cutting machine | WP | plastic welder |
| HO | Honing machine | WS | ultrasonic welder |
| IG | Nut wrap machine | ZC | compressor |
| IJ | Injection molding machine | ZD | demagnetizer machine |
| IR | robot | ZG | belt sander |
| KK | type | ZL | loader |
| LA | NC Lathe | ZM | markers, stamper |
| LC | Narai lathe | ZP | packing machine |
| LE | General purpose lathe | ZR | CHILLER |
| LM | turning center | ZS | other cutting machines |
| LP | flat lapping machine | ZT | individual tank |
| LV | turning lathe | ZW | washing machine |
| LX | only for lathes | ZZ | machines not classified |

### Recommended Vendor List

#### Fabricators

|  |  |  |  |
| --- | --- | --- | --- |
| Vendor | Location | Leadtime | Price |
| Star | New Lexington, OH | 3-5 Weeks | High |
| Alten Machine Shop | Lancaster, OH | 3-5 Weeks | High |
| Ashcraft | Newark, OH | 2-4 Weeks | High |
| Jett | Newark, OH | 2-4 Weeks | High |
| Itsuwa | Japan/China | 4-8 Weeks | Med |
| Samegoal | China | 4-8 Weeks | Low |

#### Steel/Metals/Raw Materials

|  |  |  |  |
| --- | --- | --- | --- |
| Vendor | Location | Leadtime | Price |
| Ashcraft | Newark, OH | 1-2 Days |  |
| Raymar | Lancaster, OH | 2-3 Days |  |
| McMaster-Carr | Ohio | 2-5 Days | High |
| Goodman | Zanesville, OH | 2-3 Days |  |
| Custom Cutters | Mt. Vernon, OH | 2-3 Days |  |
| Misumi USA | US | 5-7 Days |  |

#### General Stuff

|  |  |  |  |
| --- | --- | --- | --- |
| Vendor | Location | Leadtime | Notes |
| McMaster-Carr | Ohio | 2-3 Days | Everything (best website to find items) |
| MSC Industrial | Ohio | 2-4 Days | Everything (beats McMaster-Carr pricing by 10% or more) |
| Misumi USA | USA | 5-7 Days | Metric tool and die components |
| OTP | Columbus, Ohio | 5-10 Days | Omron, SMC, bearings |
| Allied Industrial | Indiana | 1-2 Weeks | Mitsubishi |

### Metric Drill and Tap Sizes

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Screw Size | Major Diameter | Threads Per Inch | Minor Diameter | Tap Drill | | | | Clearance Drill | | | |
| **75% Thread**  **(AL, Brass, & Plastics)** | | **50% Thread**  **(Steels & Iron)** | | **Close Fit** | | **Free Fit** | |
| 0 | .0600 | 80 | .0447 | 3/64 | .0469 | 55 | .0520 | 52 | .0635 | 50 | .0700 |
| 1 | .0730 | 64 | .0538 | 53 | .0595 | 1/16 | .0625 | 48 | .0760 | 46 | .0810 |
| 72 | .0560 | 53 | .0595 | 52 | .0635 |
| 2 | .0860 | 56 | .0641 | 50 | .0700 | 49 | .0730 | 43 | .0890 | 41 | .0960 |
| 64 | .0668 | 50 | .0700 | 48 | .0760 |
| 3 | .0990 | 48 | .0734 | 47 | .0785 | 44 | .0860 | 37 | .1040 | 35 | .1100 |
| 56 | .0771 | 45 | .0820 | 43 | .0890 |
| 4 | .1120 | 40 | .0813 | 43 | .0890 | 41 | .0960 | 32 | .1160 | 30 | .1285 |
| 48 | .0864 | 42 | .0935 | 40 | .0980 |
| 5 | .125 | 40 | .0943 | 38 | .1015 | 7/64 | .1094 | 30 | .1285 | 29 | .1360 |
| 44 | .0971 | 37 | .1040 | 35 | .1100 |
| 6 | .138 | 32 | .0997 | 36 | .1065 | 32 | .1160 | 27 | .1440 | 25 | .1495 |
| 40 | .1073 | 33 | .1130 | 31 | .1200 |
| 8 | .1640 | 32 | .1257 | 29 | .1360 | 27 | .1440 | 18 | .1695 | 16 | .1770 |
| 36 | .1299 | 29 | .1360 | 26 | .1470 |
| 10 | .1900 | 24 | .1389 | 25 | .1495 | 20 | .1610 | 9 | .1960 | 7 | .2010 |
| 32 | .1517 | 21 | .1590 | 18 | .1695 |
| 12 | .2160 | 24 | .1649 | 16 | .1770 | 12 | .1890 | 2 | .2210 | 1 | .2280 |
| 28 | .1722 | 14 | .1820 | 10 | .1935 |
| 32 | .1777 | 13 | .1850 | 9 | .1960 |
| 1/4 | .2500 | 20 | .1887 | 7 | .2010 | 7/32 | .2188 | F | .2570 | H | .2660 |
| 28 | .2062 | 3 | .2130 | 1 | .2280 |
| 32 | .2117 | 7/32 | .2188 | 1 | .2280 |
| 5/16 | .3125 | 18 | .2443 | F | .2570 | J | .2770 | P | .3230 | Q | .3320 |
| 24 | .2614 | I | .2720 | 9/32 | .2812 |
| 32 | .2742 | 9/32 | .2812 | L | .2900 |
| 3/8 | .3750 | 16 | .2983 | 5/16 | .3125 | Q | .3320 | W | .3860 | X | .3970 |
| 24 | .3239 | Q | .3320 | S | .3480 |
| 32 | .3367 | 11/32 | .3438 | T | .3580 |
| 7/16 | .4375 | 14 | .3499 | U | .3680 | 25/64 | .3906 | 29/64 | .4531 | 15/32 | .4687 |
| 20 | .3762 | 25/64 | .3906 | 13/32 | .4062 |
| 28 | .3937 | Y | .4040 | Z | .4130 |
| 1/2 | .5000 | 13 | .4056 | 27/64 | .4219 | 29/64 | .4531 | 33/64 | .5156 | 17/32 | .5312 |
| 20 | .4387 | 29/64 | .4531 | 15/32 | .4688 |
| 28 | .4562 | 15/32 | .4688 | 15/32 | .4688 |
| 9/16 | .5625 | 12 | .4603 | 31/64 | .4844 | 33/64 | .5156 | 37/64 | .5781 | 19/32 | .5938 |
| 18 | .4943 | 33/64 | .5156 | 17/32 | .5312 |
| 24 | .5114 | 33/64 | .5156 | 17/32 | .5312 |
| 5/8 | .6250 | 11 | .5135 | 17/32 | .5312 | 9/16 | .5625 | 41/64 | .6406 | 21/32 | .6562 |
| 18 | .5568 | 37/64 | .5781 | 19/32 | .5938 |
| 24 | .5739 | 37/64 | .5781 | 19/32 | .5938 |
| 11/16 | .6875 | 24 | .6364 | 41/64 | .6406 | 21/32 | .6562 | 45/64 | .7031 | 23/32 | .7188 |
| 3/4 | .7500 | 10 | .6273 | 21/32 | .6562 | 11/16 | .6875 | 49/64 | .7656 | 25/32 | .7812 |
| 16 | .6733 | 11/16 | .6875 | 45/64 | .7031 |
| 20 | .6887 | 45/64 | .7031 | 23/32 | .7188 |
| 13/16 | .8125 | 20 | .7512 | 49/64 | .7656 | 25/32 | .7812 | 53/64 | .8281 | 27/32 | .8438 |
| 7/8 | .8750 | 9 | .7387 | 49/64 | .7656 | 51/64 | .7969 | 57/64 | .8906 | 29/32 | .9062 |
| 14 | .7874 | 13/16 | .8125 | 53/64 | .8281 |
| 20 | .8137 | 53/64 | .8281 | 27/32 | .8438 |
| 15/16 | .9375 | 20 | .8762 | 57/64 | .8906 | 29/32 | .9062 | 61/64 | .9531 | 31/32 | .9688 |
| 1 | 1.000 | 8 | .8466 | 7/8 | .8750 | 59/64 | .9219 | 1-1/64 | 1.0156 | 1-1/32 | 1.0313 |
| 12 | .8978 | 15/16 | .9375 | 61/64 | .9531 |
| 20 | .9387 | 61/64 | .9531 | 31/32 | .9688 |

