

Ansys Electronics – Imagination's Precipice

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Engineer

Electronics – More Than You Might Think

- HFSS
- Q3D
- SIwave
- Maxwell
- Circuit
- EMC Plus
- Charge Plus
- RaptorX

/ HFSS – More Than Meets the Eye

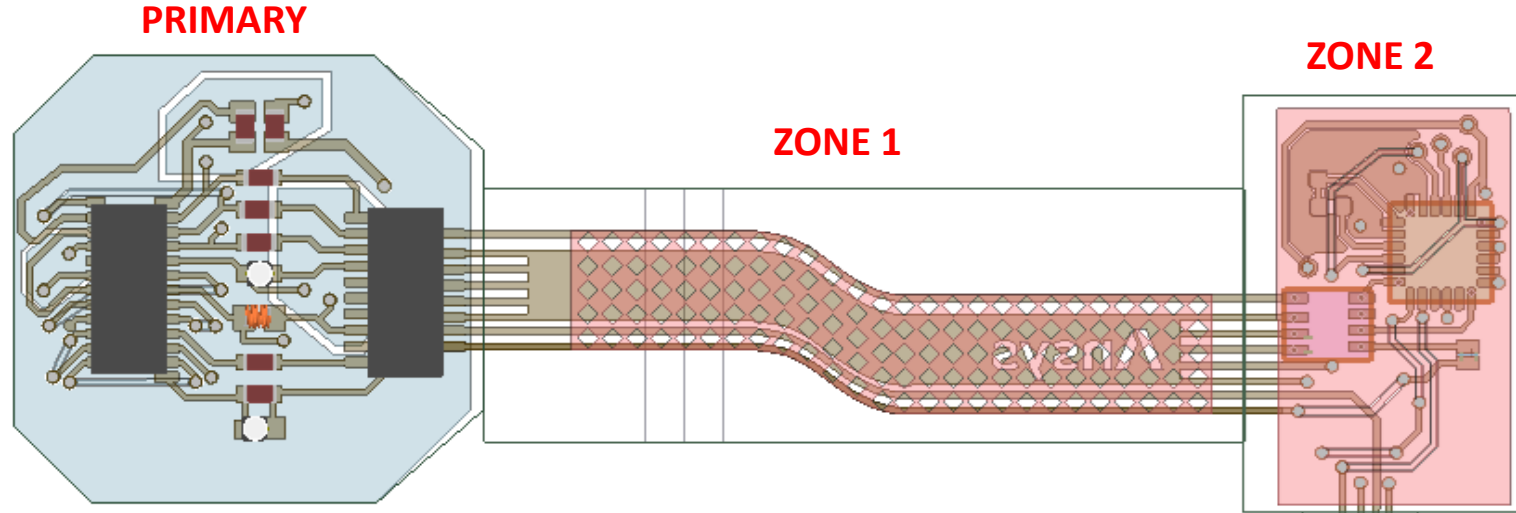
- There is more power in an HFSS license than ever
 - In the beginning....
 - There was FEM
 - One UI
 - Now?
 - FEM (Differential Form)
 - IE (Integral Form)
 - SBR+ (Asymptotic)
 - FETD/DGTD (Time Domain)
 - Hybrid (FEBI)
 - Two UIs - MCAD UI / ECAD UI



Unlocking Potential – Flexing

Rigid flex PCB workflow

- ECAD-centric workflow for Flex PCB
- Specialized Flex PCB Meshing
- Easily assign zones (Multizone)
- Define bend angle and radius



Name	Type	Material	Thickness	Primary	Zone1	Zone2	Zone3	Zone4	+
L2	signal	copper	0.06mm	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
d3	dielectric	FR4_epoxy	0.6mm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d2	dielectric	FR4_epoxy	0.45mm	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
L1	signal	copper	0.06mm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
d1	dielectric	FR4_epoxy	1mm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Bottom	signal	copper	0.06mm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Layer

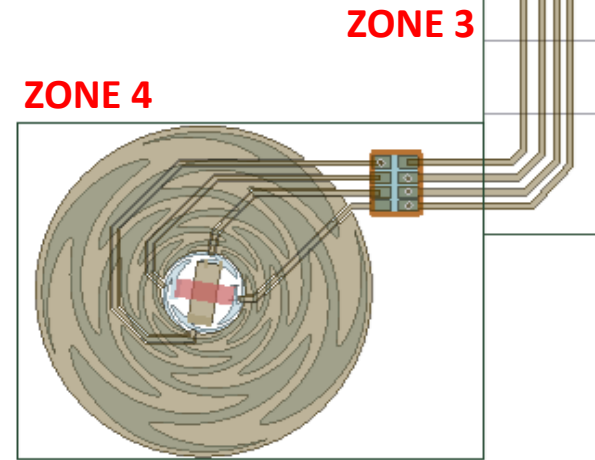
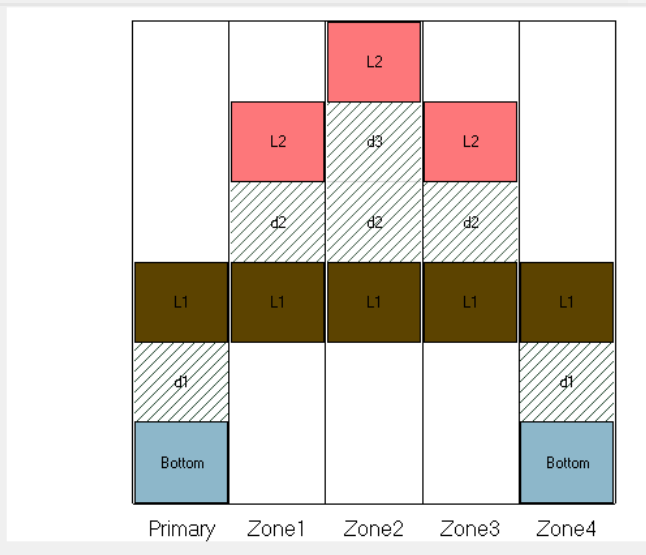
Insert above...

Insert below...

