

Quality System Manual

Howell Foundry LLC. 4084 US Hwy. 61 St. Francisville, LA. 70775

1st Edition Revision 4



Howell Foundry LLC

4084 US Highway 61

St. Francisville, LA. 70775

Quality System Manual

First Edition

Revision 4

Controlled Copy # _____

Non-Controlled Copy # X

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SCOPE:

This manual is written in accordance with and includes measures to comply with the ISO 9001 standard as well as the requirements of castings in both ferrous and non-ferrous alloys. Howell Foundry specializes in the supply of cast products to a multitude of industries including Petro-Chemical. Activities at the facility shall include estimating and quotation, contract review and entry, procurement, molding, core making, melting, chemical analysis, welding, heat treatment, blasting, shipping, corrective action and certification of product, NDE services shall be added as equipment, procedures and qualified inspectors are developed. Activities shall also include qualification of material organizations, approval and control of suppliers of source material and subcontracted services.

Statement of Authority:

The **President** has been given full authority, responsibility and organizational freedom to implement the elements of this manual to comply with ISO 9001 as well as any other requirements above and beyond the ISO scope that may be imposed by the customer. Decisions made by the **President** may be overruled or revised only by the ownership of Howell foundry L.L.C. within this Quality System.

Quality and Operating Policy:

It is Howell Foundry's policy to ensure that all activities performed at this site are done so in accordance with the established quality manual and that adequate control of quality is in line with the customers purchase order and maintained throughout the process; and, that the process shall meet and/or exceed the requirements of ISO 9001 with a central focus on continuous improvement.

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Prepared By:



Date: 3/1/2020

Vice President of Operations

Approved By:



Date: 3/1/2020

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President

Preface:

Howell Foundry LLC was started in 1995 and has specialized in complex, high integrity castings in both ferrous and non-ferrous alloys including nickel based which services a multitude of industries for a variety of casting needs.

Howell Foundry LLC. is located in St. Francisville Louisiana and sits on 3.5 acres of land with 14,500 square feet of covered manufacturing capability. The activities performed at the facility include estimating and quotation, contract review and entry, procurement, vendor approval and control, molding, core making, melting, chemical analysis, welding, heat treatment, blasting, shipping, corrective action and certification of product.

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1.0 Introduction:

1.1 Purpose:

To introduce the Quality Systems Manual that is in use at Howell Foundry LLC. which describes the means with which products are produced within a controlled operating system that defines traceability and accountability.

1.2 Responsibility:

1. **President:**

The **President** is responsible for all activities conducted and the day to day operations at the facility. The **President** is also responsible for the selection of the internal audit team and the approval of the audits conducted. Sales and Marketing as well as QA/QC fall under his/her direct responsibility.

2. **Vice President of Operations:**

The **Vice President of Operations** is responsible for all activities conducted and the day to day operations of HR, safety, core making, molding, melting, welding, inspection, shipping/receiving, engineering and production control.

3. **Sales and Marketing Manager:**

The **Sales and Marketing Manager** is responsible for facilitating all customer correspondence and inquiries including processing customer complaints and invoicing.

4. **Materials Engineer:**

The **Materials Engineer** is responsible for all items related to the procurement, inspection and processing of materials. This includes approval of suppliers and calibration of equipment.

5. **Process Engineer:**

The **Process Engineer** is responsible for all methods used in the manufacturing process. This includes creation and maintenance of processes and procedures as well as training and evaluation of competence of operators.

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6. **Pattern/Core/Mold Lead:**

The **Pattern/Core/Mold Lead** is responsible for the scheduling and completion of duties associated with the pattern, core making, and molding processes.

7. **Cleaning Lead:**

The **Cleaning Lead** is responsible for the scheduling and completion of duties associated with the riser removal, welding, grinding, blasting, Inspection and heat treatment process.

8. **Office Manager:**

The **Office Manager** is responsible for ensuring that all applicable information obtained from the customer is properly conveyed to manufacturing personnel and that all required documentation is provided to the customer in accordance with this manual.

1.3 Procedure:

1.3.1 Training and Indoctrination:

- (1) The **Process Engineer** is responsible for the training of all applicable personnel on the applicable requirements of this Quality Systems Manual in accordance with 1.3.1 (2). Indoctrination of employees is the responsibility of the **VP of Operations**.
- (2) Documentation shall be maintained by the **President** for Quality Systems Manual training. Training records shall include the following:
 - (a) Name and position of trainee.
 - (b) Signature of Instructor and employee.
 - (c) Amount of time spent performing the training.
 - (d) Subject matter of training.
 - (e) Date of training session.

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- (3) Retraining shall be conducted when deemed necessary by the **Vice President of Operations** or when there are revisions to the Quality Systems Manual.

1.3.2 Organizational Reporting:

- (1) QA/QC personnel shall have an organizational reporting structure which allows freedom and authority to:
 - (a) Initiate action to prevent occurrence of product nonconformity.
 - (b) Identify and record any and all product quality problems.
 - (c) Initiate, recommend or provide solutions through designated channels.
 - (d) Verify the implementation of solutions.
 - (e) Prevent further processing of castings until unsatisfactory conditions are resolved.
- (2) The Howell Foundry organizational reporting structure shall be in accordance with figure 1-1.

1.3.3 Delegation of Authority:

Those individuals with assigned responsibilities within this manual may delegate those responsibilities as needed to qualified individuals. However, all actions carried out by delegates remain under the responsibility of those indicated in the manual.

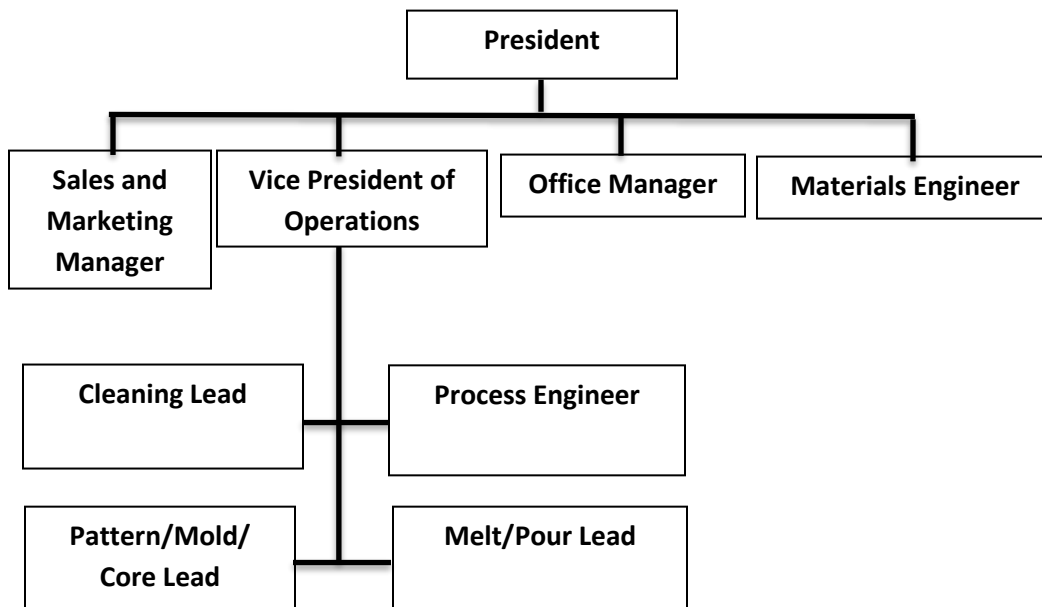
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Figure 1-1

Howell Foundry LLC Organizational Structure



2.0 QSM REVISION CONTROL

2.1 PURPOSE:

To establish a system for revising, documenting revisions, and assuring controlled distribution of revisions to the Quality System Manual.

2.2 RESPONSIBILITY:

- (1) It shall be the responsibility of the President to:

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- a. Create and approve all editions and revisions to this manual and distribute them to all controlled manual holders.
- b. Review all Standard revisions for possible changes to this manual within six months of issue.
- c. Maintain all controlled manuals by issuing all new manual editions and all revisions to the manuals.

