ALTIUM
DESIGNER 25

Wire Bonding in Altium Designer 25:

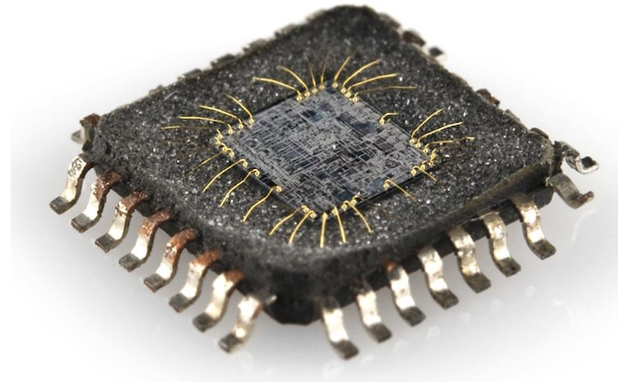
Features & Capabilities

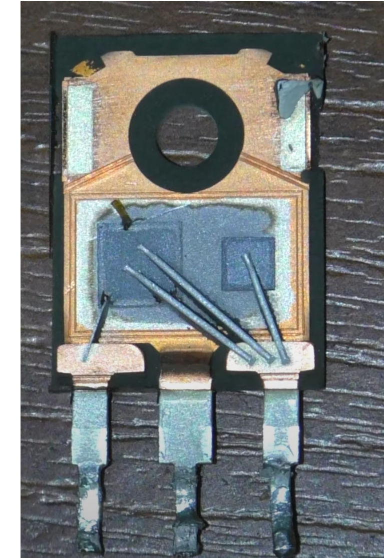
Samer Aldhaher

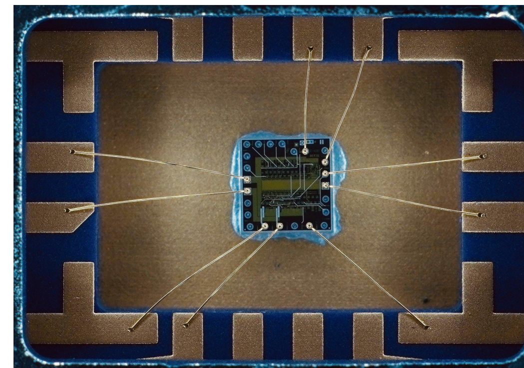
1. Introduction to Wire Bonding
2. Modern Uses and Applications
3. Manufacturing and Costs
4. Wire Bonding in Altium Designer

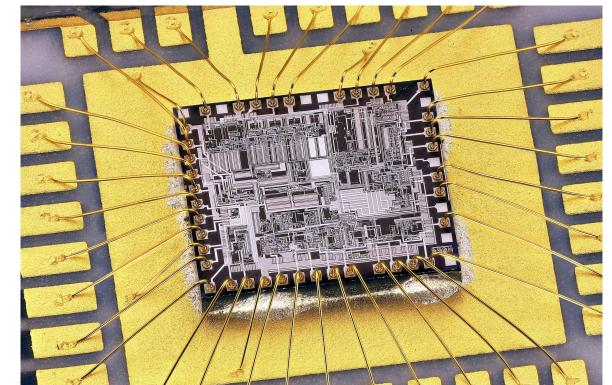
What is Wire Bonding?

- **Key Connection Technology:** Wire bonding is the process of creating electrical connections between semiconductor dies and the circuit board.
- **Predominant Technique**: Over 75-80% of first-level microelectronics connections use wire bonding.
- **Types of Bonding Wires:** Typically uses gold, aluminum, or copper wires; each with unique properties.
- **Critical for Component Performance:** Ensures signal integrity and thermal performance in PCB designs.