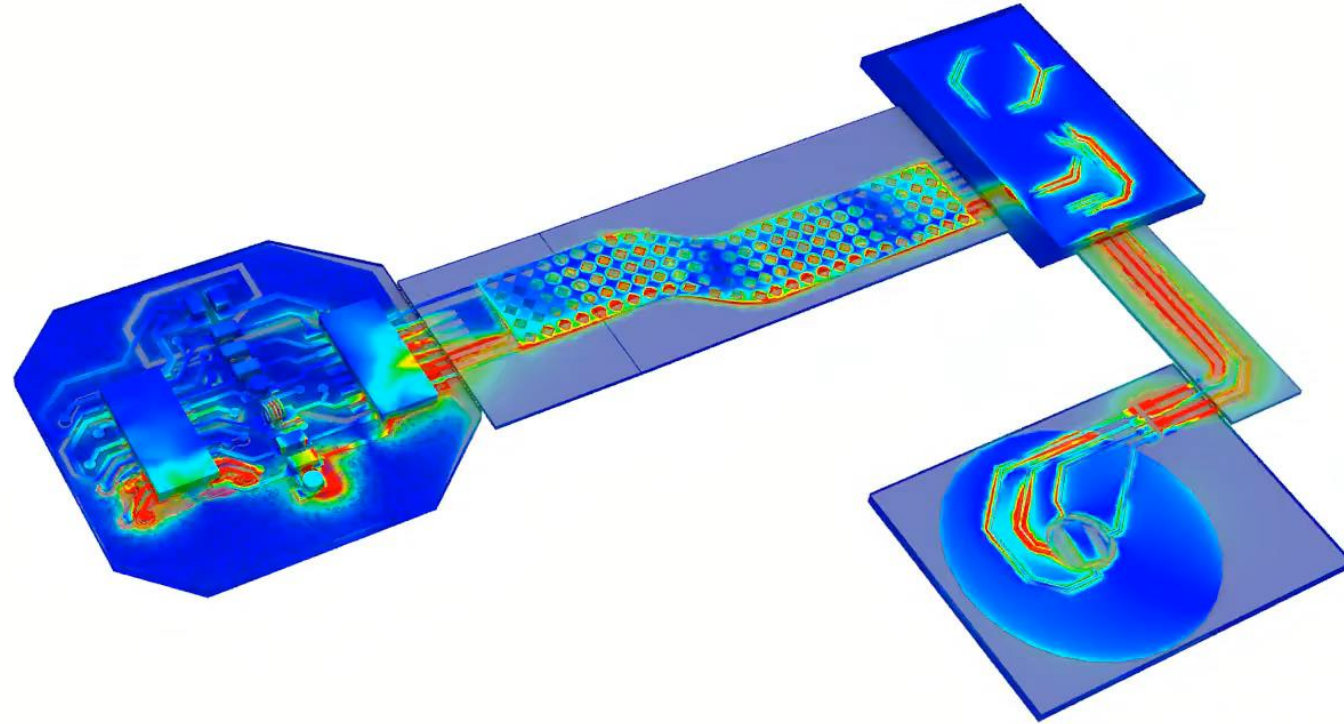
Remove

Select all

Multizone stack up



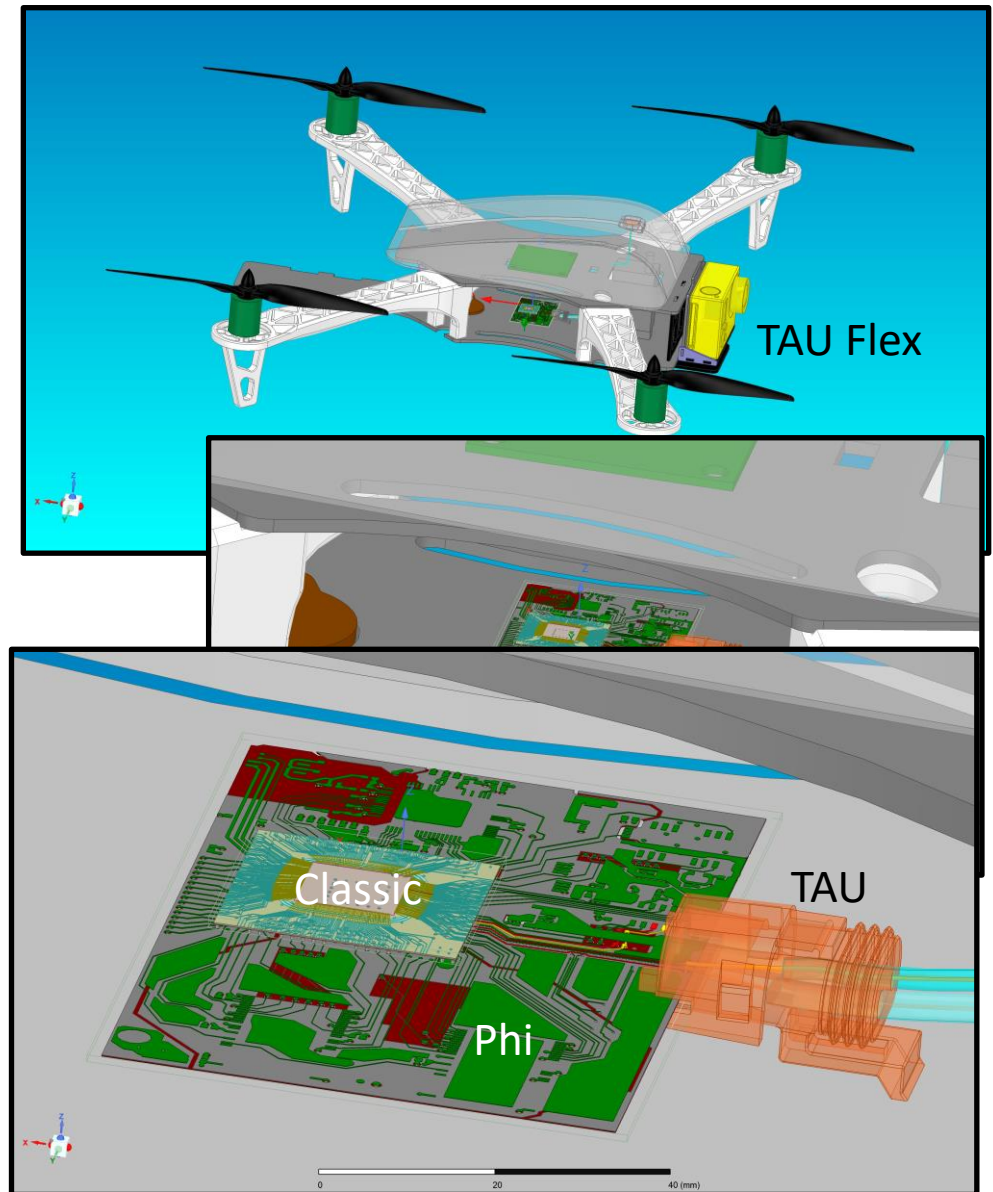
/ Rigid flex PCB workflow



Limit Breaking – Mesh Fusion

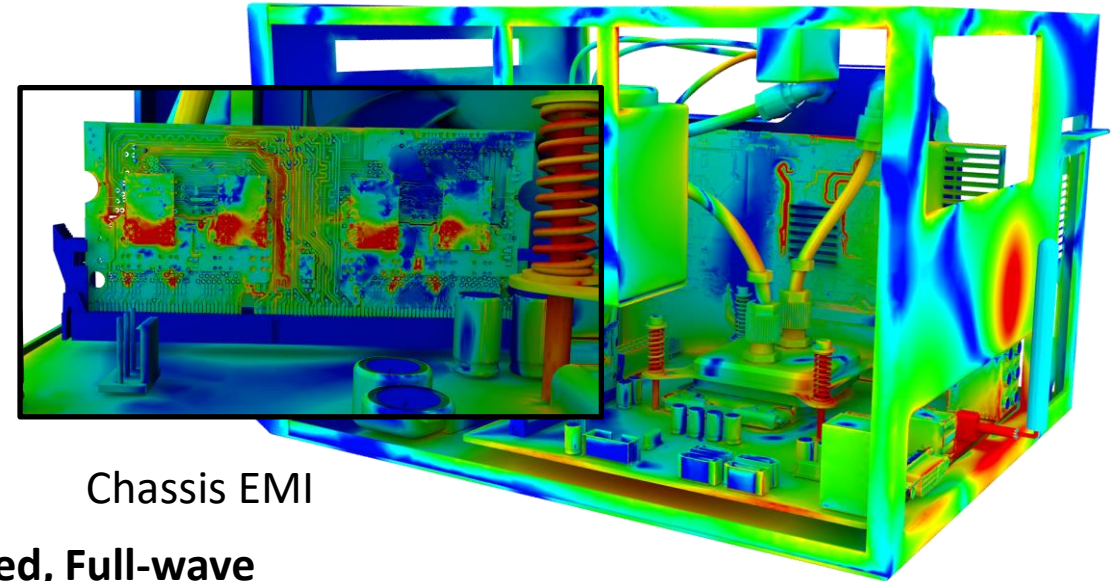
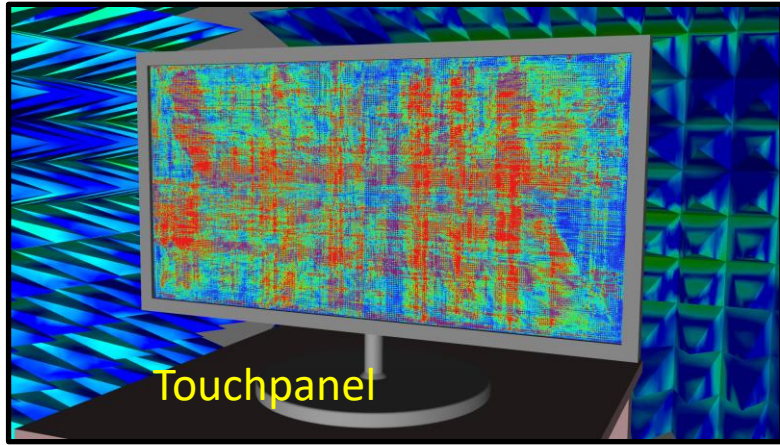
HFSS Mesh Fusion: No Limits

- New Beta Feature in HFSS 2021 R1
 - Fusion of powerful meshing and solving technologies
- Mesh Fusion Features:
 - Independent mesh regions
 - Optimal mesh algorithm and scale for each region