2.3 PROCEDURE:

- (1) All new editions and revisions to the Quality Systems Manual shall be controlled in the same manner and must be approved by the President before implementation.
- (2) A receipt form acknowledging "Receipt of Revisions" for all controlled copies, will accompany the revisions or new edition. The controlled manual holder shall be required to sign and return the receipt along with obsolete sections within the specified time period. These receipts shall be kept on file by the President until the next edition or revision is accepted. The Process Engineer, when he deems necessary, shall review all revisions affecting Quality with the supervisors who are affected by the changes.
- (3) Non-controlled manuals shall be distributed as needed and shall not be kept up to date. Only controlled copies shall be issued for use by Howell Foundry personnel.
- (4) Controlled manuals shall be serialized and a record kept as to their assigned holders, by the President. The VP of Operations may keep a list of uncontrolled versions when deemed it may be necessary to recall manuals. All noncontrolled versions are issued with a notice they may be recalled at the discretion of HF.
- (5) At the discretion of the President, a new edition can be issued. The new editions shall start at Rev. 0 and the requirement for the new edition shall be documented by the President.
- (6) Revisions shall be entered on each page as follows:

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- a. When a revision to the manual text is made, it shall be made in ***bold, italic*** text to aid in readily identifying the revision. Deletions shall be made using the ~~strike through~~ method.
- b. The revision number, month, day and year of revision will be entered on all pages of the header for the section being revised. When any page of the section is revised, the entire section shall be considered to be revised. The cover page, scope, statement of authority, and table of contents will also be revised to reflect the latest revision to the manual. Signatures on the newly revised scope page indicate Howell Foundry management approval of the latest revisions to the manual.
- c. For revised example pages, an "*" will be placed next to the example number.
- d. The bold type will be reduced to normal type when the next revision to any paragraph or example in the section is made. (Example 2-4)

3.0 CUSTOMER PURCHASE ORDER AND CHANGE ORDER PROCESSING

3.1 PURPOSE:

To establish a system for assuring that all pertinent information is obtained and to assign responsibilities for processing customer requests for quotations and purchase orders.

3.2 RESPONSIBILITY:

It is the responsibility of the Office Manager to assure that all customer requests for quotations and purchase orders for castings to be produced under the Howell Foundry Quality System Manual are processed in accordance with procedures set forth in this section. Individual procedural responsibilities are defined in 3.3.

3.3 PROCEDURE:

3.3.1 Pre-order quotation review:

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- (1) Upon receipt of a request for quotation the Sales and Marketing Manager shall assure that sufficient information is included to evaluate Howell Foundry's ability to provide the product as requested. This shall include at a minimum:
 - (a) Material
 - (b) Description
 - (c) Delivery Information
 - (d) Terms & Conditions
 - (e) Quantity

- (1) Technical reviews if required:
 - (a) The Office Manager is responsible for reviewing all areas as applicable to the customer purchase order, and for a general review of the purchase order and a detailed analysis where necessary.
 - (b) The Process Engineer is responsible for review of the design, molding, core making and pattern requirements.
 - (c) The President is responsible for review of the materials specification and required destructive testing.

- (2) The Office Manager shall review comments and resolve any questions originating from the review process and shall enter the product accordingly in the computer.

- (3) The Office Manager then transmits the order package to the Sales and Marketing Manager or delegate for final estimation review as applicable. Upon completion of the review the Office Manager shall perform a final verification of the shop order (Example 3-2) containing reference to the applicable specifications required by the customer and forward to the customer all applicable acknowledgements (Example -3-1) and any internal Howell Foundry procedures that require customer review and approval. Any changes to approved processes such as first article qualification shall be documented and submitted to the customer for approval.

- (4) Customer purchase order revisions shall be processed in accordance with paragraphs (1)-(5) above as applicable.

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- (5) Responsibility for communicating revised delivery dates to the Sales department and customers shall be the responsibility of the VP of Operations.

Example 3-1



Howell Foundry L.L.C.

P. O. Box 2487
St Francisville, LA 70775

www.howellfoundry.com
Tel: (225) 635-2278
Fax: (225) 635-4584

Purchase Order	139551
Order Date:	5/18/2016
Entry Date:	5/24/2016
Our Reference:	OR/25038
Currency:	\$

**ORDER
ACKNOWLEDGEMENT**

Bill To
ITT ProCast
P2P Operations
P. O. Box 750
Seneca Falls, NY 13148
USA

Ship To
ITT ProCast
PO Box 1
2242 Flonacher Road
Zachary, LA 70791

Item	Part Number	Description of Part	Req. Date	Quantity	Price Each
1	53137-1001	# 53137-1001: Gland - Half (Rough Casting) Material : A48 20B Cast Iron	6/15/2016	2	\$96.00

The goods covered by this document are subject to our terms & conditions of sale, which are available upon request.

Comments:

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Example 3-2



Product Routes and ITP

Part Number		Description				Family	
sample		Impeller (Rough Casting)				Impeller	
Default Customer:				Metal Grade: WCB			
Number off:	1	Gross Weight:	200.001 Lb	Nett Weight:	100.001 Lb	Yield: 50.00%	
Default Services:							
Drawing No.		Pattern No.			Pattern Loc.		
Route ID: 1		A216 (WCB)			Not Set As Default		
Required Materials per casting				of ()			
Required Products per casting				x ()			
Item	Process Name	L. Days	Time	UOM	Time Type	Procedure	Acceptance
1	Solid Model Creation	2	0	MIN	Actual		
2	Clean and Prep Mold Package	0	0	MIN	Actual		
3	Melt/Pour	1	0	MIN	Actual		
4	Shakeout	0	0	MIN	Actual		
5	Visual Inspection	2	0	MIN	Actual	MSS-SP-55	
6	Cutoff	1	0	MIN	Actual		
7	Grind	3	0	MIN	Actual		
8	Heat Treat	1	0	MIN	Actual	QA0013 at its most current revision	
9	Weld	3	0	MIN	Actual	QA0030 at its most current revision, Map Major Repairs	
10	Grind	3	0	MIN	Actual		
11	Heat Treat	1	0	MIN	Actual	QA0030 at its most current revision Majors only unless otherwise specified by customer PO.	
12	Blast	0	0	MIN	Actual		
13	Final Inspection	1	0	MIN	Actual		
		18	0	MIN			

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4.0 SHOP ORDERS AND CHANGE ORDERS

4.1 PURPOSE:

To establish a controlled procedure for the issuance of Howell Foundry shop orders and document changes.

4.2 RESPONSIBILITY:

The Office Manager is responsible to assure shop orders and change orders are processed in accordance with the procedures set forth in this section. Individual procedural responsibilities are defined in paragraph 4.3

4.3 PROCEDURE:

4.3.1 SHOP ORDERS

- (1) Purchase orders shall be processed, forwarded for all applicable reviews, and distributed by the Office Manager.
- (2) A “Howell Foundry Order Acknowledgement” will be issued under the following limitations.
 - a. The Customer material specifications, with revision, and other applicable Customer specifications with revision number shall be listed on the shop order for the subject product. All drawing information including revision levels applicable to a specific Howell Foundry shop order shall be included and entered in to the shop order by the Office Manager or delegate.

4.3.2 SHOP ORDER CHANGE ORDERS:

- (1) Additional or revised customer purchase order documentation upon receipt, shall be forwarded to the Office Manager for review and implementation into the existing shop order for a product. This review shall include an evaluation by the President or delegate for any non-conforming conditions resulting from

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purchase order and/or specification changes on previously processed products to assure they are identified, and dispositioned in accordance with Section 12 of this manual.

- (2) The Office Manager shall then incorporate the revisions.
- (3) Copies of the Howell Foundry shop order change order, revised specification document and the original or revised customer purchase order change, shall be reviewed and approved by the Office Manager prior to release to the foundry. Upon approval by the Office Manager, copies of the Howell Foundry shop order change order and revised specification document shall be documented and communicated via the ERP system.
- (4) Any additional QA/QC correspondence or documentation shall remain on file in the office until completion of the order where it shall then be retained in accordance 11.3.3 (4) as applicable.

5.0 PROCUREMENT CONTROL

5.1 PURPOSE:

To establish a controlled system for the purchase of services and materials which become part of the final product.

5.2 RESPONSIBILITY:

The Materials Engineer shall be responsible to assure that all Howell Foundry purchase orders for services and materials are processed in accordance with the provisions of this section of the Quality System Manual.

5.3 PROCEDURE:

5.3.1 PROCUREMENT:

- (1) Purchase of services and materials defined in 5.1 shall be from the Suppliers List contained within the ERP system when applicable. Services and materials which do not become part of the final product or are 100% verified during the manufacturing process may be purchased as deemed necessary by the Materials Engineer.

