



***iamcam***

Project presentation



# iamcam

## Intelligence Aided Manufacturing

- Client/Server solution for offloading routine PCB CAM data preparation to an **automated workflow system**
- **Reducing** front-end processing **time** and **costs** dramatically
- Enabling **higher throughput** with less manpower
- Cutting **human error** from the CAM process for **consistent quality**



# iamcam

## Intelligence Aided Manufacturing



- **Adjustable** to your specific product mix
- **Extendable** with your proprietary fabrication know-how
- **Scaleable** with multiple workflows running in parallel to follow the growth of your company
- Suitable for seamless **integration** with your Web Server, Email Server, ERP System, Production Planning system,...

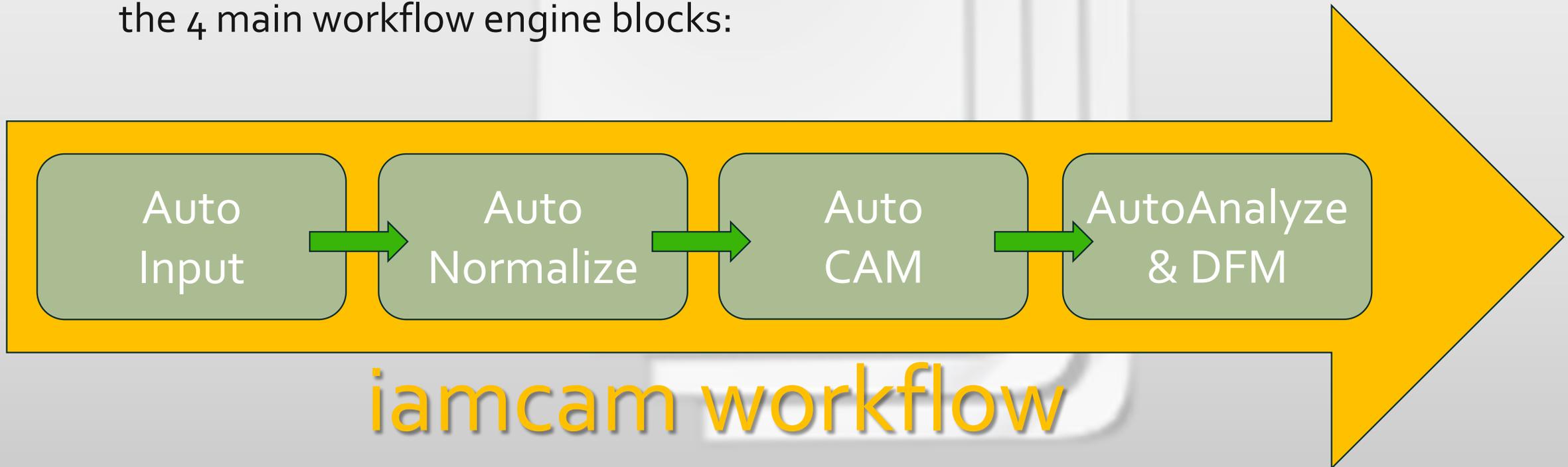


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## Intelligence Aided Manufacturing – Workflow Engine



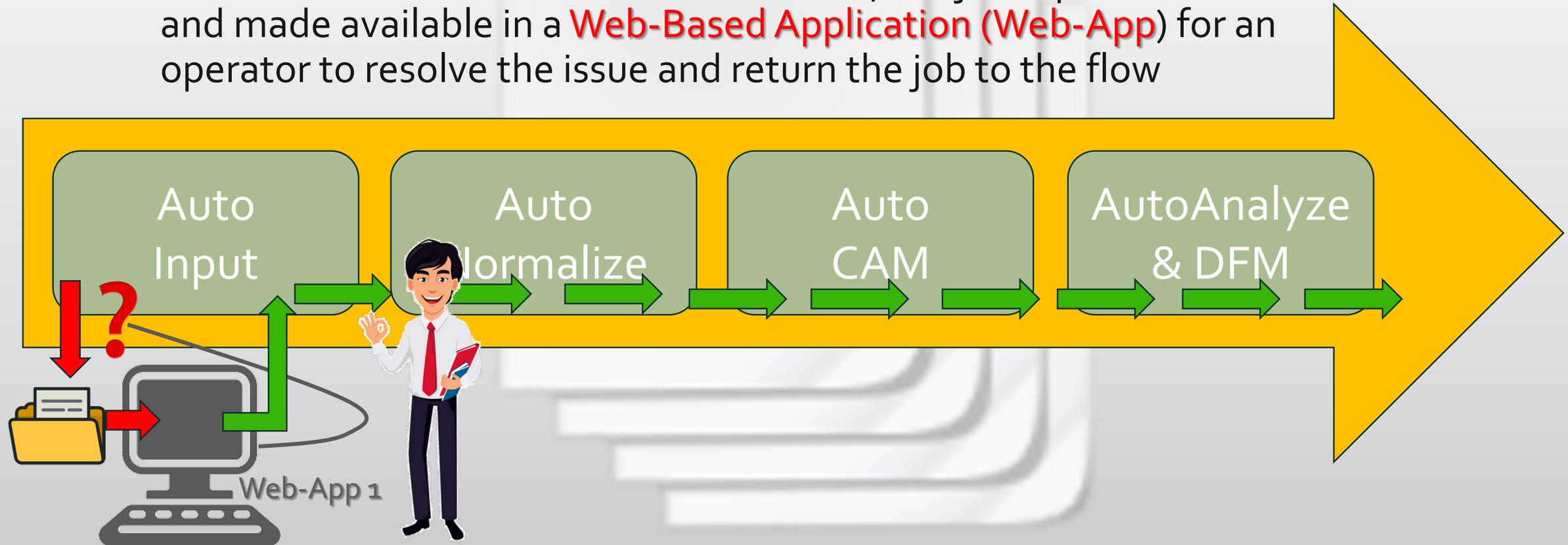
- High-availability server queues incoming customer data archives unattendedly, 24/7
- Powerful AI-based iamcam algorithms steer the PCB data through the 4 main workflow engine blocks:



