



Work Instruction

Ballooned Drawings and AS9102 First Article Inspection Reports
[Offline Desktop Application](#)

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1. Purpose

This work instruction describes how to use FAIRmark to create ballooned drawings (bubble prints) and AS9102 Rev C First Article Inspection Reports (Forms 1, 2, and 3). It covers the complete workflow from importing a drawing through exporting the finished report.

2. Scope

FAIRmark is an offline Windows desktop application. All data stays on the local computer — nothing is uploaded to the internet. This makes it suitable for use with ITAR-controlled and export-restricted drawings.

FAIRmark supports single-sheet and multi-sheet drawings in PDF or image format, and produces:

- Ballooned drawings (PNG export or Print-to-PDF)
- AS9102 Rev C Forms 1, 2, and 3 (print, Excel, or XML export)
- QIF (ISO 23952) characteristic data for CMM and metrology systems

3. Getting Started

Step 1: Launch the application

Double-click the FAIRmark icon on your desktop or in the Start menu. The application opens with a blank project. No internet connection is required.

Step 2: Activate your license (first use only)

On first launch, FAIRmark runs in evaluation mode. Outputs include a watermark. To remove it, go to Help → Activate License and enter the license key provided with your purchase.

 **Tip:** *Evaluation mode is fully functional — every feature works. The only difference is a watermark on exported drawings and printed forms. This lets you verify FAIRmark fits your workflow before committing.*

4. Importing a Drawing

Step 1: Click "Import drawing" or drag and drop

Click the Import drawing button in the toolbar, or drag a PDF or image file directly onto the application window. Multi-page PDFs are split into separate sheets automatically.

Step 2: Add more sheets to the same project

To add additional drawing sheets (e.g. a second view or a detail sheet), either click the “+ Sheet” button or drag another file into the application. New sheets are appended — they do not replace what you already have.

Step 3: Rotate a sheet if needed

If a sheet appears sideways, click the “🔄 Rotate” button to rotate the current sheet 90° clockwise. Existing balloons rotate with it.

 **Note:** *FAIRmark works with PDFs and common image formats (PNG, JPEG, BMP, TIFF). For the best OCR results, use the highest-resolution source available.*

5. Setting Up the Zone Grid

Zone references (e.g. A1, B3, C2) identify where each characteristic appears on the drawing. FAIRmark overlays a configurable grid on each sheet.

Step 1: Open the Zones & bubbles panel

Click the “Zones & bubbles” panel on the right side. Set the number of columns and rows to match the drawing's zone border. Choose which axis carries the letters (typically the short edge) and which corner is origin.

Step 2: Align the grid to the drawing's border

Click “Detect grid from drawing” to let FAIRmark automatically find the printed zone border and tick marks. Or drag the blue frame edges and inner lines manually to match the drawing's own borders.

Step 3: Read zone labels (optional)

Click “Read zone labels (OCR)” to have FAIRmark read the printed A/B/C and 1/2/3 labels and set the letter axis and start corner automatically.

 **Tip:** Once the grid is set, every balloon you place is automatically assigned its zone reference. You can click “Recompute all zones” at any time to update all zones after adjusting the grid.

6. Placing Balloons

Step 1: Enter Balloon mode

Click the “● Balloon” button in the toolbar (or press B). The cursor changes to show you are in placement mode.

Step 2: Click on the drawing to place a balloon

Click once on or near the characteristic you want to balloon. A numbered red circle appears. The balloon is automatically assigned the next sequential number and a zone reference based on its position.

Step 3: Set a leader line (optional)

Select the balloon, then in the editor panel click “Set point” under Leader. Click on the exact feature on the drawing. A leader line (arrow) connects the balloon to the feature.

Step 4: Reposition a balloon

Click a balloon to select it, then drag it to a new position. The zone reference updates automatically.

 **Tip:** Switch between Balloon mode and Pan mode using the toolbar buttons or keyboard shortcuts B and P. Hold Space at any time to temporarily pan.

7. Editing Characteristics

When a balloon is selected, the editor panel on the right shows all fields for that characteristic. These fields map directly to the columns in AS9102 Form 3:

Field	Form 3 Column	Description
Char No.	5	Assigned automatically; editable
Zone	6	Derived from grid position; editable
Type	—	Dimension, GD&T, Note, Thread, Surface
Designator	7	KC (Key Characteristic) or leave blank
Prefix / Suffix	8 (in text)	Ø, R, 4X, MAX, (REF), etc.
Nominal	8 (in text)	The nominal dimension value
Tol +/-	8 (in text)	Plus and minus tolerance
Method	9	Inspection method (CMM, caliper, etc.)
Tool	—	Specific tool or gage used
Result	10	Measured value; PASS/FAIL auto-calculated
NCR	11	Nonconformance report number, if applicable
Comments	12	Additional notes; can show on the drawing

PASS/FAIL is calculated automatically when you enter a result: if the measured value falls within the nominal $\pm$ tolerance range, it passes. Out-of-tolerance results are flagged.