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- (2) If required by customer purchase order, only Approved Suppliers (Example 5-1) listed on the Suppliers List shall be used.
- (3) "Purchase Order Requisitions" (Example 6-1) for services and materials shall be prepared by the Materials Engineer or delegate within Howell Foundry. Purchase order requisitions may also be computer generated. Purchase order requisitions shall list applicable drawings, standards, specific requirements, including identification and traceability control.

Example 5-1

SYNCHRO ERP		SUPPLIERS LIST		Printed: 6/2/2016	
				Page 2 of 2	
Name	Appraisal Date	QA_Status	Account Code	Telephone #	
Joe H. Smith Co	12/20/2015		Smith, Joe H. (800-638-3614	
Jules Noel	12/07/2015		Noel, Jules		
King Supply Inc	12/20/2015		King Supply		
LA Champagne	12/07/2015		Champagne	925-1120	
LA Dept of Revenue	12/07/2015		LA Rev Sales		
LA Rev Withholding	12/07/2015		LA Dept of Rev		
LA Worker's Compensation Coporation	12/07/2015		LWCC	1-800-756-7123	
LA Workforce Commission UI Tax	12/07/2015		LA Workforce I		
M&N Metals	12/07/2015		M&N Metals	1-800-351-1592	
Mitchell Insurance Services	12/07/2015		Mitchell Insur	667-9300	
Parish and City Treasurer	12/07/2015		EBR Parish Sa	1-225-389-3084	
Parish of St Mary Sales Tax	12/07/2015		St Mary Parish	1-985-384-8510	
Parish Utilities	12/07/2015		WFP Water	1-225-635-4574	
Pioneer Metal Solutions LLC	12/20/2015		Pioneer Metal	713-315-0980	
Porter Warner	11/12/2015		Porter Warner	205-251-8223	
Premier Equipment Corporation	12/07/2015		Premier Equip		
ProCast	12/07/2015		ProCast	654-8071	
Progressive Paloverde Insurance Inc.	12/07/2015		Progressive In	1-800-444-4487	
Pump Crafts	11/12/2015		Pump Crafts	225-654-6879	
Quality Testing Inc.	12/07/2015		Quality Testing	1-225-927-3244	
Rachel Howell	12/07/2015		howellR		
Red Wing	03/01/2016				
Republic Services #820	12/07/2015		Republic Servi	1-225-675-8021	
Sage Software	12/07/2015		Peachtree Soft	1-770-724-4705	
Saint Francisville Symphony Association	12/07/2015		SF Symphony		
Scott Equipment	11/12/2015		Scott Equipme	225-356-7975	
Secretary of State	12/07/2015		LA Secretary o	1-225-625-4704	
Serious XM Radio Inc	12/07/2015		Serious Radio		
Shannon Herring	12/07/2015		Shannon Herri		
Specialty Foundry Products	11/12/2015		Specialty Foun	205-591-2111	
St. Francisville Chamber of Commerce	12/07/2015		Chamber of Cc		
St. Francisville Rotary Club	12/07/2015		Rotary Club		
St. James School Board	12/07/2015		St. James Sale		
Steel Founders Society Foundation	12/07/2015		SFSF		
Steel Founder's Society of America	12/07/2015		SFSA	1-815-455-8240	
Sun Minerals LLC	12/07/2015		Sun Minerals	1-800-219-9434	
Synchro ERP LTD	12/07/2015		Synchro ERP	1-800-323-2808	
Tinker Omega Manufacturing L.L.C.	12/07/2015		Tinker	1-937-322-2272	
TNT Gas and Supply	11/12/2015		T&T	225-343-4806	
U-Metco Inc.	12/20/2015		Umetco		
US Postal Service	12/07/2015		US Postmaster		
Welding Test Lab	12/07/2015	Approved Vendor	Welding Test L	357-4014	
WW Grainger	12/07/2015		Grainger	923-0215	
Zed Howell	12/07/2015		HowellZ		

Report generated by Synchro ERP



5.4 RECEIVING INSPECTION:

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- (1) All controlled services and materials shall be inspected upon receipt, to the requirements of the purchase order. Supplied certification documents shall be reviewed for compliance with purchase order and specification requirements. This review shall include verification that the signature of the authorized representative is included when required.
- (2) Receiving inspections for services and materials shall be performed and documented in accordance with this section of the Howell Foundry QSM.
- (3) The Materials Manager or delegate shall:
 - a. Monitor receiving inspections and supplier performance of suppliers identified in example 5-1.
 - b. Evaluate and assure proper disposition of any non-conforming conditions identified as a result of receiving inspection.
 - c. Initiate required corrective actions.
- (4) Upon receipt, the Materials Manager or delegate shall review the weld filler metal certificates to ensure compliance with the purchase order. If acceptable, the certificates shall be signed and dated and scanned in to the “Shared on HF network” file for computer access. Upon receipt by the Welding Department, each container of acceptable weld filler metals shall be affixed with a Howell Foundry approved filler metal sticker.
- (5) Unacceptable weld filler metals or materials shall be returned to the vendor.
- (6) Castings found to be discrepant as a result of a vendor’s nonconforming material or defective service, shall be dispositioned in accordance with this manual. The President, or delegate shall ensure that acceptable vendor corrective action is documented in accordance with this manual.
- (7) Vendors shall be approved in accordance with the provisions of this manual.

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6.0 PROCESS CONTROL & DEVELOPMENT

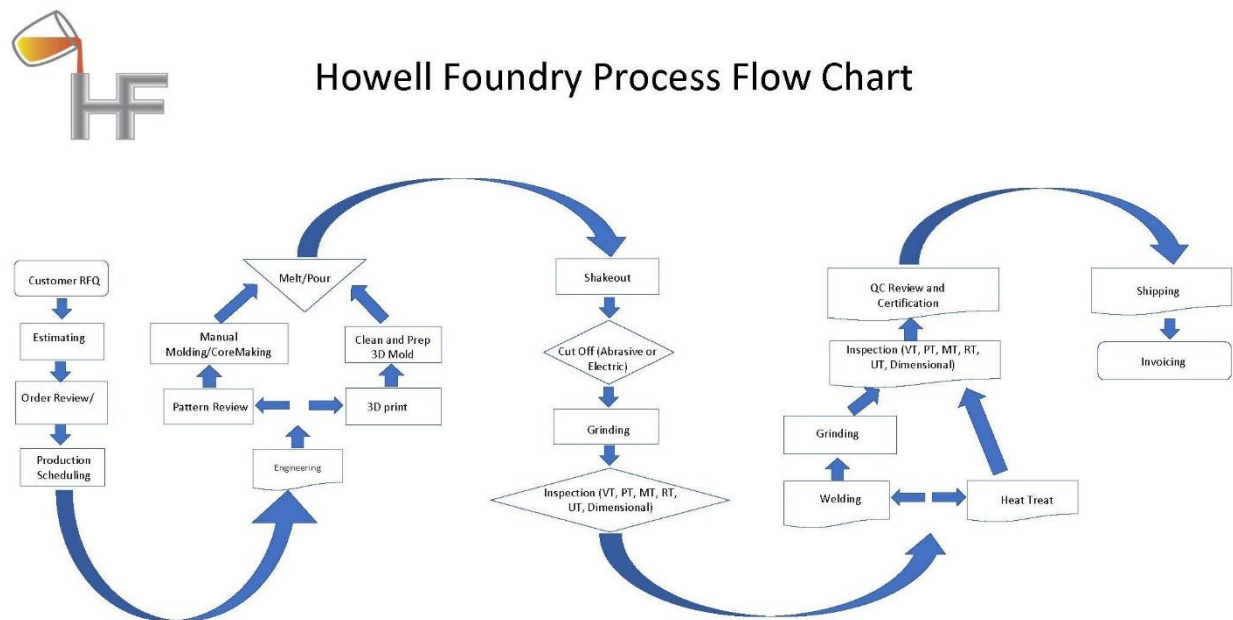
6.1 PURPOSE:

To establish a controlled system to assure that proper procedures and sequences are used for processing castings from pouring, through production, to shipment.

6.2 RESPONSIBILITY:

It is the responsibility of the VP of Operations to assure that all inspections are properly performed and documented within the ERP system as they are completed.

Figure 6-1*



6.3 PROCEDURE:

6.3.1 Process Control Implementation:

- (1) The Office Manager or delegate shall review the requirements of the customer's purchase order, and specifications in order to prepare a product within the ERP system. From the product, the Office Manager or delegate shall prepare, on the computer, the process route listing the manufacturing steps and all activities

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affecting quality and inspection points and indicating the sequence of operations to be performed.