*(Little Machine Shop, n.d.)*

### 3D CAD Shortcuts

Alibre Design 2019:

|  |  |  |
| --- | --- | --- |
| Drawing | Part | Assembly |
| CTRL+A - Select All | CTRL+A - Select All | CTRL+A - Select All |
| CTRL+C - Copy | CTRL+C - Copy | CTRL+C - Copy |
| CTRL+X - Cut | CTRL+X - Cut | CTRL+X - Cut |
| CTRL+V - Paste | CTRL+V - Paste | CTRL+V - Paste |
| CTRL+SHIFT+T - New Part Workspace | CTRL+SHIFT+T - New Part Workspace | CTRL+SHIFT+T - New Part Workspace |
| CTRL+SHIFT+L - New Sheet Metal WorkSpace | CTRL+SHIFT+L - New Sheet Metal Workspace | CTRL+SHIFT+L - New Sheet Metal Workspace |
| CTRL+SHIFT+B - New Assembly Workspace | CTRL+SHIFT+B - New Assembly Workspace | CTRL+SHIFT+B - New Assembly Workspace |
| CTRL+SHIFT+D - New Drawing WorkSpace | CTRL+SHIFT+D - New Drawing WorkSpace | CTRL+SHIFT+D - New Drawing WorkSpace |
| CTRL+SHIFT+M - New Bill of Materials Workspace | CTRL+SHIFT+M - New Bill of Materials WorkSpace | CTRL+SHIFT+M - New BOM Workspace |
| CTRL+P - Print | CTRL+S - Save | CTRL+S - Save |
| CTRL+S - Save | CTRL+SHIFT+S - Save As | CTRL+SHIFT+S - Save As |
| CTRL+SHIFT+S - Save As | CTRL+Y - Redo | CTRL+Y - Redo |
| CTRL+Y - Redo | CTRL+Z - Undo | CTRL+Z - Undo |
| CTRL+Z - Undo | DEL - Delete | DEL - Delete |
| DEL - Delete | F1 - Help | F1 - Help |
| F1 - Help | F3 - Previous View | F3 - Previous View |
| F3 - Previous View | F4 - Next View | F4 - Next View |
| F4 - Next View | CTRL+P - Print | CTRL+P - Print |
| CTRL+O - Open | ALT+ENTER - Properties | ALT+ENTER - Properties |
| CTRL+SHIFT+O - Options | CTRL+O - Open | CTRL+O - Open |
| ALT+TAB - Switch Windows | CTRL+SHIFT+O - Options | CTRL+SHIFT+O - Options |
| F9 - Join Session | ALT+TAB - Switch Window | ALT+TAB - Toggle Workspace |
| F10 - Leave Session | F9 - Join Session | F9 - Join Session |
| RMC Key - Right Click Properties | F10 - Leave Session | F10 - Leave Session |
| CTRL+SHIFT+A - View Annotations | CTRL+H - Hide | CTRL+H - Hide |
| CTRL+SHIFT+C - View Constraint Symbols | RMC Key - Right Click Properties | RMC Key - Right Click Properties |
| CTRL+SHIFT+R - View Redlines | CTRL+U - Orientations | CTRL+U - Orientations |
| ALT+ENTER - Drawing Properties | CTRL+R - Rotations | CTRL+R - Rotations |
| CTRL+K - SketchMode | CTRL+SHIFT+A - View Annotations | CTRL+SHIFT+A - View Annotations |
| CTRL+B - Bill of Materials | CTRL+SHIFT+C - View Constraint Symbols | CTRL+SHIFT+C - Auto Constrain |
| CTRL+I - Insert Custom Symbol | CTRL+SHIFT+R - View Redlines | CTRL+SHIFT+R - View Redlines |
| HOME - Zoom To Fit | CTRL+K - Sketch mode | CTRL+L - Layers |
| PgUp - Zoomin | CTRL+SHIFT+G - View Grid | CTRL+M - Measurement Tools |
| pgDn - Zoomout | CTRL+SHIFT+K - View Sketches | CTRL+E - Equation Editor |
| LeftArrow - PanLeft | CTRL+L - Layers | F5 - Regenerate |
| RightArrow - PanRight | CTRL+SHIFT+H - Check Part | HOME - Zoom To Fit |
| UpArrow - PanUp | CTRL+M - Measurement Tools | PgUp - Zoomin |
| DownArrow - PanDown | CTRL+E - Equation Editor | pgDn - Zoomout |
| Ctrl-LeftArrow - Move Pointer Left | F5 - Regenerate | LeftArrow - PanLeft |
| Ctrl-RightArrow - Move Pointer Right | HOME - Zoom To Fit | RightArrow - PanRight |
| Ctrl-UpArrow - Move Pointer Up | PgUp - Zoomin | UpArrow - PanUp |
| Ctrl-DownArrow - Move Pointer Down | pgDn - Zoomout | DownArrow - PanDown |
|  | LeftArrow - PanLeft | Ctrl-LeftArrow - Move Pointer Left |
|  | RightArrow - PanRight | Ctrl-RightArrow - Move Pointer Right |
|  | UpArrow - PanUp | Ctrl-UpArrow - Move Pointer Up |
|  | DownArrow - PanDown | Ctrl-DownArrow - Move Pointer Down |
|  | Ctrl-LeftArrow - Move Pointer Left | CTRL+SHIFT+P - View All References |
|  | Ctrl-RightArrow - Move Pointer Right | CTRL+SHIFT+I - Insert Part/Subassembly |
|  | Ctrl-UpArrow - Move Pointer Up | CTRL+SHIFT+N - Insert New Part |
|  | Ctrl-DownArrow - Move Pointer Down | CTRL+SHIFT+F5 - Deep Regenerate |
|  | CTRL+SHIFT+Z - Orient to Sketch Plane |  |
|  | CTRL+SHIFT+Q - Isometric to Sketch Plane |  |
|  | CTRL+SHIFT+P - View All References |  |
|  | CTRL+SHIFT+E - View Sketch Dimensions |  |

