



BRENDELL
MANUFACTURING, INC.

BMP-003 Work Order Creation and Maintenance

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Revision
H

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G	Update for Quality Compliance.	11/21/06	BD
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Scope: This document is intended to define the requirements for the creation of a Work Order, (W.O.) revisions to a Work Order and maintenance of the Work Order. This procedure will define the methods for identification of the W.O. and the required information to be contained in the W.O.

Purpose: The W.O. is the Primary document for quality planning and quality plan execution, configuration management and traceability of each individual component or lot of products. The W.O. is used to record all pertinent data to demonstrate that all aspects of the part conform to requirements.

References

BMP-001 Document Control
BMP-005 Tool Management
BMP-007 Control of NCM
AS9100 Section 7.5
Shop control system W.O. Template
Q-form 213 Stamp Control Log

1.0 Creation of a New Work Order

The Work Order serves many functions at Brendell Manufacturing. As the Work Order is created it also serves as the quality plan. Consideration must be given to the Q.A. performance level as defined in the Quality Manual and as stipulated as a result of Contract review BMF-102. In order for all elements of the customer's requirements to be contained in the W.O a full review of the following documents must be performed by qualified management including Quality management:

- Engineering drawings and all Change orders,
- Customer specifications,
- Customer Purchase order
- External specifications

After a review of these documents for specific requirements, consideration can be given to the required complexity of the Work Order. Based upon the individual customer requirements some of the conventions noted below may or may not apply.

At a minimum, the elements as defined in section 1.2 below shall be adhered to as applicable to assure consistency and standardization of the various W.O.s.

Any staff member at BMI may initiate a W.O following these guidelines. All W.O.s must be approved by BMI management prior to release to the shop floor.



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1.1 Naming Convention and Header

The W. O. number and technical data will be standardized using the shop control software. The method of component traceability should be determined based upon the specific contract requirements and the intended use of the product. Individual serialization may be required or simply a lot or batch number. In either case some method of discrete identification that associates the W.O. to the products is required in all cases.

1.2 Required elements

The included elements for all W.O.'s should be the similar for all products regardless of the complexity. This standardized approach is intended to reduce the training time for employees when a new product is introduced.

All W.O.'s should include all elements noted below:

- o Header- Job number as noted in 1.1 above
- o Technical Specification data
- o Contract required identification and traceability
- o Required tooling with Identification as applicable
- o N.C program identification and revision level as applicable
- o Material and Components data
- o Manufacturing Sequence
- o In-process inspections
- o Outside processing data
- o Final acceptance
- o Packaging & shipping instruction

1.3 Technical Specifications and Data

This data should be presented in table format that states the document or specification number, the title of the document, the revision number/letter. This section is intended to provide easy reference to the technician if other information is required. CNC programs created for the production of the components should be referenced here with their revision status noted.

1.4 Required tooling

Required tooling will be noted on the W.O. under job notes whenever applicable. It is only intended to identify a component unique to a job or customer tooling required for manufacturing and/or handling large parts during manufacture and shipping the part. Standard hand and shop tools are not identified in this section. Typically this section is



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used to record the tool number, number of tool parts, tool revision and other pertinent configuration data.

If the tool or N.C program is new, reworked or repaired, a tool prove out shall be performed. This shall consist of a first article inspection of all part features controlled by the tool or N.C program in question. This inspection shall take place before the production run is underway. A record of the inspection shall be created on BMI format and filed in the job file for the parts and production run in question. If the inspection is unacceptable rework/repair/N.C. revision shall take place and the tool prove out will be repeated.

1.5 Material and Components data

The material and components section is where the raw materials are qualified as being the correct for the application. This is where the material and component traceability chain begins. As applicable, the material type, lot number, Heat treat # or batch, and supplier should be recorded. This section serves to "buy in" the materials to the work in progress.

This section is also used to incorporate other materials and components such as fittings or purchased products. If these components have unique serial numbers, they should be recorded in this section.

