Revision	Reason for change	Date	Approval
E	Updating Manual to reflect actual practices	3/16/06	BMD
F	Update 4.0,4.2 per 5-9-08 audit	5-9-08	pjm

Scope:
This document defines the Tool management policy for all tooling, measurement, and test equipment used at BMI. The following policies and procedures will be defined:

- o Tool identification
- o Tool Storage
- o Tool rework and repair
- o Customer Owned Tooling
- o Tool calibration policy
- o Control of Calibrated MTE

Reference documents
BMP-003 Creation and Maintenance of Work Orders
BMP-007 Control of NCM
AS9100 Section 7.6
Shop control software Q.A. calibration module
Appendix A- Tool suffix

1.0 Tool Identification

Tools will be identified with respect to the part that the tool produces and the tools function. The tool will also be assigned a log number that corresponds to the log number in the shop control system Master tool list. Appendix A defines the suffixes that identify the tools function that are to be used when identifying a tool.

For example:
001-145T0001-1HF
This tool is a holding Fixture that makes a 145T00001-1 component and it is logged on shop control system at entry 001

Tools that are of general use and not used for a specific component only, will be identified with simply the log number and either the suffix MTE or MFG as noted in Appendix A.

If a tool has multiple parts that can be removed in the normal course of work, each part must be identified in the same manner indicating the number of parts to the tooling package. For example, after the part number above Part 1 of 5, 2 of 5 and 3 of 5 shall be entered. Only tools with multiple parts shall be identified in this manner.

Tools that are also used to make other parts shall be identified as above utilizing the part number identifier of the part that is most frequently manufactured. The other components that can be made form the tool shall be entered into the shop control

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system inspection tooling inventory log.

Physical identification of the tools shall be done with a metal stamp as the preferred method. Where that is not possible due to construction of the tool a vibro-etch may be used. Stamped metal tags may be used provided they are securely attached to the tool. Paper printed stick on tags may be used for MTE (measurement and test equipment). All identification methods must be able to withstand the production environment

Tools manufactured under government or customer contract will be identified in accordance with the customers supplied instructions and or tooling manual.

2.0 Tool Storage and Inventory

All tools will be entered into the master tool list embedded in the shop control software. All required fields on the form shall be completed. The revision level of the tool shall be entered as applicable. Tools will be stored on racks or in crates as applicable to prevent damage. Proper packaging and preservation will be performed prior to storage. Tools that are in storage and not active will be logged as such with the on line master tool list embedded in the shop control software.

2.1 Customer tool storage and inventory

Customer owned tooling will be entered with the designation as customer owned tools in to the online master tool list embedded in the shop control software. The applicable customer contract and customer tool management policy will be reviewed as a customers tool is received or put into storage. All applicable data will be entered on the log. Before a customer supplied tool can be stored as inactive, the customer must be contacted for a long term storage agreement.

3.0 Tool rework and repair

3.1 Tools and MTE

Tools and MTE may require repair and service to continue to perform properly. All tools and MTE are to be inspected for damage and proper function each time they are used. It is the technician's responsibility to either repair the tool or notify management when a tool or MTE is found to be in need of repair or service.

In the event of a drawing change that will effect the tooling configuration, the tool must be reworked to the new technical data. Tools that are reworked as a result of a drawing change shall have their revision status changed to match the current drawing revision level of the part to be made from the tool.

3.2 Customer tooling repair and rework

Customer or government owned tooling will not be repaired or reworked with out the

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customer's authorization. Tools found to be discrepant or in need of repair shall be documented on Non conforming material report in the shop control software. The NCM will be forwarded to the customer for authorization.

4.0 Tool Calibration policy

All part features that are verified for final acceptance of the component and those specified by customer contract will be verified with MTE maintained on a periodic calibration cycle. Other in process verifications will use MTE that is "reference only tooling" as defined in 4.2 below.

4.1 Final Acceptance

All part features that are defined as final acceptance items shall be verified with MTE that have been calibrated in accordance with this procedure. Part features that are verified in-process and later inspected at final acceptance may use tools that are considered "reference only tooling". Part features that are verified in process that will not be later verified at final acceptance due to subsequent processing will use calibrated MTE.

4.2 Reference Only Tooling

Part features that are not considered final acceptance features and/or will be subsequently verified at final acceptance may be verified using MTE that are considered "Reference Only Tooling." Such tooling is not to be used for final acceptance of product. This calibration shall consist of the operator checking the tool against a shop standard on a periodic basis. These tools will not be maintained in the data base as requiring calibration. It is the operator's responsibility to check and calibrate the MTE as it is used. The operator is also required to maintain the MTE as fit for use and remove from service any MTE found to be damaged or out of calibration. All tooling that is not clearly marked as within the calibration system, be it by lack of calibration sticker or outdated sticker, is considered "reference only."

4.3 Mandatory Calibration

At a minimum the following categories of MTE and processing equipment will require calibration and inclusion in the periodic recall list. Much of the calibration shall be done in house employing secondary standards that are NIST traceable. The specific tools to be included will be noted on the on line master tool list embedded in the shop control software

- Set of standard dimensional inspection tools for critical features.
- Standard set of gage blocks
- Micrometer standards
- Temp probes
- Processing equipment controllers

Revision	Reason for change	Date	Approval
E	Updating Manual to reflect actual practices	3/16/06	BMD
F	Update 4.0,4.2 per 5-9-08 audit	5-9-08	pjm

- Testing equipment

4.4 Control of MTE

Any Measuring or Testing Equipment (MTE) used to verify a final acceptance, critical feature and/or part features as directed by the customer contract and MTE categories as described above shall be calibrated to assure accuracy.