 - Concurrent (i.e., parallel) region by region meshing
 - Faster initial mesh generation
 - Improved reliability for multi-scale assembly designs
 - e.g., Antenna on platform, package on PCB, IC on package
- A Major Breakthrough in FEM Solver Technology
 - Uncompromised and accurate: Fully coupled fields across region interfaces!
 - Solver delivers the true HFSS *Gold-standard Accuracy*

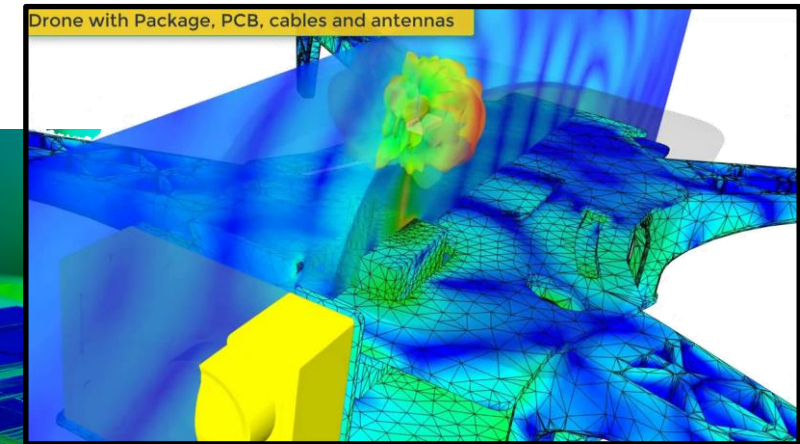
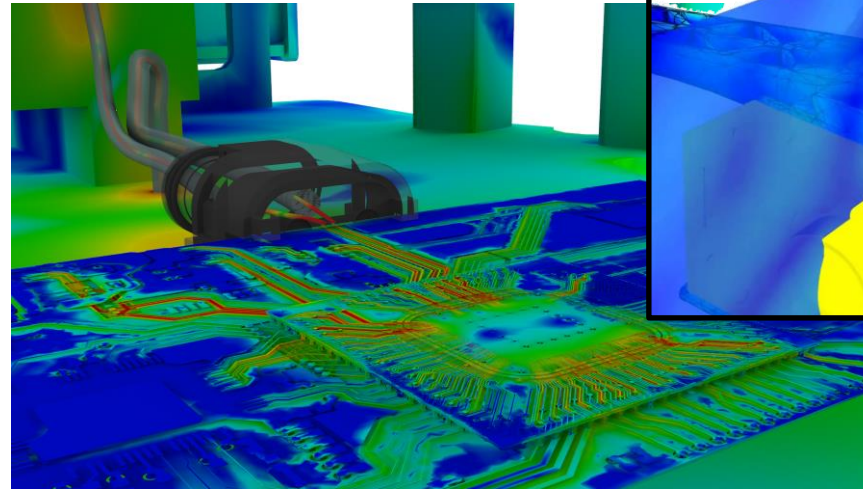
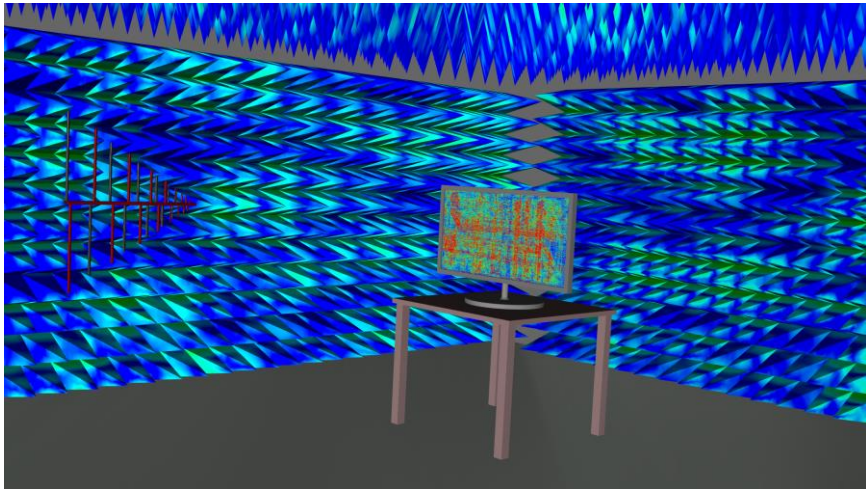


