

Integr8tor v2016.04

Ucamco
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Integr8tor

Version 2016.04



Integr8tor v2016.04

Introduction



We are pleased to announce the release of Integr8tor version 2016.04

Integr8tor v2016.04 offers significant improvements and new functionality explained in these release notes.

It also offers improved quality and bug fixes.

We recommend to install v2016.04 as soon as possible.

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Commitment to regular updates



Version	Release date	Highlights	
5.1	Jul-10	Multiple job submit via email.	CAM input report.
5.2	Nov-10	Copper clearances by type.	Scoring calculation.
6.1	Mar-11	Perspectives in Cockpit.	Improved performance.
6.2	Nov-11	Multiple QED reports.	Exposed copper calculation.
7.1	Jun-12	Localized interface.	Line width on planes.
7.1.3	Jul-12	Bug fix release for 'recovered job'.	
8.1	May-13	Support for ODB++ v7.	Compatible with Windows server 2012 and windows 8.
8.2	Nov-13	Detection and flagging of duplicate archives.	Edge connector recognition.
8.3	Jun-14	New standard parameters.	Determination of laser/mechanical drilling.
9.1	Dec-14	Support for Gerber X2 datasets.	Optimized and new QED values.
2015-06	Jun-15	New standard parameters.	Determination of laser/mechanical drilling.
2016-04	Apr-16	SMD/BGA pads differentiates copper- and solder mask defined	DFM Checks (former Capabilities) revised

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Enhancements and new functionality



- Report copper area when no outline is found
- Cut-outs now recognized and processed as outline
- SMD/BGA pad count and characteristics for jobs without solder mask
- Report the presence and the ring of solder mask defined SMD/BGA pads
- Copper to outline clearance now reports separate values for pad, track and region
- More accurate pad count for nets without plated drills and jobs with lots of contours
- ODB++ input: supports for version 8 and mixed imperial/metric jobs
- Better pad classification in the Rebuilt Job; classification can be used in UcamX. e.g. selecting specific pads
- Simplified way to change the order of copper layer order in Job Editor by drag & drop
- Much more capable DFM Checks (this was called Capabilities in the previous versions; same license)
- Now possible to script layer subclasses in a new layer rename functionality
- Other important improvements

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New: copper area when no outline is found



When no outline is found, the Copper Area is now calculated based on the user defined envelope (rectangle manually defined in the Cockpit)

Benefit:

- copper areas available without going to CAM

Before

Copper Layers										
File	Pos.	Min. Line Width	Min. Ring	Min. Clr. to Copper	Min. Same Net spacing	Min. Clr. to Plated Hole			Copper Area	
		mm	mm	mm	mm	mm			dm ²	%
BS	1	0.127	0.000	0.137	0.128	0.114			0.0000	unknown
LS	2	0.127	0.004	0.111	0.010	0.189			0.0000	unknown

No Copper Area calculated because of non existing outline

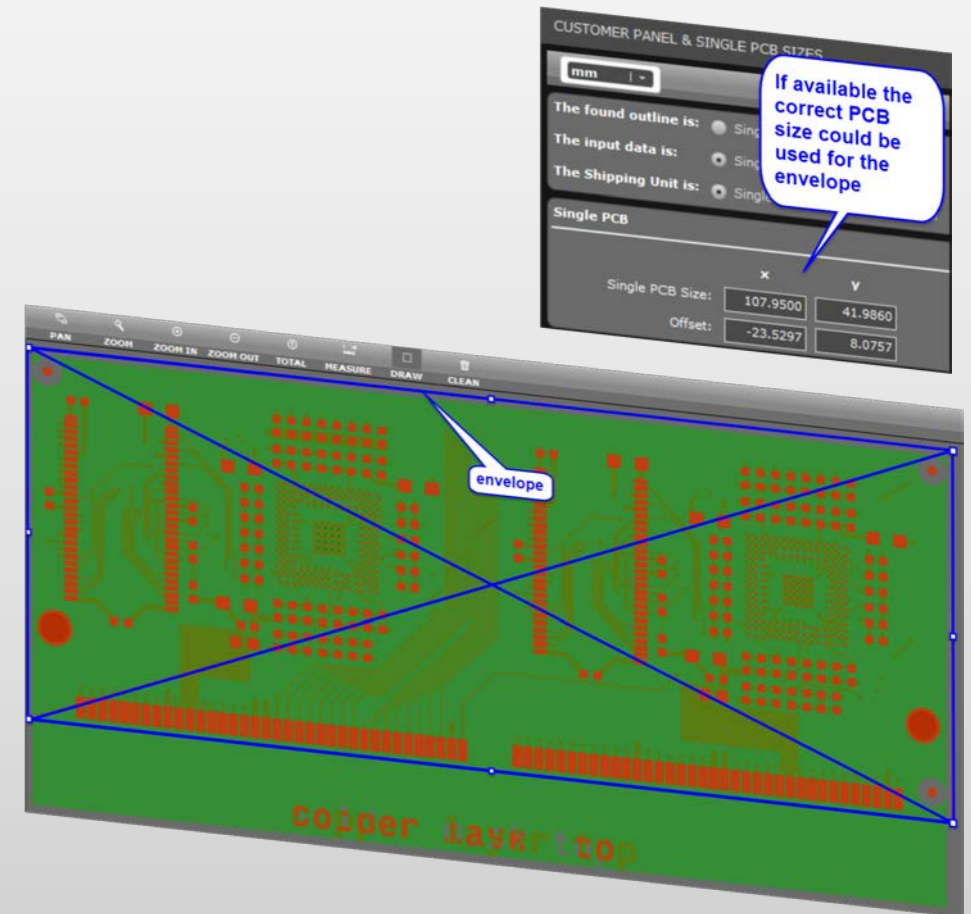
PCB (Single)			
PCB Size	Outline Type	Outline Length	Outline Area
mm x mm		mm	dm ²
unknown	unknown	unknown	unknown