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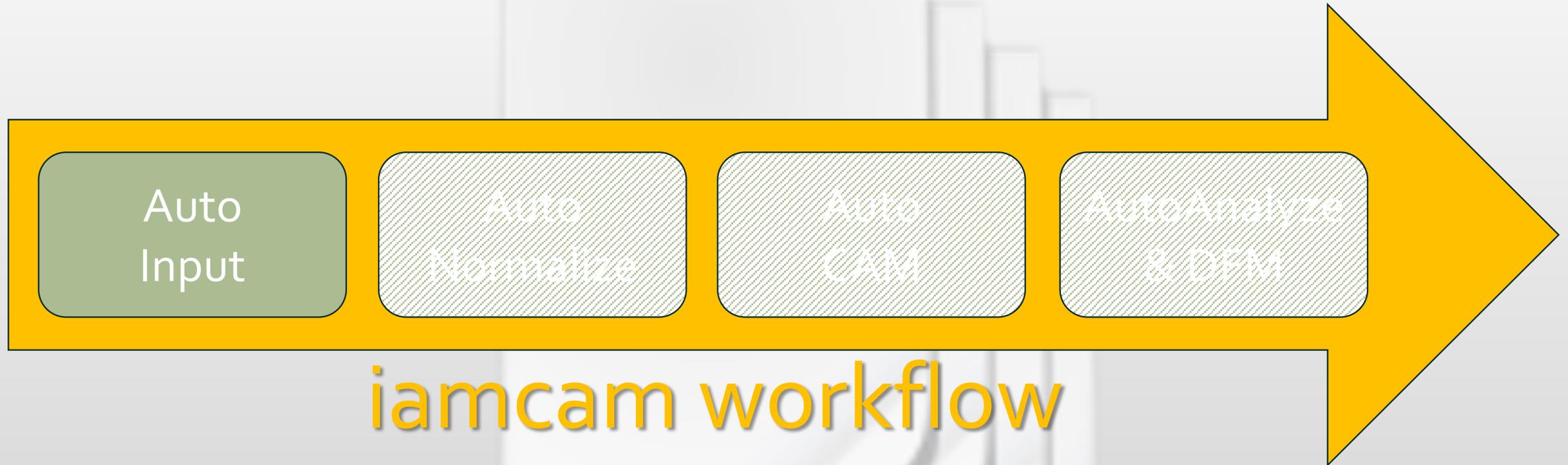
## Intelligence Aided Manufacturing – Workflow Engine Web-Apps

- Most jobs run through the workflow fully automatically
- If the workflow is uncertain about a result, the job is put on hold and made available in a **Web-Based Application (Web-App)** for an operator to resolve the issue and return the job to the flow



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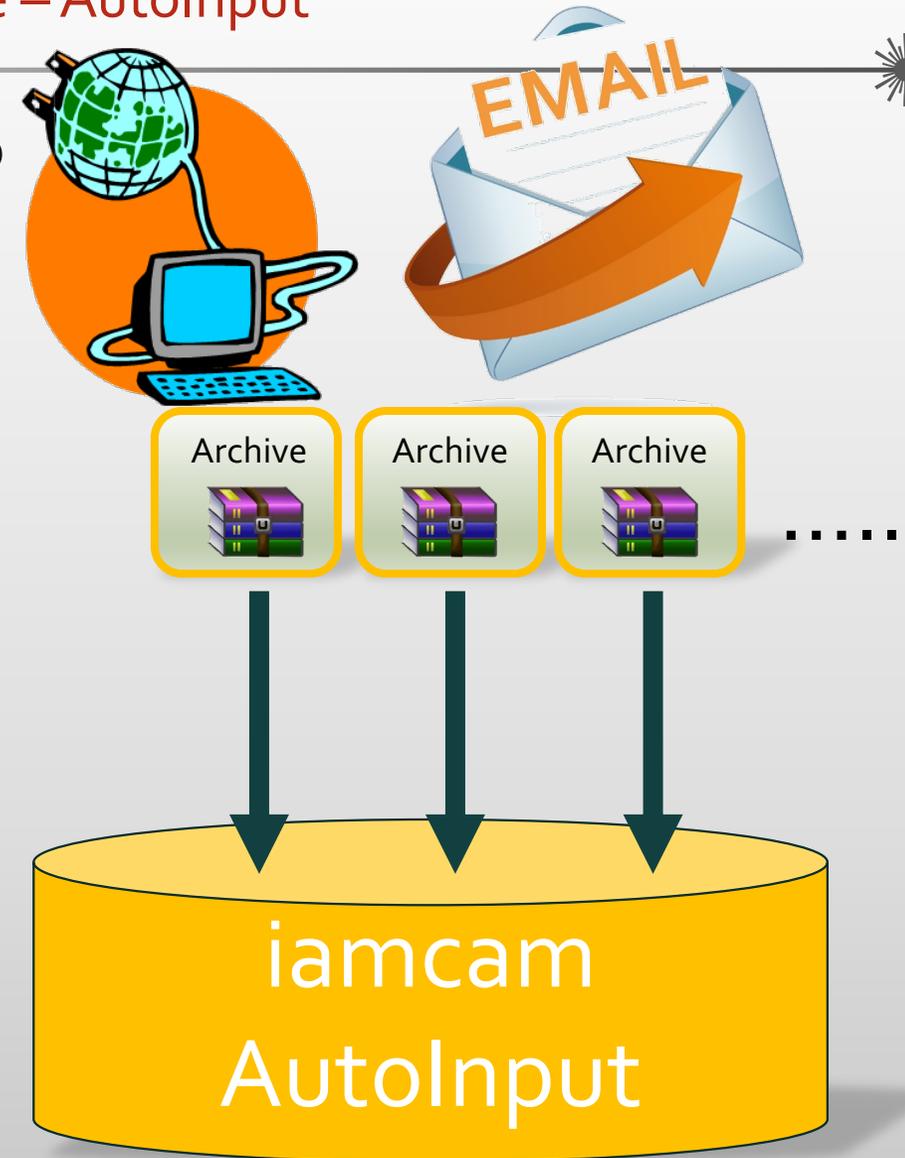
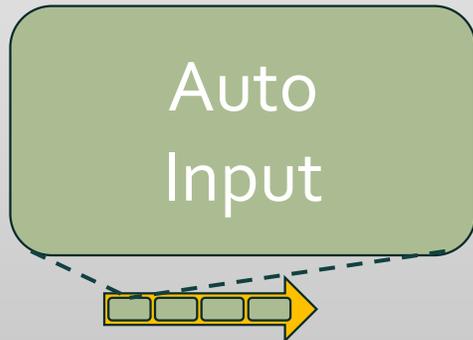
Intelligence Aided Manufacturing – Workflow Engine – AutoInput