AutoCAD 2013 LT:

### 2D CAD Drawing Basics

**Things to Know:**

1. Work in layers and know the layer functions
   1. Recommended layers
      1. 0 – for the actual drawing
      2. Center – for center lines
      3. Hidden – for hidden lines
      4. Dimension – for drawing dimensions
   2. Layer Functions
      1. Match Properties – match the properties of an object from one layer to the properties of another layer. Useful in moving objects from one layer to another
      2. Make Current – easily switch from layer to layer
2. Make sure that the line color and line weights are all set to default. This will affect the appearance of the printed drawing if not set correctly
3. Working with Plant Layouts
   1. When working with a plant layout that takes several days or weeks, make sure that the final update is done on the most recent file. Other engineers can be working with a layout change during that period, and if the most updated drawing is not used their modifications will be lost.
   2. When copy and pasting complex objects into a cad file make sure that they are all one layer. Sometimes we receive an overhead CAD image from the equipment builder, and it is composed of many new layers. If this copy and pasted into the current layout drawing the layers will be added also. This can be seen in our current layout drawings with the many unneeded layers. This makes our CAD files less stable and greatly increases the file size.
4. Recommended CAD hot keys. (CAD was originally created to use without a mouse, and some of the functionality is still built into CAD. A combination of the hot keys and mouse can speed up the drawing process. Here are some recommend commands to learn and use.
   1. L – Line
   2. REC – Rectangle
   3. C – Circle
   4. CO – Copy
   5. TR – Trim
   6. EXP – Explode
   7. O – Offset
   8. EX – Extend
   9. DIV – Divide
   10. F – Fillet
   11. MI – Mirror
   12. M - Move

# Human Resources

## Break and Lunch Schedule

Hourly workers are paid for 7 hours of work, a 30-minute lunch, and 2 10-minute breaks. Salary employees are paid for 7.5 hours of work and receive a 1-hour lunch break and 2 15-minute breaks during their shifts. Hourly workers follow the following break schedule. Salary workers follow the same schedule except 1st shift lunch is from 11:30am-12:30pm and their shift is from 7:00am-4:00pm.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1st Shift  (7:00am-3:00pm) | | 2nd Shift  (3:00pm-11:00pm) | | 3rd Shift  (11:00pm-7:00am) | |
| 1st Break  (10 minutes) | 8:50am-9:00am | 9:00am-9:10am | 4:50pm-5:00pm | 5:00pm-5:10pm | 12:50am-1:00am | 1:00am-1:10am |
| Lunch  (30 minutes) | 11:00am-11:30am | 11:30am-12:00pm | 7:00pm-7:30pm | 7:30pm-8:00pm | 3:00am-3:30am | 3:30am-4:00am |
| 2nd Break  (10 minutes) | 1:50pm-2:00pm | 2:00pm-2:10pm | 9:40pm-9:50pm | 9:50-pm-10:00pm | 5:40am-5:50am | 5:50am-6:00am |

## 2022 Holiday Schedule

|  |  |  |
| --- | --- | --- |
| 10 paid holidays | | |
| January 3rd | Monday | New Year’s Day |
| April 15th | Friday | Good Friday |
| May 20th | Monday | Memorial Day |
| July 4th | Monday | Fourth of July |
| July 5th | Tuesday | Fourth of July |
| September 5th | Monday | Labor Day |
| November 24th | Thursday | Thanksgiving |
| November 27th | Friday | Thanksgiving |
| December 23rd | Friday | Christmas |
| December 26th | Monday | Christmas |

## Evacuation & Emergency Action Plans

Snow, fire, tornado, escape, etc.