- (2) The steps in the process route shall be dispositioned in the computer. It shall be maintained through production to the final shipment. The operations cannot be eliminated without approval of the VP of Operations, or the President.
- (3) The VP of Operations, or delegate may disposition a router step only after the operation has been fully completed. In the event that the operation was not fully completed, the VP of Operations shall review to determine if additional steps are needed within the shop route before further processing may commence.
- (4) Approved procedures, instructions and acceptance criteria for all departments can be referenced via the product within the ERP system.

6.3.4 PROCESS HANDLING:

- (1) Castings shall be handled during all stages of the production process in a way that precludes damage and prevents removal of the identification for the casting.
- (2) Castings requiring special handling shall have those instructions specified within the UID.
- (3) Materials used in the manufacturing processes shall be handled and stored in a way that:
 - a. Precludes damage and contamination.
 - b. Assures traceability is maintained where applicable.
 - c. Assures isolation from non-conforming materials.
- (4) Materials requiring special handling and storage not specifically addressed in this QSM, shall be identified and controlled per written departmental standard operating procedures.

6.3.5 DOCUMENTATION:

- (1) The Order shall contain, at a minimum, the following information:

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- a. Customer Name
- b. Purchase Order Number
- c. Howell Foundry UID Number

(2) All changes in procedures which affect previously processed material, except for recycling for repair shall be reviewed and approved by the VP of Operations or delegate.

7.0 WELDING

7.1 PURPOSE:

To establish a controlled system to assure that all welding conforms to ASTM A488 and/or customer requirements.

7.2 RESPONSIBILITY:

The ~~President~~ VP of Operations or delegate is responsible for qualifying all welding procedures and welders as provided below. Welding procedures and welder qualifications shall be maintained by the Materials Engineer or delegate. It is the responsibility of the VP of Operations or delegate to assure that the welding is performed in accordance with the approved welding procedure as listed in the appropriate section of the ERP system and assign a qualified welder to perform the welding.

7.3 PROCEDURE:

- (1) Welding material control shall be done in accordance with QA 040, "Weld Filler Control", which shall contain, as a minimum, procurement control, marking and identification, receiving inspection, storage, issue and return of supplies, and documentation. Identification shall be maintained until the material is consumed.
- (2) Qualifications of welders shall be done in accordance with Howell Foundry procedures which meet the requirements of ASTM A488, or for the applicable specification. Welder performance variables shall be verified via computer access to ascertain their qualifications for a particular job. The VP of Operations or delegate shall maintain records for verification of welder qualification continuity as applicable.

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- (3) The qualified Weld Procedure (Example 7-1), which includes all essential, supplementary essential and non-essential variables, with revision to be used on a casting shall be listed in the ERP system and the information shall be readily available to the welder. The Weld Procedure shall be qualified with a PQR where applicable which shows all the essential variables used and shall be certified by the VP of Operations or delegate.
- (4) Any re-qualifications or new qualifications shall be made in accordance with the test requirements of the Howell Foundry procedures which meet the requirements of the current editions of ASTM A488 or the applicable customer specification.
- (5) Weld equipment other than arc air machines shall be calibrated in accordance with QA 041, which shall contain, as a minimum, method of calibration, calibration standards, accuracy tolerances and documentation. Records of equipment calibrations and frequencies shall be maintained on file in accordance with this manual.

7.4 DOCUMENTATION


- (1) The Weld Procedure, Procedure Qualifications Record and the Record of Performance Qualification Test shall be maintained on file by the VP of Operations or delegate for customer review.
- (2) When required by customer Purchase Order, weld records shall be recorded in a "Howell Foundry Weld Log" (Example 7-2) which shall include all essential variables relating to welding performed on a specific casting.

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Example 7-1



Procedure # **QA0037**
 Rev. **0**
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Welding Procedure

Alloy: CF8M Filler Type: E316L-16
ASTM: A743 AWS: _____
 ASME: _____

Filler Process: **FCAW:** _____ **SMAW:** **GTAW:** _____

Process Qualification: Qualified in accordance w/ ASTM A488

Base Material: In accordance with ASTM A743. 18%-21% Cr, 9%-12% Ni, 2%-3% Mo.

Welder Qualifications: Qualified in accordance w/ ASTM A488

Weld Positioning: **Flat:** **Vert.:** _____ **Horiz.:**

Pre-Heat: Not Required.

Interpass Temperature: Not to exceed 750 degrees.

Shielding Gas: Not Required.

Electrical Characteristics:	Electrode Dia.	AMPS	RANGE	VOLTS
	1/8" (3.25mm)	100	+/-20	25

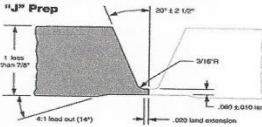
Base Metal Preparation: Edges of the surfaces to be welded may be prepared by machining, chipping, grinding or sand blasting. Surfaces must be clean and free of rust, oil, grease, dirt, and any cleaning agent used in degreasing must be completely removed prior to welding. This criteria also applies to any backing plates used.

Metal Removal: Defects uncovered by the non-destructive tests specified by the purchase order may be removed by the following methods: chipping, grinding, drilling or machining, arc gouging.

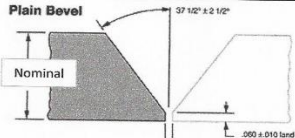
Pre-Weld Heat Treatment: No required.

Weld Prep Configuration:

Partial Penetration Weld



Full Penetration Weld



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Welding technique:

Width of Pass:

The width of any pass shall not exceed 4 times the core diameter of the electrode.

Thickness of Pass:

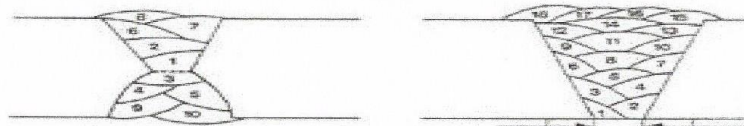
The thickness of each pass of welding shall be approximately 1/8".

Cleaning:

No weld metal shall be deposited on any surface from which the slag has not been removed. Excessive spatter on the sidewalls shall be removed.

Weld defects:

Welding shall not be performed over defective welds or passes. Any cracks, slag inclusions, undercutting, or evidence of poor fusion that appear on the surface of a pass shall be removed before depositing subsequent passes.



Multipass Welding

Post-Weld Heat Treatment:

Not required unless otherwise specified by the customer PO.

PQR #(s):

Prepared By:

 10/20/15

Approved By:

 10/20/15


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Example 7-2

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Howell Foundry Weld Log

Customer: Pattern #: Unique I.D.#:

Customer PO#: Heat#: Alloy:


Prior Approval Required: Y: X: N:

Defect#	Date	Length	Width	Depth	*Type	Major	*Process Found	Inspector	Welder	WPS	Filler Lot#:	Comments:
1	2/3/2016	2"	1"	.125"	LI	N	VT	JB	DC	QA0027 Rev.0	272044	
2	2/3/2016	.5"	.25"	.125"	RI	N	VT	JB	DC	QA0027 Rev.0	272044	
3	2/3/2016	3"	1"	.5"	LI	N	VT	JB	DC	QA0027 Rev.0	272044	
4	2/3/2016	.75"	.5"	.125"	RI	N	VT	JB	DC	QA0027 Rev.0	272044	
5	2/5/2016	1"	1"	.125"	LI	N	VT	JB	DC	QA0027 Rev.0	272044	
6	2/5/2016	.5"	.75"	.50"	RI	N	VT	JB	DC	QA0027 Rev.0	272044	
7	2/5/2016	2"	1"	.125"	DI	N	VT	JB	DC	QA0027 Rev.0	272044	
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												

*Found Process: VT= Visual Testing, PT= Penetrant Testing, MT= Magnetic Particle Testing, UT= Ultrasonic Testing, RT= Radiographic Testing, DI= Dimensional Inspection
*Type: LI= Linear Indication, RI= Rounded Indication, DI= Dimensional Indication

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Howell Foundry Weld Log (Sketch)

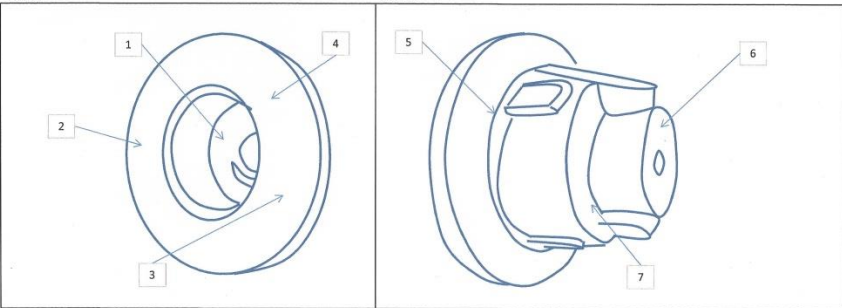
Customer: Pattern #: Unique I.D.#:

Customer PO#: Heat#: Alloy:

Prior Approval Required: Y: X: N:

View #1

View #2



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8.0 NON-DESTRUCTIVE TESTING:

8.1 PURPOSE:

Howell Foundry plans to offer NDE services in the future. As these services are offered, they shall be conducted in accordance with section 8 of this manual.