# iamcam

## Intelligence Aided Manufacturing – Workflow Engine – AutoInput

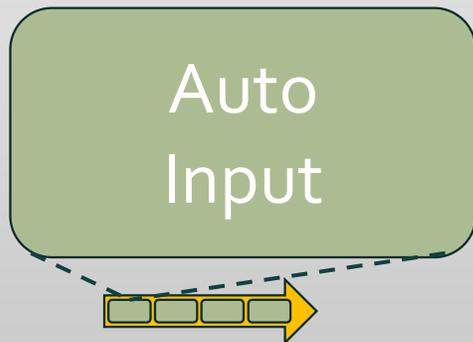
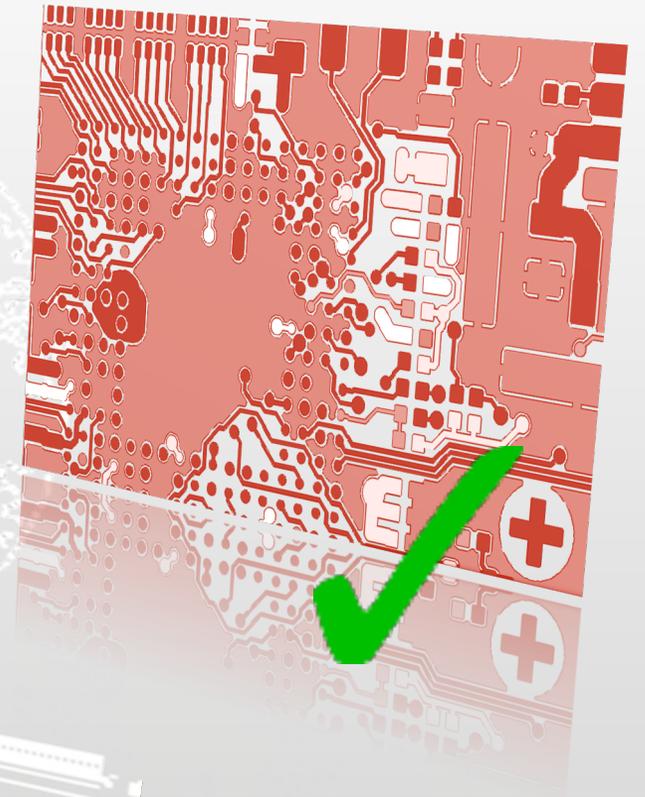
- Email – Web server – ERP system submit data to the iamcam workflow engine uninterruptedly
- iamcam's intelligent load scheduler sets up the order of processing for fastest results
- iamcam AutoInput
  - analyses and reads in different file formats (Gerber, ODB++, Altium, Eagle, Excellon,...)
  - automatically captures product parameters from **Gerber Job File** or external documents (PDF – TXT – Word – Excel - ...)
  - recognizes layer stackup and assigns layer functions (copper – drill – soldermask – legend – ...)