## TMA Phone List

Last Updated: 10/2019

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| LM Fax # (740) 928-1418 / LB Fax # (740) 928-2344 / DC Fax # (740) 928-0146 / HR Fax# (740) 929-8668 | | | | | |
| **Ext.** | **Direct Dial** | **First Name** | **Last Name** | **Title** | **E-mail Address** |
|  |  |  |  |  |  |
| **286** |  | **Akio** | **Shimmi** | Maint.-Project Engr. | Ashimmi@tma.thk.com |
| **294** |  | **Alexis** | **McCullough** | Content Writer | AlexisMcCullough@thk.com |
| **298** | **527-1019** | **Alisha** | **Turley** | HR Acquisition Partner | Aturley@tma.thk.com |
| **149** | **929-8628** | **Alison** | **Nutter** | Accounting | Anutter@tma.thk.com |
| **122** | **929-8650** | **Ann** | **England** | Payroll-Accounting | [Aengland@tma.thk.com](mailto:Aengland@tma.thk.com) |
| **188** | **929-8601** | **Andrew** | **Lower** | VP | [Alower@tma.thk.com](mailto:ALower@tma.thk.com) |
| **129** | **929-8677** | **Andrew** | **Lower** | LB Side | Alower@tma.thk.com |
| **233** | **527-2451** | **Andy** | **Burris** | LM Supers – 1st shift | Aburris@tma.thk.com |
| **264** | **929-8647** | **Ashley** | **Bowles** | Warehouse Receiving Coor | Abowles@tma.thk.com |
| **107** | **929-8670** | **Atsushi (Atsu)** | **Okamoto** | LB General Manager | Aokamoto@tma.thk.com |
| **299** |  | **Audrey** | **McCullough** | Project Engineer | Amccullough.tma.thk.com |
| **113** | **929-8683** | **Ben** | **Beall** | Interpreter/Translator | Bbeall@tma.thk.com |
| **374** | **929-8606** | **Bobby** | **Bickle** | LM Scheduler Supervisor | Rbickle@tma.thk.com |
| **266** | **527-2426** |  |  | Purchasing Assistant |  |
| **118** | **929-8614** | **Brandon** | **Ryan** | Quality Engineer | Bryan@tma.thk.com |
| **293/226** | **527-2429** | **Brent** | **Boykin** | LB Assembly Prod. Mgr. | Bboykin@tma.thk.com |
| **373** |  | **Brian** | **Black** | LMGR Assbly. Prod.Supvr. | Bblack@tma.thk.com |
| **106** | **929-8640** | **Brian** | **Downs** | LM Prod. Supers. 2nd shift | Bdowns@tma.thk.com |
| **118** | **929-8614** | **Brandon** | **Ryan** | Quality Engineer | Bryan@tma.thk.com |
| **153** | **929-8609** | **Cage** |  | LM-Cage |  |
| **371** | **929-8629** | **Carlin** | **Ford** | Quality Assurance Tech. | Cford@tma.thk.com |
| **119** | **929-8682** | **Charlie** | **VanArsdale** | Facilities Custodian | Cvanarsdale@tma.thk.com |
| **104** | **929-8623** | **Chiaki** | **Okamoto** | Administrative Coordinator | Cokamoto@tma.thk.com |
|  |  | **Chie** | **Schuller** | Mgr-Language & Comm. | [Cschuller@tma.thk.com](mailto:Cschuller@tma.thk.com) |
| **146** | **929-8615** | **Chris** | **Downton** | HR Talent & Develop.Supvr.. | [Cdownton@tma.thk.com](mailto:Cdownton@tma.thk.com) |
| **110** | **929-8675** | **Chris** | **Fisher** | LM Engineering Supervisor | Cfisher@tma.thk.com |
| **124** | **929-8648** | **Chris** | **Lackey** | Materials Supervisor LM | Clackey@tma.thk.com |
| **116** | **929-8678** | **Chris** | **Ross** | Project Engineer | [Cross@tma.thk.com](mailto:CRoss@tma.thk.com) |
| **265** | **929-8657** | **Chuck** | **Tate** | LM Plant Manager | Ctate@tma.thk.com |
| **162** |  | **Christine** | **Clark** | LM Scheduling Clerk | Cclark@tma.thk.com |
| **181** | **929-8671** | **Clay** | **Hooper** | Maintenance Manager | Chooper@tma.thk.com |
| **280** | **929-8656** | **Danielle** | **Rymers** | Bilingual Lang. Instructor | Drymers@tma.thk.com |
| **371** | **929-8629** | **Darlene** | **Donaker** | Quality Technician | [Ddonaker@tma.thk.com](mailto:Ddonaker@tma.thk.com) |
| **154** | **929-8674** | **Dave** | **Compton** | Engineer Support | Dcompton@tma.thk.com |
| **152** | **929-8672** | **Dave** | **Garbark** | Facilities Engineer | [Dgarbark@tma.thk.com](mailto:Dgarbark@tma.thk.com) |
| **147** | **929-8641** | **David** | **Stebelton** | Maint. Project Engineery | Dstebelton@tma.thk.com |
| **229** | **929-8611** | **Dee** | **Scott** | QA Supervisor | [Dscott@tma.thk.com](mailto:DWard@tma.thk.com) |
| **194** | **929-8631** | **Derrick** | **Mitchell** | Maintenance Supervisor | Dmitchell@tma.thk.com |
| **262** | **929-8693** | **Die Cast** |  | Die Cast 2nd shift Prod.Supr |  |
| **128** | **929-8685** | **Donna** | **Holland** | Master Scheduler | Dholland@tma.thk.com |
