Section 23 – Project Engineer Procedures
Table of Contents

1.0 SCOPE ......................................................................................................................... 3
  1.1 PROJECT ENGINEER (PE): ....................................................................................... 4

2.0 GENERAL PROCEDURES ............................................................................................. 5
  2.1 OTHER POLICIES AND PROCEDURES ................................................................. 5
  2.2 CUSTOMER COMMUNICATION .............................................................................. 5
  2.3 INTER-COMPANY/INTER-DIVISION COMMUNICATION ........................................ 6
  2.4 TECHNICAL SUPPORT FOR THE OTHER COMPANIES ...................................... 6
  2.5 ELECTRONIC ORDER DOCUMENTATION PROCEDURES ............................... 6
    2.5.1 Directory Nomenclature ...................................................................................... 6
    2.5.2 File Types ............................................................................................................ 7
    2.5.3 Shipping Documents Directory .......................................................................... 8
    2.5.4 Master Release Directory ................................................................................. 8
    2.5.5 Production Order Directory ............................................................................. 8
    2.5.5 As Built and As Released Directories .................................................................. 9
    2.5.6 Summary of Directories .................................................................................... 9
  2.6 PRICING, QUOTATION, AND PRICE PROCEDURES ........................................ 10
    2.6.1 Bill-of-Materials (BOM)................................................................................... 10

3.0 QUOTES ......................................................................................................................... 11
  3.1 QUOTE REQUESTS ................................................................................................. 11
  3.2 QUOTE CREATION PROCESS ............................................................................... 11
  3.3 CONCEPT DEVELOPMENT .................................................................................... 12
    3.3.1 Initial Concept .................................................................................................. 12
    3.3.2 Engineering Management Concept Review .................................................... 12
    3.3.3 Outside Sales Concept Review .................................................................... 12
  3.4 PRICING, PRELIMINARY SCHEMATICS AND QUOTE WRITE-UP ................. 13
    3.4.1 Re-quotes ....................................................................................................... 13
  3.5 MARGIN AND SELLING PRICE ............................................................................ 14
  3.6 QUOTE REVIEW .................................................................................................... 15
    3.6.1 Review by salesman ....................................................................................... 15
    3.6.2 Review by engineering manager ................................................................... 15
  3.7 QUOTE DELIVERY ................................................................................................. 16

4.0 ORDERS ......................................................................................................................... 17
  4.1 PURCHASE ORDER RECEIPT HANDLING ....................................................... 17
<table>
<thead>
<tr>
<th>General Engineering Procedures</th>
<th>Standard Work Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 23</td>
<td></td>
</tr>
</tbody>
</table>

4.1 Customer Purchase Order
4.1.2 Order Handling by Engineer
4.1.3 Repeater Handling by Engineer
4.1.4 Production Release Repeater Orders
4.1.5 Non-Production Release Repeater Orders

4.2.1 Price and/or Quantity
4.2.2 Contract
4.2.3 Delivery
4.2.4 Payment Terms
4.2.5 Credit
4.2.6 Part Number
4.2.7 Design Revision

4.3 Engineering Order Documentation
4.3.1 Bill-of-Materials (BOM)
4.3.2 Hydraulic Schematics
4.3.3 Electrical Schematics
4.3.4 Mechanical Layout Drawing
4.3.5 Testing Document(s)
4.3.6 Spare Parts
4.3.7 Additional Documentation
4.3.8 Create Production Order Worksheet
4.3.9 Update TRM

4.4 Repeat Order Documentation

4.5 Engineering Documentation Review
4.5.1 Safety
4.5.2 Terms
4.5.3 Review the Design
4.5.4 Pricing

4.6 Engineer-Coordinator Handoff

4.7 Production Scheduling

4.8 Final Engineer Review Prior to Coordinator-Shop Handoff

4.9 Change Orders

4.10 Manual POs

4.11 Engineering Responsibility Once Job is Released to the Shop

4.12 First Production Review with Shop

4.13 Second Production Review with Shop

4.14 Testing

4.15 Job Close
1.0 Scope

The purpose of this section is to provide some standard procedures and methods for building a power unit.