Now

Copper Layers										
File	Pos.	Min. Line Width	Min. Ring	Min. Clr. to Copper	Min. Same Net spacing	Min. Clr. to Plated Hole			Copper Area	
		mm	mm	mm	mm	mm			dm ²	%
BS	1	0.127	0.000	0.137	0.128	0.114			0.0944	
LS	2	0.127	0.004	0.111	0.010	0.189			0.0547	

Copper Area calculated and reported based on the envelope

PCB (Single)			
PCB Size	Outline Type	Outline Length	Outline Area
mm x mm		mm	dm ²
107.950 x 41.986	envelope		



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New: cut-outs

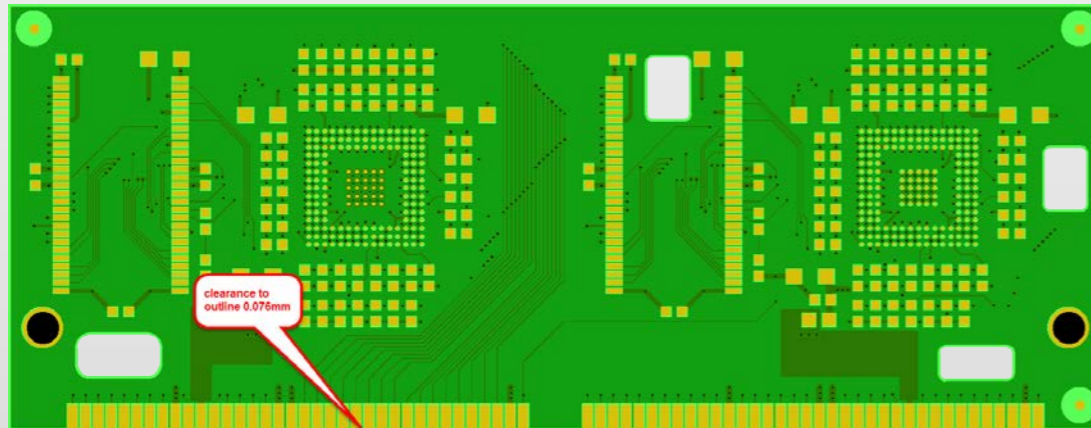


Cut-outs are now recognized and processed as the PCB outline.

Benefits:

- more accurate area detection  and outline length  measurement
- cut-outs taken into account for minimum clearances

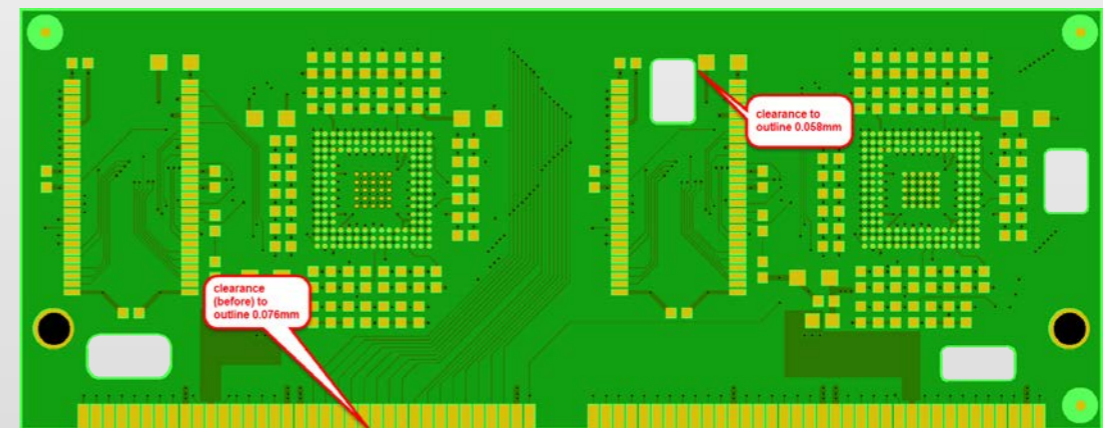
Before



Summary - Copper Layers						
Layer Type	Min. Line Width	Min. Ring	Min. Clr. to Copper	Min. Clr. to Plated Hole	Min. Clr. to NPTH	Min. Clr. to Outline
	mm	mm	mm	mm	mm	mm
Outer	16 0.127	17 0.000	18 0.111	19 0.114	20	21 0.076
Inner						

PCB (Single)			
PCB Size	Outline Type	Outline Length	Outline Area
mm x mm		mm	dm ²
107.950 x 41.986	real	300.937	0.4516

Now



Summary - Copper Layers						
Layer Type	Min. Line Width	Min. Ring	Min. Clr. to Copper	Min. Clr. to Plated Hole	Min. Clr. to NPTH	Min. Clr. to Outline
	mm	mm	mm	mm	mm	mm
Outer	16 0.127	17 0.000	18 0.111	19 0.114	20	21 0.058
Inner						