| **100 or 0** | **928-1415** | **Dottie** | **Williams** | Receptionist | receptionist@tma.thk.com |
| **192** | **929-8651** | **Doug** | **Stoops** | Heat Treat- | dstoops@tma.thk.com |
| **224** |  | **Drew** | **Maxwell** | Maint. Process Engineer | dmaxwell@tma.thk.com |
| **292** | **527-2498** | **Dylan** | **Kull** | Project Engineer | Dkull@tma.thk.com |
| **369** |  | **Ed** | **Conley** | Network Administrator | [Econley@tma.thk.com](mailto:Econley@tma.thk.com) |
| **282** | **527-2495** | **Erin** | **White** | Production Analyst | Ewhite@tma.thk.com |
| **372** | **929-8687** | **Frank** | **Pusok** | LB 1st Prod Supervisor | [Fpusok@tma.thk.com](mailto:Fpusok@tma.thk.com) |
| **130** | **527-2472** | **Geoff** | **Schafer** | DC Shipping Supervisor | Gschafer@tma.thk.com |
| **261** | **527-2467** | **Greg** | **Rolfsen** | Die Cast 2nd Shift Supers. | Grolfsen@tma.thk.com |
| **193** | **929-8649** | **Heat Treat** |  | Heat Treat | heattreat@tma.thk.com |
| **117** | **929-8617** | **Heath** | **Mickley** | LM Asst. Assembly Mgr. | Hmickley@tma.thk.com |
| **228** | **929-8665** | **Heather** | **Callis** | LM Scheduler | Hcallis@tma.thk.com |
| **369** | **929-8655** | **IT Server Room** |  |  |  |
| **234** | **929-8676** | **Jamie** | **Dages** | Quality Engineer LB | Jdages@tma.thk.com |
| **230** | **929-8632** | **Jeanette** | **Dodson** | DC Coordinator | JDodson@thk.com |
| **289** |  | **Jeff** | **Sibert** | LB Engineering | Jsibert@tma.thk.com |
| **184** | **929-8681** | **Jeremy** | **Schnipke** | Quality Assurance Spvr LB | Jschnipke@tma.thk.com |
| **172** | **929-8660** | **Jim** | **Eckman** | General Mgr-LM Ind.Equip | Jeckman@tma.thk.com |
| **200** | **527-2450** | **Jim** | **Rennick** | LM Green RM Super. -2nd | Jrennick@tma.thk.com |
| **193** | **929-8649** | **Jim** | **Webb** | Production Supervisor | Jwebb@tma.thk.com |
| **261** | **527-2467** | **John** | **Miller** | Die Cast Super. – 3rd shift | Jmiller@tma.thk.com |
| **271** | **929-8690** | **Josh** | **Garza** | 3rd Shift LB Support Suprv | Jgarza@tma.thk.com |
| **151** | **929-8625** | **Josh** | **Van Sickle** | Design Engineer | [Jvansickle@tma.thk.com](mailto:Jvansickle@tma.thk.com) |
| **121** | **929-8620** | **Judith** | **Farmer** | Controller | Jfarmer@tma.thk.com |
| **145** | **929-8686** | **Justin** | **Reeves** | LB Supervisor-2nd shift | Jreeves@tma.thk.com |
| **165** | **929-8622** | **Justin** | **Sheets** | Suprv,.BilingualSupport L&C | Jsheets@tma.thk.com |
| **297** | **527-2435** | **Kamya** | **Krishnan** | Bilingual Comm. Support | Kkrishnan@tma.thk.com |
| **205** | **929-8639** | **Katie** | **Grundy** | LM Scheduler | Kgrundy@tma.thk.com |
| **207** | **929-8644** | **Kato (Takeshi)** | **Kato** | Coordinator LM Production | Ktakeshi@tma.thk.com |
|  | **740-438-1748** | **Kaz (Kazuhiro)** | **Kadosawa** | Sr. Quality Engr. LM | Kkadosawaa@tma.thk.com |
| **126** | **527-2435** | **Kay (Kazuhiko)** | **Takeuchi** | LB Production Engineer | Ktakeushi@tma.thk.com |
| **300** |  | **Kealee** | **Humphrey** | Maint. Process Engineer | Khumphrey@tma.thk.com |
| **262** | **929-8693** | **Ken** | **Proby** | Die Cast Supervisor | Kproby@tma.thk.com |
| **185** | **929-8613** | **Kevin (Kunishige)** | **Nakajima** | Systems Administrator | Knakajima@tma.thk.com |
| **153** | **929-8609** | **Khai** | **Abbott** | Materials Controller | Kabbott@tma.thk.com |
| **111** | **929-8624** | **Koji** | **Hayashi** | LM Design Engineer | Khayashi@tma.thk.com |
| **108** | **929-8646** | **LM Cage** |  | Inventory Coordinator | Llittle@tma.thk.com |
| **157** | **929-8643** | **LM Supervisors** |  |  |  |
| **271** | **929-8690** | **Lamar** | **Little** | 3rd Shift Supervisor LB | [Llittle@tma.thk.com](mailto:Llittle@tma.thk.com) |
| **115** | **929-8616** | **Lanna** | **Glenn** | Purchasing Agent | Lglenn@tma.thk.com |
| **158** | **929-8659** | **Leland** | **Ward** | Prod./Materials Manager | lward@tma.thk.com |
| **269** |  | **Lisa** | **Robberts** | QA Tech-LB | Lrobberts@tma.thk.com |
| **242** |  | **Maintenance North** |  | Ron Jones, Mike Willis |  |
| **197** | **929-8653** | **Marlene** | **Dixon** | DC Admin. Coordinator | [Mdixon@thk.com](mailto:Mdixon@thk.com) |