NOTE: These are only guide lines. Official assembly drawings, schematics, or engineering notes determine the final layout assembly of all units. Check with your Project Engineer on any questions pertaining to procedural, construction, or layout issues.

Purpose: The purpose of this document is to define a set of standards and practices for the engineering department. It is not a standalone document but is intended to be used in conjunction with the following:

- Network naming and file location conventions
- Employee handbook
- Privacy and Intellectual Property Protection
- Shop Procedures
- Reception Procedures
- Accounting Procedures
- Outside sales Procedures
- Salesforce.com manual
- IFP/EHA Quality Manual
- Shop “Red Book”
- EHA Drawing standards

In addition the engineering manager may make changes and give verbal instructions from time to time to cover unusual circumstances or otherwise improve or clarify these guidelines.
1.1 Project Engineer (PE):
The PE’s job is to manage projects from across different phases of the project from quoting, production, start-up and support.

The PE is responsible for:
- All project costs even if other engineers work on parts of the project.
- System quality.
- Delivery to the customer’s satisfaction within reasonable ability to do so.
- Meeting contractual obligations
- Customer satisfaction
- Protecting the company from harm & liability
- Producing safe equipment
- Following all departmental and company policies
- Protecting the employees and co-workers from all safety hazards
- Following all Federal, State, and local laws.
- Communication and coordination with other parts of the company including but not limited to: Outside Sales, Inside Sales, warehouse, accounting, purchasing, etc.

Project Engineers also perform primary technical support for the other departments and companies.

Project Engineers develop designs, write quotes, estimate costs, create bill of materials, manage the shop schedule, supervise the shop construction, oversee testing, and perform onsite startup and technical support. The project engineer handles a project from cradle to the grave.
2.0 General Procedures

2.1 Other Policies and Procedures
In addition to the procedures listed in this document all company rules and the following documents should be followed:

- Network naming and file location conventions
- Employee handbook
- Privacy and Intellectual Property Protection
- Shop Procedures
- Reception Procedures
- Accounting Procedures
- Outside sales Procedures
- Salesforce.com manual
- IFP/EHA Quality Manual
- Shop “Red Book”
- EHA Drawing standards

In addition the engineering manager may make changes and give verbal instructions from time to time to cover unusual circumstances or otherwise improve or clarify these guidelines.

2.2 Customer Communication
Customers are the lifeblood of this company and should be treated as such. All correspondence should be acknowledged or followed up on within 24 hours if possible. When a customer is having problems more frequent responses are required even if no new information is known.
2.3 Inter-company/Inter-department Communication

What goes here?

2.4 Technical Support for the other companies

Technical support for inside and outside sales departments.

- Log time spent into TRM as “IS” (IFP Support). Note the specific product in the notes field (ie: Rexroth, Balluff, Weidmueller, etc).
- Return needed information to CSR for pricing and availability.
- Inform outside salesman of call

All customer/vendor correspondence relating to a project to be filed with the folder. E-mails should be copied into a subfolder of the drawing folder named “customer correspondence”. If more than one quote is attached to the drawing then suffix the folder with the quote number.

2.5 Electronic Order Documentation Procedures

Due to the following reasons all schematics, layouts, job pictures, etc. will need to be submitted and maintained electronically:

- Coordinators/shop do not have the ability to print schematics.
- To avoid confusion about which revision/drawings/etc. are current for that production order
- To avoid sending old documents to the shop that may have changed since order entry
- To provide for access for electronic devices
- To store “As-built” information to avoid the confusion of what revision/version was used in the production.

2.5.1 Directory Nomenclature

The following directory structure and naming conventions will need to be followed:

- Master release documents in “n:\dwgs\{drawing directory}\Master_Release”
  - Note: There is an “_” (underscore) between “Master” and “Release”
- Production Order Specific in, “n:\dwgs\{drawing directory}\P{Production order Number (full number)}”
- Production Order Specific in, “n:\dwgs\{drawing directory}\P{Production order Number (full number)}\Shipping_Docs”

Page 6 of 28 N:\Internal\QC\Quality Management System (QMS)\Quality Work Procedures (QWP)\Engineering\Project Engineer (QWP).doc
Note: Due to compatibility issues between computers with different operating systems, FILENAMES MUST NOT CONTAIN SPACES!! An underscore should be used in place of spaces in the master release and production order directories.