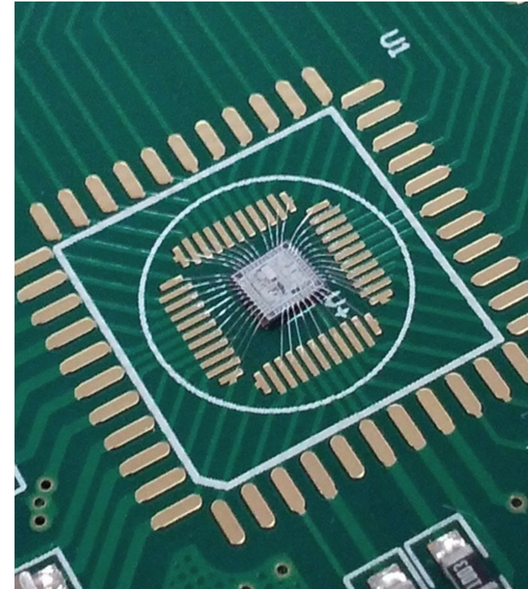


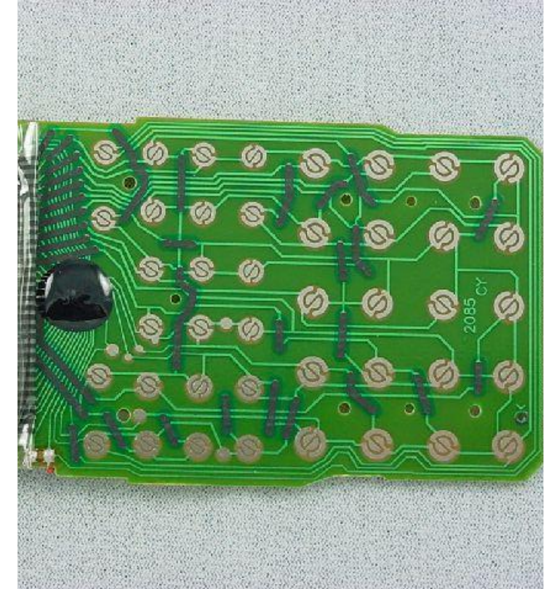


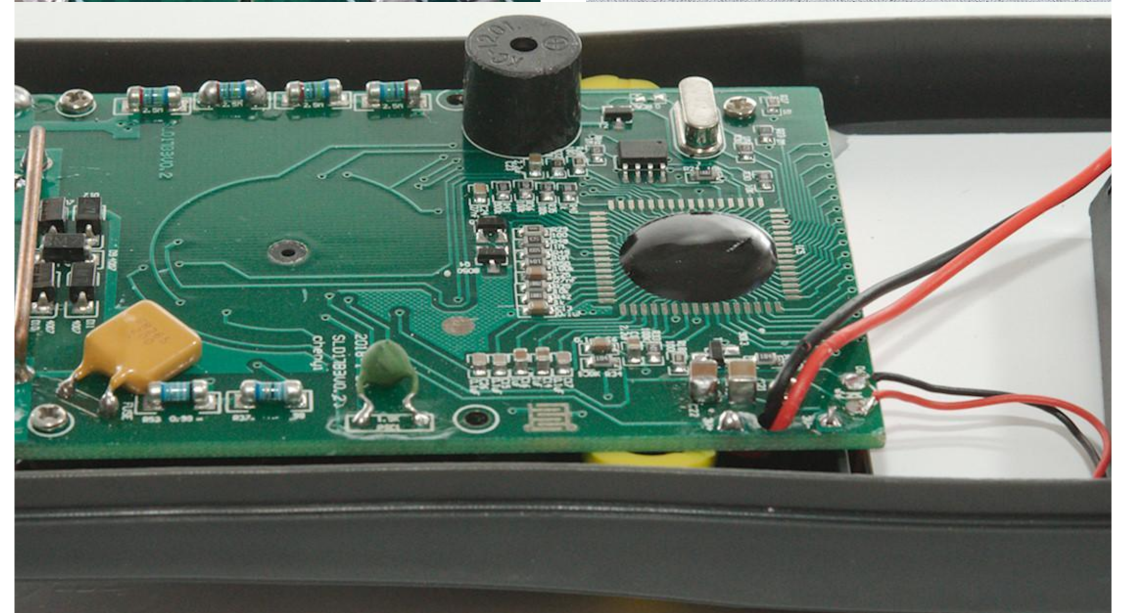


Why Wire Bonding?

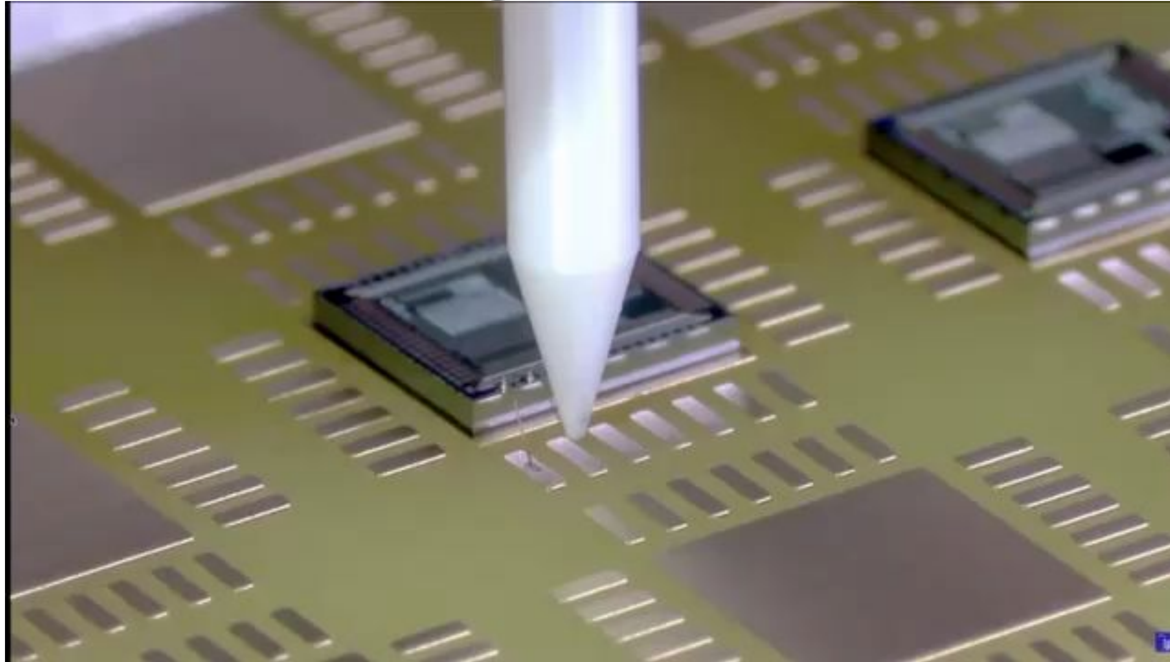
- Popular in Chip-on-board low-cost mass-produced products such as calculators, multimeters – referred to as black blobs or glob tops
- Enables smaller and more compact designs
- Allows for advanced digital designs – higher processing power per unit area
- Applications range from low-cost mass production to more advance high speed high density