8. Instances, Locations, and Sub-Features

A single characteristic on a drawing often appears more than once on the actual part. For example, a bolt circle with five identical holes means the same diameter callout applies five times. AS9102 requires each occurrence to have its own row in Form 3 with its own measured result. FAIRmark handles this with three fields in the editor panel: Loc (location), Sub (sub-feature suffix), and the Add Instance button.

Char No., Loc, and Sub — How the Numbering Works

Every balloon has three number parts that combine into its full characteristic number:

Field	Example	Meaning
Char No.	32	The base characteristic number, assigned automatically when you place the balloon.
Loc	32-1, 32-2	Which occurrence of this feature on the part. Use this when the same callout appears at different locations (e.g. two bores at opposite ends of the part). Leave blank if the feature exists only once.
Sub	32a, 32b	A sub-feature letter within one location. Used for repeated identical features (e.g. the five holes in a bolt circle). Each sub-feature gets its own Form 3 row with its own measured result.

Combined, these produce characteristic numbers like 32-1a, 32-1b, 32-2a, 32-2b (feature 32, at two locations, with two sub-features each). The exact combination depends on the drawing. Most characteristics need only the base number.

Adding Instances of a Bubble

Step 1: Select the balloon

Click the balloon you want to create instances for.

Step 2: Click “+ Add instance (1a, 1b...)”

In the editor panel, click the “+ Add instance” button. This duplicates the characteristic with all its requirement data (nominal, tolerances, prefix, method) but gives it the next available sub-feature letter and clears the measured result. The first click turns balloon 1 into 1a and creates 1b.

Step 3: Place or combine

Each new instance is unplaced by default — click on the drawing to position it. If all instances refer to the same callout and should share one bubble on the drawing, tick the “One combined bubble” checkbox. The drawing then shows a single bubble labeled e.g. 3a-e, while Form 3 keeps five separate rows (one per instance) so each gets its own measured value.

 **Tip:** *The combined-bubble option is the standard way to balloon a bolt circle or a pattern of identical holes: one bubble on the drawing, separate inspection rows in Form 3.*

FAIRmark

When to Use Loc vs. Sub

Use Loc when the same callout appears in physically different places on the part (e.g. two counterbores at opposite ends). Each location is a separate balloon on the drawing, and each gets its own characteristic number with a location suffix (32-1, 32-2).

Use Sub (via Add Instance) when the same callout appears multiple times at the same location (e.g. a 5-hole bolt circle). The instances share the same base number and location, differing only by their sub-feature letter (32a, 32b, 32c).

You can combine both: a bolt circle at two locations would produce 32-1a through 32-1e at the first location, and 32-2a through 32-2e at the second.

⚠ Note: *The Loc and Sub fields correspond to the characteristic number format defined in AS9102 Form 3, column 5. FAIRmark composes them automatically, but you can also type directly into the fields to match an existing numbering scheme.*

9. Using OCR to Read Callouts

FAIRmark includes a built-in OCR engine (Tesseract) that can read dimension callouts directly from the drawing, eliminating manual transcription of nominals and tolerances.

Step 1: Select a balloon

Click on a placed balloon to select it.

Step 2: Draw a crop box around the callout

In the OCR panel, click “Crop & read” then draw a rectangle around the dimension callout on the drawing. FAIRmark reads the text and parses the nominal, tolerances, and prefix (Ø, R, etc.) automatically.

Step 3: Verify and apply

Review the parsed values in the OCR panel. Correct any misreads (the Ø and ± symbols are the most common ones to check). Click “Apply” to populate the characteristic fields.

⚠ Note: *OCR works entirely offline — no data leaves your computer. Always verify the parsed values against the drawing before accepting. GD&T feature control frames are not auto-parsed; use the GD&T builder for those.*

10. Adding Notes to Bubbles

You can display a text note next to any balloon on the drawing. This is useful for inspection instructions, special process callouts, or any annotation the inspector needs to see at a glance.

Step 1: Enable the note

Select a balloon, then tick “Show comment as a note next to the bubble” in the editor panel. A note text box appears.

Step 2: Type the note

Enter your text. Press Enter for a new line. Long text wraps automatically.