PCB (Single)			
PCB Size	Outline Type	Outline Length	Outline Area
mm x mm		mm	dm ²
107.950 x 41.986	real	467.422	0.4304

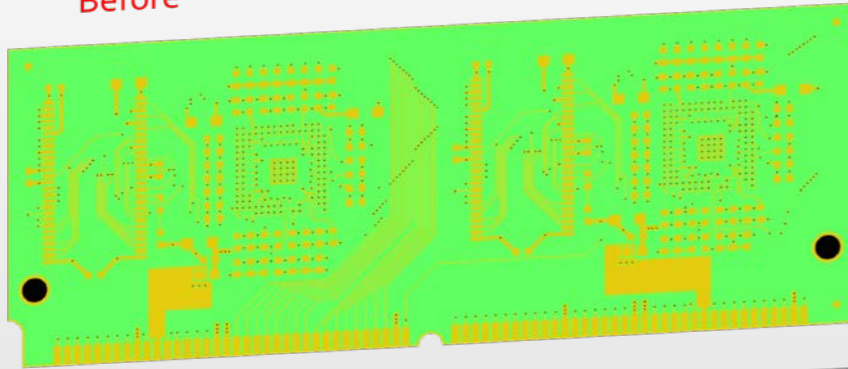
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New: jobs without solder mask



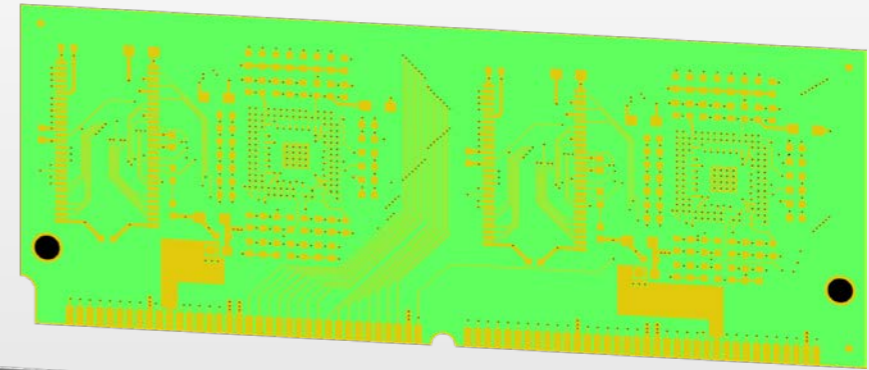
Correct SMD/BGA pad count and characteristics now for jobs without solder mask

Before



SMD								
Side	Pads (Total)	Min. SMD Pad	Pitch of Min. SMD Pad	Excl. BGA Pads	BGA Pads	BGA Min. Pitch	All Tracks in BGA Centered	BGA Drilled
		mm	mm			mm		
Top	unknown	unknown	unknown	unknown	unknown			
Bottom	unknown	unknown	unknown	unknown	unknown			
All	unknown	unknown	unknown	unknown	unknown			

Now



SMD (Including BGA Pads)									
Side	SMD Pads (Total)	Min. SMD Pad	Pitch of Min. SMD Pad	Solder Mask Defined Pads	Excl. BGA Pads	BGA Pads	BGA Min. Pitch	All Tracks in BGA Centered	BGA Drilled
		mm	mm				mm		
Top	670	0.279	0.787	0					
Bottom	0			0	336	334	0.800	Yes	No
All	670	0.000	0.000	0	336	334	0.800	Yes	No

Benefits:

- provides important information to correctly quote mask less boards
- provides vital information to CAM

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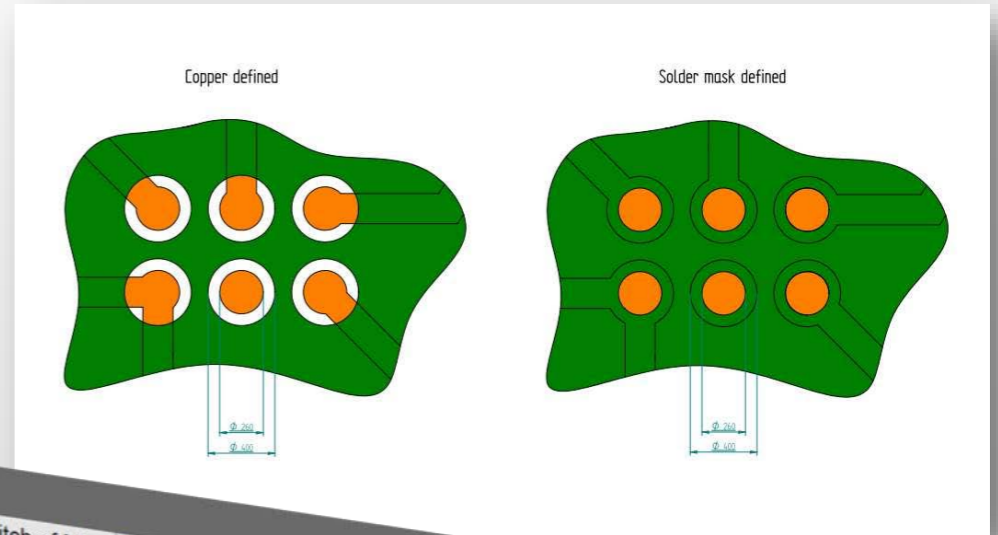
New: Solder mask defined pads



Report the presence and the ring of solder mask defined SMD/BGA pads.