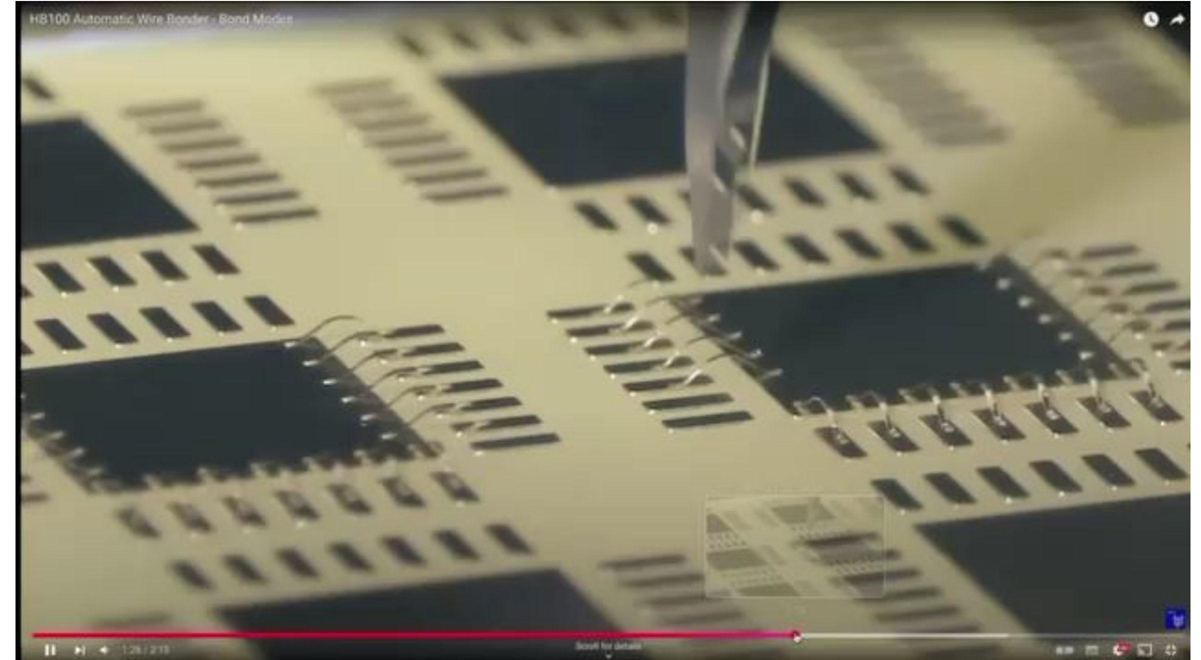






Wire Bonding Process



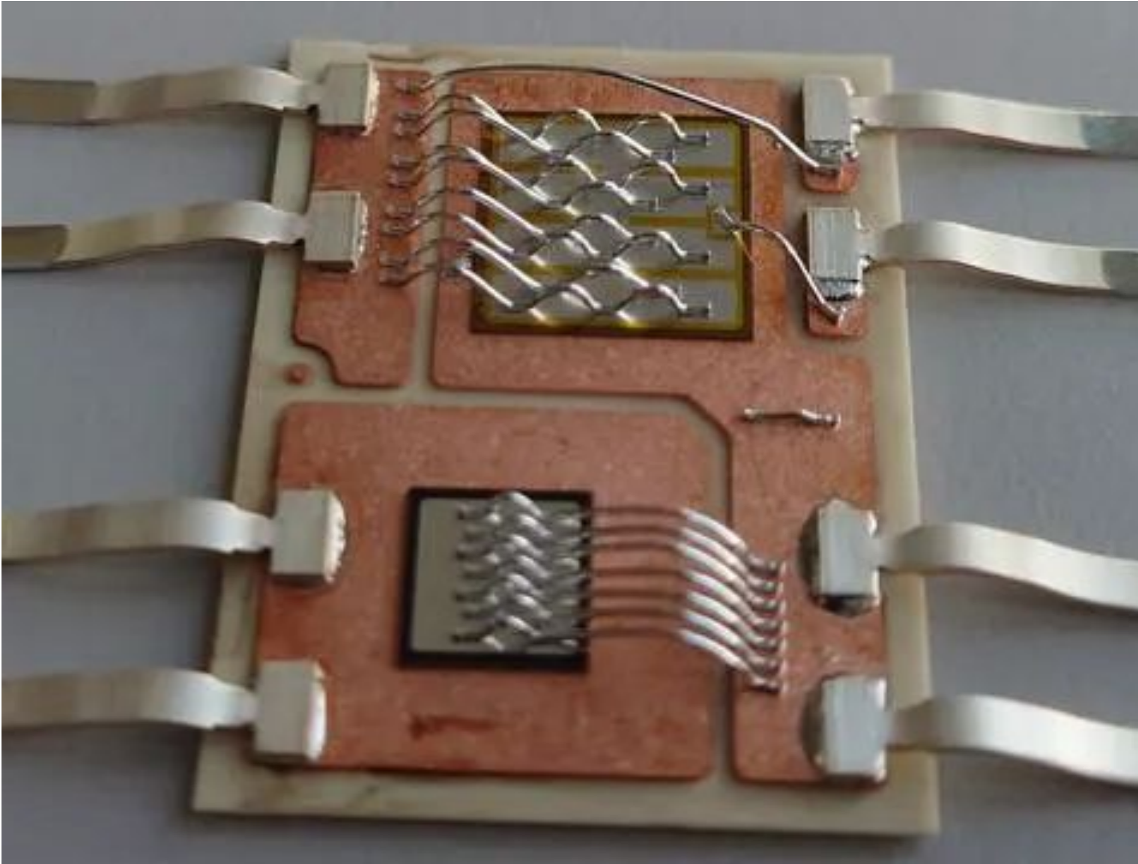


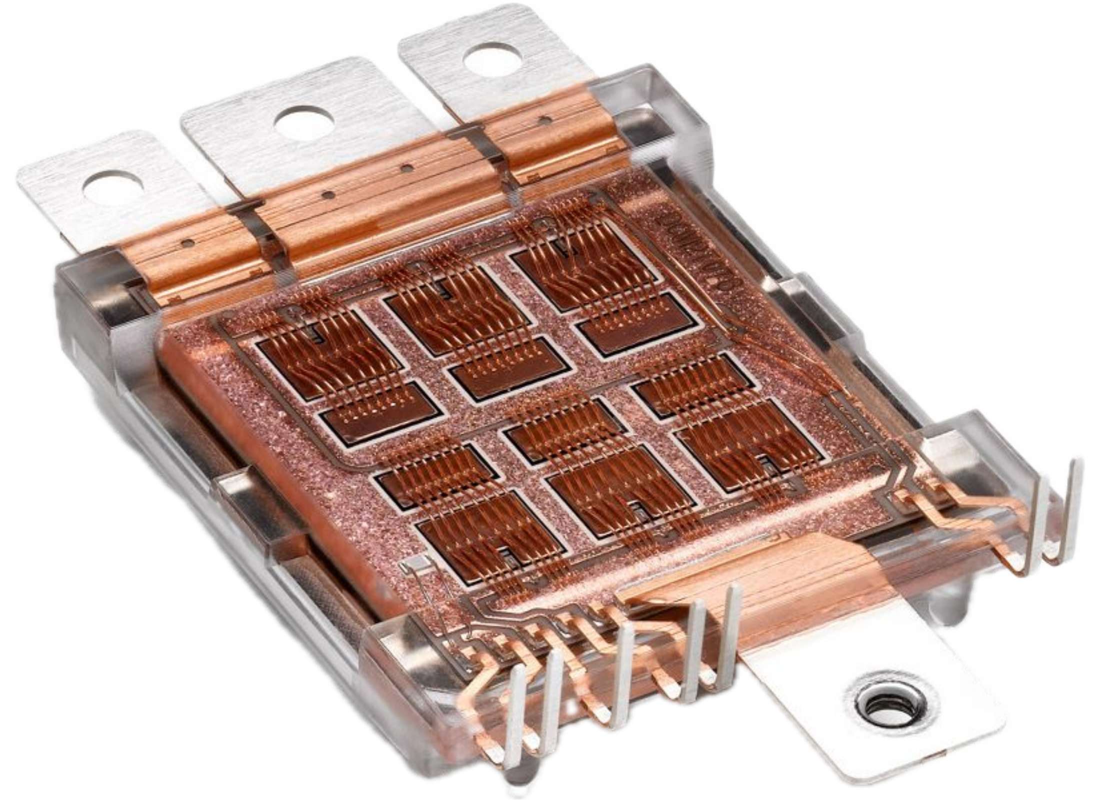
Video from TPT Wire Bonder GmbH & Co KG
https://www.youtube.com/watch?v=3YkGrhvrWxA