HFSS Mesh Fusion: No Limits

- Simulate Complete Electromagnetic Systems



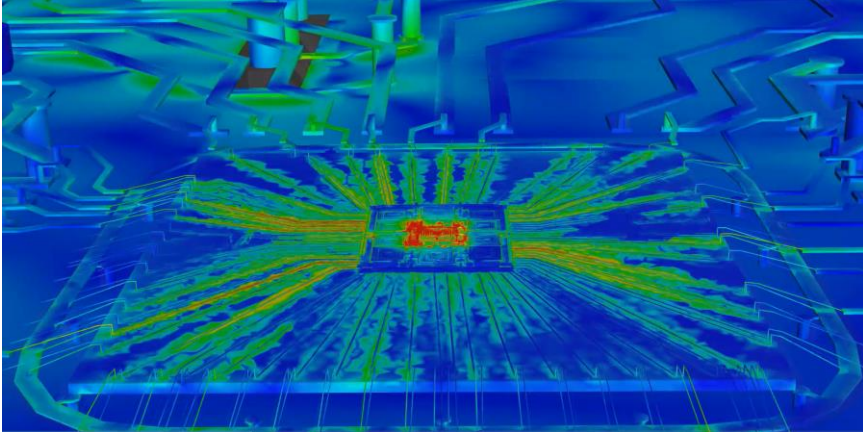
Fully-Coupled, Full-wave
Electromagnetic Matrix



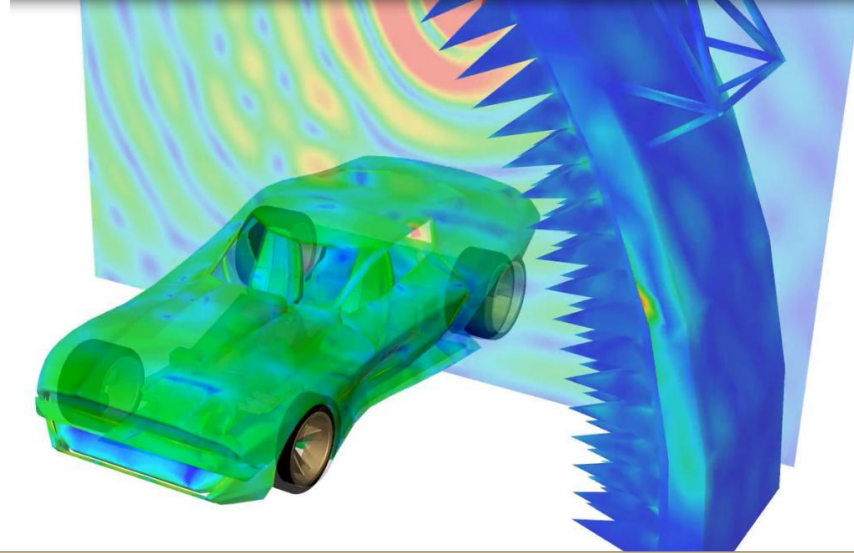
From Chip to
Antenna

HFSS Mesh Fusion

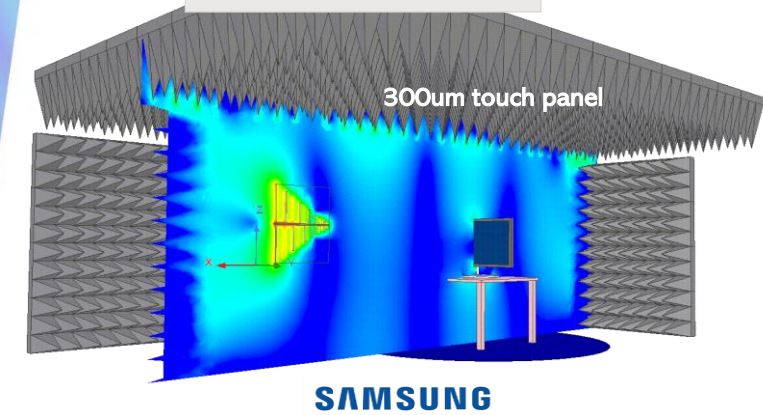
Chip/Package/Board: System Performance



Antenna System Performance



Touch Panel System EMI



Ansys YouTube Video: [HFSS Mesh Fusion Technology \[Overview\]](#)

Ansys Blog: [From Chips to Ships, Solve Them All With HFSS](#)

Pittsburgh Business Times: [Ansys Debuts New Simulation Technology](#)