Any measurement or calibration standard that is used to perform the calibrations required as noted above shall also be calibrated to assure accuracy. Such calibration shall be traceable to National Institute of Standards and Technology (N.I.S.T.) certifications of accuracy. The total, collective uncertainty in any calibration standard shall not exceed 25% of the applicable tolerance

4.4.1 Calibration Recall System

A list of all items of MTE requiring calibration shall be noted on the on line master tool list embedded in the shop control software. This list shall be updated as required upon each acquisition of new equipment requiring calibration.

On a monthly basis the on line master tool list embedded in the shop control software will be queried to identify all tools that are noted as requiring calibration in the coming month.

A log of all items requiring calibration shall be maintained by the QA Administrator. The log shall show, as a minimum:

- Name of the item.
- Identification number, traceable to the physical item.
- Date of most recent calibration.
- Expiration or recall date for the current calibration.

Revision	Reason for change	Date	Approval
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4.4.2 Calibration Records

In addition to the log described above, calibration records shall be maintained for each individual item of MTE. These records may be originated at an outside calibration contractor or simply be contained in the on line master tool list embedded in the shop control software with remarks entered as appropriate. Calibration records shall show, as a minimum, the following:

- Name of the item.
- Identification number, traceable to the physical item.
- Required calibration interval.
- Date of most recent calibration.
- Calibration source, including identification of standards and names of personnel where appropriate.
- Method or technique used in calibration, if not obvious from nature of calibration data.
- Expiration or recall date for the current calibration.
- Calibration results, with supporting data as appropriate.
- Any actions taken as a result of the calibration.

4.4.3 Calibration status

Upon acceptable calibration of an item, a calibration status tag, label, or stamp shall be affixed to the item. If size or configuration of the item precludes attachment of such marking, the marking may be attached to the item's container. The calibration status marking shall include, as a minimum, the following:

- Identification number of the item.
- Date (Month, Day, Year) the calibration was performed.
- Due date for next calibration (M/D/Y).

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- Any limitation or restriction which applies to the calibrated item.

On any item whose calibration could be rendered inaccurate by inadvertent or intentional movement of operator-accessible adjustment mechanisms, tamper-resistant seals shall be employed on such adjustments.

Any item which is found to be out-of-tolerance during calibration is to be identified as unacceptable, using tags or stamps as appropriate, and segregated from conforming items in such a way as to preclude further use.

Any item whose accuracy becomes suspect or demonstrably out-of-tolerance during use, but whose calibration status is current, is to be removed from service immediately. The item is to be identified and segregated as described above.

Items failing calibration may be repaired, replaced, or discarded, as deemed appropriate by Management, QA, or Customer/Government representative.

4.4.4 Failed Calibration

If any item is found to be significantly out of tolerance at calibration, the following are to be accomplished as rapidly as possible:

(1) The project manager/supervisor will ascertain whether there is a significant likelihood that the item may have caused undetected delivery of nonconforming product.

(2) If such likelihood is found to exist, the project manager/supervisor will notify the appropriate Customer, User, or Government representative of the problem. This notification will include pertinent data concerning the magnitude of the out-of-tolerance condition, and its potential impact on the quality of the product. This notification will be in the form of a letter noting the following: the gage or tool in question, the degree of out of tolerance, the customer part number, the suspected impact on that product and the quantity of the delivered products.

Note: For purposes of this paragraph, the term "significantly out of tolerance" shall be defined as an out-of-tolerance condition equal to or greater than the tolerance bandwidth for the characteristic being inspected with that particular item.

Tooling that has been found to be significantly out of tolerance will be marked with a sticker which reads “not in calibration system.”

4.5 Standards and Procedures for Calibration

Any calibration standards used in the calibration of MTE shall possess adequate accuracy, stability, range, and resolution to accomplish their intended function. All such

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standards shall be traceable to N.I.S.T. certifications of accuracy.

Unless otherwise provided for in the specific contract for which the item is used, the total collective uncertainty of the measurement standards shall not exceed 25% of the acceptable tolerance for the calibration being performed.

To the extent necessary to assure satisfactory calibration accuracy and on-line reliability, calibrations shall be performed and calibrated items used under suitable environmental conditions. Unless otherwise provided for, calibrations must be conducted under conditions not exceeding 63 - 85 deg. F. and 0 - 85% Relative Humidity.

If conditions of temperature, humidity, vibration, and cleanliness cannot be maintained at optimal levels, appropriate compensatory corrections are to be applied to calibrations and measurements.

Calibration intervals for each item shall be assigned by the Quality Administrator, and shall be based on previous experience with similar equipment, or on contractual requirements, whichever is more stringent. Calibration intervals are to be shortened if problems during calibration or use of items indicate a need to do so. Calibration intervals may be lengthened if review of prior calibration experience indicates that this can be done without compromising the reliability of the items.

The Quality Administrator shall periodically review calibration records for all items, and shall use the frequency of calibration failures and problems as an aid in assessing the adequacy of the calibration system. The Quality Administrator shall implement any corrective action that he deems appropriate to remedy any repetitive deficiency in the calibration system.

After completion of either an In-house calibration or by an outside service contractor the master tool log shall be to reflect the new calibration recall date.

Appendix A Tool Identifier Suffix

MTE Measurement and test equipment
MFG General Manufacturing equipment
IF Inspection Fixture
BM Brendell owned inspection tooling
- Employee tooling will be serialized with the employee's initials
- Customer owned tooling will be identified per Vendor Code