|  | **740-328-7905** | **Mason** | **Nickel** | Billungual Comm. Support | Mnickel@tma.thk.com |
| **143** | **929-8605** | **Matthew** | **Clark** | Sr. Staff Accountant | [Mclark@tma.thk.com](mailto:Mclark@tma.thk.com) |
| **257** | **527-2468** | **Mike** | **Brower** | Project Engineer | Mbrower@tma.thk.com |
| **112** | **929-8642** | **Mike** | **Gayheart** | Team Leader | Mgayheart@tma.thk.com |
| **101** | **929-8610** | **Mr. Teramachi** | **Teramachi** | C.E.O. |  |
| **187** | **929-8604** | **Mollie** | **Scurlock** | Accounting Clerk | mscurlock@tma.thk.com |
| **192** | **929-8651** | **Nick (Naoki)** | **Kozue** | LM Production Coordinator | Nkozue@tma.thk.com |
| **202** | **929-8645** | **Nishi (Takayuki)** | **Nishijima** | LM Production Coordinator | Tnishijima@tma.thk.com |
| **114** | **929-8621** | **Pauline** | **Parks** | Quality Document Control | Pparks@tma.thk.com |
| **371** | **929-8629** | **Quality Assurance** |  | QA Lab |  |
| **182/138** | **929-8688** | **Rance** | **Fetherolf** | LB Plant Manager | [Rfetherolf@tma.thk.com](mailto:Rfetherolf@tma.thk.com) |
| **179** | **929-8636** | **Rick** | **Arigan** | LM Sched/Mtls Manager | Rarigan@tma.thk.com |
| **125** | **929-8684** | **Ronni** | **Kell** | LB Master Scheduler | Rkell@tma.thk.com |
| **224** | **929-8692** | **Scott** | **Wood** | Process Improvem. Tech. | Swood@tma.thk.com |
| **112** | **929-8642** | **Shad** | **Mossholder** | LM Supervisor | Smossholder@tma.thk.com |
| **284** | **527-2477** | **Shelly** | **Swackhammer** | QA Specialist | Sarledge@tma.thk.com |
| **288** |  | **Shipping Dock** |  | Lori Skobrak | LBdock@tma.thk.com |
| **240** | **929-8663** | **Stacey** | **Emmert** | HR Generalist | Semmert@tma.thk.com |
| **103** | **929-8619** | **Steve** | **Parish** | Quality Manager | [Sparish@tma.thk.com](mailto:Sparish@tma.thk.com) |
| **112** | **929-8642** | **Steve** | **Rakaska** | LM Supervisor 3rd Shift | Srakaska@tma.thk.com |
| **166** | **929-8608** | **Swen** | **Hunt** | HR Supervisor | [Shunt@tma.thk.com](mailto:Shunt@tma.thk.com) |
| **204** |  | **Take (Taketo)** | **Murakami** | Prod. Support Coord. LM | Tmurakami@tma.thk.com |
| **196** | **929-8654** | **Tammy** | **Mount** | Distribution Clerk | [Tmount@thk.com](mailto:Tmount@thk.com) |
| **225** | **929-8693** | **Ted (Tetsuya)** | **Toriyama** | Die Cast Prod. Coordinator | [Ttoriyama@tma.thk.com](mailto:Ttoriyama@tma.thk.com) |
| **127** | **527-2448** | **Teresa** | **Mossholder** | Prod. Superv. LM Assembly | [Tmossholder@tma.thk.com](mailto:Tmossholder@tma.thk.com) |
| **105** | **929-8635** | **Teru (Yoshiteru)** | **Morita** | VP-Industrial Machinery | Ymorita@tma.thk.com |
| **201** | **929-8607** | **Tim** | **Basham** | LM Scheduler | Tbasham@tma.thk.com |
| **180** | **929-8602** | **Tim** | **Copper** | Sr. Quality Assurance Engr | [Tcopper@tma.thk.com](mailto:Tcopper@tma.thk.com) |
| **285** | **527-2419** | **Todd** | **Waugh** | LM Master Scheduler | [Twaugh@tma.thk.com](mailto:Twaugh@tma.thk.com) |
| **206** | **929-8637** | **Tomomi** | **Davis** | Asst. Prod. Support Coord. | [Tdavis@tma.thk.com](mailto:Tdavis@tma.thk.com) |
| **207** | **929-8644** | **Tony (Takayuki)** | **Shinoda** | LM Production Coord. | [Tshinoda@tma.thk.com](mailto:Tshinoda@tma.thk.com) |
|  |  | **Torie** | **Lebsack** | Supvr. Corp. Lang Services | [Tlebsack@tma.thk.com](mailto:Tlebsack@tma.thk.com) |
| **102** | **929-8600** | **Toshi (Toshiyuki)** | **Sugimoto** | President | [Tsugimoto@tma.thk.com](mailto:Tsugimoto@tma.thk.com) |
| **260** |  | **Tracy** | **Trickett** | Receiving | Ttrickett@tma.thk.com |
| **235** | **929-8627** | **Trisha** | **Richardson** | Asst. Materials Manger | [Trichardson@tma.thk.com](mailto:Trichardson@tma.thk.com) |
| **259** | **527-2471** | **Tyler** | **Clark** | LM Engineering Lead | [Tclark@tma.thk.com](mailto:Tclark@tma.thk.com) |
| **175** | **929-8612** | **Tyler** | **Turnbull** | IT Technician | Tturnbull@tma.thk.com |
| **227** | **929-8633** | **Vic** | **Grooms** | Team Lead Wrap & Pack | [Vgrooms@tma.thk.com](mailto:Vgrooms@tma.thk.com) |
| **260** |  | **Warehouse(new)** |  |  |  |
| **231** | **929-8695** | **Yumi** | **Aoyagi** | LM Bilingual Master Sched. | Yaoyagi@tma.thk.com |