To establish a controlled system to assure that non-destructive examination is performed by qualified and certified personnel using qualified procedures.

8.2 RESPONSIBILITY:

It is the responsibility of the VP of Operations to assure that all personnel performing non-destructive examination are adequately trained, qualified and certified and that qualified procedures are followed.

8.3 PROCEDURE:

- (1) Non-destructive examination (NDE) personnel shall be certified in accordance with the Howell Foundry “Non-destructive Examination Personnel Qualification and Certification Manual” (QA 042), which meets the requirements of the Recommended Practice SNT-TC-1A (~~2006~~ **2020** and all previous editions). Records of certifications and personnel qualifications shall be maintained by the VP of Operations *or delegate*.
- (2) The product section of the ERP system shall list the approved NDE procedure with revision to be used on a casting. A copy of the NDE procedure shall be readily available to the inspector.
 - a. Non-destructive examination procedures shall be demonstrated to the satisfaction of and approved by the SNT-TC-1A Level III.
- (3) The status of the NDE performed on a casting shall be noted in the computer on the shop order screen at the appropriate step.
- (4) The non-destructive examination equipment requiring calibration shall be calibrated and certified in accordance with QA 041. When discrepancies, in excess of accepted tolerances for testing equipment are found at calibration, the VP of Operations shall determine what disposition is required.

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8.3.1 DOCUMENTATION:

- (1) Records of personnel qualifications examinations and eye exams shall be maintained on file by the VP of Operations or delegate.
- (2) Record of equipment calibrations and material certifications shall be maintained on file in accordance with section 9 of this manual.
- (3) An “NDE Certification Report” (Example 9-1) and/or “Inspection Report” shall be written when the casting is acceptable; as applicable. These reports shall include the name and qualification level of the personnel interpreting the examination. This information shall be verified by the VP of Operations or delegate.
- (4) A weld repair record where applicable shall be completed.

8.3.2 SUBCONTRACTED SERVICES:

- (1) NDE may be subcontracted to an organization surveyed and qualified in accordance with Section 15 of this manual. However, Howell Foundry retains the responsibility for the subcontracted NDE.
- (2) The services of a subcontracted Level III may be utilized. The VP of Operations shall review the Level III qualification and certification records and if acceptable shall appoint by letter this Level III individual as a Howell Foundry Level III.
- (3) Howell Foundry NDE procedures and techniques shall be utilized for all subcontracted NDE services in cases where the vendor does not have procedures and techniques which meet our customers standards.
- (4) Records of all subcontracted NDE services and personnel qualifications shall be maintained by the Howell Foundry Quality Control Department.
- (5) Results of NDE shall be reviewed and approved by a Howell Foundry Level II or Level III qualified inspector.

9.0 CALIBRATION

9.1 PURPOSE:

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To establish a standard procedure for the calibration of instruments, gauges and other devices used to perform examinations, tests, and inspections and to determine positional relationships. It is the intention of this procedure to assure that only properly calibrated equipment is used to verify compliance of the materials with the applicable requirements.

9.2 RESPONSIBILITY:

The Materials Engineer or delegate is responsible for the calibration of dimensional inspection equipment and for maintaining an organized system of calibrating and recording results of all gauges and measuring instruments as applicable

9.3 PROCEDURE:

- (1) Records of equipment calibrations and frequencies shall be maintained on file in accordance with this manual which is written to meet the requirements of ISO-10012-1.
- (2) Calibration shall be against standards which have known relationship to national standards where such standards exist. If such standards do not exist, calibrations shall be against industrial standards and the basis for calibration documented. Purchase orders for outside calibration shall reference that traceability to NIST Standards per ISO-10012-1 is required.
- (3) Standards used for calibrating the measuring and test equipment used in controlling casting quality shall have capabilities for accuracy, stability, range and resolution required to assure the adequacy for subsequent manufacturing and intended use.
- (4) Measuring and test equipment shall be calibrated and used in an environment which is controlled to the extent necessary to assure measurements of required accuracy for intended use.
- (5) Each instrument, gauge or other device subject to calibration shall be identified by a serial number applied directly to the item, where practical, by engraving, electro-chemical etching, impression stamping or other suitable method. Where it is not practical to apply the identification directly to the item, or where such application might damage the item, it may be applied to the protective case or stand and identified to the item.

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9.3.1 CALIBRATION INTERVAL:

- (1) The interval between calibrations shall be determined by the type of instrument, gauge or other device; the amount of use it received; and how subject it is to variation between calibrations. The calibration interval on calibrated equipment shall be approved by the Materials Engineer.
- (2) When the amount of variation is not known, the initial calibration interval shall be deliberately shortened until a suitable history is developed. Based upon this history, the interval may be extended so long as adequate control is maintained.

9.3.2 HISTORY:

- (1) A "History of Record" shall be maintained by the Materials Engineer or delegate detailing the inspection and calibration record of all applicable equipment.
- (2) For instruments calibrated by outside agencies, a certification shall be maintained which specifies the accuracy of the instrument being calibrated. Additionally, purchase orders for outside calibrations shall reference that traceability to the NIST standards per ISO-10012-1 are required.
- (3) Data shall be readily available to verify proper method of calibration, accuracy required and acceptance for both in-house and outside calibration services.
- (4) Each instrument, gauge or other device shall be marked with a suitable adhesive label bearing the following:
 - a. Date of last calibration.
 - b. Date next calibration is due.
 - c. Initials of the person who performed the last calibration.
- (5) When practical, adhesive labels shall be applied directly to the item. Where this is not practical, or where to do so might damage the device, the label may be applied to the protective case or an associated item.
- (6) Some equipment such as tape measures, shrink rules measure which are used for in process inspections or verifications do not require calibration. If dimensional inspection results are to be provided to the customer only calibrated equipment shall be used.

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9.3.3 LIST OF CALIBRATED EQUIPMENT:

The Materials Engineer shall maintain a complete list of all equipment subject to calibration. This list shall contain the description, item serial number, calibration source and the calibration interval, record location and department responsible.

9.3.4 STORAGE AND HANDLING:

All measuring and test equipment shall be handled, stored and transferred in a manner which will not adversely affect the calibration or condition of the equipment.

9.3.5 VENDOR EQUIPMENT:

Whenever a purchase order requires an inspection and/or inspection equipment to be utilized by a vendor, suitable evidence must be available to assure adequate calibration of the equipment used. Adequacy of calibration must be determined prior to the acceptance of any inspection using such equipment.

9.3.6 OUT OF TOLERANCE CONDITIONS:

- (1) When a piece of calibrated equipment does not meet the calibration requirements or whenever any event occurs which caused doubt that the accuracy established at the last calibration can still be obtained, the instrument shall immediately be removed from service and tagged.
- (2) In no circumstances shall such items be returned to service until they have been inspected, repaired as required and re-calibrated. The disposition of the rejected item shall be noted on the history card. Periodic checks shall not be used for the purpose of instrument adjustment. Instruments requiring adjustments must be recalibrated.
- (3) When out of tolerance conditions on inspections, examination or testing equipment are found at calibration, the VP of Operations shall perform a review to determine what disposition is required based upon the significance of the impact. This review shall be recorded on a Howell Foundry NMR form. Any equipment found to be out of calibration shall be removed from service and considered as having been used on all castings processed since the previous valid calibration unless positive proof is available and documented that it was not used on a particular casting(s). Suspect castings still at Howell Foundry shall be reprocessed with calibrated equipment.