Cost factors

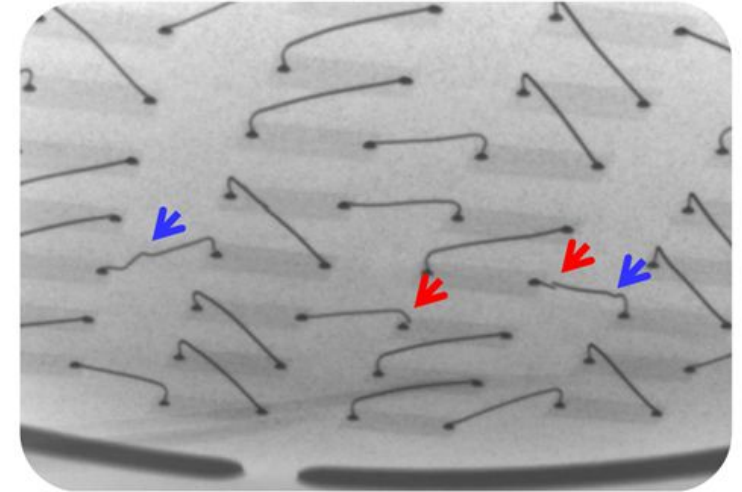
- **Wire bond material**: Gold, silver, copper
- **Wire bond dimensions**: diameter, bond type, height
- **Die specifications**: body size, pad size, die attach
- **PCB specifications**: surface finish, HDI design
- **Design complexity**: number of wire bonds,
- **Manual or Automated process**