EE Journal (Fish Fry Podcast): [A Mesh by Any Other Name Just Isn't the Same: Breaking Rules and Making the Impossible Possible with Ansys HFSS Mesh Fusion](#)

EE Journal: [Ansys Launches HFSS Mesh Fusion, Redefines Product Development by Enabling Design of Entire Systems](#)

HPC Wire: [Ansys Launches HFSS Mesh Fusion](#)

Digital Engineering: [Ansys Launches HFSS Mesh Fusion](#)

PCBDesign007: [Ansys Launches HFSS Mesh Fusion, Redefines Product Development by Enabling Design of Entire Systems](#)

New Electronics: [Ansys' HFSS Mesh Fusion Enables the Design of Entire Systems](#)

CAO: [Ansys launches HFSS Mesh Fusion and Reinvents Product Development By Enabling Full System Simulation](#)

Semiconductor Engineering: [Week in Review: Auto, Security, Pervasive Computing](#)

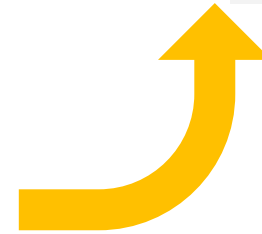
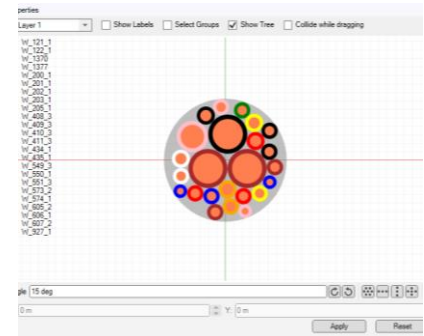
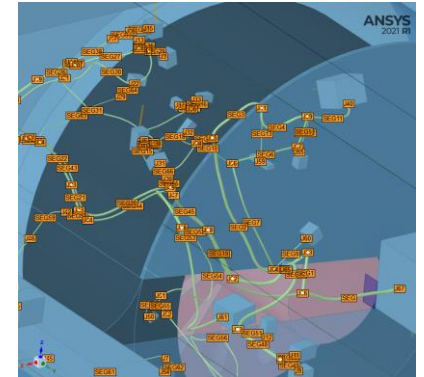
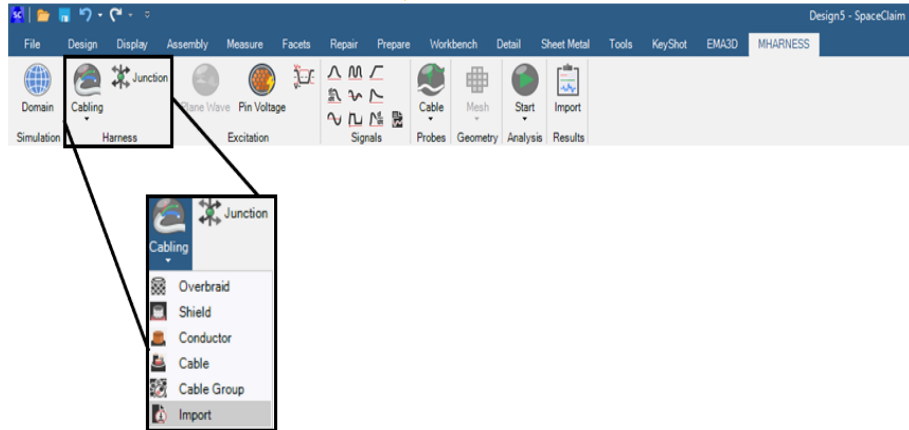
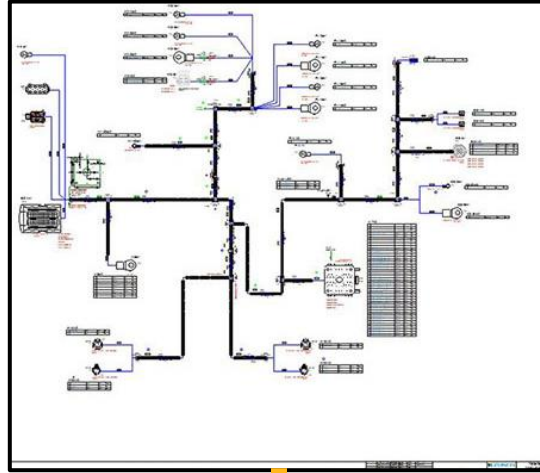
SemiWiki: [System-level Electromagnetic Coupling Analysis is now possible, and necessary](#)

EDACafé: [EDACafe Bunker Broadcast: Matt Commens, Lead Product Manager for HFSS](#)

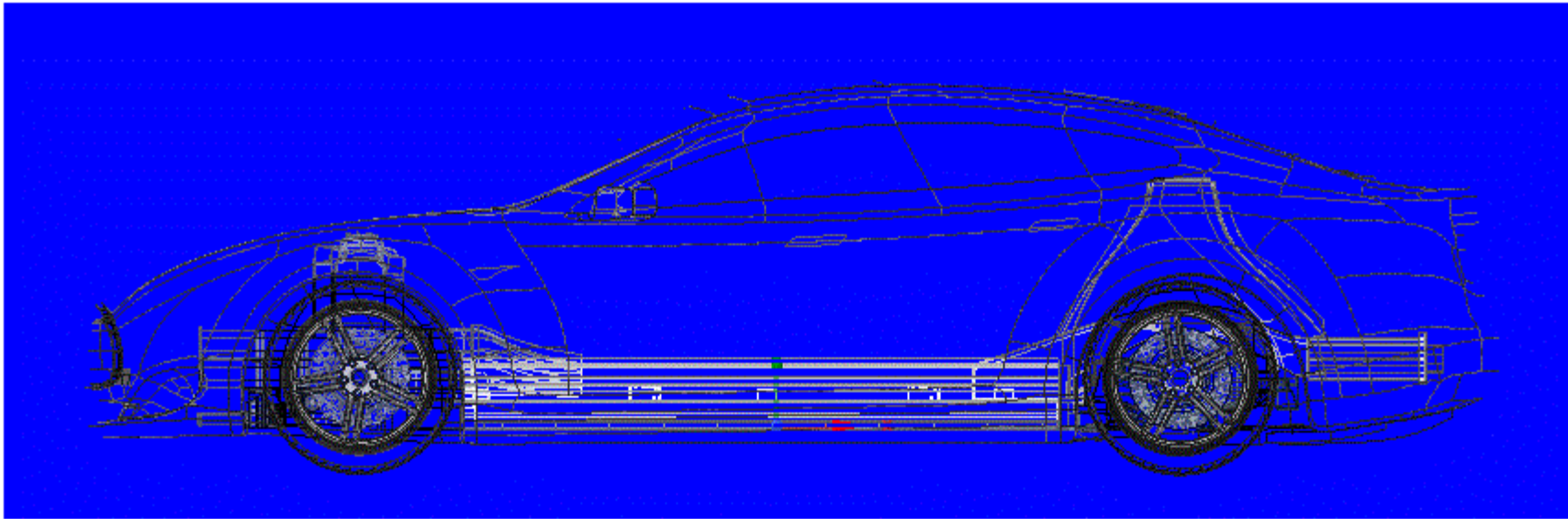
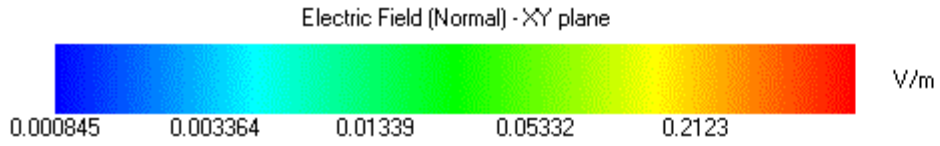
AUTOCAD & Inventor Magazine: [Electromagnetic Simulation: Calculate Complex Interactions](#)