2.5.2 File Types
A PDF of any of the following documents should be put in the corresponding directory:
- Schematics
- Layouts
- Pictures (if multiple pictures exist then please combine into as few of PDF pages as possible)
- Assembly drawings
- Component datasheets if required
- Test specifications (only if referenced in the “Production release” sheet)
- The “Production Release” sheet from excel with blank “production order number” and released date fields

A PDF should be used because of the widespread support for this file format and the ease at which the coordinator can print them. However, any file type that is widely supported by browsers without a plug-in could technically work.

Filenames should start with the PARENT PART NUMBER (the drawing number in most cases) and then a description of what the file is. For example:
14861AA HYD Schematic.pdf
14861AA Elec Schematic.pdf
14861AA Assembly Drawing.pdf
14861AA Sample Pictures.pdf
14861AA Sample Picture 1.jpg
14861AA Example Picture 1.jpg
14861AA Production Release.pdf

Note: Due to compatibility issues between computers with different operating systems, FILENAMES MUST NOT CONTAIN SPACES!! An underscore should be used in place of spaces in the master release and production order directories.
Note: Use discretion when putting specifications in these directories by determining what the shop needs for manufacturing purposes. For example, a 4WE6 valve data sheet is not required by the shop to assemble most manifolds. The general rule is that if the drawing/datasheet/file is available elsewhere then don’t include it unless it is absolutely necessary. With few exceptions only EHA generated content should be placed in the Master_Release directory.

2.5.3 Shipping Documents Directory
The “Shipping_Docs” directory is contained under the production/master_release directories. The purpose of this directory is to place copies of documents that are intended to “Ship” with the unit or are intended for release to the customer.

2.5.4 Master Release Directory
The purpose of the “Master_Release” directory is to hold files for production items that the Project Engineer has determined are stable designs, well documented, and that he has no need to review prior to orders being placed, built and shipped without his intervention (someone must still signoff on the inspections however). Generally a first build of a production should not have a master_release directory created until the production order has gone through the shop and no issues found.

Note: The project engineer is the only one who should place documents into the Master_Release directory.
To rescind a “master_release” rename the “master_release” directory to {obsolete_CCYY_MM_DD}.

2.5.5 Production Order Directory
Upon receiving an order the coordinator shall check for the existence of the “Master_Release” directory AND a file matching the parent part number being ordered by the customer.

If files in the “Master_Release” directory do not exist then the order should be turned over to the project engineer and he will provide a complete set of documentation for the order. The project engineer may elect to create a “Pxxx” directory in the root drawing folder as a place holder and put files into that directory that he intends to be used for the production order. This is required as the production order number is not assigned until the order write-up is
turned in and entered into P21. Once the coordinator creates the production order in P21 then they will RENAME the “Pxxx” to the P{Full Production Order Number} directory name. If this method is being used then the project engineer should inform the coordinator when he turns over the order write-up to avoid confusion.

Prior to releasing a job to production the coordinator will print all documents in the production order specific folder.

Prior to shipping a power unit that normally would have a schematic wire tagged to the power unit, the coordinator will print a copy of all documents in the “Shipping_Docs” directory.

The project engineer is responsible for updating all paper copies once the job has been released to the shop and for maintaining current docs in the production release folder. The shop should be informed of the new drawings and the changes from one revision to another.

2.5.5 As Built and As Released Directories

“As_Built” and “As_Released” directories can be used to hold additional files to “Lock” a copy of them. For example a copy of the AutoCAD file can be copied into the “as built” directory along with the pdf versions so that they can be a snapshot of that file at that moment in time. The use of these directories is project specific. On low volume repeaters it should not be used.

After the close of the production order all scanned documents will be placed into a directory called “as_built” in the \P{Production order number} directory. In addition, all job pictures should be placed in that directory as well. (A copy of the AutoCAD/excel file can/should be copied there to preserve the information of what was used to build.)

Note: The shop will only be presented with files in the root directory of the production order specific directory.