Power Electronics

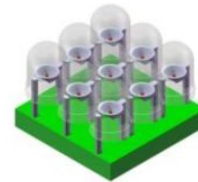




Sensors and LEDS

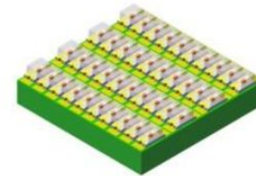


DIP



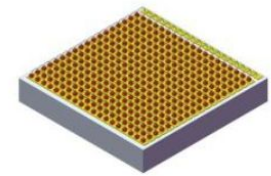
9 LEDS

SMD



40 LEDs

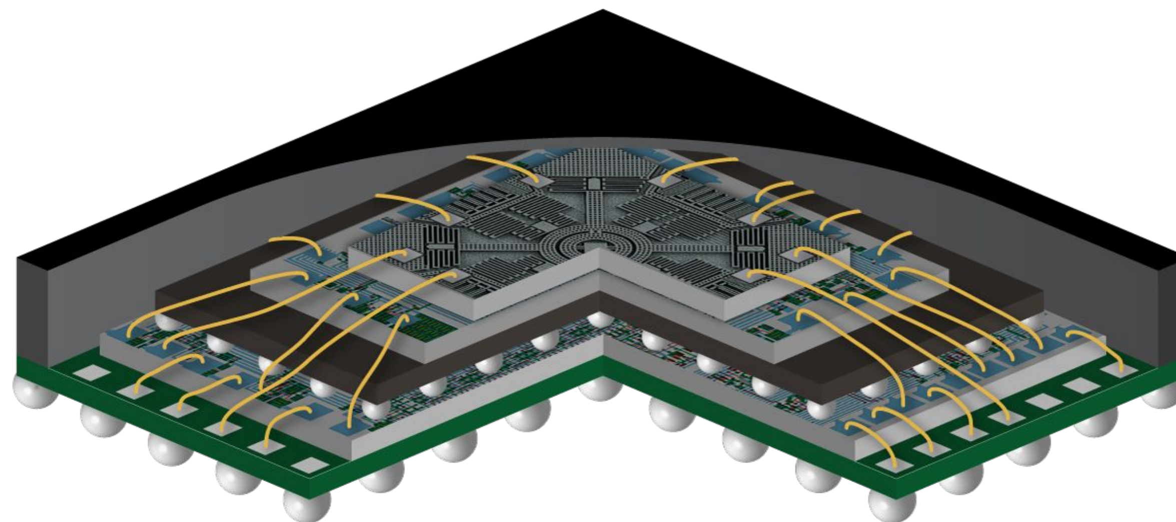
COB

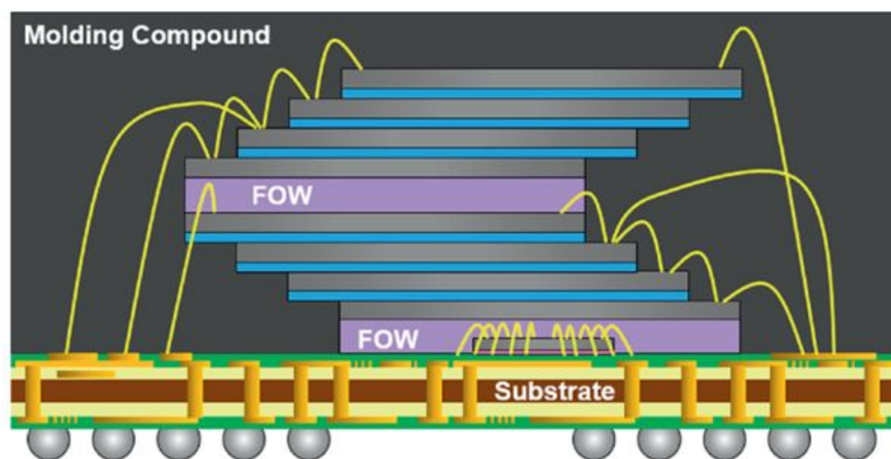


342 LEDs

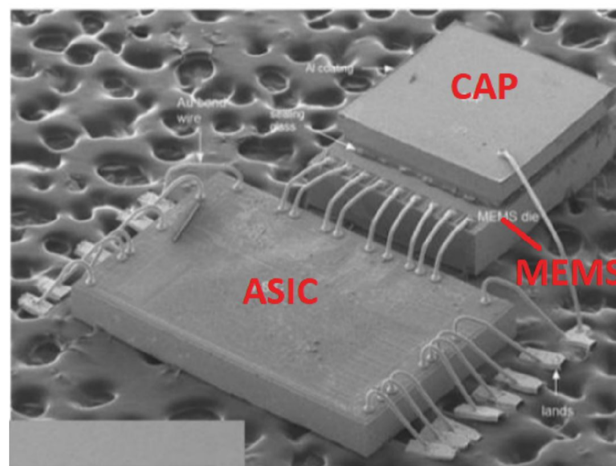
3D Stacked Die

- Multiple Dies are stacked vertically
- Enables smaller and more compact designs
- Higher “processing-power” density

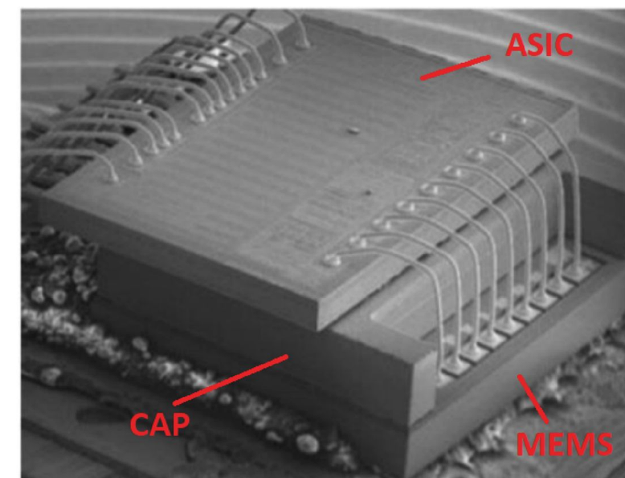




Prof. G. Langfelder Lectures Electronics Engineering Politecnico di Milano



(a) Lateral integration.