Benefits:

- better information to choose the best manufacturing process
- supports a more accurate cost calculation



SMD (Including BGA Pads)									
Side	SMD Pads (Total)	Min. SMD Pad	Pitch of Min. SMD Pad	Solder Mask Defined Pads	SMD Pads (Excl. BGA)	BGA Pads	BGA Min. Pitch	All Tracks in BGA Centered	BGA Drilled
Top		mm	mm						
Bottom	662	0.279	0.787						
All	0			25	328	334	mm		No
	662	0.000	0.000	0	0	0	0.800	Yes	
Solder Mask									
Side	Min. Ring on Cu Defined Pads	Min. Ring on SM Defined Pads	Min. Clr. Mask to Mask	Min. Web	Min. Clr. Mask to Copper	Fully Covered Via Holes	Partly Covered Via Holes		
	mm	mm	mm	mm	mm				
Top	0.076	0.125	>0.250	0.076	0.001				No
Bottom	0.102		>0.250	>0.250	>0.250	Yes			No
						Yes			No

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New: more detailed copper clearance information



We now report outline clearances separately for pads, tracks and regions.

Benefit:

More detailed and clearly arranged information for a better cost analysis

Old QED report

Copper Layers												
File	Pos.	Min. Line Width	Min. Ring	Min. Clr. to Copper	Min. Clr. Pad to Pad	Min. Clr. Pad to Track	Min. Clr. Track to Track	Min. Self-spacing	Min. Clr. to PTH	Min. Clr. to NPTH	Min. Clr. to Outline	Copper Area
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	dm ² %
BS	1		0.279	0.213	0.384	0.213	0.229	0.004	0.416		0.279	0.0488 79
LS	2		0.279	0.254	0.384	0.254	0.356	> 0.500	0.559		0.279	0.0163 26

Moved to the new section Copper Layers Details

New information

New QED report

Copper Layers										
File	Pos.	Min. Line Width	Min. Ring	Min. Clr. to Copper	Min. Same Net spacing	Min. Clr. to Plated Hole	Min. Clr. to NPTH	Min. Clr. to Outline	Copper Area	
		mm	mm	mm	mm	mm	mm	mm	dm ²	%
BS	1	0.127	0.000	0.137	0.128	0.114		0.076	0.0957	21
LS	2	0.127	0.004	0.111	0.010	0.189		0.800	0.0547	12

Copper Layers Details									
File	Pos.	Min. Clr. to Copper				All to Outline	Min. Clr. to Outline		
		All	Pad to Pad	Pad to Track	Track to Track		Pad to Outline	Track to Outline	Region to Outline
		mm	mm	mm	mm	mm	mm	mm	mm
BS	1	0.137	0.137	0.140	0.142	0.076	0.076	1.003	>1.600
LS	2	0.111	0.152	0.111	0.140	0.800	1.384	0.800	>1.600

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Improved: copper area and SMD/BGA count