In the event that a component has had outside processing, this section should give instructions to verify that the component has been processed in accordance with instructions. These processes may be anodize, alodine, priming or heat treatment.

In all cases this section should provide any instructions to the technician, for pertinent verification and inspection requirements of the raw materials or components before they are incorporated in to the production cycle.

Should any of the raw materials or components be considered as customer property, any special instructions for documentation, use or disposition of materials should be included in this area. Use of customer furnished materials should be clearly noted in the W. O.

1.6 Manufacturing Sequence

The W. O. should clearly and concisely instruct operators, technicians, and other manufacturing personnel on correct sequences and methods to be used. These instructions shall include, where appropriate, detailed information on the performance of any special processes. Instructions shall include any special requirements related to



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storage, handling, contamination control, safety precautions, and other areas of special significance. Components that are more straightforward in their manufacture may have instructions such as “build complete per print” or “build per print except for...” noted in the manufacturing sequence. This sequence will be laid out on the W.O. in table format and instructions will be divided up into their respective steps. Traceability on the W.O. routing steps will be maintained through operator and inspector initials. For identification and traceability purposes, all employee initials will be recorded for reference on Q-form 213, Employee Stamp Log.

The manufacturing sequence shall also define the identification requirements of the component as it goes thru the fabrication process. The method of identification should be defined as metal tag, sticker, stamp or any other method that ensures product identification. Also define what information should be contained on the identification tag. Care should be taken to provide special instructions when parts are processed in environments that the I.D method will not survive such as heat treat.

In-process inspections

Depending on the customer requirements, complexity, and application of the product being produced, there are a number of operations that will require acceptance by the technician. Selection of these items is based upon specification and P.O requirements as well as past process performance. The acceptance operations must also be placed in the W. O. at the appropriate sequence so they are not later concealed and become non-verifiable. A space should also be provided to indicate acceptance or rejection of the inspection operation. Consideration should be given to the following elements for inclusion as an acceptance item:

- On-machine inspections
- Outside processing before final machine
- Fit for use of components parts; only use Q.C. “accepted” parts
- Customer specification mandates for verification
- Customer requested source inspections

If a specific gage or tool is to be used it should be called out by name and/or serial # as applicable.

1.7 Outside processing Data

If the components were sent out for heat treat, finishing or the vendor and the acceptance criteria, if any should be noted on the W.O. Depending on the customer requirements, various levels of detail for recording this data must be considered and incorporated in to the W. O.



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1.8 Final Acceptance

Final acceptance should define the end item acceptance features of the component that, at a minimum, are specified by the customer. In the event the customer requirements are minimal, key features may be determined by BMI to accept the product. The key features should be inherent product characteristics that demonstrate the process has performed properly.

Any and all requirements for release of the product should be defined in this section. Examples of this would be testing of witness coupons, heat treat coupons or any other test or inspection required as part of the contract. All elements required to satisfy the contract requirements should be defined here and have evidence of review and acceptance. The entire W. O. is to be reviewed at this point to assure that all operations have been completed based on initialized steps. Once all required review and inspection is completed the "Final Acceptance" field in the W.O. will be initialed indicating that products shipping readiness.

1.9 Packaging and shipping

Any special instructions for packaging and shipping should be defined in this section. Any special crating or handling requirements must be considered. Commercial Items may be simply stated as pack and ship or may be shipped according to any other customer needs.

2.0 Revision of an existing W. O.

Revisions to a W. O. can occur for a number of reasons as noted below. W.O.s that are created from existing W.O.s for different components are considered new documents and shall have a unique header and start with revision A. This section is intended to discuss only revisions to work in progress and follow on work of the same product. BMI management or the production supervisor may redline changes to the W.O. All changes must be reviewed and approved by the project engineer and Quality management prior to release to the shop floor.

Revisions can occur for the following reasons:

- Customer Drawing revisions
- Customer P.O revisions
- Process specification changes
- Material processing difficulties
- Material changes
- Tooling revisions
- Prototype processing.