# Reference

Machine Install Procedure

Machine installs are a lengthy process that starts by obtaining a “Machine Installation Work Request” form from the TMA Resource Center. Resource Center/Quality Assurance/Documents and Templates/Machine Installation Work Request ***(Note: Documents can only be downloaded from the resource center using Internet Explorer, SORRY!)***. This form will be used throughout the capital install process and should be updated on a regular basis. The type of equipment and install will dictate what sections of the form will be required to be checked off. Ultimately **all** sections are the responsibility for engineering to follow-up on the completion of each task and the completion of this form.

Table

Description automatically generatedTop Section:

* Receipt No. – This number is obtained from the excel file in: U:\Engineering\Engineering Div\Fabrication Modifica…..\M2020 Work Orders\(most recent file)
* Machine Name reference from similar machine types in master equipment list: U:\Engineering\Engineering Div\Master Equipment List\*most recent file*
* Machine Number: Must be created in the master equipment list

Machine Install Breakdown:

* **Layout (Engineer):** A layout for the new equipment will be completed in AutoCAD and can be started from a copy of the related building CAD file located in the Engineering drive. U:\Drawings in Engineering Div\Layout
  + Final Layouts must be approved by management prior to machine install
  + When starting a layout, the surrounding equipment must be verified for accuracy of drawing placement to negate or correct any previous errors.
  + Most layouts reference the column or concrete expansion joints
  + When adding a machine from a vendor’s CAD drawing move all drawing components to the same layer. Most vendor drawing will contain many layers and if the vendor drawing is cut and paste into the TMA CAD drawing the layers from the vendor drawing will be copied also. This makes for an extremely large and inefficient CAD file.
  + Be careful when working with CAD files. Multiple engineers can be working on layouts, so when making your final layout changes to the layout drawing make sure that you are using the latest file. Do not copy your modified file back into the layout folder as other changes could have occurred during your install process.
* **Layout Floor (Engineer):** The floor layout gives management and associated production groups the ability to view the actual machine location prior to setting the machine. This step can help alleviate any unforeseen issues. Layouts can be completed by marking either centerline locations or equipment perimeters depending upon machine requirements. The marks are also used for the rigging companies to aid in exact machine placement. Tape, chalk line, or paint markers can be used for layout purposes.
* **Arrival Schedule Confirmation (Engineer):** This can be followed up by the machine vendors, or in the case of oversea shipments by the Facility Engineer.
* **Unloading/Unpacking/ Machine Setting (Engineer):** Completed either internally by the engineering department and maintenance under engineering supervision, or by a equipment rigging company under engineering supervision. Final machine placement is the responsibility of the engineer in charge of the project.
* **Electrical Hookup (Engineer):** Completed either by outside contractor or TMA Maintenance group depending upon project size and timeline.
* **Air Hookup (Engineer)**: Completed either by outside contractor or TMA Maintenance group depending upon project size and timeline.
* **Coolant (Supply/Discharge) (Engineer):** Only required for specific machines
* **Machine Number Registration (Engineer):** This is the building of the record in the Master equipment list excel file. At this time the serial number and other pertinent information will be included in the master equipment list.
* **Machine History Setup (if necessary) (Maintenance Manager):** This is a throwback to prior to EPAC, where all the machine maintenance information was recorded in Excel. This step is in the process of being phased out.
* **Data Registration PLC (Engineer):** Most pieces of new equipment are installed with a PLC installed. It is the engineer’s responsibility to back up the program that is in the PLC in the case of a catastrophic failure.
  + Backup a copy of the program to the Master folder based upon the PLC type and Processor type. J:\English Software\Master. This is the master original backup that should never be touched or modified
  + Backup a copy of the program to the Revised folder based upon the PLC type and processor type. J:\English Software\Revised. This is the file that will be referenced for future modifications.
  + All PLC programs should contain the factory comments, but the comments are normally not stored in the actual PLC memory. PLC comments must be acquired from the vendor or in worse case scenarios entered by the engineer. In the case that the comments are Japanese, they will need to be sent to LangCom for translation. Saved PLC programs with comments will be designated by xxxxxxxxxx -c in the file name to indicate that they have comments.
  + PLC backups can consist of more than just the program. It is recommended to do a full backup due to some data that is not stored in the program. This can include servo settings, module settings, drive settings, or user entered stored data.
* **Data Registration (Screen) (Engineer):** Similar to the PLC backups, the HMI (human machine interface) screens are required to be backed up into two locations.
  + J:\English Software\Master\SCREEN
  + J:\English Software\Revised\SCREEN
* **Data Registration (NC) (Engineer):** NC stands for numerical control and can also be referred to as G-Code. This is primarily only associated with CNC controllers, and can be found on various types of machines throughout the plant. As with the PLC backups this may require more than a program backup due to other information that may need to be backed up.
* **Data Registration (Robot) (Engineer):** Backup of the robot will require the backup of the program and firmware of the robots. The backup process will vary between robot types, so refer to the manual of the specific robot type. Our primary robot of choice is Fanuc, and it is recommended to use a trained Fanuc engineer to assist in the backup.
* **Data Reg. (FANUC Data Sheets/Inspection Sheet) (Engineer):** Each Fanuc robot is shipped with an inspection sheet that needs to be stored. This contains all the official purchase information and serial number that Fanuc requires for support. In many cases the robot will also be shipped with a USB that contains all the software packages that were purchased with the robot. This is very important to keep for future robot upgrades.
* **Instruction Manual (Check Contents) (Engineer):** All equipment should come with a user manual that will need to be labeled by equipment number and stored in the Engineering room cabinets by the equipment number. In the case of duplicate manuals, the manuals can be labeled by the equipment number and stored in the electrical cabinet if the space allows. It is recommended to place the manuals in a sealed plastic bag to prevent dirt or oil contamination.
* **Accessory Equipment Manuals (Engineer):** Most larger pieces of equipment consist of parts that are either fabricated by the manufacture or purchased from other vendors. This could include sensors, displays, motors, drives, mechanical components. These manuals will be labeled and stored with the instruction manuals.
* **Translation Necessary (Engineer):** Not all manuals will be in English and specific portions of the manuals will need to be translated. Please note that this translation can include the PLC comments.
* **Operational Check (Engineer, Coordinator, Quality, Production):** Once a machine is in place it needs to be check for function. It is recommended to utilize a cross functional team to determine the proper operation of the machine.
* **Consumables/Drawing Check (Engineer):** This includes any fabricated parts that could experience a high amount of wear or possible damage. Drawings are important because the machines could have been fabricated in other countries and access to the consumable parts are not readily available. For this process it is also important perform a risk assessment to evaluate the components of the machine that must be kept in stock to keep the machine running. There are several factors to look at for this.
  + Will the components prevent multiple machines from running? What is the global effect on the plant if this machine does not run?
  + What is the availability of the parts? Can we get them in 24 hours, or 8-10 Weeks?
  + What is the price of the components? Do we need to keep a $10K part on the shelf that we can get in 24 hours?
  + Is this part on other machines?
* **Ongoing Machine Modifications (Engineer):** This is for any modifications completed as part of the new piece of equipment. This is normally not used on most machine installs.
* **Create PM (MC Op) Work Sheet (Engineer & Quality):** This process varies based upon the plant location. LB has different processes than LM. In LM the PM work sheets will consist of an Operator check list and a Master that explains the checks in more detail. This will require to go through the DCR process for the document creation or update.
* **LOTO Procedure/Arc Flash Label (Maintenance Manager):** The information from the master equipment list will be sent to the maintenance manager who creates the procedures to be posted on the machine. Arc Flash labels and single line diagram updates will also be required to be done. This is usually not done by project, but after we have several changes that need to be done to the single line drawing.
* **M/C Frames Update (Vice President):** After the full machine information has been entered into the master equipment list, the data from the master equipment list is sent to the VP, Maintenance Manager, and the Engineering staff member in charge of EPAC. MC Frames is used to globally track all THK’s assets. This is a extremely important part of the process. Once the items have been entered into M/C Frames a FAS number will be created for the machine.
* **EPAC Registration (Engineer):** EPAC is the maintenance tracking system used to track all assets throughout the plant. This information is used for maintenance request and for automatically generated PM work orders.
* **WIFI Registration (Engineer and IT):**  WIFI and Ethernet connectivity is becoming more common with all pieces of equipment. This may include recording IP address and other pertinent information. Currently most new pieces of equipment do not require this step.