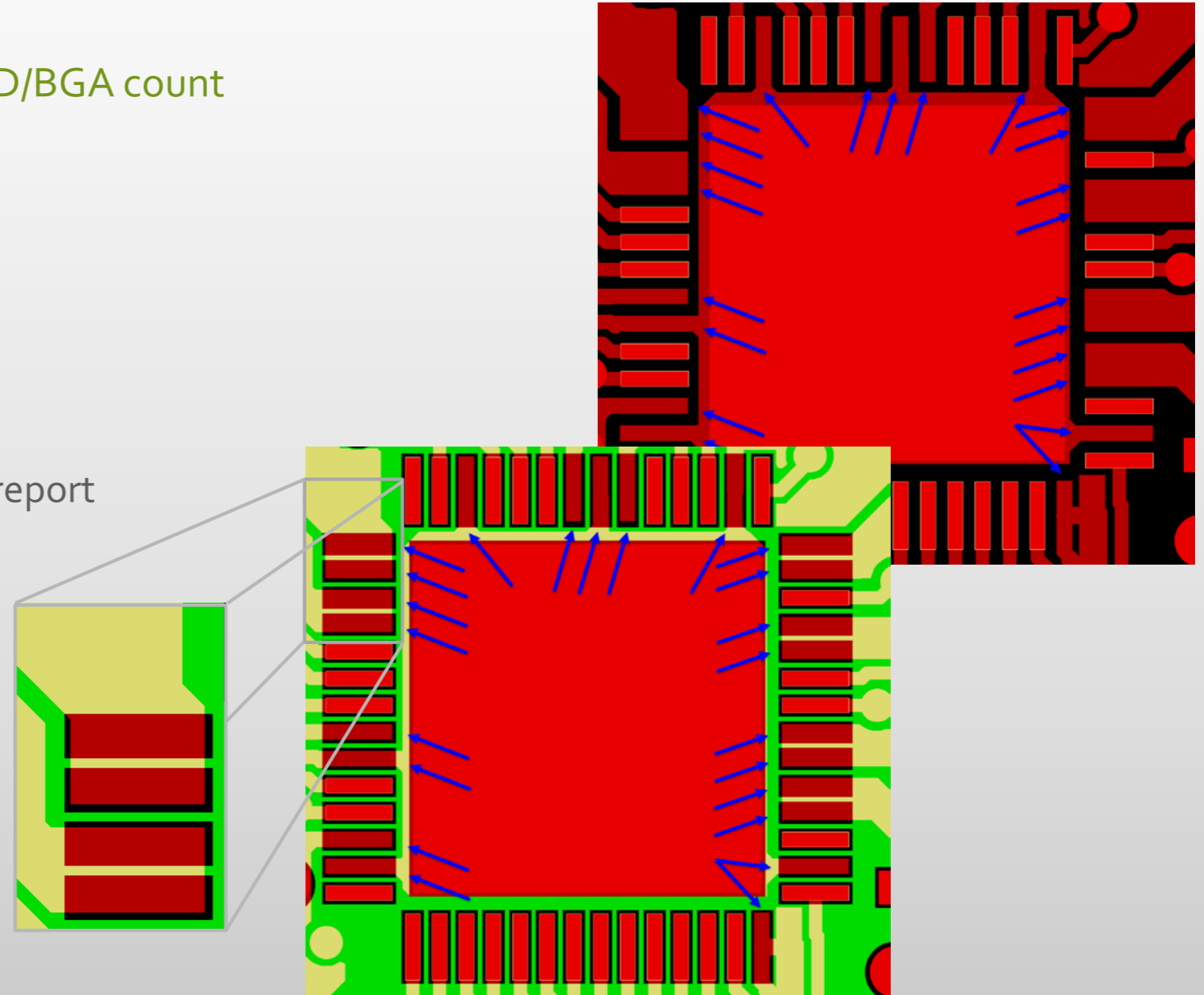


Better reporting of the copper area and SMD/BGA count

- ❑ for nets without plated drill holes
- ❑ for jobs with lots of contours

Benefits:

- improved reporting of copper surface
- more accurate SMD/BGA count in QED report



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ODB++ input



Now supports input of ODB++ v8 data sets

Full support of ODB++ data sets with mixed metric and imperial units

Benefit:

- Designers begin sending more and more ODB++ v8 data sets to fabricators. This release keeps you up-to-date with the latest practices

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Improved: pad classification

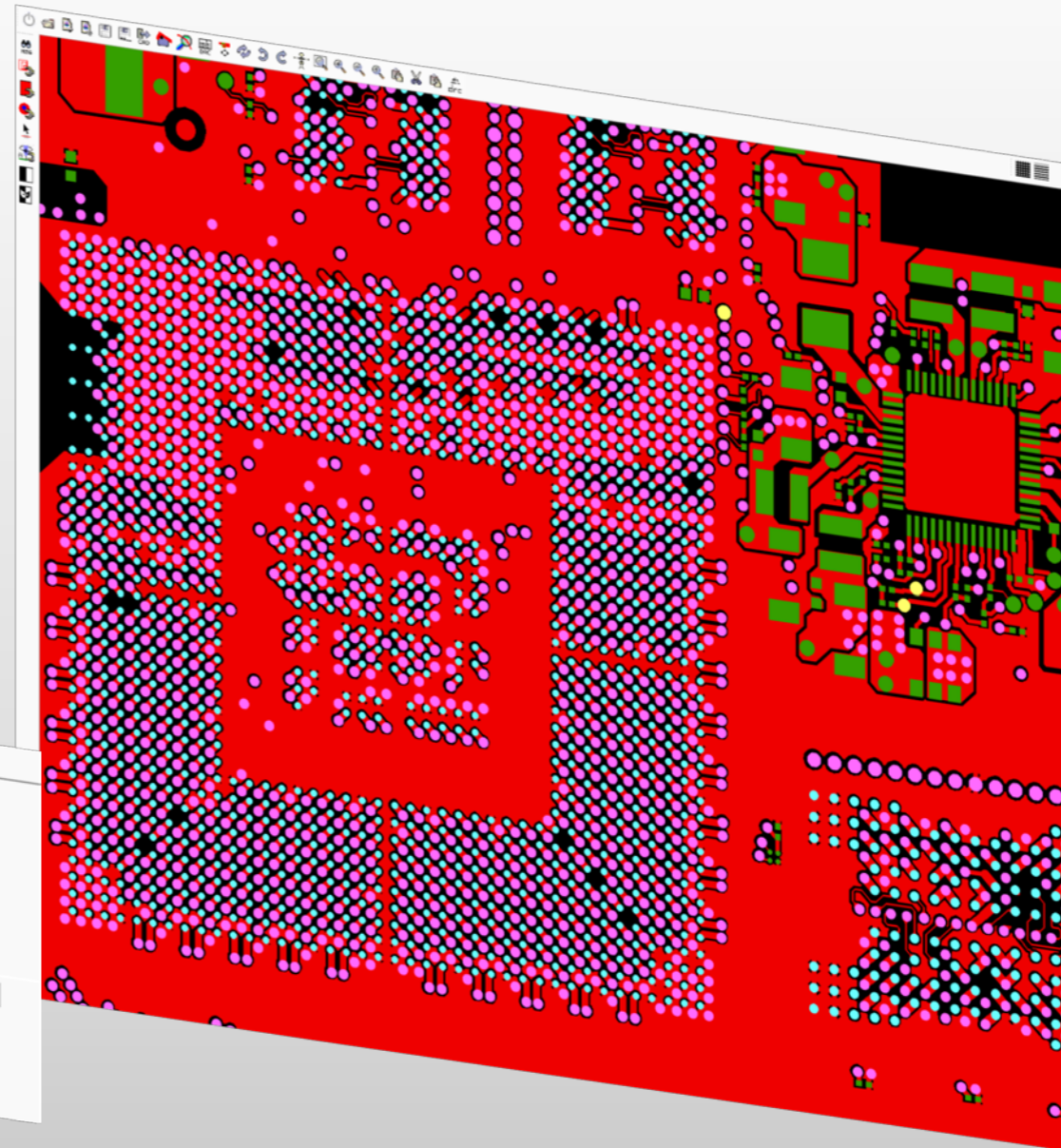
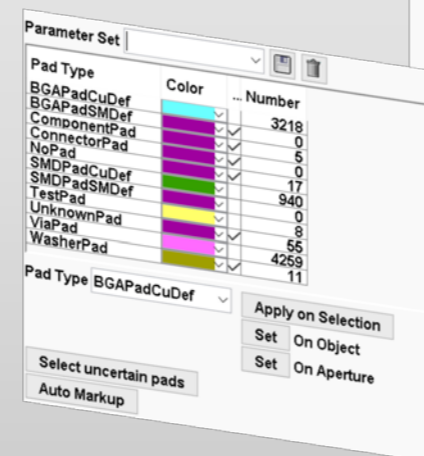