2.5.6 Summary of Directories

In summary the following directories are going to be standardized:

- Master release documents in “n:\dwgs\{drawing directory}\MasterRelease”
• Master release documents in “n:\dwgs\{drawing directory}\MasterRelease\obsolete_CCYY_MM_DD”
• Production Order Specific in “n:\dwgs\{drawing directory}\P{Production order Number (full number)}\Shipping_Docs”
• Production Order Specific in “n:\dwgs\{drawing directory}\P{Production order Number (full number)}\as_released”
• Production Order Specific in “n:\dwgs\{drawing directory}\P{Production order Number (full number)}\as_built”
• “Pre-release” Production Order Specific documents in “n:\dwgs\{drawing directory}\Pxxx”

2.6 Pricing files and Excel Procedures

Use current templates

2.6.1 Bill-of-Materials (BOM)

Pricing - all pricing will be done in Excel by the following method:
• If this is a new quote/project then copy the pricing spreadsheet from the template to a new tab and save in the drawing directory.
• If this is a re-quote then copy the newest version of the Job or quote pricing page to a new tab to be labeled: XXXXAA-QXXXX. If the design is going to change make sure you copy any “Design” pages as well and use the format “Design-Qxxxx”.
• Fill in date, quote number, customer name, in header
• All Changes to the worksheet (except header of course) are to be done by the following methods:
  o If the quote is a re-quote or new revision then mark the items that changed from the previous quote to help understand the differences between the two prices or designs. Follow the colors on the top of the template to mark those items. It is not necessary to mark the whole row of the things that changed.
    ▪ Mark the PN if it changed or was added
    ▪ Mark qty if changed, price or discount if changed. Margin, etc.
  o Often it is helpful to leave the old lines in the spreadsheet and blank out the qty, highlight the qty field and add the replacement items below those lines.

Order write-up
• All order write-ups will be done in Excel by the following method:
  o Copy the pricing spreadsheet to a new tab. New tab is to be labeled: XXXXAA JXXXX.
  o Fill in date, quote number, customer name, in header
  o All Changes to be done by the following methods:
    ▪ Modify the BOM above to keep it correct as would be ordered next time or for the books.
    ▪ Valves with spool changes, springs, etc. done for one time only reasons to show corrected final part numbers only.
    ▪ Pricing to be kept up-to-date by engineer and coordinator.
    ▪ All changes to be shown down below BOM with all pluses and minuses clearly shown along with a note of explanation and a date.
  • A yellow sheet still given to Engineering coordinator and filled with the order.

3.0 QUOTES

3.1 Quote Requests
Incoming requests come from the following sources.
• Outside sales
• Inside sales
• Directly from customer
• Assigned by engineering manager

Inform supervisor for possible re-assignment of the quote if workload or project is more suited to another engineer.

3.2 Quote Creation Process
Assign quote # in TRM
• All quotes should receive a quote number as soon as a customer/salesman provides an initial request
• A drawing number should be assigned at the time a quote is assigned
• Discuss with territory salesperson (on-going throughout total project)
• Estimated mark-up is established by salesperson
• Review the application to determine if customer has any special requirements
3.3 Concept Development

3.3.1 Initial Concept
After all of the initial customer requirements have been defined, the initial concept should be developed. Depending on the nature and complexity of the project several engineers may be involved to help develop an initial concept.

- At this phase, hand sketches, preliminary schematics, rough numbers, etc. can be collected to present to a reviewing group of engineers
- Safety should be part of the process
- Contractual review
- Final product specifications review
- A “design” tab in the excel spreadsheet should be created and all design constraints, inputs, bores/rods/strokes, cycle timing, I/O list, etc. should be documented.

3.3.2 Engineering Management Concept Review
Review by engineering manager
- All quotes that are unusual, complicated, large dollar (over $50k), or involving a large amount of labor or other departments should be reviewed by the Engineering manager at the earliest possible time in the process to see if the quote should be continued beyond the concept stage.
- The concept development can be an iterative process involving going back for re-design, further design, etc. until a final design has been developed.