Step 3: Position the note

Drag the note on the drawing to move it away from geometry it might cover. Click “Reset position” to put it back under the bubble.

 **Tip:** The note text is the same as the Comments field (Form 3, column 12). Editing it in one place updates the other, so the drawing and the report always agree.

11. Completing Form 1 – Part Number Accountability

Click the “Form 1 · Part Accountability” tab to open Form 1. Fill in the header fields:

- 1. Part Number — the part number being inspected
- 2. Part Name — description of the part
- 3. Serial/Lot Number
- 4. FAI Report Number — your FAIR identifier
- 5–7. Part and drawing revision levels
- 10. Organization Name — your company name
- 11. Supplier Code (CAGE / DUNS)
- 13. Detail / Assembly — select as applicable
- 14. Full / Partial FAI and the reason

The sub-parts index (Form 1 section 15–18) lets you list sub-components. Click “+ Row” to add entries.

Complete the signature block (fields 19–25) when the FAIR is ready for review.

12. Completing Form 2 – Materials & Processes

Click the “Form 2 · Materials & Processes” tab. Each row documents one material or process specification referenced on the drawing.

Step 1: Add rows

Click “+ Row” to add a blank row. Fill in the material/process specification, the source (drawing, PO, spec), and whether it is a special process.

Step 2: Use Quick-fill (optional)

Click “Quick-fill from drawing” to let FAIRmark scan the notes and title block for specification callouts (e.g. AMS, ASTM, MIL-spec) and pre-populate rows.

13. Reviewing Form 3 – Characteristic Accountability

Form 3 is built automatically from your balloons. Click the “Form 3” tab to review the full characteristic list. The toolbar above the table provides:

- Search — filter characteristics by text
- Zone filter — show only a specific zone
- Designator filter — show only KC (Key Characteristics) or all
- Pass / Fail filter — show only failing, passing, or uninspected characteristics
- Group by zone — organize the table by zone reference

Click any row to select that balloon on the drawing (and vice versa — clicking a balloon on the drawing highlights its row in Form 3).

14. Exporting and Printing

FAIRmark offers several export formats:

Button	What it does
Ballooned PNG	Downloads the current sheet as a PNG image with all balloons, leaders, and notes baked in.
Export XML	Exports the complete FAIR as AS9102 Rev C XML for import into Net-Inspect or customer QMS systems.
Export QIF	Exports the Bill of Characteristics as QIF (ISO 23952) for CMM and metrology systems.
Export Excel	Exports Forms 1–3 as a single Excel workbook.
Print / PDF	Opens the print dialog. Select which items to include (drawing sheets, forms). Choose paper size and orientation. Save as PDF from the browser's print dialog.

 **Tip:** When printing to PDF, the file name you type in the Save dialog is what Adobe Acrobat shows in the title bar — there is no separate naming step inside FAIRmark.

 **Note:** Mixed-orientation drawings: use “Auto” orientation (the default) for the best page fill. Each sheet prints at the orientation that fills the paper. If you need true per-sheet mixed orientation, select “Per sheet” and accept a slight scale reduction.

15. Saving and Reopening Projects

Step 1: Save your project

Click “Save project” to download a .fairmark file containing everything: drawing sheets, balloons, forms, grid settings, and notes. This is your working file.

Step 2: Reopen a project

Click “Open project” and select the .fairmark file. Everything is restored exactly as you left it.

Step 3: Start fresh

Click “New project” to clear everything and start a blank project. (Your saved .fairmark file is not affected.)

 **Tip:** Save often. The .fairmark file is your single source of truth. Export the XML, Excel, or PDF only when you are ready to deliver the FAIR.

16. Keyboard Shortcuts

Shortcut	Action
B	Switch to Balloon mode
P	Switch to Pan mode
Space (hold)	Temporary pan while held
Ctrl + Z	Undo
Ctrl + Y	Redo
Ctrl + S	Save project
Delete	Delete selected balloon
Scroll wheel	Zoom in / out

17. Importing Data from Other Sources

If you already have a characteristic list, you do not need to key everything in by hand. Use the import buttons in the Form 3 toolbar:

- CSV in — imports a .csv file (from Excel, a CMM program export, or a prior revision) and creates unplaced balloons pre-filled with all the data. Each click on the drawing places the next balloon.
- XML/QIF in — imports an AS9102 XML file (from a prior FAIR or another QMS system) or a QIF file (from CMM/metrology software). Same result: pre-filled, unplaced balloons ready to place.

These imports bring in tolerance values, zones, KC flags, and comments. You only need to position each balloon on the new drawing — the data is already filled in.

18. Support

For questions, issues, or feature requests:

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