Rebuilt Job Export has improved pad classification

BGAs and edge connectors more effectively classified

Benefits:

- better pad classification in UcamX after import of Rebuilt Job
- less manual CAM work



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Improved: Job Editor



Now possible to change the order of copper layer order in Job Editor by drag & drop

Benefit:

Fast and easy way to rearrange the order of copper layers by drag and drop

LAYER STRUCTURE EDITOR

Top Bottom Both None Pos Neg

INITIAL	RENAMED	FUNCTION
smt.dpf	zzyxxx41	mask
01_TOP.dpf	zzyxxx01	outer
02_GND.dpf	zzyxxx02	solid
03_SIG.dpf	zzyxxx03	signal
04_SIG.dpf	zzyxxx04	mixed
05_SIG.dpf	zzyxxx05	mixed
06_SIG.dpf	zzyxxx06	signal
07_GND.dpf	zzyxxx07	solid
08_BOT.dpf	zzyxxx32	outer
smb.dpf	zzyxxx51	mask
pl.dpf	zzyxxx79	paste
1-2.dpf	zzyxxxL80	blind
2-7.dpf	zzyxxx96	buried
7-8.dpf	zzyxxxL85	blind
npth.dpf	zzyxxx60n	unplated
pth.dpf	zzyxxx60	plated
ImageOutline.dpf	zzyxxx38	cad_outline

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Improved: DFM Classes in QED (licensed feature formerly called Capabilities)



The "Capabilities" option is amplified to DFM Classes

- ❑ DFM Classes can now access all QED fields and not just a limited subset. This includes custom parameters
- ❑ DFM classes no longer require contiguous intervals
- ❑ Indicates when checks are not applicable for the job
- ❑ Possibility to pick any number of design characteristic values, perform calculations using them and insert the result in the table or use it for classification

Benefits:

- The table in the QED report can now match each customer's layout and rules

Check area	Parameter	Value	Standard	Extra 1	Extra 2	Advanced 1	Advanced 2
			class 1	class 2	class 3	class 4	class 5
Check area 1	Material thickness rigid		0.5-2.4	0.2-3.2	0.05-6.35	0.05-6.35	-
	Material thickness flexible		-	0.05-0.1	0.025-0.049	0.025-0.049	-
	Flex-Rigid		-	-	-	-	-
Check area 2	Layercount	4	1-6	1-8	1-10	1-10	1-32
	Aspect Ratio	3.0	-	-	-	-	-
	Blind Vias		-	-	-	-	-
Check area 3	Min. Track		-	-	>= 0.10mm (max. depth 0.10mm)	>= 0.075 (max. depth 0.065mm)	>= 0.075 (max. depth 0.065mm)
	Min. Track outer	0.21	>= 0.2000	>= 0.1500	>= 0.1000	>= 0.0750	>= 0.0500
	Min. Track inner	0.21	>= 0.2000	>= 0.1500	>= 0.1000	>= 0.0750	>= 0.0500
	Min. Clearance	0.25	>= 0.1500	>= 0.1500	>= 0.1000	>= 0.0750	>= 0.0500
Check area 4	Min. Annular Ring outer	0.054	>= 0.1524	>= 0.1270	>= 0.1016	>= 0.1500	>= 0.1500
	Min. Annular Ring inner	0.199	>= 0.2200	>= 0.1700	>= 0.1300	>= 0.0762	>= 0.0500
	Min. Clearance PTH to inner	0.15	>= 0.2500	>= 0.2200	>= 0.1900	>= 0.1000	>= 0.0750
	Min. Diameter PTH	0.3	>= 0.2540	>= 0.2286	>= 0.2159	>= 0.1500	>= 0.1250
	Min. Diameter NPTH	0.5	>= 0.2000	>= 0.1500	>= 0.1500	>= 0.2032	>= 0.1905
	Min. Clearance outer	0.85	>= 0.3000	>= 0.2000	>= 0.1500	>= 0.1000	>= 0.0500
Check area 5	Min. Clearance inner	0.054	>= 0.1524	>= 0.1270	>= 0.2000	>= 0.1000	>= 0.0500
	Bondgold	0.3	>= 0.1524	>= 0.1270	>= 0.1016	>= 0.0762	>= 0.0500
	Gold Edge Connector		>= 0.1524	>= 0.1270	>= 0.1016	>= 0.0762	>= 0.0500
	Vcut		-	-	>= 0.1016	>= 0.0762	>= 0.0500
	Depth routing		-	-	Yes	Yes	-
	Impedance-Check		-	-	Yes	Yes	-
	Special materials (TMM, Teflon)		-	Yes	Yes	Yes	-
			-	-	Yes	Yes	Yes
			-	-	Yes	Yes	-
			-	-	Yes	Yes	Yes

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Improved: DFM Classes in QED (licensed feature formerly called Capabilities) - Examples



Example 1 – Combine min. ring and Product IPC Class

I have a design characteristic min ring and I have a custom parameter Product IPC Class.