3.3.3 Outside Sales Concept Review
The salesman should be consulted after a successful concept review to see if they concur. If they do not, then the Engineering manager and salesman shall resolve any issues with the salesman’s ultimate recourse being the company president.
3.4 Pricing, Preliminary Schematics and Quote Write-up

Prepare spreadsheet of anticipated costs (Excel)

- From standard templates
  - Burden
  - Margin
  - Freight
  - Misc.
  - Header information:
    - Revised Date
    - Created Date
    - Project Name
    - Standard colors
- Prepare preliminary schematic – (ZwCad)
  - Use of standard library

3.4.1 Re-quotes

If this is a repeater then “pull” the production release documentation
Follow quote procedures for the Excel pricing document.
3.5 Margin and Selling Price

The salesman sets the selling margin. If that margin is outside of the limits set by the engineering manager then inform the manager before sending the quote.

The market should always be considered with setting a final sell price.

Basic Margin guidelines:

Power Units:
- OEM Customer 25-28%
- End User 28-35%
- Consult management if the salesman sets less than 20%

Manifolds:
- OEM Customer 18-25% depending on volume
- End User 28-35%
- Consult management if the salesman sets less than 18%

Terms:
- All projects over $25,000, odd and unusual projects, and special cases shall be have terms for that project considered.
3.6 Quote Review

All quotes SHALL BE REVIEWED by a second person, preferably a second PE. Each person reviewing a quote should review the following items:

- **Safety**
  - Can we make it safely?
- **Verbiage**
  - Does the quote spell out what the pricing prices?
  - Is it clear what the customer needs to provide/do?
  - What TERMS are being offered
- **Review the design**
  - Does it make sense?
  - Will it work?
  - What are the key issues with the design?
- **Pricing**
  - Does the pricing reflect what is on the quote?
  - Review List prices, discounts, net costs. Do they look correct?
  - Review Labor, miscellaneous costs, inbound freight.
  - If repeater, what happened last time? Margin? Labor?

3.6.1 Review by salesman

The salesman should be part of the quote review process. Smaller quotes rarely require much feedback, but larger systems often involve tight pricing, terms, contractual items, etc. and salesmen should be given every chance to review and comment as early as possible in the review process.

3.6.2 Review by engineering manager

All quotes that are unusual, complicated, large dollar (over $50k), or involving a large amount of labor or other departments should be reviewed by the Engineering manager at the earliest possible time in the process.
3.7 Quote Delivery

After the quote review process has been completed the following steps should be followed:

- e-mail (or hand) the quote to salesman, bcc: quotes@ifpusa.com
- Make it very clear that you have not sent to customer and if it meets the salesman’s approval that they can forward it to the customer
- Always use .pdf file for the quote form
- Send via separate e-mail the spreadsheet of costs
- Mark the quote as “mailed” in TRM to close the quote task. Use the date that the quote got delivered as the mailed date.
- File for future reference
  - File by drawing number.
  - Included in file
    - All notes and materials related to the quote
    - Copies of quotes by 3rd parties. –scan and file
    - Copies of e-mails – drag and drop from excel
    - A copy of the pdf quote sent to the customer
    - A copy of the pdf of the schematic sent to the customer
    - If pieces of the spreadsheet need to be sent to the customer, always copy to separate sheet and follow file naming rules such as “xxxxxxAA sent on xx_xx_08.xls”.
    - Do not copy the sheet outside of excel and delete the sheets as this information may be recovered by the customer. Always select the tab and copy into a new workbook.
4.0 Orders

4.1 Purchase Order Receipt Handling
A purchase order can come in by several methods including fax, e-mail, or called-in. In addition it can come in by many routes as well including, coordinator, IFP inside sales, outside sales, or directly to the project engineer.

4.1.1 Customer Purchase Order
Customer Purchase Order
- Forward to person who created the Quotation
- Verbal
  - Record the date and the name of person placing order
  - Request that confirming P.O. be sent by fax or mail
- Hard copy of P.O. (Mailed or Faxed) will be delivered to the engineering coordinator who will in turn inform the PE of the order.

4.1.2 Order Handling by Engineer
Order Handling by Engineer
- Create Job # in TRM
- It is the PE’s job to inform to salesman of the order, an e-mail is the preferred method
- Review all materials in the quote
- Determine if the order is a repeater

4.1.3 Repeater Handling by Engineer
Repeater handling by Engineer
- Repeaters fall into two categories
  - Production Release
  - Non-Production Release
- Review TRM for labor and margin to determine if necessary to re-quote
- Must be reviewed by engineering unless electronic Production release order indicates “Production Release”.