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- (4) Customers shall be notified for their disposition of any castings shipped to them where out of calibration equipment was used. Resulting nonconforming materials and deviations from approved calibration procedures shall be handled in accordance with Section 12 of this manual.

10.0 HEAT TREATMENT

10.1 PURPOSE:

To establish a controlled system to assure that all heat treating is performed using approved procedures.

10.2 RESPONSIBILITY:

It is the responsibility of the VP of Operations or delegate to assure that the approved procedure is followed.

10.3 PROCEDURE:

- (1) The heat treat procedure with the appropriate revision number to be used is listed in Heat Treatment section of the ERP system.
- (2) Heat treat procedures shall be prepared by the Materials Engineer or delegate and shall be approved by the VP of Operations.
- (3) Castings and test bars shall be heat treated in accordance with customer purchase order and/or material specification requirements. The procedure shall include all required temperatures and other parameters to assure compliance with the aforementioned requirements.

10.3.1 DOCUMENTATION

- (1) The heat treatment cycle shall be recorded on charts which are mounted on the temperature recorder for the oven or are recorded electronically on the data logger. Heat Treat Charts shall be maintained on file consistent with customer purchase order requirements when required. Heat Treat Department personnel shall write the UID number, oven number and date on the Heat Treat Log. The

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Heat Treat operator shall enter all of the following information into the computer.

- a. Howell Foundry UID number
- b. Oven number
- c. Date

- (2) The Heat Treat Operator shall review all heat treat charts to assure that the proper heat treat time at temperature is accumulated on the casting. The VP of Operations shall retain the original heat treat chart and forward a copy of the front of all heat treat charts, as required by purchase order, to the C.S. Engineer.

10.3.2 CALIBRATION:

Records of equipment calibrations and frequencies shall be maintained on file in accordance with this manual. Heat treat oven survey records shall be maintained on file with the Materials Engineer. Out of survey ovens may be used provided thermocouples are attached to each load of castings and a calibrated temperature recorder is used.

10.3.3 DISCREPANCIES:

When discrepancies in excess of accepted tolerances in heat treating equipment are found at calibration, the heat treating equipment shall be immediately tagged to prevent use on upgrade work. The Heat Treat Operator shall record the out of tolerance condition and report the findings to The VP of Operations or delegate who shall determine what disposition is required in accordance with Section 12.

11.0 DOCUMENT AND RECORD CONTROL:

11.1 PURPOSE:

To establish a controlled system to assure that a complete records file, as required by the customer purchase order, is maintained.

11.2 RESPONSIBILITY:

It shall be the responsibility of the VP of Operations or delegate to maintain the records file.

11.3 PROCEDURE:

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11.3.1 Contract specific documents which are generated throughout the duration of a customer purchase order shall be forwarded to the Office Manager. Documents shall be recorded in a permanent medium or manner in black or blue ink unless otherwise specified by purchase order. Upon receipt, they shall be combined in a file and reviewed for completeness and compliance with the customers purchase order.

- (1) All lower tier or supporting documentation generated in the manufacturing process, but not required to be included in the documentation package by the purchase order contract, shall be maintained by the generating departments.
- (2) All controlled documents, forms and records which includes all new revisions shall be reviewed and approved by the VP of Operations or delegate prior to their release for use. Evidence of approval shall be via signed master copy on file for all controlled forms.

11.3.2 REVIEW:

- (1) The final documentation file shall be reviewed and approved by the VP of Operations, or delegate. After review and approval, the VP of Operations shall authorize the release of the casting to ship.
- (2) All quality records shall be accessible to the customer for review.
- (3) In the event an error is discovered, requiring a documentation change, the applicable customer shall be notified and a new copy of the revised document, marked "Corrected Copy" shall be forwarded to the customer. A copy of the corrected copy shall also be retained in the Howell Foundry customer order file. If the document has not been submitted to the customer, and if allowed by purchase order, a correction may be made by drawing a single line through the incorrect entry and entering the correct information. The correction shall be initialed and dated. When additional information is added to an existing document, the additional entry shall also be initialed and dated. All corrections shall be made in permanent blue or black ink, unless otherwise specified by the purchase order.

11.3.3 RETENTION:

- (1) Upon completion of an order, all contract specific documents, initiated throughout the duration of a customer purchase order will be forwarded to the office. These are to be filed with the customer's purchase order. These records

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shall be identifiable and retrievable. In addition, they shall be maintained and protected from deterioration, loss or disposal consistent with customer purchase order requirements. If not designated by the purchase order, or as specified below, the retention of these records shall be a minimum of seven years.

Howell Foundry Document Retention Schedule				
	Electronic	Scanned	Hard Copy	Duration
<u>Quality</u>				
Vendor Audit Results		X		7 years
CAR's	X			3 years
PAR's	X			3 years
NMR's	X			3 years
Management Review's	X			3 years
Customer Complaints	X			3 years
Customer Drawings		X		7 years
Internal Audits		X		5 years
External Audits		X		7 years
Certification Documents		X		7 years
Superseded Manu. Procedures		X		3 years
<u>Human Resources</u>				
Employee Performance Records	X			3 years after termination
W-2's	X			3 years after termination
OHS Testing	X			3 years after termination
Employee Training Records	X			3 years after termination
<u>Accounting</u>				
Customer Purchase Orders			X	5 years
Tax Returns	X			10 years
Purchase Orders	X			5 years
Bank Account Statements	X			5 years
<u>Maintenance</u>				
Calibration Records		X		life of equipment
Owners Manuals		X		life of equipment
PM records	X			life of equipment

12.0 CONTROL OF NON-CONFORMING MATERIALS, C/A AND P/A

12.1 PURPOSE:

The purpose of this section is to establish a controlled system to assure all nonconforming materials and conditions, deviations and deficiencies at all stages of

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manufacturing are documented, dispositioned, root cause(s) determined and positive and effective corrective action(s) to prevent recurrence is implemented.

12.2 RESPONSIBILITY:

It is the responsibility of all employees to report.

13.2.1 Non-conforming materials conditions which:

- a. Appear to be uncorrectable deviations from specification or purchase order requirements.
- b. Require excessive cleaning and repairs. (based on weld deposition history and supervisory decision)
- c. Are required to be reported by purchase order contract.
- d. Deficiencies and deviations from quality requirements established by approved procedures, specification and this Quality System Manual.

12.3 PROCEDURE:

12.3.1 CONTROL OF NON-CONFORMING MATERIAL

- (1) Non-conforming material conditions related to products, upon discover, shall be documented utilizing the NMR form. The initiator of the NMR shall describe the material and nonconformance and include any information which may help to determine the root cause and corrective action. If the casting cannot be processed until disposition is received, a “quarantine” process shall be placed in the process route and the non-conforming material segregated and placed on “HOLD” to prevent further processing until authorized disposition is made. The VP of Operations shall notify the affected departments as appropriate.
- (2) If the non-conforming material can be brought into compliance with customer purchase order requirements, it may be dispositioned by any member of the MRB board, or delegate with the concurrence of the VP of Operations or delegate. Compliance shall be verified, where applicable, by re-inspection.
- (3) If the non-conforming material cannot be reworked, the VP of Operations or delegate shall propose the disposition, which includes contacting the customer for concession, as applicable. If required by purchase order customer forms or electronic submittal for disposition shall be used in lieu of the Howell Foundry

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CAR/PAR system. All dispositions, including customer dispositions, shall require approval of the "Material Review Board" which shall consist of:

- a. President, or delegate
 - b. VP of Operations, or delegate
 - e. Materials Engineer, or delegate
- (4) After cause and corrective action to prevent recurrence has been documented on the NMR by the responsible department, the NMR shall be forwarded to the VP of Operations or delegate for review and determination of any required follow-up and distribution as needed.
- (6) If it is determined by the VP of Operations or delegate that the committed corrective action to prevent recurrence requires specific Quality Department follow-up, he/she shall note this accordingly in the "Action Taken" section of the NMR and indicate that the action is completed until such time that the follow-up is completed.
- (7) Distribution of the NMR copies shall be at a minimum:
- a. Office Files
 - b. Engineering or responsible department
 - c. "Hard" copy on non-conforming material as needed.