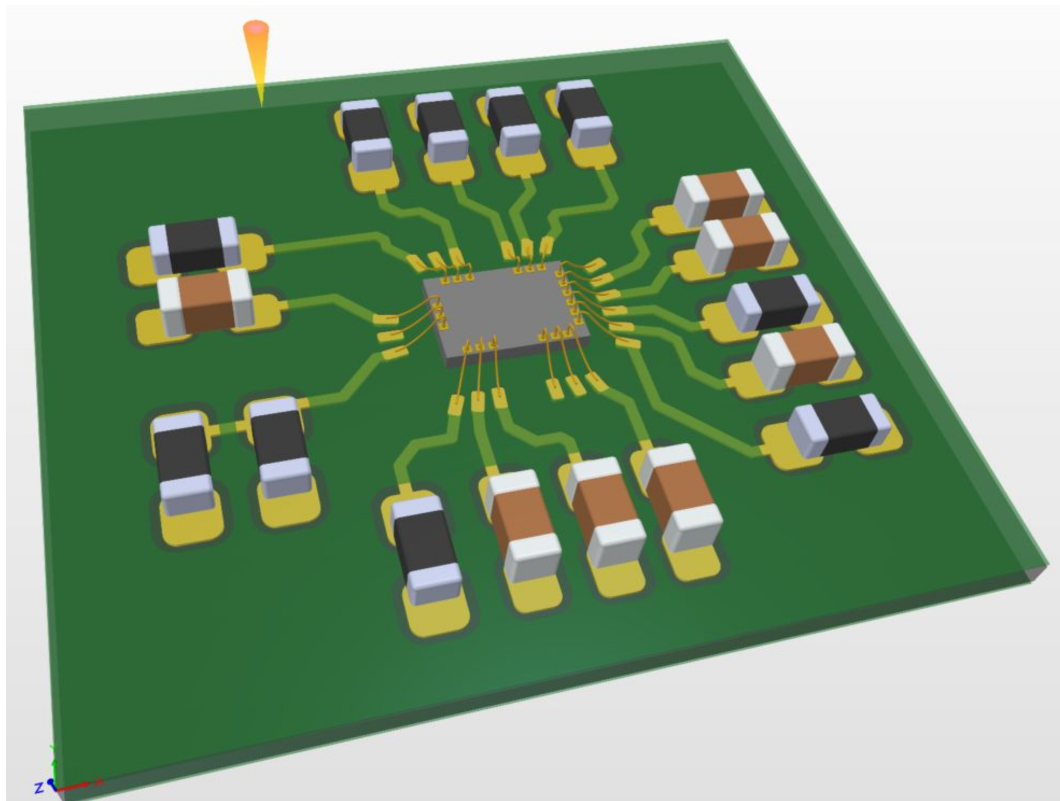


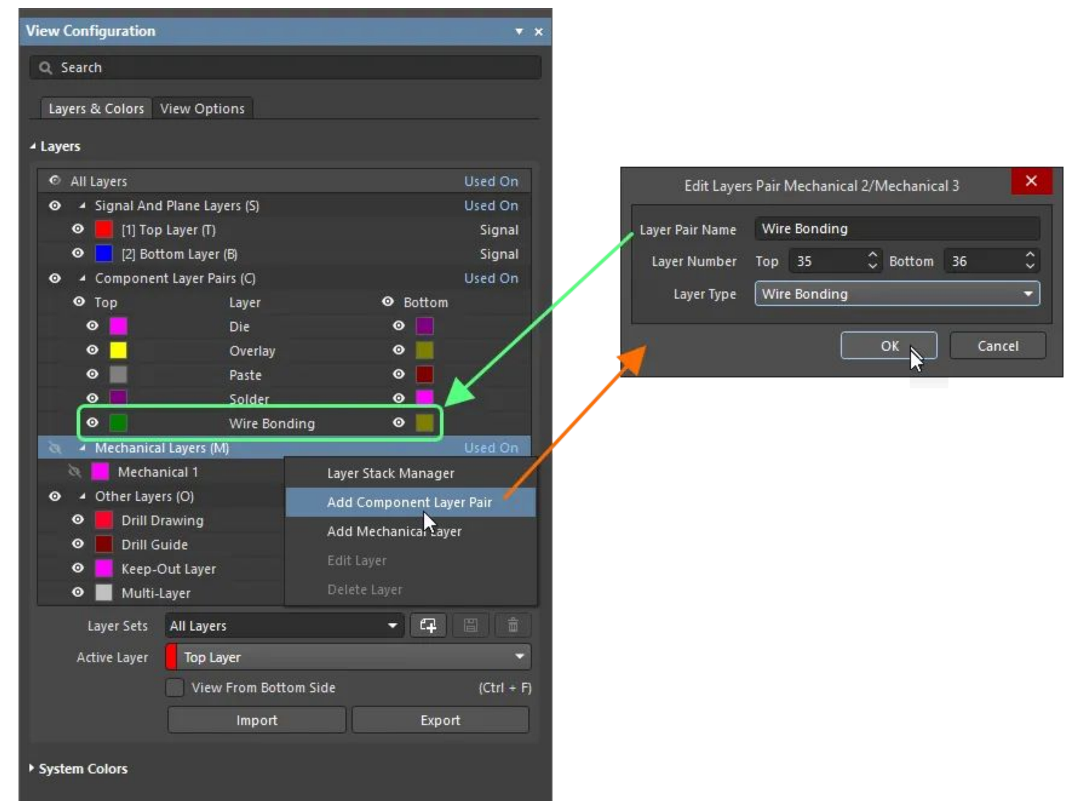
(b) Stacked integration.

DEMO

Dedicated Layers for Die and Wire Bonds

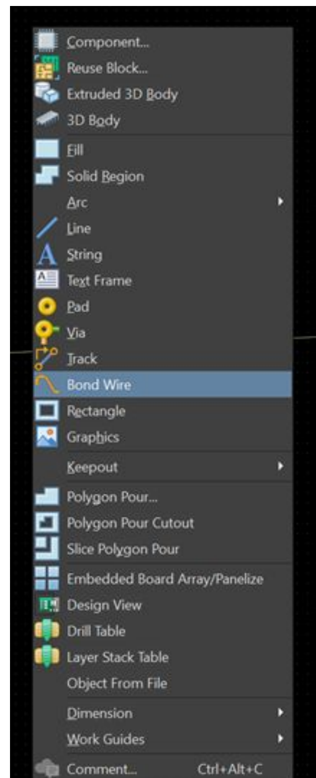
- Chip-on-Board Component Footprint Creation
- Can be done as a footprint, or drawn on a PCB