Page 17 of 28 N:\Internal\QC\Quality Management System (QMS)\Quality Work Procedures (QWP)\Engineering\Project Engineer (QWP).doc
4.1.4 Production Release Repeater Orders
Production Release Repeater Orders shouldn’t need to involve the Engineer. They should be documented in sufficient enough way so that the coordinator can manage all aspects of the order including price and delivery.

4.1.5 Non-Production Release Repeater Orders
An engineer reviews all “Non-Production Release” orders to:
- Verify that no changes are required
- Verify pricing
- Verify BOM
- Verify layout
- Make sure the documentation is correct and meets current standards for repeaters
- Review TRM for labor and margin to determine if necessary to re-quote
- Check old production release for fittings, shop notes

It is the ENGINEERS JOB to make sure that fittings get put on repeaters and that the documentation gets done for repeaters.

4.2 Purchase Order Review
All purchase orders SHALL BE REVIEWED for the following information. If the any of the items on the PO deviate from our quote, then the Engineering Manager and possibly the salesman should be consulted and the order not entered or acknowledged until a successful review has been completed and all parties are in agreement.

4.2.1 Price and/or Quantity
- Does the price and quantity match what was quoted?
- Time frame, how much time has elapsed

4.2.2 Contract
- Does the PO try to apply additional terms and conditions?
- Does the PO try to modify the liability in any way?
4.2.3 Delivery
   • Is the customer’s requested delivery able to be met?

4.2.4 Payment Terms
   • Did the customer modify our payment terms?

4.2.5 Credit
   • Is the customer’s credit acceptable?

4.2.6 Part Number
   • Does the part number match what was quoted?

4.2.7 Design Revision
   • If the customer part number is a design behind or doesn’t match our current design then every attempt to get the customer to revise his part number should be attempted
   • Audits require IFP / EHA to have traceability in all areas of production. It is vital that we watch revisions and part numbers.
   • While we can’t always get customers to update purchase order information it is NOT acceptable to be selling the “DB” revision on our sales order and the drawings be for “DC”
   • Our documentation should match all the way around. Schematics, layouts, sales order, spreadsheets, etc. should all be consistent and match.

Need more here?
4.3 Engineering Order Documentation

The PE is responsible for all order documentation. The level of detail varies depending on the type of project, its level of repeat business, and customer requirements.

4.3.1 Bill-of-Materials (BOM)

All items on the BOM should have:

- Sufficient information for the coordinator / purchasing so the part can be procured
- Preferred vendors
- Pricing for all new items
- Include special instructions for ordering like special discount, combining orders, special terms or lead time, etc.
- Spread sheet copy for shop without costs if manifold is in supply. This sheet should go to the shop floor.

4.3.2 Customer supplier Parts

- When a customer provides parts, the correct way to handle the production order BOM is to put an asterisk in front of the part number and use “Customer supplied Motor/Pump/Valve/etc” as the description. The CSR should issue a PO to the customer for zero dollars so that our receiving department can receive the part and make sure that it reaches the production order. This also allows us to track that the part was customer supplied when looking at it after the fact. If the exact part number that the customer is going to supply is not known then use an asterisk and the best description you have for it like “*20HP 254TC 1800RPM” electric motor.
- This this is something out of the ordinary the CSR should be told about it to avoid any confusion.

4.3.2 Hydraulic Schematics

For most projects a schematic and production release worksheet are required for shop construction. Every job should have a computer schematic. Hand sketches are fine to get the job entered and pushed through quickly but by the time the parts hit the floor the job should have a computer schematic.