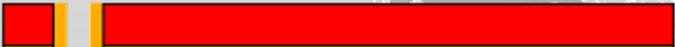
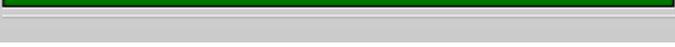


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## Intelligence Aided Manufacturing – Workflow Engine – AutoInput

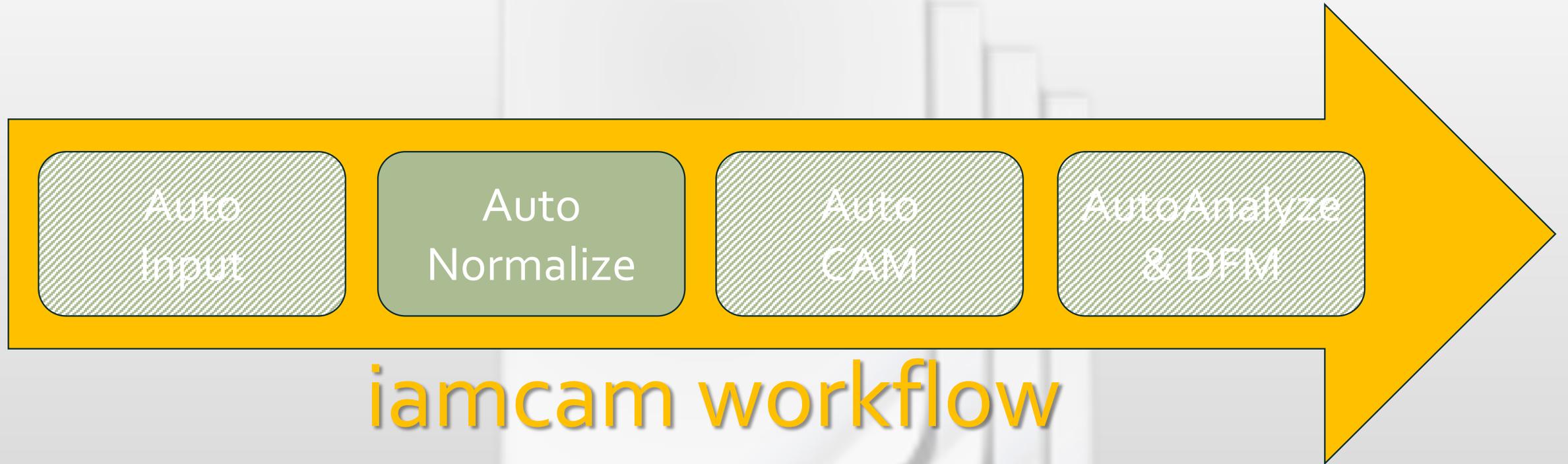
- recognizes PCB outline
- renames layers to suit your conventions
- selects optimum build / material / copper thickness
- backs up customer original job
- produces human-readable PDF documentation and machine-readable XML for interfacing with 3rd party systems
- creates netlist reference to verify future iamcam automatic CAM edits
- saves golden board image data for later iamcam image comparison



|   |  |        |                            |
|---|--|--------|----------------------------|
|   |  | 25.0   | Liquid PhotoImageable Mask |
| 1 |  | 18.0   | FR4 Core TG180 1550/18/18  |
| 2 |  | 1550.0 |                            |
|   |  | 18.0   |                            |
|   |  | 25.0   | Liquid PhotoImageable Mask |

# iamcam

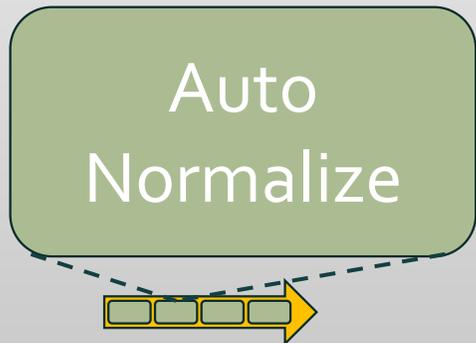
Intelligence Aided Manufacturing – Workflow Engine – AutoNormalize



# iamcam

## Intelligence Aided Manufacturing – Workflow Engine – AutoNormalize

- Incoming image data is often very poorly constructed and contains little or no intelligence, unfit for automatic processing
- iamcam's AutoNormalize is a unique arsenal of sophisticated, AI-based algorithms designed to reshape this suboptimal data into a solid and consistent model for an automated workflow system
- AutoNormalize injects intelligence into this upgraded model as it recognizes the functions of the various graphical elements in the PCB design
- The upgraded data, enriched with the knowledge about the functions of the data elements is the pre-requisite for error-free, reliable and fully automatic CAM data preparation

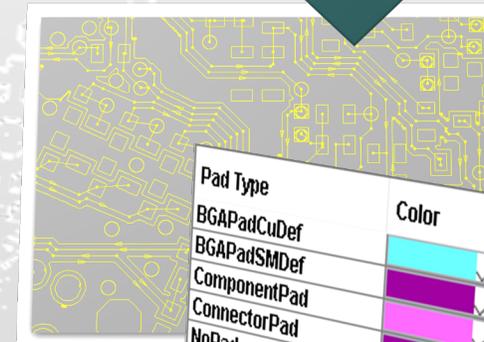
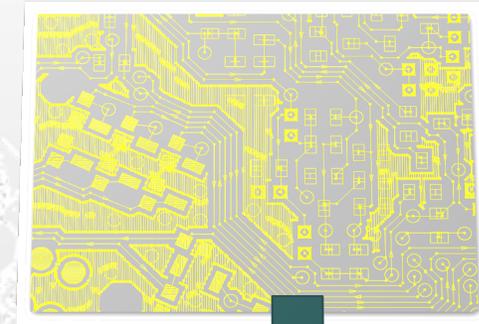


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## Intelligence Aided Manufacturing – Workflow Engine – AutoNormalize

➤ iamcam's AutoNormalize includes amongst others these powerful functions

- PadMaker – transforming painted and contour pads into flashed pads
- RegionMaker - optimizing drawn copper areas into regions
- SlotMaker – recognizing and standardizing slots
- recognizing plated from non-plated tools
- establishing drill hole functions (via - component hole - mechanical hole,..)
- assign copper pad functions (via pad - component pad - SMD pad - BGA Pad - ...)