12.3.2 CORRECTIVE ACTIONS

- (1) Corrective actions shall be taken to eliminate the cause of nonconformities and noncompliant conditions in order to prevent recurrence. Corrective actions shall be appropriate to the effects of the nonconformities or noncompliant conditions encountered. If after review of the nonconformity (including customer complaints) it is determined that corrective action is required it shall include the following:
- a. The cause of the nonconformity or noncompliant condition shall be determined.
 - b. Action to ensure that the nonconformity or noncompliant condition does not reoccur.
 - c. Determining and implementing the action(s) needed.
 - d. Review of the corrective action taken for effectiveness.

12.3.3 PREVENTIVE ACTIONS

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- (1) Preventive actions shall be taken to eliminate the cause of potential nonconformities in order to prevent their occurrence. Preventive actions shall be appropriate to the effects of the potential problems.
 - a. Sources of potential nonconformities and their causes.
 - b. Action to prevent occurrence.
 - c. Assessing risk (SWOT)
 - d. Determining and implementing action needed.
 - e. Reviewing preventive action taken.

13.0 RELEASE OF ORDERS

13.1 PURPOSE:

To provide control over the system established for release for shipment castings.

13.2 RESPONSIBILITY:

- (1) It is the responsibility of the Office Manager to assure that all proper releases for shipment of castings are obtained from the VP of Operations.
- (2) The Office Manager, or delegate shall be responsible to ascertain that all customer requirements, including the completed CMTR, have been met and provide a release to the VP of Operations.

13.3 PROCEDURE:

The Office Manager or delegate shall print a list of all routers that have had the "Final Inspection" process booked within the router indicating that they have been released by the shop for review and shipment. After ascertaining compliance with all contractual requirements, the Office Manager or delegate shall authorize shipment of the casting(s) by notifying the VP of Operations, or delegate.

14.0 PACKAGING AND SHIPPING OF CASTINGS:

14.1 PURPOSE:

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To establish a procedure to control packaging and shipping operations to ensure conformance to purchase order requirements.

14.2 RESPONSIBILITY:

The VP of Operations, or delegate is responsible for assuring packaging and shipping operations are carried out in compliance with the purchase order requirements.

14.3 PROCEDURE:

- (1) Packaging and shipping requirements requested in contractual documents shall be described in the Howell Foundry ERP system. Unless otherwise specified, castings shall be packaged using good commercial practices.
- (2) Castings ready for shipment shall be stored and identified in such a manner as to prevent damage and intermingling with other material.
- (3) Casings shall be tagged or marked for identity as specified in the Howell Foundry ERP system. Shipping documents, packing lists, tags or labels, external markings, etc., shall be applied as required. The Howell Foundry UID Number shall be verified by the VP of Operations, or delegate prior to attaching shipping documents and/or packing lists.

15.0 VENDOR SURVEYS

15.1 PURPOSE:

To establish a controlled system to approve suppliers of services and/or material by on site audit and continuous performance assessment when required by customer purchase order or specification.

15.2 RESPONSIBILITY:

The President, or delegate shall be responsible for auditing suppliers using the “General Vendor Audit” checklist and a specific audit checklist for the service or material being supplied in the event that the vendor is not currently certified to the ISO standard via 3rd party registrar. Changes in vendor’s status shall require a revision to the “Approved Vendor List”.

15.3 PROCEDURE:

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- (1) A vendor who holds a Quality System Certificate (Material Organization) from ASME or a valid ISO accreditation shall not be required to be surveyed and shall be listed as an “Accredited Materials Organization” on the Howell Foundry “Approved Vendor List” provided the scope of the Certificate includes the required materials or services. However, a current copy of the Certificate(s) must be kept on file.
- (2) A “Non-accredited Material Organization” or “Approved Supplier” that does not hold a QSC certificate or valid ISO accreditation shall be audited at least triennially. Additionally, audits or performance assessments will be conducted at least annually. Performance assessments shall include a documented review of the organization’s history of conditions adverse to quality, NMR(s) and corrective action requests and an over check of the service or materials supplied. Upon meeting the requirements of this section, the vendor shall be listed as an “Approved Supplier”, on the Howell Foundry “Approved Vendors List”.
- (3) The vendor survey forms shall be completed in conjunction with surveys at the vendor’s facilities. The vendor’s procedures and records system will be reviewed. Vendors shall have a Quality manual and an organized Quality Program, as applicable, to meet the requirements of the purchase order and/or specification requirements. The intent is to assure material and services remain in conformance and identification and traceability are maintained while the part is at the vendor’s facility.
- (4) If a vendor is approved, the company name, address, scope of approval, with limitations (if any), Manual revision with effective date and/or certificate number and the date the next survey or audit is to be performed shall be listed on the “Approved Vendor List”.
- (5) A completion time shall be given for any corrective action(s) that needs to be taken. If the corrective action is not complete within the time assigned, the vendor may be removed from the “Approved Vendors List”.
- (6) Each “Approved Supplier” shall not qualify other suppliers and the scope of each “Approved Supplier” is limited to furnishing material or services to Howell Foundry only.

15.4 DOCUMENTATION:

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- (1) The most recent completed vendor survey audit and applicable performance assessment forms shall be kept on file and available for customer review in accordance with this manual.
- (2) The appropriate level of management shall be advised of the audit results in writing. All “Approved Suppliers” shall be notified by letter that any proposed modifications to their programs must be approved by Howell Foundry prior to implementation for any materials or services ordered under the provision of this manual.

16.0 INTERNAL AUDITS AND MANAGEMENT REVIEW

16.1 PURPOSE:

To establish a system of internal audits to assure that the approved Howell Foundry Quality System is being implemented as required.

16.2 RESPONSIBILITY:

The President, is responsible for assuring that internal audits as well as management reviews, conducted at least annually, are in accordance with this manual.

16.3 PROCEDURE:

- (1) An annual internal audit shall be carried out by Howell Foundry to assure compliance with the approved Quality System and to determine the effectiveness of the program. The audits shall be performed in accordance with this manual by personnel not having direct responsibilities in areas being audited. Audit results shall be documented by the auditing personnel and reviewed with the President by the VP of Operations. Any audit findings shall be documented on a “Corrective Action Request” (CAR) form in accordance with this manual and the CAR number listed in the CAR No. column of the internal audit checklist. The CAR findings shall be reviewed with the Lead Person having responsibility over the area audited. In the event a finding is noted a second time, a meeting will be held with the President, the VP of Operations and the Department Lead Person involved. The results of the meeting will be recorded and retained.

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- (2) The VP of Operations, and the President shall review the status and adequacy of this program by reviewing the results of each internal audit performed, including any resulting CAR forms, a summary of the Quality Objectives and the matrices for their measurements, and other topics as deemed necessary. This review shall be conducted at least annually with the review meeting conducted and documented. Review meetings may be held more often at the discretion of the VP of Operations or the President. The Quality Objectives, the matrices for their measurement, and other data pertaining to management commitment are posted on the HF shared network and available for review by all personnel on a continual basis. This data is updated on a regular basis by the VP of Operations and Howell Foundry Management.
- (3) Lead Auditors shall be qualified on the basis of education, experience, training audit participation and examination.

16.3.1 DOCUMENTATION:

Lead auditor qualification documentation and the Howell Foundry internal audit checklists shall be maintained on file by the VP of Operations.

- (1) The Internal Audit as well as all items contained within the Management Review Checklist (FN200204-01 at its latest revision) shall be reviewed and signed off on by top management at least annually.

17.0 CASTING IDENTIFICATION AND MARKING

17.1 PURPOSE:

To establish a system to assure that all castings are properly identified and marked to the requirements of the customer purchase order.

17.2 RESPONSIBILITY:

The VP of Operations, or delegate shall be responsible for assuring that the established identification and marking system is followed.

17.3 PROCEDURE:

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- (1) Castings must be identified with a cast Howell Foundry UID number. If possible, castings shall have the following minimum identification cast on.
 - a. Shop Order Number
 - b. Materials specification and grade
 - c. Howell Foundry logo or name.
- (2) Prior to removal due to manufacturing processing the Howell Foundry UID number shall be transferred to an area where it will not be removed or the information will be on a card attached to the casting.
- (3) Prior to shipment, the complete casting shall have the UID number and/or the heat number stamped or marked on it. In addition, all of the information referenced in the shipping section of the ERP system shall be stamped or marked on the casting.
- (4) Castings shall be marked as required by purchase order or, if not specified, by any method which will not result in any injurious conditions to the casting. Steel stamping, Vibro or chemical etching or permanent ink markings may be applied as applicable.
- (5) In the event identification marking is removed or is illegible, the VP of Operations or delegate shall be notified in accordance with this manual. The casting shall be scrapped, unless identification can be re-established to the satisfaction of the VP of Operations, or delegate using substantiating documentation which assures traceability. The casting shall be re-identified by VP of Operations prior to releasing for the next operation.