- Does it meet all engineering schematic requirements (PSI Flow settings)?
- Are settings labeled correctly?
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<th><strong>4.3.3 Electrical Schematics</strong></th>
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<tbody>
<tr>
<td>For most projects a schematic and production release worksheet are required for shop construction. Every job should have a computer schematic. Hand sketches are fine to get the job entered and pushed through quickly but by the time the parts hit the floor the job should have a computer schematic.</td>
<td></td>
</tr>
<tr>
<td>- Does it meet all engineering schematic requirements</td>
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<tr>
<th><strong>4.3.4 Mechanical Layout Drawing</strong></th>
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<tbody>
<tr>
<td>- Determine that the physical drawings are correct</td>
<td></td>
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<tr>
<td>- Are hard specification dimensions called out clearly?</td>
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</table>

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<tr>
<th><strong>4.3.5 Testing Document(s)</strong></th>
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<tbody>
<tr>
<td>Specify special considerations, for example:</td>
<td></td>
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<tr>
<td>- Food grade application?</td>
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<tr>
<td>- Glycol based hydraulics that can't be tested with standard hydraulic oil?</td>
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<th><strong>4.3.6 Spare Parts</strong></th>
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<tr>
<th><strong>4.3.7 Additional Documentation</strong></th>
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<tr>
<td>Create as required by project type</td>
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<th><strong>4.3.8 Create Production Order Worksheet</strong></th>
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<tr>
<td>All special instructions to be clearly written on the job production order worksheet. Non-standard items and practices are to be called out on either the drawing or the production release worksheet.</td>
<td></td>
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<tr>
<td>- Correct settings listed</td>
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<tr>
<td>- All special construction notes to be called out (bead blast, layout constraints, etc.)</td>
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<tr>
<td>- Special or customer supplied paint</td>
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</tr>
<tr>
<td>- Any modified components must be noted, although how or what to do can be supplied separately. (Items like change spools, special stack drills)</td>
<td></td>
</tr>
<tr>
<td>- Any special testing notes</td>
<td></td>
</tr>
<tr>
<td>- Special shipping or packaging requirements</td>
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</tr>
<tr>
<td>- All loose-shipped items to be called out</td>
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Page 21 of 28 N:\Internal\QC\Quality Management System (QMS)\Quality Work Procedures (QWP)\Engineering\Project Engineer (QWP).doc
• All loose ship items shall be noted on the production release. It is preferred that it is also noted on the schematic with a dashed line showing what is mounted on the unit and what is loose.
• Any layout constraints or special production processes shall be called out.
• Any item that deviates from the shop “RED BOOK” should be clearly called out.
• Items on the BOM that required modification (such as spool changes, pump controls, etc) should be called out.
• Any special testing requirements should be called out.
• Obtain sales approval.
• Insert pictures of a prior build onto the worksheet. Be sure to make clear notes on the worksheet of any required changes from the pictures. Pictures should not be included if they are going to cause confusion for the builder. CAD drawings with a fully ballooned drawing is the preferred method of documenting drawings.
• The schematic and the production release worksheet should contain all of the information required by the shop for construction and testing without further engineering interaction.

4.3.9 Update TRM
Review and update TRM statistics, estimated hours and margin as needed

4.4 Repeat Order Documentation
Repeaters should have a higher level of documentation since they have been designed and built before. The documentation on repeaters should be at a level that the unit can be built with little or no engineering shop interaction with respect to layout, testing, and shipping.

• Production release order (PRO) to be filled out in Excel along with scanned pictures linked in
• Fittings should be on the BOM so check last order
• While not every repeater must be documented to the extreme, the following is expected:
  o Bill of materials for manifolds should be ballooned and annotated.
  o Mechanical drawings. At the very least a simple X,Y hole size drawing (even if it’s a scanned hand sketch for really in-frequent repeaters) is done. Label the function of each port such as “Case Drain.”
• It’s the PE’s job to make sure that the fittings from the last job are updated on the BOM so they can be pulled for the next job.
• Does the documentation meet all engineering specs (PSI, GPM, etc)?
• Digital/Scanned Pictures. Drawings are preferred to prevent errors so the pictures should be for reference only.

4.5 Engineering Documentation Review
All order-write-ups SHALL BE REVIEWED by a second PE. Engineering Coordinator is not to enter the order without a 2nd engineering signature. Each person reviewing the order should review the following items:

4.5.1 Safety
• Can we make it safely?
• Can the customer operate it safely?

4.5.2 Terms
• Terms are handled MANUALLY and must be reviewed with the coordinator and accounting

4.5.3 Review the Design
• Does it make sense?
• Do the electrical and hydraulic schematics match?
• Will it work?
• What are the key issues with the design?