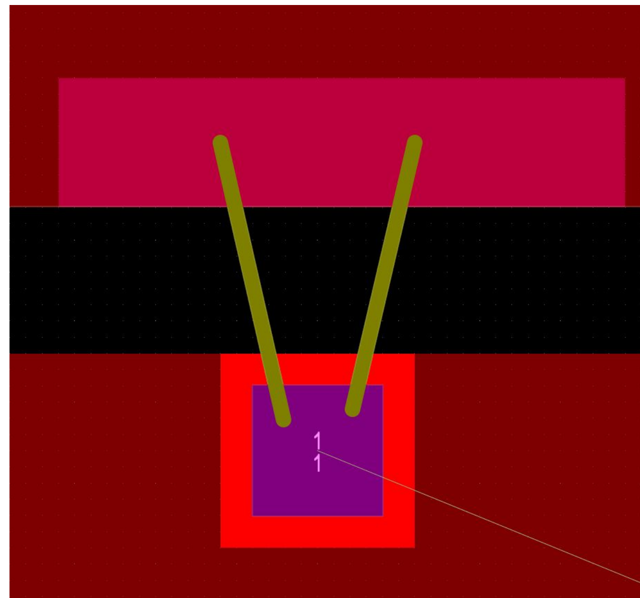


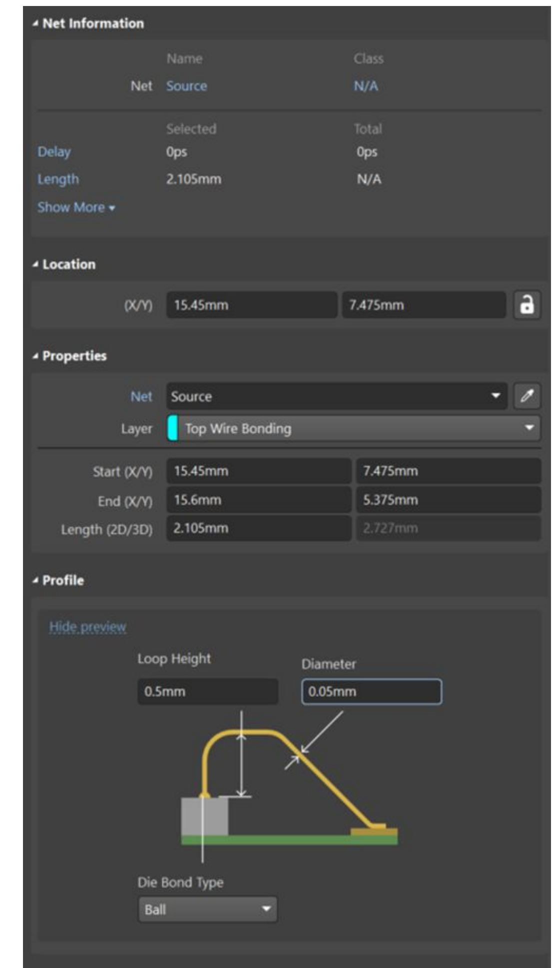


"Drawing" Wire Bonds

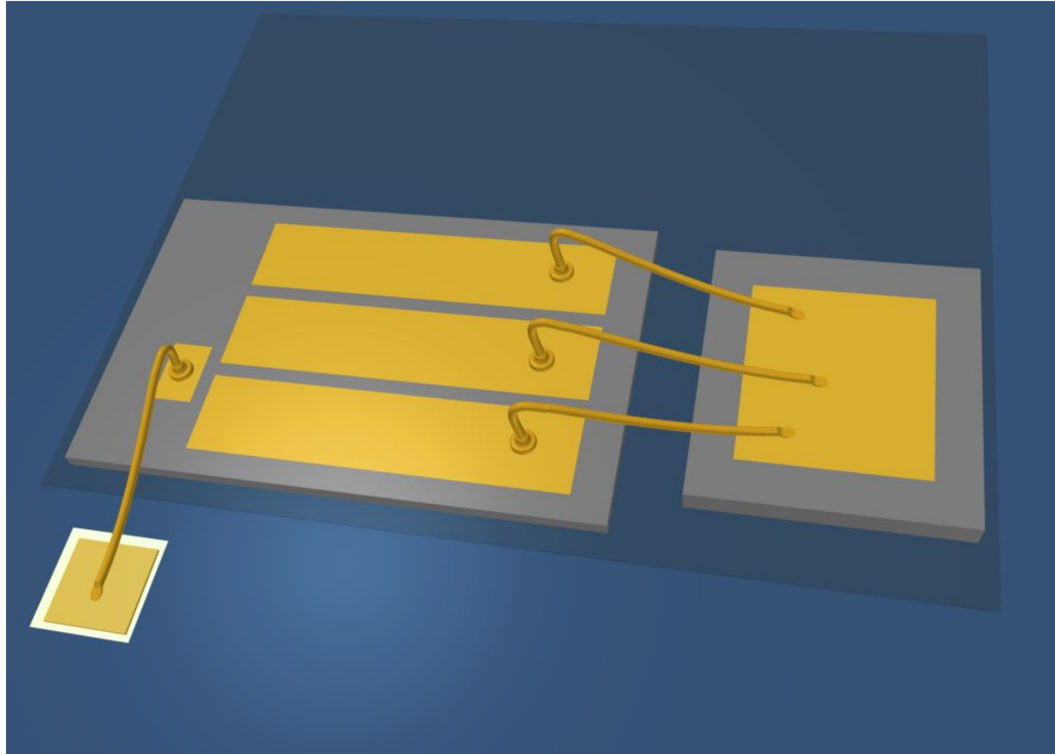
- Place wire bonds, similar to creating tracks
- Adjust parameters, such as diameter, height and bond type