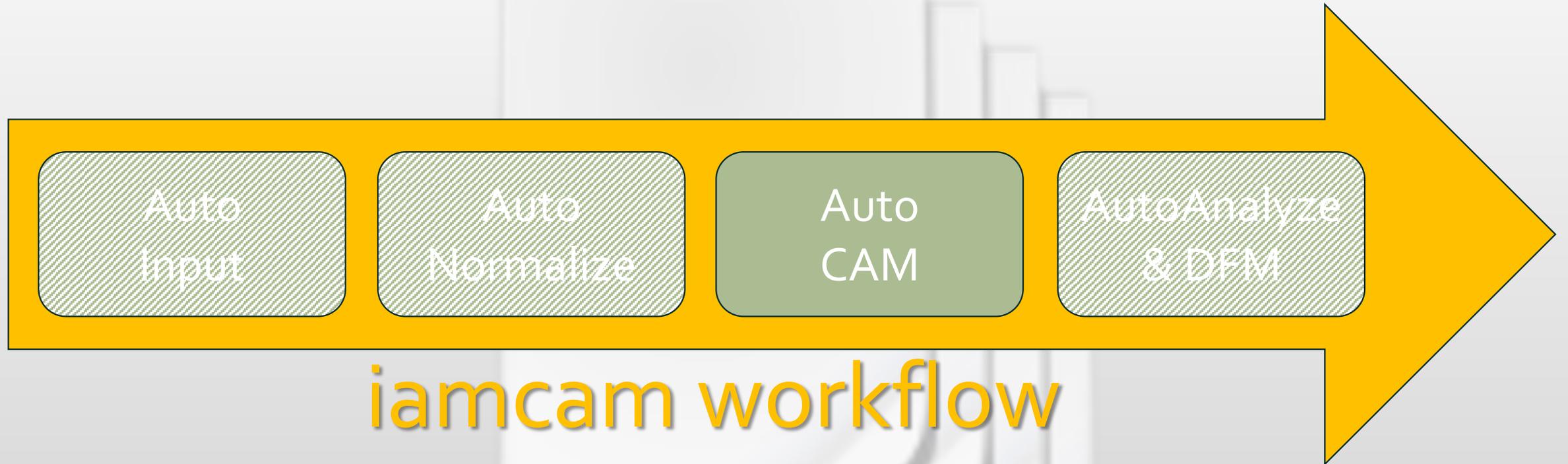
| Pad Type     | Color | Hide                     | Number |
|--------------|-------|--------------------------|--------|
| BGAPadCuDef  |       |                          |        |
| BGAPadSMDDef |       |                          |        |
| ComponentPad |       | <input type="checkbox"/> | 836    |
| ConnectorPad |       | <input type="checkbox"/> | 0      |
| NoPad        |       | <input type="checkbox"/> | 167    |
| SMDPadCuDef  |       | <input type="checkbox"/> | 0      |
| SMDPadSMDDef |       | <input type="checkbox"/> | 2      |
| TestPad      |       | <input type="checkbox"/> | 639    |
| UnknownPad   |       | <input type="checkbox"/> | 0      |
| ViaPad       |       | <input type="checkbox"/> | 0      |
| WasherPad    |       | <input type="checkbox"/> | 0      |
|              |       | <input type="checkbox"/> | 1782   |
|              |       | <input type="checkbox"/> | 0      |

Auto  
Normalize



# iamcam

Intelligence Aided Manufacturing – Workflow Engine – AutoCAM



iamcam workflow

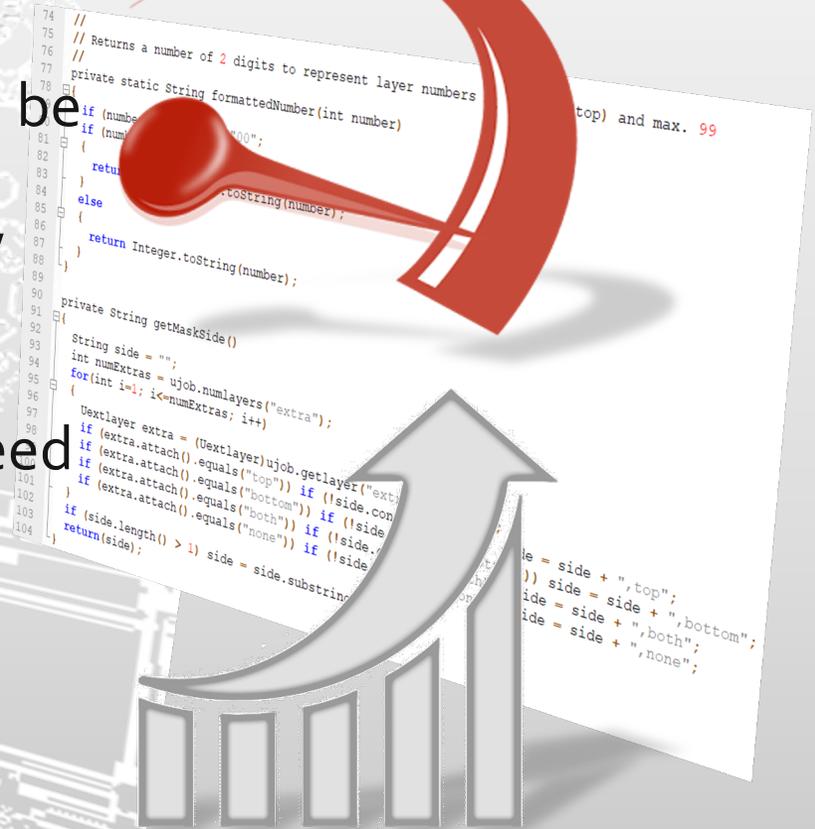
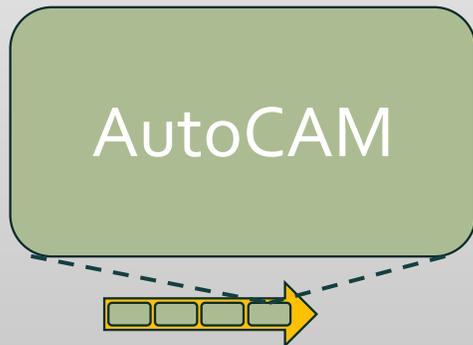