Advanced EMI – Handling Cables

Cable Import



Results – E-Field Emissions

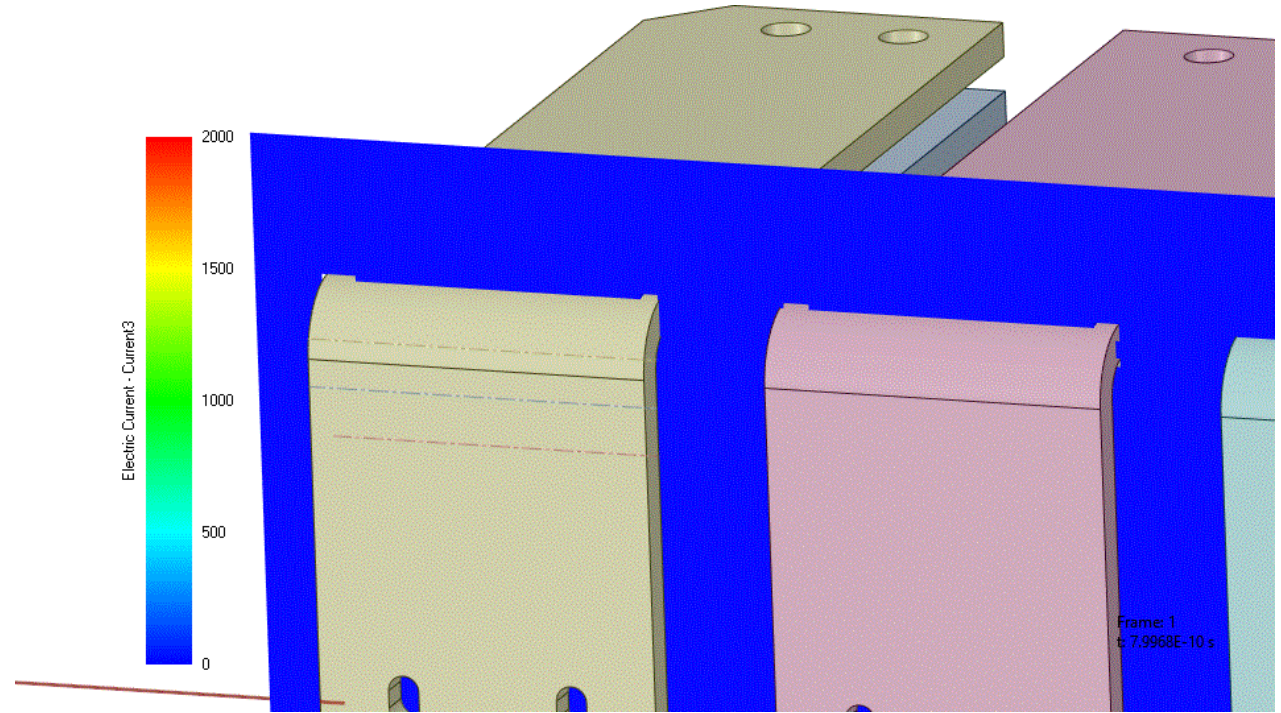
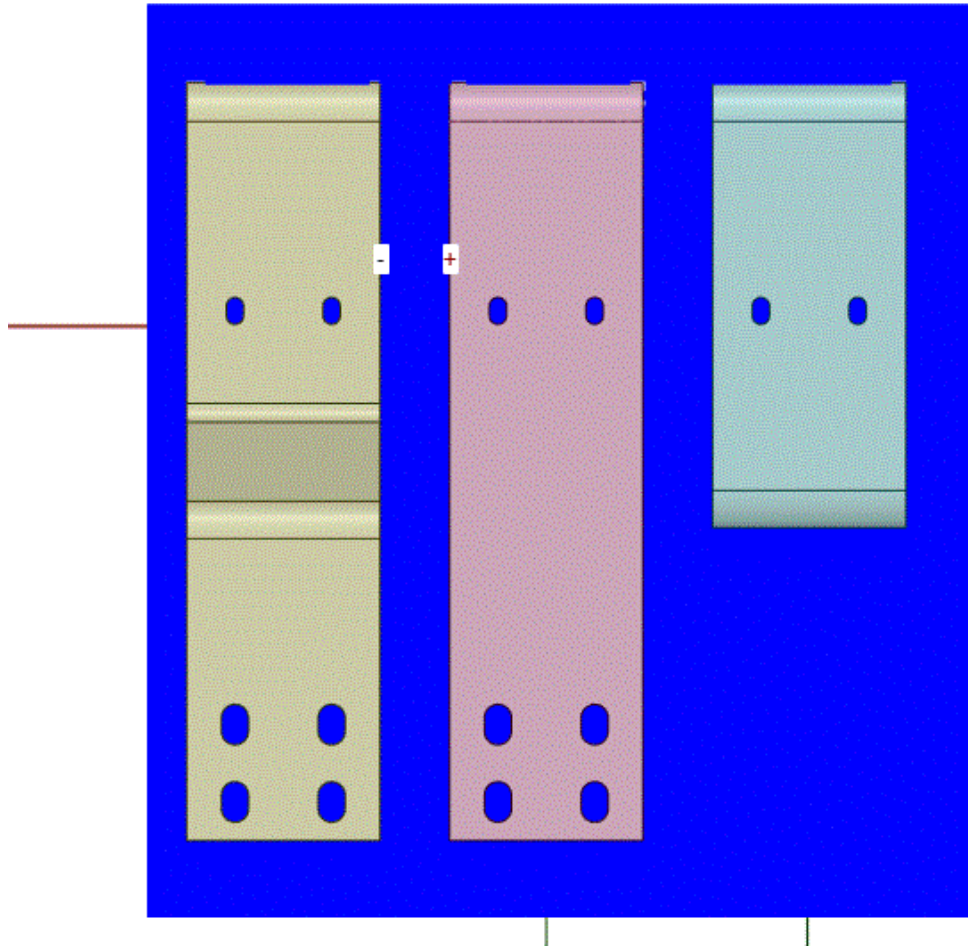