Depending on the value of Product IPC Class, I can instruct DFM Classes to subtract a certain amount off the value of annular ring, giving me not just the min annular ring in the design, but the real tolerance for drill hole (mis)placement during production.

Example 2 – Custom parameter “Impedance Controlled”

If I had a custom parameter “Impedance Controlled”, DFM Classes can be instructed to:

- a) Take into account this controlled impedance parameter as a criterion in my DFM Classes.
- b) Make sure the classes Standard and Extra1 (cf. screen shot) always turn orange if impedance controlled is set to “yes” for a given job.

DFM Checks		Standard	Extra 1	Extra 2	Advanced 1	Advanced 2
		class 1	class 2	class 3	class 4	class 5
Check area 1	Material thickness rigid					
	Material thickness flexible	0.5-2.4	0.2-3.2	0.05-6.35	0.05-6.35	-
	Flex-Rigid	-	0.05-0.1	0.025-0.049	0.025-0.049	-
Check area 2	Layercount					
	Aspect Ratio	2				
	Blind Vias	0.0	1-6	1-8	1-10	1-32
Check area 3	Min. Track			>= 0.10mm (max. depth 0.10mm)	>= 0.075 (max. depth 0.065mm)	>= 0.075 (max. depth 0.065mm)
	Min. Track outer	0.127	>= 0.2000	>= 0.1500	>= 0.1000	>= 0.0750
	Min. Track inner	0.127	>= 0.2000	>= 0.1500	>= 0.1000	>= 0.0500
	Min. Clearance		>= 0.1500	>= 0.1500	>= 0.1000	>= 0.0750
Check area 4	Min. Annular Ring outer	0.111	>= 0.1524	>= 0.1270	>= 0.1016	>= 0.0762
	Min. Annular Ring inner	0.0	>= 0.2200	>= 0.1700	>= 0.1300	>= 0.1000
	Min. Clearance PTH to inner		>= 0.2500	>= 0.2200	>= 0.1900	>= 0.1500
	Min. Diameter PTH		>= 0.2540	>= 0.2286	>= 0.2159	>= 0.1500
	Min. Diameter NPTH	0.2	>= 0.2000	>= 0.1500	>= 0.1500	>= 0.1000
	Min. Clearance outer		>= 0.3000	>= 0.2000	>= 0.2000	>= 0.1000
Check area 5	Min. Clearance inner	0.111	>= 0.1524	>= 0.1270	>= 0.1016	>= 0.0762
	Bondgold		>= 0.1524	>= 0.1270	>= 0.1016	>= 0.0762
	Gold Edge Connector		>= 0.1524	>= 0.1270	>= 0.1016	>= 0.0762
	Vcut					
	Depth routing					
	Impedance-Controlled			Yes	Yes	Yes
	Special materials (TMM, Teflon)	Yes		Yes	Yes	Yes

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Improved: DFM Review



DFM Review, a software application in Integr8tor with which the static table of DFM Classes can be interrogated. Locations worthy of review can be visited and visualized.

	Value	Standard			Advanced	
		Light	Normal	Difficult	Wizard	External
General	Thickness	0.0	0.5-2.4	0.2-3.2	0.05-6.35	0.05-6.35
Copper	Aspect Ratio	6.0	7.0	8.0	10.0	12.0
	Blind Vias	-	>300	200	< 200	-
	Buried Vias	-	>300	200	< 200	-
	Min. Track	0.127	>200 [74]	150 [74]	100	50
	Min. Clearance	0.111	>200 [419]	150 [242]	100	50
	Min. AnnRing Outer	0.0	>250 [1024]	200 [1024]	150 [1024]	100 [1024]
	Min. AnnRing Inner	>30	200	150	120	100
	Min. Drill-Copper Inner	>450	350	250	200	175

Benefits:

- great support in evaluating the PCB
- fast way to evaluate results
- easy to locate possible threats

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Improved: Layer rename



New layer renaming functionality - now possible to script layer subclasses

Benefit:

Subclasses can be scripted according to existing in-house requirements or customer conventions.

Example: different inner layer subclasses based on their copper area

- inner layers with copper area < 50% should be subclass "signal"
- inner layers with copper area 50% - 70% should be subclass "mixed"
- inner layers with copper area > 70% should be subclass "solid"
- drill layer starting on outer layer but not going through all layers should be subclass "blind"
- drill layer starting on inner layer and ending on inner layer should be subclass "buried"

The screenshot shows the 'LAYER STRUCTURE EDITOR' window. At the top, there are buttons for 'Top', 'Bottom', 'Both', 'None', 'Pos', and 'Neg'. Below these are buttons for 'Add', 'Duplicate', 'Cu Renumber', and 'Flip Job'. A blue arrow points to the 'Add' button. The main table has columns for 'INITIAL', 'RENAMED', 'FUNCTION', 'POSITIO', and 'POLARITY'. The 'INITIAL' column lists various layer types like 'smt.dpf', '01_TOP.dpf', '02_GND.dpf', etc. The 'RENAMED' column shows new names like 'zzyxxx41', 'zzyxxx01', etc. The 'FUNCTION' column lists functions like 'mask', 'outer', 'solid', 'signal', 'mixed', 'blind', 'buried', 'unplated', 'plated'. The 'POSITIO' and 'POLARITY' columns show positions like 'top', 'bottom' and polarities like 'positive'.