# iamcam

## Intelligence Aided Manufacturing – Workflow Engine – AutoCAM



- iamcam's AutoCAM features Ucamco-supplied, high-level CAM automation functions but is designed also to incorporate your proprietary fabrication know-how
- Customer-developed automation and scripts can be plugged into the AutoCAM module easily and integrate seamlessly with the standard workflow engine
  - As more automation is plugged in, the need for operator assistance and Web-app intervention becomes smaller...
  - Full automation and throughput reach unprecedented heights...



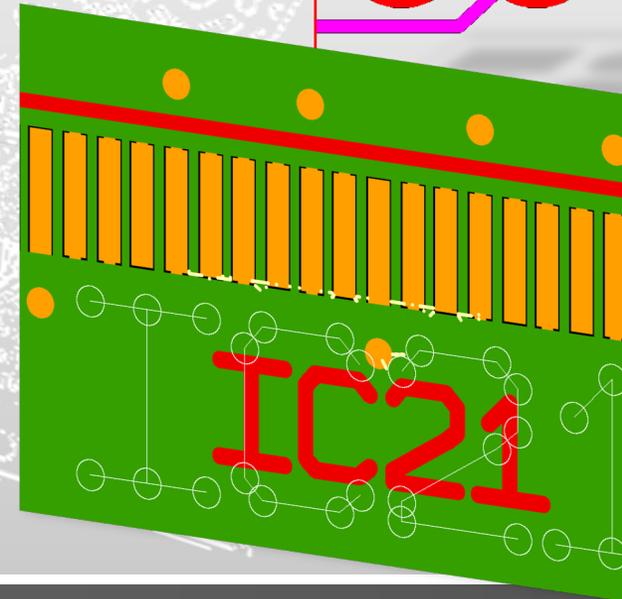
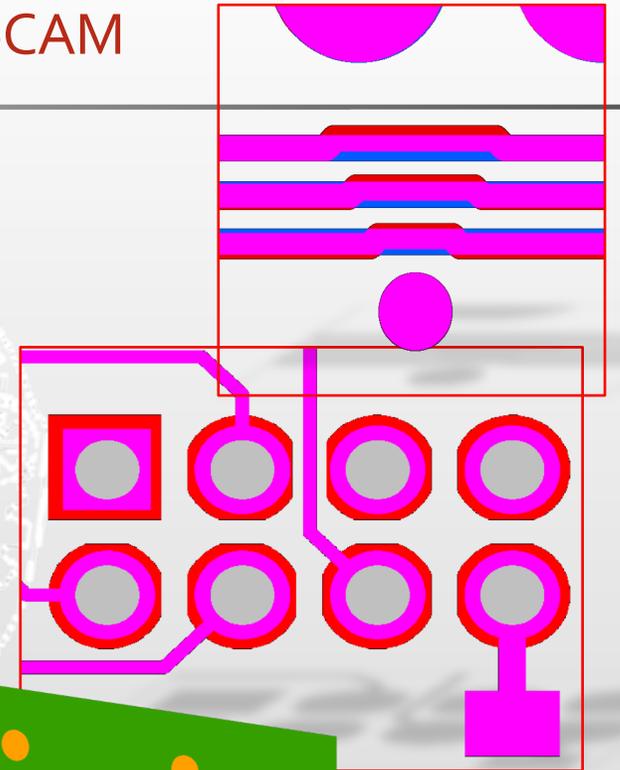
# iamcam

## Intelligence Aided Manufacturing – Workflow Engine – AutoCAM

➤ Library of Ucamco-supplied intelligent iamcam automation functions is continuously expanding to include amongs others

- Automatic rules-based drill tool compensation
- Yield Enhancing Layout Optimizer (YELO) combining advanced DRC and Repair
  - ✓ Copper Layer Adjuster
  - ✓ Solder Mask Layer Adjuster
  - ✓ Legend Layer Adjuster