Frame: 1
t: 0 s

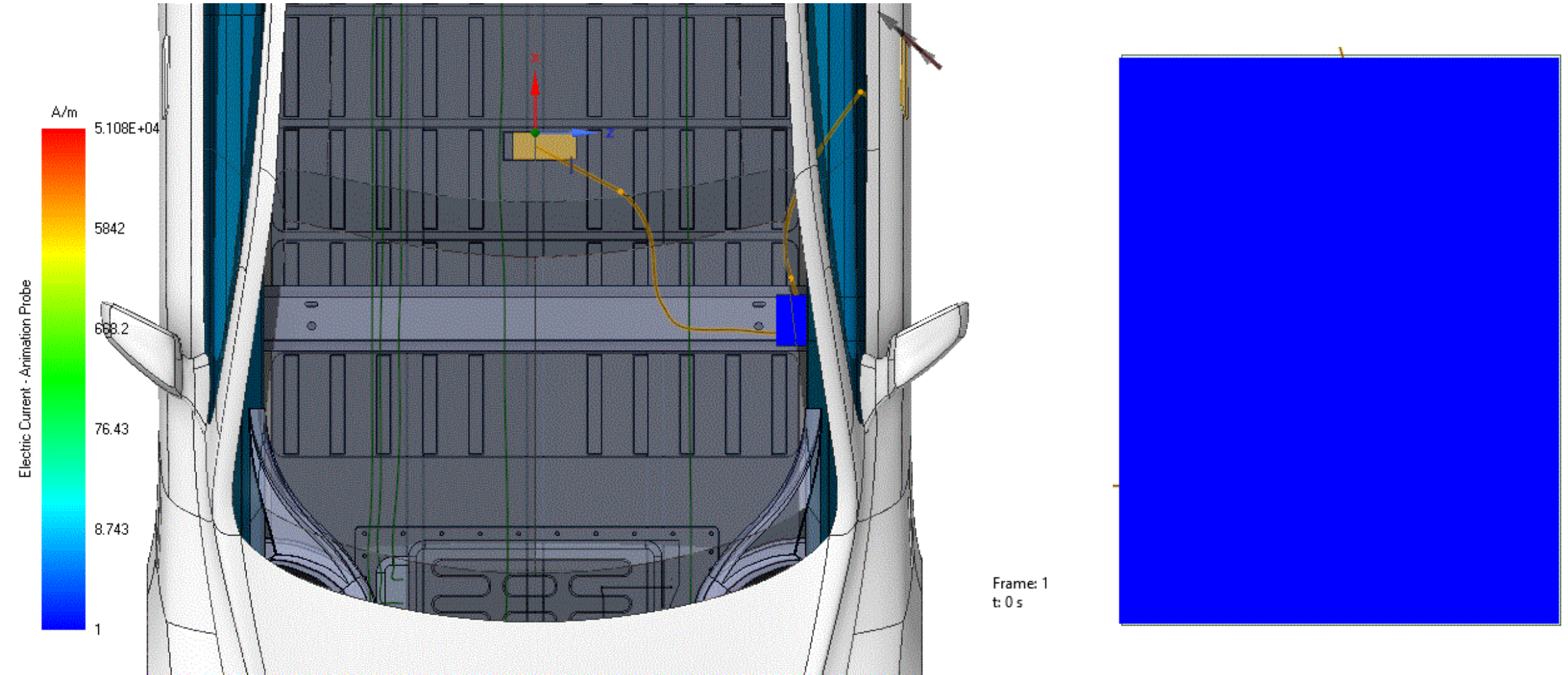


Electrostatic Discharge – Solving the Real Physics

Arc Formation in HV Systems



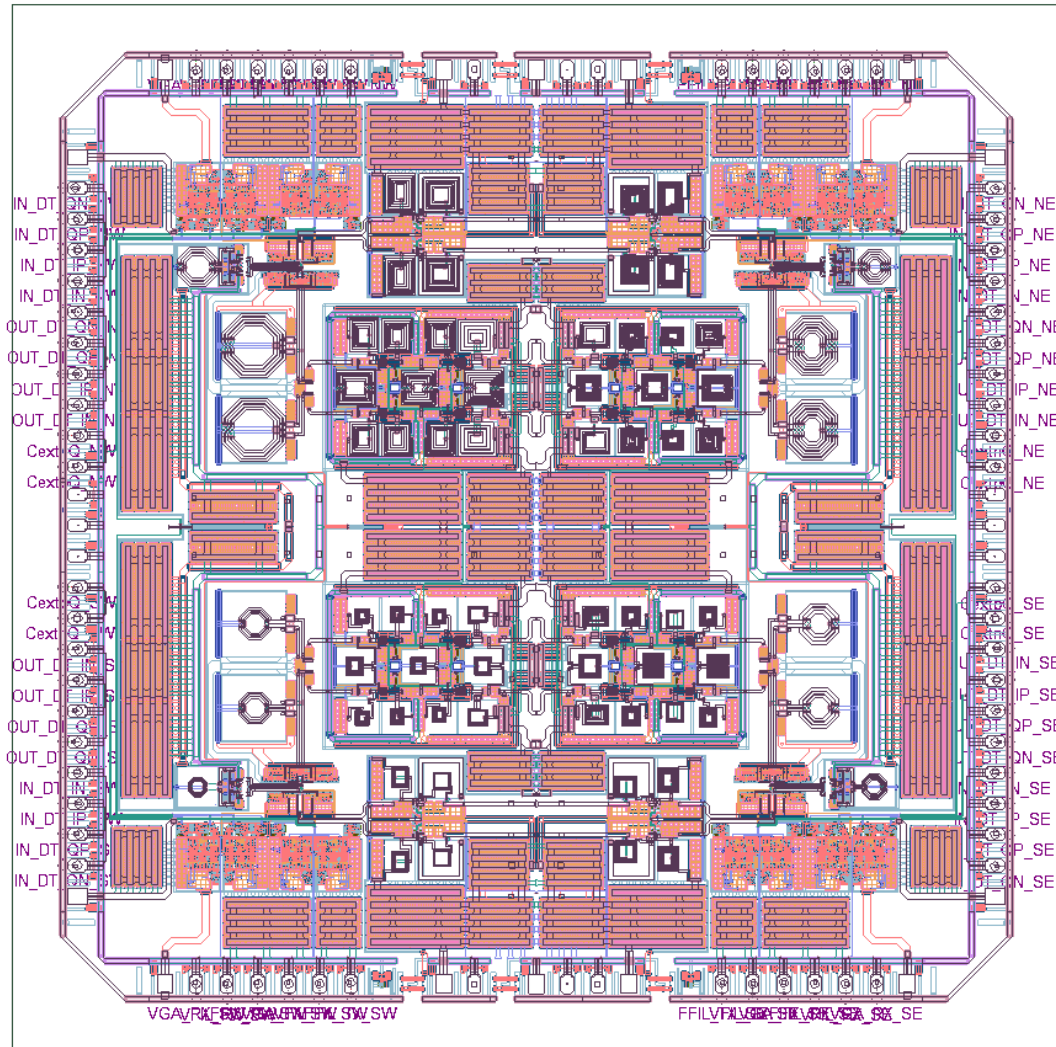
Contact ESD and 54A pulse leads to secondary arc.





What about the really
small?

Utilizing HFSS at the IC Scale

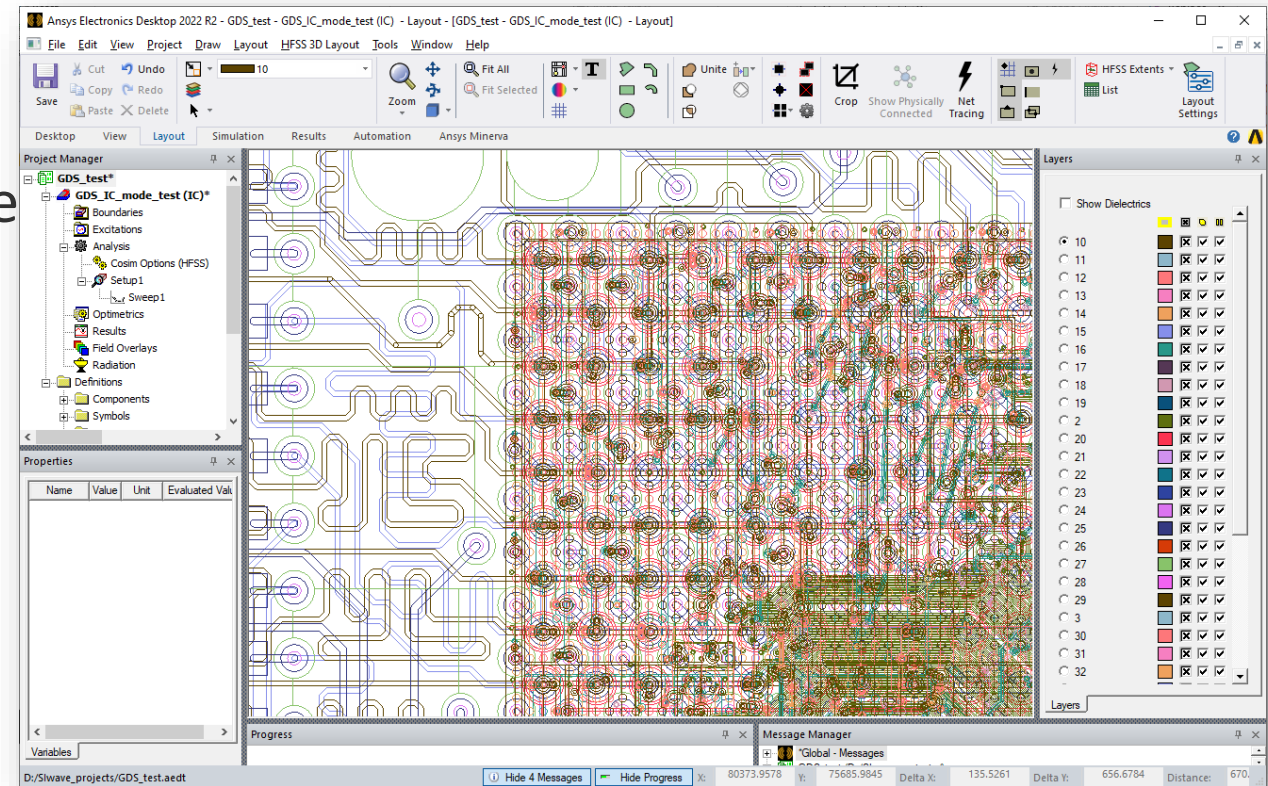


- 5mm x 5mm
- Solved at 5 GHz
- 704 Cores
- 2.6 TB of RAM
- 23.5 Million Tetrahedra
- 93 Million Unknowns

HFSS 3DLayout

IC Design Mode

- Integrated ECADXplorer functionality for higher-capacity IC editor
- End-to-end workflow for IC-scale designs: ports, mesh feedback, post-processing,...
- Specialized 3D Layout “IC Design Mode”
- IC focused functionality and scope
 - Hierarchical/cell-based navigation and editing
 - Simulation Setups and options
- Integrated end-point for GDS import



Closing Remarks

Ansys Electronics – Solving More Than Ever

- In the past 5 years, Ansys has rapidly expanded capabilities that we had previously not addressed
- Talk with your local AE resource regularly to see if there are capabilities that Ansys possesses that previously had not been the case

Thank you!