18.0 CHEMICAL ANALYSIS CONTROL

18.1 PURPOSE:

To establish a system of performing, documenting and recording chemical composition of castings in accordance with the customers purchase order.

18.2 RESPONSIBILITY:

The Materials Engineer, is responsible for assuring that all chemical analysis are conducted and documented in accordance with this manual.

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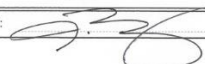
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18.3 PROCEDURE:

- (1) A chemical analysis sample shall be obtained from the furnace representing each heat, identified by furnace, heat number and date and analyzed.
- (2) The "Certificate of Analysis" form (Example 18-1) consisting of chemical analysis and mechanical properties (when applicable) shall be approved, signed and dated if within specification by the President, or delegate. This report shall then be forwarded to the Office Manager for review and processing in accordance with this manual.
- (3) When discrepancies in excess of accepted tolerances for analysis equipment are found during accuracy checks, the VP of Operations or delegate shall record the out of tolerance condition and report the findings to the President. The VP of Operations shall determine which disposition is required.

Example 18-1

 Howell Foundry L.L.C. P. O. Box 2487 St Francisville, LA 70775 www.howellfoundry.com Tel: (225) 635-2278 Fax: (225) 635-4584	Certificate No.:	CA/2	
	Print Date:	06/01/2016	
	Customer:	ITT Corp	
	Customer Fax:		
	Customer E-mail:	www.procastparts.com	
Comments:	CERTIFICATE OF ANALYSIS		
Heat: 8999 Qty: 1			
Specification: ASTM A216 Grade WCB Element Test: 1/6/2016 Balance: 97.945			
Results:			
C 0.190 (0.000 > 0.300)	Mn 0.890 (0.000 > 1.000)	P 0.035 (0.000 > 0.040)	S 0.010 (0.000 > 0.045)
Si 0.580 (0.000 > 0.600)	Cu 0.110 (0.000 > 0.300)	Ni 0.060 (0.000 > 0.500)	Cr 0.120 (0.000 > 0.500)
Mo 0.050 (0.000 > 0.200)	V 0.010 (0.000 > 0.030)		
Dated	Report	Location	Notes
Respectfully Submitted	Howell Foundry L.L.C.	Signed: 	Name: JB Shoaf, VP Operations

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19.0 MECHANICAL PROPERTIES CONTROL

19.1 PURPOSE:

To establish a controlled system to assure that the mechanical properties of castings produced meet the customer specification requirements.

19.2 RESPONSIBILITY:

It shall be the responsibility of the Materials Engineer to assure that this system is followed

19.3 PROCEDURE:

- (1) Identification of samples, determination and reporting of mechanical properties shall be performed in accordance with the manual.
- (2) The "Certificate of Analysis" (Example 18-1) consisting of mechanical properties and chemical analysis which shall be included in the CMTR document package shall be approved and certified, if within specification, by the President or delegate. This report shall then be forwarded to the Office Manager, or delegate for review and processing in accordance with this manual.
- (3) Records of equipment calibrations and frequencies shall be maintained on file in accordance with this manual.

20.0 CONTROL OF CASTING UID NUMBERS AND HEAT NUMBERS

20.1 PURPOSE:

To establish a controlled system to assure that adequate traceability of a casting is maintained.

20.2 RESPONSIBILITY:

It shall be the responsibility of the VP of Operations to assure compliance with the controlled system for establishing and maintaining casting identification and traceability through all phases of manufacturing.

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20.3 PROCEDURE:

- (1) When a customer purchase order for a casting is received, a Howell Foundry UID shall be issued via the ERP system in accordance with this manual. This order shall contain the customer name, Howell Foundry UID number and product class, pattern/product number, material specification and Howell Foundry alloy number as a minimum.
- (2) A Howell Foundry UID for each casting on the customer order shall be produced. This shall contain the Howell Foundry UID number, customer name, tool/pattern number, alloy, product number and the number and type of test bars required.
- (3) A sequential number shall be assigned to each casting by the Office Manager, or delegate. The VP of Operations, or delegate will then assign a pouring date using the scheduling module within the ERP system.
- (4) When the mold is poured, the VP of Operations or delegate shall enter the following on the pouring module within the ERP system with the date poured and the heat number.
- (5) Test samples shall be separately or integrally cast in accordance with the Howell Foundry UID. When cast separately, the keel block will have the heat number stamped on it. Integrally cast test coupons shall have the Howell Foundry UID number cast on them.
- (6) The heat number is assigned by the Materials Engineer, or delegate by entering the date of pouring, heat number, spec code and alloy into the computer.
- (7) After the pouring information has been entered. The information is updated into the ERP system database data base and is available to the other Howell Foundry Departments via computer access. The information is verified by the Office Manager or delegate.
- (8) The Inspection Department shall use a computer terminal to ascertain the heat number for a casting within the ERP system. The heat number shall then be stamped on the casting prior to shipment when required.
- (9) After receiving the castings, the VP of Operations, or delegate shall verify the stamped on heat number and cast on UID number.

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21.0 PROCEDURE CONTROL

21.1 PURPOSE:

To establish a controlled system for the issue control and review of Quality Assurance procedures that describes activities affecting quality.

21.2 RESPONSIBILITY:

It shall be the responsibility of the President, or delegate to assure that all activities affecting quality shall be performed in accordance with documented instructions, procedures or drawings appropriate to the circumstances and these documents shall include all applicable acceptance criteria.

21.3 PROCEDURE:

- (1) All Quality Assurance procedures shall be approved by the President or delegate and shall be reviewed for process, equipment and capability, as applicable, and compliance with this manual, customer purchase order requirements, or the appropriate specification.
- (2) All procedures issued or revised, concerning the above, shall include as a minimum, title, a unique number, revision number and approved by signature. Revisions shall be made by total procedure and not by page.
- (3) Upon approval, the President, or delegate shall have the procedure scanned in as a no editable file (TIF, PDF, etc.) into the shared folder on the HF server where it can be accessed by shop personnel from any computer terminal that has access to the shared folder. Editable "master" copies of procedures or revisions to procedures are to be maintained only by the VP of Operations or President. A copy of the signed procedure is maintained by the office for customer review or submittal.
- (4) To provide back-up for critical areas, hard copies of procedures may be forwarded to the critical areas.
- (5) Revised QA procedures shall be approved by the VP of Operations, or delegate, who shall then release the procedure for access to the shared

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network above. Where practical, the nature of the revision shall be defined and/or the revised paragraph identified via ***bold italics***.

- (6) A hard copy of the original (master) or revised procedure approved by the President, VP of Operations or delegate shall remain on file in the office. Related customer correspondence or approvals of procedures shall also be retained in the applicable customer order file until the related customer order(s) are shipped.
- (7) Departmental “Standard Operating Procedures” (SOP’s) are used to detail job task functions; proprietary foundry rigging and departmental quality planning shall be generated and controlled in accordance with this manual.

22.0 CERTIFIED MATERIALS TEST REPORTS — DOCUMENT PACKAGE

22.1 PURPOSE:

To establish a controlled system to assure compliance of “Certified Material Test Report” to the material specification.

22.2 RESPONSIBILITY:

It shall be the responsibility of the VP of Operations or delegate to assure that this procedure is followed.

22.3 PROCEDURE:

Characteristics required to be reported by the material specification shall be verified and the results recorded. Records shall be traceable to the specification and revision to which the inspection, examination or test was performed. The “Certified Materials Test Report” shall be transmitted to the purchaser at the time of shipping and shall consist of the following (when required):

- (1) “CMTR Cover Sheet” showing the documents enclosed and the approval of the Authorized representative.
- (2) Actual results of chemical and mechanical test which is the “Certified Metallurgical Test Report”.

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- (3) Results of dimensional examinations when required, Non Destructive Examinations including radiography film.
- (4) Weld repair records on castings as required (Example 7-2).
- (5) Heat treatment as required by materials specification shall be reported as required.
- (6) Any tests, examinations, or heat treatments required by the material specification that were not performed shall also be listed.
- (7) "Weld Filler Metal Certification" as applicable.
- (8) Material identification.
- (9) Applicable certifications from approved suppliers for subcontracted services.