AutoCAM

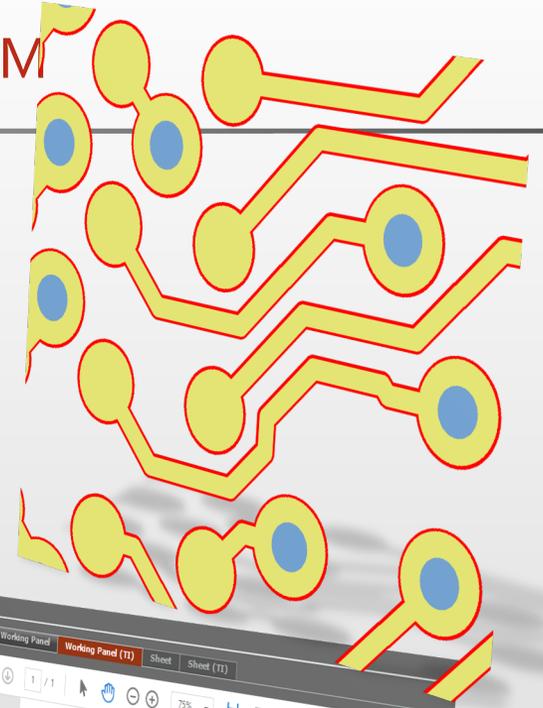
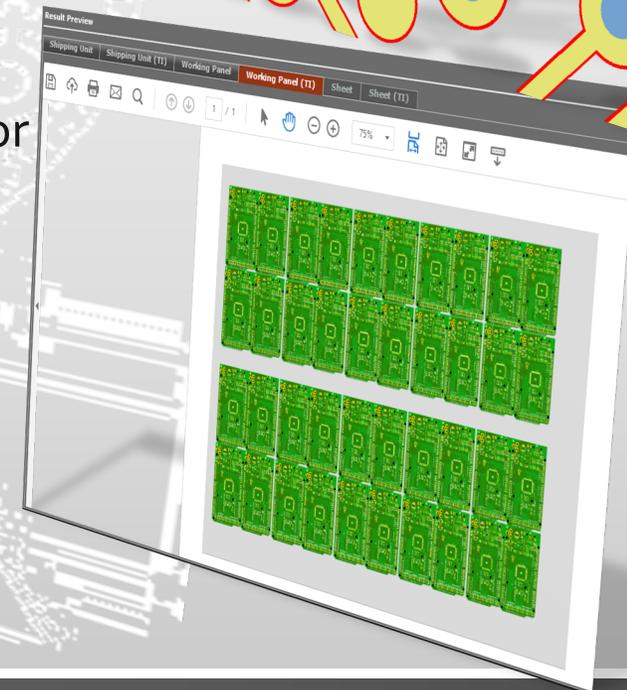


# iamcam

## Intelligence Aided Manufacturing – Workflow Engine – AutoCAM

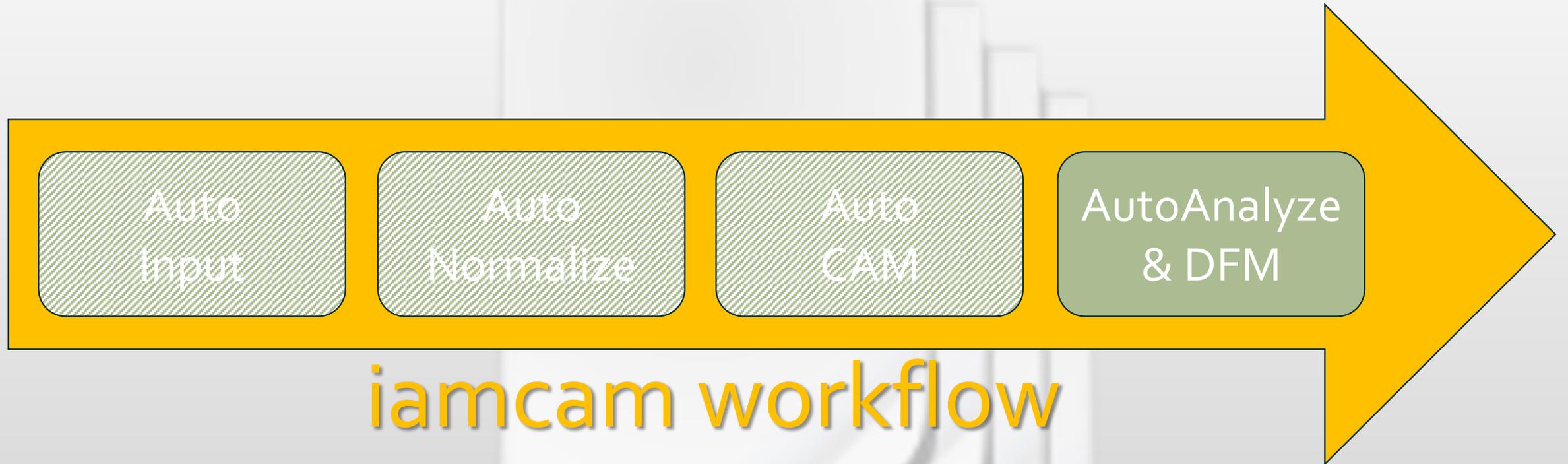
- Sophisticated etch compensation compensation
- State-of-the-art assembly panel generator
- Fully-fledged production panelization module including configurable panel overlay generation
- Highly-customizable drill and rout output generation module for machine-ready shopfloor data
- ...