INITIAL	RENAMED	FUNCTION	POSITIO	POLARITY
smt.dpf				
01_TOP.dpf	zzyxxx41	mask	top	positive
02_GND.dpf	zzyxxx01	outer	1	positive
03_SIG.dpf	zzyxxx02	solid	2	positive
04_SIG.dpf	zzyxxx03	signal	3	positive
05_SIG.dpf	zzyxxx04	mixed	4	positive
06_SIG.dpf	zzyxxx05	mixed	5	positive
07_GND.dpf	zzyxxx06	signal	6	positive
08_BOT.dpf	zzyxxx07	solid	7	positive
smb.dpf	zzyxxx32	outer	8	positive
pl.dpf	zzyxxx51	mask		
1-2.dpf	zzyxxx79	paste	bottom	positive
2-7.dpf	zzyxxxL80	blind	bottom	
7-8.dpf	zzyxxx96	blind	1-2	
npth.dpf	zzyxxxL85	buried	2-7	
pth.dpf	zzyxxx60n	blind	7-8	
	zzyxxx60	unplated	1-8	
		plated	1-8	

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Other improvements

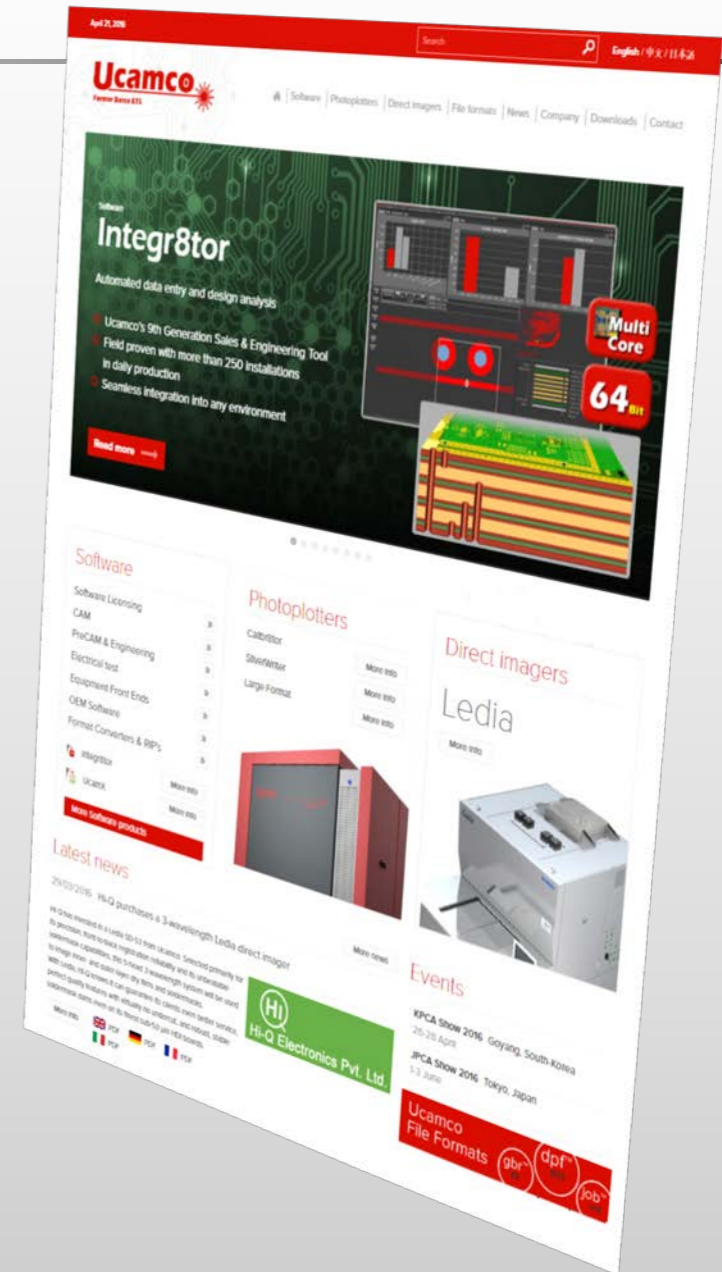


- More stable server – less “No license” problems
- New v2016 Cockpit introduces hotkeys:
 - Ctrl s save preferences
 - Ctrl q close (quit) preferences / licenses
 - Ctrl e exit cockpit
- Improved recognition of solder mask polarity
- Faster processing after action in the Cockpit, like duplicate layers in the Job Editor
- Support for openings in outlines
- More reliable Eagle import by improved handling of font text
- Support for Windows 10

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General information

- The installer can be downloaded at <ftp://ftp.ucamco.com/Integr8tor>
- We recommend to install this update as soon as possible.
- Users on v9.1 and earlier need a new license key.
- For all questions please contact our local business partner or Ucamco support (see contact page on the website)



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