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# Purpose

### The purpose of this user guide is to provide instructions for Laser Technicians in the process and procedures necessary for Laser Etching.

# Responsibilities

### Etching Department engineering/management is responsible for maintaining this procedure. Authorized Etching Department technicians are responsible for carrying out this procedure. The affected department for this procedure is the “Etching Department”.

# Associated Documents

### ISO 9001, QAM, QSM, AS9100, PE04, TA04, TA012, TA1089, TA144

# Procedure

## Safety

### Eye Safety

#### Laser etching uses a focused beam of light to achieve very precise marks. The major hazard of this powerful beam is to the eyes, which can be blinded when hit with the beam.

#### The laser etchers are Class I workstations that do not allow access to hazardous levels of laser light during operation. Never disable or defeat the door safety switch or remove any of the guarding when the laser is running production.

#### If during maintenance the laser beam must be on when the guards are removed, the Laser Safety Officer must establish a perimeter around the machine to prevent people from entering the nominal hazard zone (NHZ). The Laser Safety Officer is also responsible to make sure that people inside the NHZ are using appropriate laser safety glasses.

### Electrical Safety

#### High voltages are present in these systems but are not accessible unless the protective doors are opened or the safety locks defeated.

#### Only trained electrical personnel who have a complete understanding of the laser’s electrical system should perform electrical maintenance on these systems.

### Air quality

#### During laser etching, hazardous gases may be produced from the burning of plastics or metal coatings. In the case of deep etching/light engraving, hazardous metal vapors will be produced. To protect the operator, the etchers are equipped with ventilation units.

#### Do not etch plastics and coated metals or deep etch without the ventilation system working properly.

## Etching Instructions (TA012 Creation and Control)

### Existing Instructions

#### The initial specific etching/marking instructions can be found on the model number etching drawing (TA012), which is located in the **G:\Etchings** folder and grouped by series.

#### For example, **602D01** can be found in the **600 to 606 Etching Drawings.pdf** document.

### Similar Models

#### When confirmation of the etching file is required, reference the Product Identification Guide Form TA012 that is located in the G:\Etchings folder and listed by model number.

#### If a TA012 is not found for a specific model, reference the Etching Index. The model may have similar characteristics to another model that has an existing TA012. The ETCHING INDEX.xls is located in the R:\Production\Etching-Welding\Etching folder.

### New Models

#### If the model does not have a TA012 and is not listed on the index, do Not Attempt to Etch. Contact a Supervisor or Trainer for further instructions. The supervisor or trainer may be required to create a new TA012 for this model or determine that it is similar to another model and add it to the index.

#### New sensors that are determined to be similar can be added to the index along with the required program and any necessary comments.

#### If a sensor does not meet any of the previously mentioned criteria, a new program and TA012 must be created. After creating a new program for the model, the etching supervisor must then provide an etching sample for the approval authority to evaluate.

#### Once the etching sample is evaluated and approved, the Etching Supervisor must create a TA012 for each model as per TA012i instructions.

## Identification of Incoming Parts / Serial Numbers

### Since the serial numbers are the basis for tracking piece specific calibration information, etching technicians need to be able to match sensors to serial numbers.

### Each assembly department is responsible to, somehow, identify each piece, and correlate it to its assigned serial number (numbered symbol/code caps, numbered sandblasting bars, writing directly on the piece, etc.), as per listed on the traveler.

### If the etching technician cannot match the piece to its serial number, the technician shall return the job to the assembly group for clearer marking.

## Operator Requirements

### All etching technicians are required to pass the yearly eye examination for near visual acuity per PE04.

### In cases where the employee is color blind, this will not affect their ability to visually inspect etched parts.

## Inspection / Quality Requirements

### Visual Inspection of Etchings

#### For “cosmetic” criteria, the etching technician will visually inspect every part to visual standard QA107 Visual Inspection Master done by unaided eye. The technician will check for the following criteria:

##### Centered

##### Legible

##### Contrast

##### Consistent

#### For “accuracy” criteria, the etching technician will visually inspect every part either by unaided eye, under magnifying glass or microscope at the operator’s discretion depending on the etching size.

##### Accurate – must match the documentation listed on the router. On all parts that get a serial number, the etching technician will also verify that the serial number is correct

##### Note: It is acceptable to have sensors etched with "ASSY in USA" if the etching drawing states "MADE in USA"

#### Call any non-conformity to the attention of the supervisor or trainer before proceeding. On all parts that get a serial number, the etching technician will also verify that the serial number is correct.

### In Process Correction

#### In process correction is acceptable for all non-coated metal parts. Sand blasting or polishing will return the parts to their pre-etched condition. The polished or sandblasted surface must match the surface texture of the rest of the sensor.

#### If sand blasting or polishing does not remove the mark, the etching technician shall consult with his supervisor about other possible rework alternatives. Other methods include but are not limited to: grind, sand, tumble.

## Handling of Non-Conforming Product

### All defective parts will be segregated from the good pieces by placing them in a separate black ESD box. Paperwork will be placed in the box identifying the item number and the job number that these parts came from.

### TA01 will be followed for material disposition. Parts that are plated or anodized need to be either recoated or scrapped.

## Job Procurement and Completion

### The etching technician will pick up jobs from the etching area line based on a first in, first out basis.

### The etching area supervisor, or their designee, may make adjustments based on product lead-time and/or verbal requests. Completed jobs will be recorded in the RTY database or Shoptrack.

### The etching technician will scan each job individually and close out each job when done, even if the next job is a similar model. This will prevent similar looking jobs from being etched with the wrong model number.

## Etcher Power Checks

### Lamp pumped laser etchers shall have the power output of the laser checked once per week.

### Diode pumped laser etchers shall have the power output of the laser checked at least once per month. This check will be documented on TA144 or through the preventative maintenance database.

## Continuous Improvement

### The etching technician will record all etching rejects. These items are reviewed on a daily basis at the morning visual board meeting. Significant issues are addressed and documented on the visual board task tracker.