AutoCAM



# iamcam

Intelligence Aided Manufacturing – Workflow Engine – AutoAnalyze and DFM



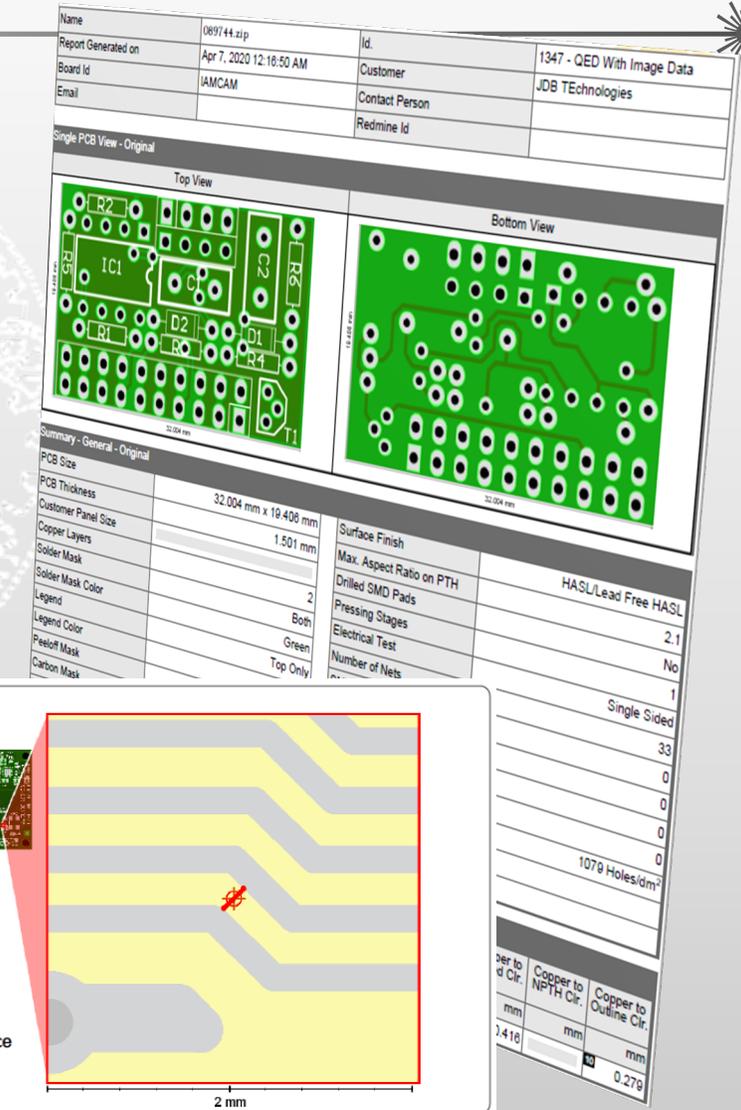
iamcam workflow

# iamcam

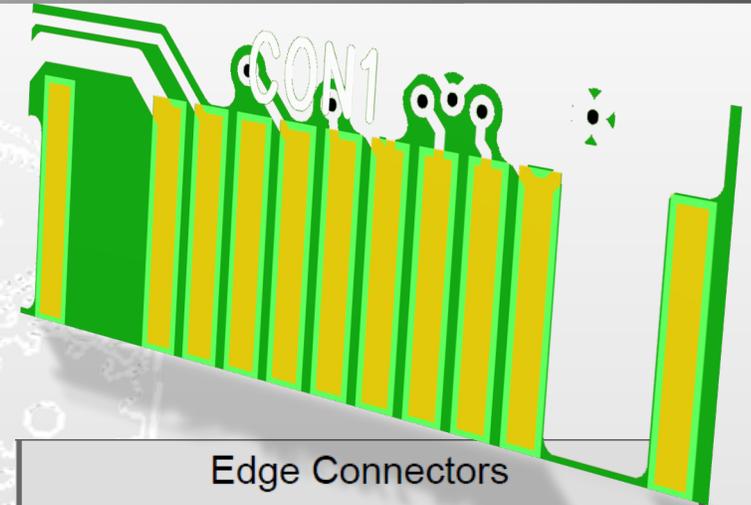
## Intelligence Aided Manufacturing – Workflow Engine – AutoAnalyze and DFM

- iamcam's workflow engine can be optionally equipped with an unrivalled AutoAnalyze and DFM module for accurate PCB data analysis and comprehensive reporting
- This analysis meticulously examines the data from AutoCAM to certify the single image is free of design flaws and ready for panelization
  - reports minimal trace width, minimal clearance for pads and traces, outline to copper clearance, minimal ring per tool function, and many more
  - makes a full analysis of all, plated&non-plated drill tools, length and width of slots, routing and scoring, castellated holes,...

AutoAnalyze  
& DFM



- provides extensive solder mask statistics including minimum solder mask ring, minimum solder webbing, solder mask overhang, cover/uncovered vias
- reports edge connectors and the amount of gold needed for their selective surface finish
- does a full analysis of SMD component pads, number, minimum size, minimum pitch
- recognizes and reports the presence of BGA components, the number of BGA pads, minimum BGA pad size, minimum pitch, non-centered BGA fanout patterns
- makes all analysis results available in PDF with high-res images for human interpretation and in XML for data exchange with 3<sup>rd</sup> party systems



| Edge Connectors |               |                 |
|-----------------|---------------|-----------------|
| Fingers         | Finger Size   | Total Area      |
|                 | mm x mm       | dm <sup>2</sup> |
| 11              | 0.550 x 4.000 | 0.0027          |
| 11              | 0.550 x 4.000 | 0.0024          |
| 23              |               | 0.0051          |

AutoAnalyze  
& DFM