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2.1 Customer required changes

Customer related changes are requests from the customer to incorporate a change to WIP and/or follow on work. As the change is received a full review of all WIP must be performed and a determination of the incorporation point that the change can be made. The incorporation point should be noted by revision number.

At the incorporation point for the change, the W.O. should be red lined with the new processing instructions and appropriate revised technical data.

Based upon the new technical data, if any parts are now discrepant, they must be processed in accordance with BMP-007 Control of NCM. Even if the parts were made to the best technical data at the time they are considered as NCM to the most current technical data and must be identified and segregated as applicable.

The incorporation point and the cost to incorporate for WIP and follow on work should be determined. Also the quantity of parts that are now non-conforming as a result of the change should be noted and forwarded to the customer for disposition. A change of scope letter should be written and to the customer that defines the following:

- o Cost to incorporate the change to the tooling and W. O.
- o Cost of materials that have changed
- o Cost of WIP that is now discrepant
- o The incorporation point where all changes can be completed.
- o Impacts to schedule

2.2 Production facility changes

Production facility changes are considered to be of "in-House" origin. These are usually associated with the prototyping processes that results in iterative changes. These changes must be captured for proper configuration management and process improvements. These changes are to be redlined into the body of the W.O. As these iterative changes are made the incorporation point must be noted in the unplanned event log as applicable. Any Part that becomes discrepant as a result of these iterative changes will be processed in accordance with BMP-007 NCM.

3.0 W. O. execution

The W.O. is printed at the time of release to the shop for production. The shop control software will only allow authorized personnel to create and release W.O.s to the shop floor. The paper copy of the W.O. serves as the record of completion and acceptance of each operation. The operator initials each operation as it is completed. This acceptance



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and completion is traceable to each operator via the operator's initials via Q-form 213 Stamp Log. Additionally each operation is recorded electronically on the shop control system with the operator's employee number.

4.0 Closeout of a W. O.

The close out of a W.O is the process of verifying that all elements of the W.O are complete, documented and the W. O. and associated paperwork is ready for archiving. The completed W. O. provides objective evidence of the as built configuration of the component and that all required manufacturing and inspection requirements have been completed. The steps noted below are required to close out the W. O. and Archive with the job file:

- Review all operations for completion
- Revise the electronic file for the W. O. to incorporate all redlines
- Verify that the following documents are included:
 - In-process and final inspection data
 - Any NCM paper work
 - Any certificate of conformance
 - End Item data package if required

File the completed work package in accordance with BMP-002 Control of Records.

5.0 Assembly Work Orders

When a work package has multiple components that are assembled into a final product at BMI these work packages may require an "Assembly" Work Order. The determination to use an assembly work order shall be based upon the complexity of the final assembly and the contract requirements to maintain traceability of the piece part components.

5.1 Creation of an assembly work order.

The assembly work order is basically a two tier work order. The top assembly work order is the set of instructions that defines the final assembly, the quantity, assembly methods and test or inspection methods as well as any other pertinent information from the customer's contract. The assembly work order shall identify the needed components and have a space for recording the batch number of each component used.

The piece parts that build up the assembly shall be manufactured on "batch" work orders. A "batch" work order is not different than any normal job that would require a work order. The batch components must simply have a clear means of identification for incorporation into the next higher assembly. The quantity of components that comprise the batch shall be noted on the batch work order. A method of identification for each



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batch shall be determined and applied to all parts in the batch or to the container that the batch is stored with in. All manufacturing instructions, inspection instructions, material traceability and outside processing functions shall be defined on the work order in accordance with this procedure as it would be done with any component requiring a work order.

5.2 Execution of the assembly

As the assembly is built up from the component parts each component part will have its batch number recorded on the assembly Work Order. This will allow the material traceability chain to flow down to the raw material and heat lot data. All testing and final assembly inspections shall be completed as part of the assembly work order. Upon completion of the assembly the completed work order shall be filed in accordance with BMP-002 control of records.