Purchase Request/RA Procedures

There are two methods of purchasing items in manufacturing and which method you use is primarily driven by the total cost of the item or project. This value can vary from company to company, and currently for TMA, any item or project under $500 will be purchased under a standard Purchase Request.

Purchase Request

* Determine vendor or vendors for items to be quoted. (in some cases, multiple quotes may be required)
* Get approval for purchase from supervisor when quote(s) are received
* Email electronic version of quote to an engineering and maintenance support staff member to process the purchase. At this time the purchase is logged into a spread sheet for tracking and for purchase history.
* Save a copy of the quote in a folder in your engineering drive for your own purchase history to be used as a reference for item purchase history.
* The processed purchase request is then sent to purchasing for final approval and for the creation of a PO (purchase order) number
* Purchasing the sends the vendor the purchase order number
* Order placement completed
* Part will be received by the receiving department
* Items must be signed as received and then logged into the purchasing system as received. If this process is not completed the invoices from the vendor will not be paid. (Note that most purchases are purchased on 30-day terms and must be paid on 30 days upon receipt)
* ***Items or services that do not go through receiving still require that paperwork be logged through receiving. If this step is not complete, it will result in unpaid invoices****.*

RA (Request Authorization)

RA’s are required for any purchase over $500 which require a higher level of authorization steps. For smaller value items the RA purchases will be considered a manufacturing/buisness expense and will be written off during the time of purchase. For much larger value items the purchases will be considered capital purchases and depreciated over a period of time. For example, office supplies are expense items while a CNC Machine, that you would use for a longer period, is a fixed asset that depreciates every year.

Depreciation is an accounting method that a business uses to account for the declining value of its assets. By allocating the cost of a purchased asset over the period of time when it is expected to be in use, businesses can deduct a smaller amount of the cost over several years instead of one large deduction in the year it was purchased.

The purpose of this is to match the cost of the assets to the revenues earned from using the asset. Also, writing off assets allows you to lower the tax bills. Fixed assets, such as equipment and vehicles, are major expenses for any business. After a certain period of time, these assets become obsolete and need to be replaced. Assets are depreciated to calculate the recovery cost that is incurred on fixed assets over their useful life. This is used as a sinking fund to replace the asset when it is at the end of its working life or when you need to sell it.

Since it is used to lower the taxable income, depreciation reduces the tax burden. However, depreciation is a non-cash expense and has no effect on your cash flow or actual cash balance.

Small RA Purchases

Smaller, expensed, purchases will follow a similar path as the purchase request but will be submitted through the RA System AND the Purchase request System once it has been approved.

Large Capital RA Purchases

Large capital purchases are a much more complex process and will normally include purchases from multiple vendors that are all included in the total project cost.

* Project Development
* RFP (request for proposal submitted to multiple vendors)
* ROI generation (Return on Investment. Goal is less than two years)
* Vendor Selection
* Formal RFQ (request for final quotation)
* Project Initial Approval
* RA Generation
* Final Approval
* Purchase Request Submittals (Note: Large purchases in the US are normally purchased under different payment terms than the standard Net 30-day term. The most common will be a 30%,30%,30%,10%. This is 30% down at the start of a project, 30% after a specified time period, 30% prior to shipment, and 10% after receiving. ***These terms must be included on the Purchase Request since they will be invoiced separately***.

RA Categories

* Prepaid: Not normally used by Engineering
* Capital: Primarily used when purchasing new equipment/new asset that will be used to expand or improve production
* R&M: Repair and Maintenance. This will be used to repair and asset. It is recommended to review with Maintenance Manager prior to using this category. In many cases the items that Engineering would purchase would fall into the MFG Expense category.
* MFG Expense: Used for expensive consumables that can be used on an asset or used for a process. This category is sometimes confused with R&M.
* DC: Distribution Center, not normally used by Engineering
* Modify an Asset: Used for additions or modifications to existing assets that will improve performance or increase capacity.
* General & Administrative Expense: Not used by Engineering
* Training: Used for outside training or internal training that is for large groups.
* Lang/Communications: Not used for Engineering
* Software Capital Expense: Not normally used by engineering due to the fact that software purchased is normally attached to some other Capital project. It could be used for software that is purchased individually and that would be controlled by IT.
* Software and Hardware Support Prepaid: Would be used for subscription-based software, but this is not normally handled through engineering.

DOR Defect Code List

Diagram

Description automatically generated