4.5.4 Pricing
• Does the pricing reflect what is on the quote?
• Review list prices, discounts, net costs – do they look correct?
• Review labor, misc. costs, inbound freight
• If repeater, what happened last time? Margin? Labor?
4.6 Engineer-Coordinator Handoff
See section on Repeaters

The PE is responsible to make sure that the coordinators have the latest, greatest, documentation. Sometimes the job gets entered with partial or incomplete documentation to get the job rolling but it’s PE’s job to ensure that the documentation that goes out to the job floor is the most up-to-date documentation available.

See section on “Order Documentation” for documentation requirements.

The PE should review with the coordinator all of the delivery, pricing, payment terms, and shipping that may require special handling.

4.7 Production Scheduling
Production scheduling meeting is held weekly typically at the beginning of the week with all engineering, shop personnel and coordinators.

Itinerary for production scheduling:
- Review TRM open jobs report
- Establish weekly production schedule

4.8 Final Engineer Review Prior to Coordinator-Shop Handoff
An engineer reviews all paperwork before being released to the shop to make sure that the documentation is up-to-date and has not changed since the order was turned over to them.

4.9 Change Orders
Change order handling
- Follow Excel procedures for keeping BOM up-to-date, procedures listed at bottom of page of BOM
- Submit to coordinator for entering into MRP and ordering
- Keep documentation up-to-date
- Order released to shop? Update shop drawings
- Pre-release to shop? Update electronic copies/coordinator copies.
4.10 Manual POs
Order URGENT parts from vendor, inform coordinator. Give "Manual Purchase Order Form" to Engineering Coordinator. Use JOB# (+) your initials for P.O. number.

4.11 Engineering Responsibility once Job is Released to the Shop
The PE is responsible for the quality, delivery, production, testing, and shipping. Once a job has been released to production the Engineer should meet with the assigned shop technician and review the project with them and make sure they understand all of the requirements.

Additional information about what should be reviewed is found in the Shop Procedure Manual.

- Oversee proper completion of job
- Clearly explain all documentation and requirements to shop personnel
- Oversee building of job
- Handle Change Orders
- Oversee quality control
- Oversee photographs
- Oversee testing
- Oversee shipping/crating

In addition to daily order progress the PE has two formal review steps during the production process. They occur after the shop checks in the parts and perform an initial layout. The formal second review occurs prior to final weld and painting. At each review the PE should review certain information with the shop including:

- Special layout
- Settings
- Painting
- Delivery requirements
- Loose parts
- Shipping information

4.12 First Production Review with Shop
What goes here?
4.13 Second Production Review with Shop

What goes here?
4.14 Testing
Follow testing procedures found in Section 14

An engineer reviews all testing, at a minimum the following items will be reviewed:

- Listen to the unit
- Witness all valves being shifted manually/electrically
- Note system pressure settings and verify they are set
- Review schematic and field plumbing to see that they match
- Review the schematic for complete information like settings, pressures, flows
- Look at fittings, NPT, SAE, JIC all look correct?
- Does the circuit function correctly?
- Does the load sense/remote pressure comp. work? Does it require a special setting?
- Do we need to double check the HP load?
- Ask yourself the questions:
  - If we build this again what would we change?
  - If we build this again what documentation would we need to duplicate the construction of the unit?
  - If the customer needs help with this unit in the field, what picture or information would it be helpful to have?
  - Does this unit have special settings, configurations, components, or circumstances that require more people to be involved with the setup/testing of the system?
  - Is this a good unit for picture book pictures? Have pictures been taken?
  - Is this unit a good learning unit?
- Check for special testing on production release sheet
- Review drawing notes for testing items
- Are you 100% certain that everything that was NOT tested works?
- Sign the production release order sheet after testing
- What special pictures might we need later?
  - Did we take that shot/angle?
  - If the customer needs help with this unit in the field, what picture or information would it be helpful to have?
- Are you 100% certain that everything that was NOT tested works?
- Are you 100% certain that everything that was NOT tested works?

4.15 Job Close
All customer/vendor correspondence relating to a project to be printed and filed with the folder.
23.1. Date: 04/01/2014

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23.1.28
Date: 04/01/2014