



ID Integration, Inc.

Direct Part Marking Synopsis

Direct Part Marking is any method of directly marking the part surface with a serial number, part number and/or machine-readable code instead of attaching an identification tag or nameplate.

Techniques: Laser engraving, dot-peen, chemical-etch, ink-jet.

Example uses: ATA Spec 2000 parts, Production tools, Structural parts, Line Replaceable Units.



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SER ABC333-001**



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Example ink jet part marks.

Benefits

- Permanent part identification.
- Machine-readable code.
- Positive identification.
- Aftermarket traceability.
- Not experimental technology – industry standard.
- Improved accuracy of part tracking.
- Ease of data collection.
- Cradle-to-grave traceability.
- No data transcription errors.
- Increased quality with reduced costs through improved efficiency.



Example production tools laser marked with a Data Matrix code.

Situation

- Multiple manual machine tool changes.
- Each tool change requires 5 unique tools.
- No accurate means of tracking tools.
- Tools ordered on a best-guess basis.
- Incorrect tooling can be installed in machine before certification.
- Tool life not accurately recorded.
- Not feasible to determine what tool caused part damage.

Marking the tools

Laser marking is a non-contact thermal process where the heat generated by the beam alters the surface of the tool. When the temperature is raised in a localized area, carbon will precipitate out along grain boundary areas turning black. An ECC, (Error Checking and Correction) level of 200 was used to allow the Data Matrix code to recover from block damage such as blotches and or scratches on the tool surface.

Details

Data Matrix code used is 0.125" in physical size, contains 30 characters of information including tool number and a unique serial number.

Benefits

- Accurate tool tracking and inventory control.
- No keyed data input errors.
- Reliable traceability.
- Efficient tool ordering - automatic email.
- Verification of correct tooling controlled by NC Program.



Example part with ink jet part identification, raw stock sticker with 1D barcode and RF tag attached.

Situation

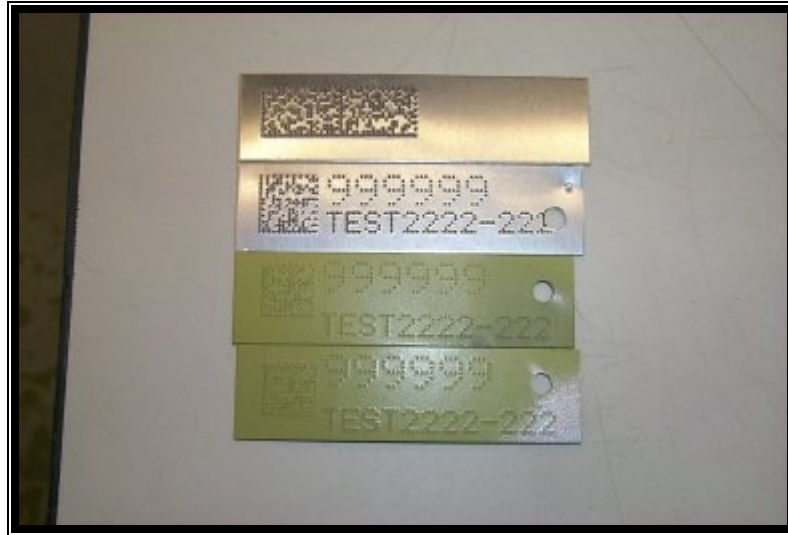
The metal tag identifying the part during manufacturing is removed during certain processes and can be placed on the incorrect part. Parts may then be stamped with the incorrect part number due to the wrong metal tag being attached to the part earlier in the process. Wrong parts can then be picked from storage and placed in the kits sent to the installation sites.

Details

The RF tag is attached to the part early in the manufacturing process and remains on the part during all processes. At part marking it is scanned and the information is passed to the ink jet, which references a database to determine which part the tag is attached to. The ink jet then prints a part mark that includes a Data Matrix code.

Benefits

- Parts will have identification attached through each stage of manufacturing.
- With the ink jet system, the part number is accurate and human errors have been eliminated during the final part mark.
- The part mark includes a Data Matrix code; parts can be verified by scanning the code before being shipped.
- Provide tracking and history for every part in the factory.



Example part identification tags with dot-peen marks.

Details

The metal tag identifying the part during manufacturing is removed during certain processes and can be placed on the incorrect part. Ideal part marking situation is identification marked directly on the part surface. Parts will be dot-peened with their identification, which will include a part number, work order number and Data Matrix code.

Benefits

- Parts will have identification marked directly on the surface during manufacture.
- Human errors will be eliminated.
- Fatigue and stress approved process.
- The part mark includes a Data Matrix code; parts can be verified by scanning the code before being shipped.
- Codes are readable after shot-peen and painting.
- Data Matrix codes are the standard for ATA Spec 2000 requirements.

What is Data Matrix?



- Public-domain code.
- 2-dimensional symbology.
- Encode up to 2,335 alphanumeric or 3,116 numeric characters.
- Error correction allows decoding even when code is damaged.
- Rectangular or square in shape.
- Can contain up to 100 times more information than linear bar code in the same or less space.
- Is machine-readable.
- Can be printed on almost any material.
- Can be decoded at any angle – rotated 360 degrees or tilted up to 60 degrees.
- Scaleable – can be 1/16” square to 24” square in size.
- Only requires 20% contrast.

Reading the code

The Data Matrix symbol is decoded using a special CCD imager. Read distances vary according to the size of the Data Matrix, equipment capability, material on which the code is marked and lighting. Depending on the application, both hand held or fixed-station readers are available.



Fixed Station Reader scanning laser-marked tool.



Handheld Reader scanning dot-peen mark.