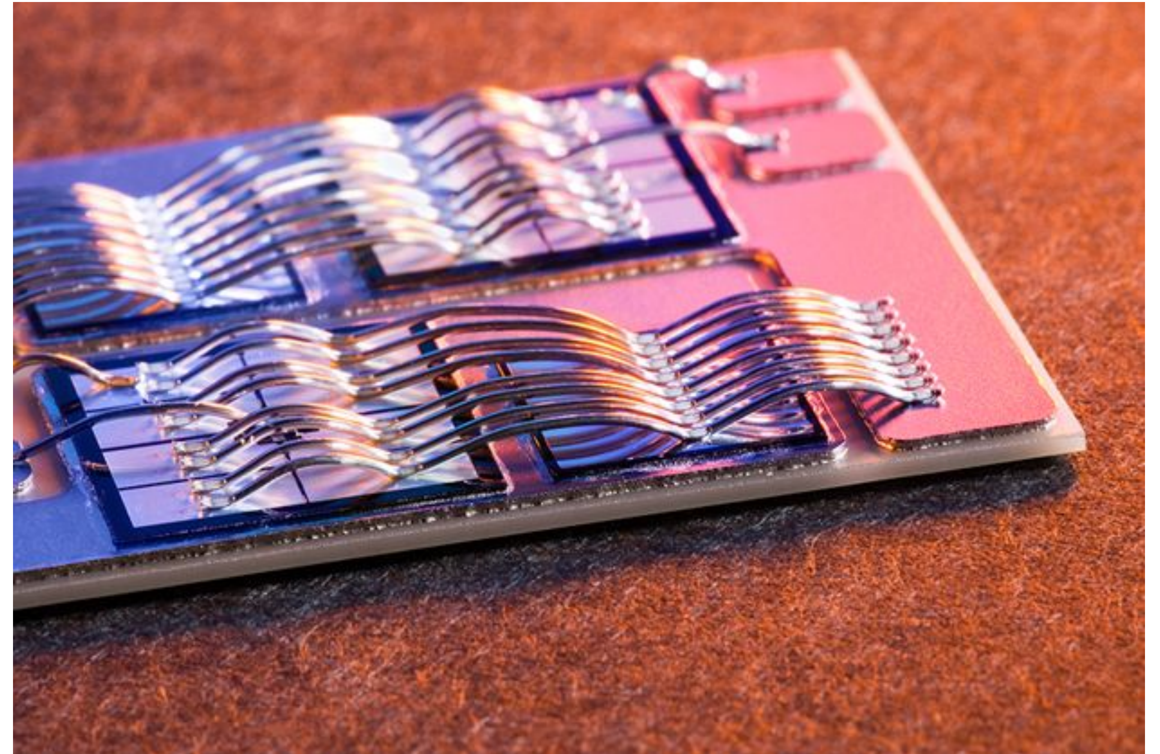




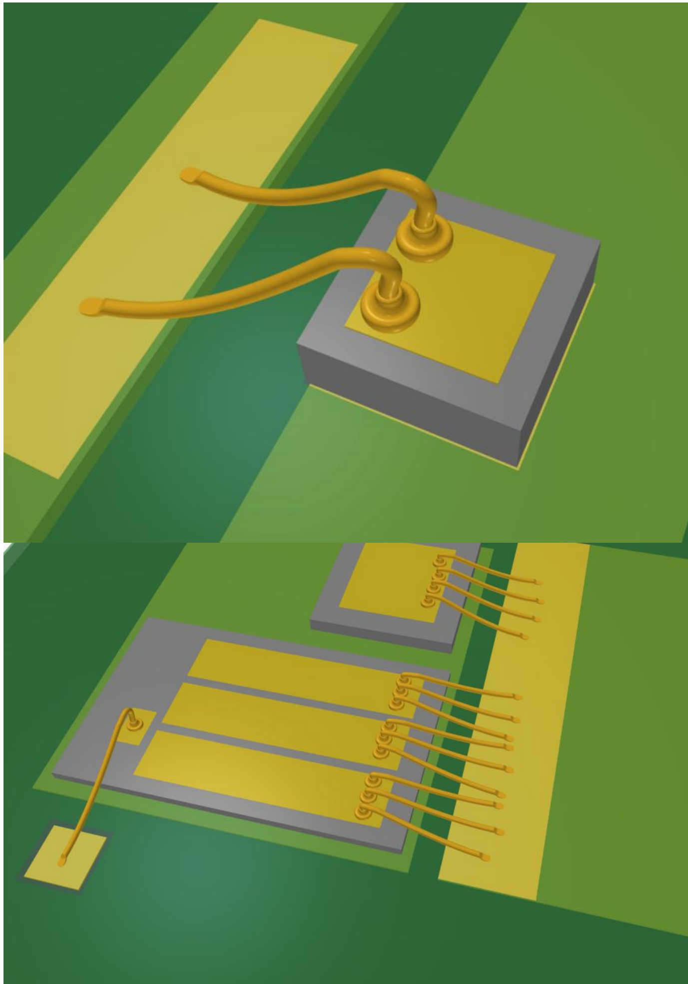


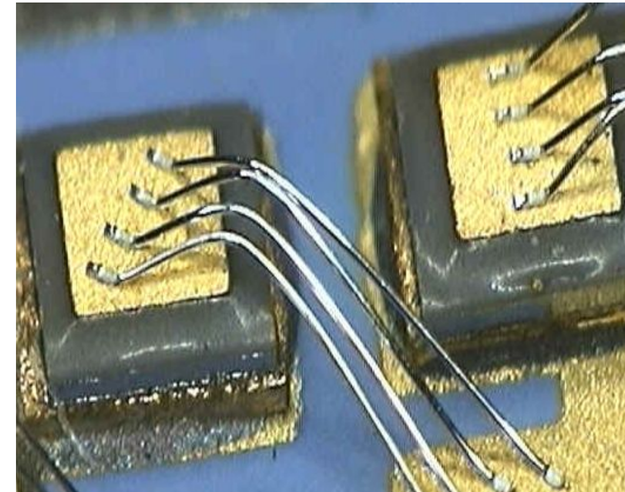
Capabilities: Die to die wire bonding

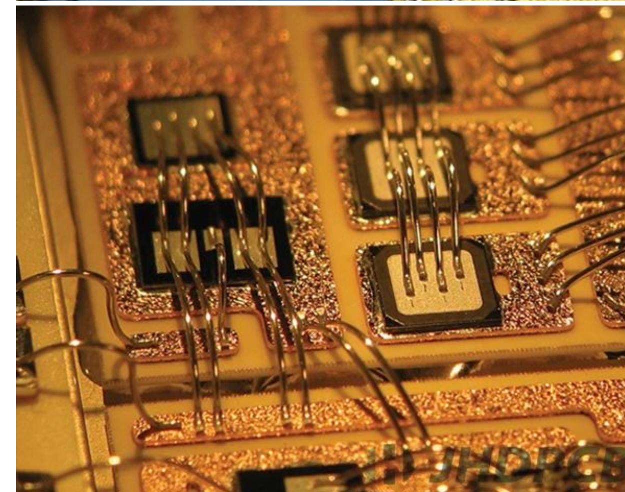




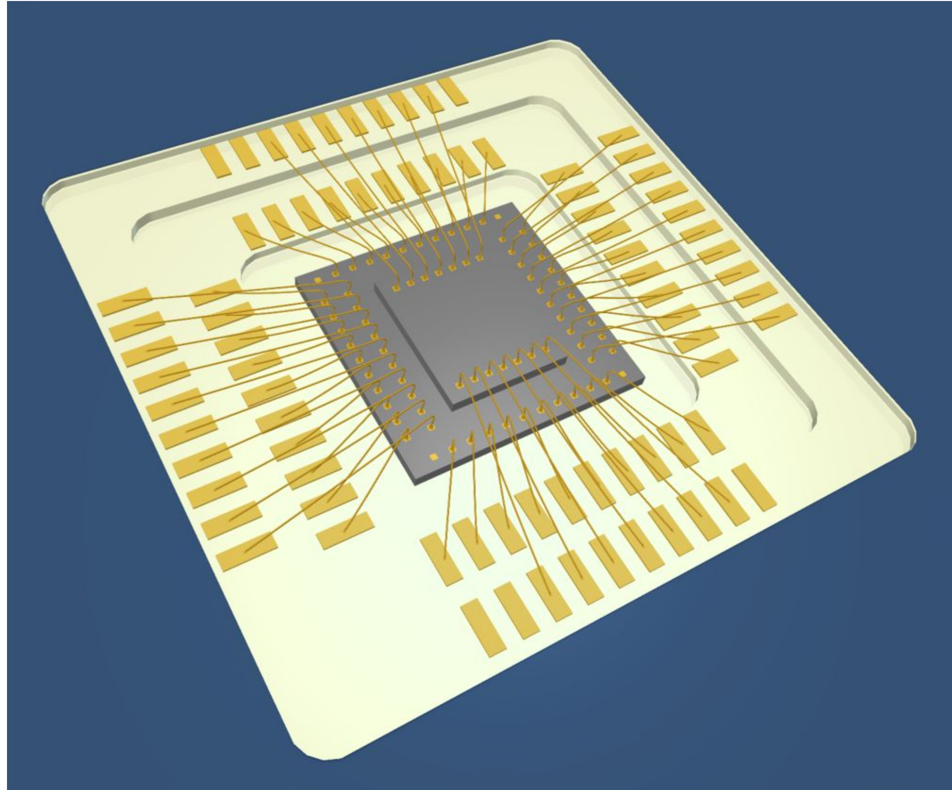
Capabilities: Multiple wire bonds, die to copper

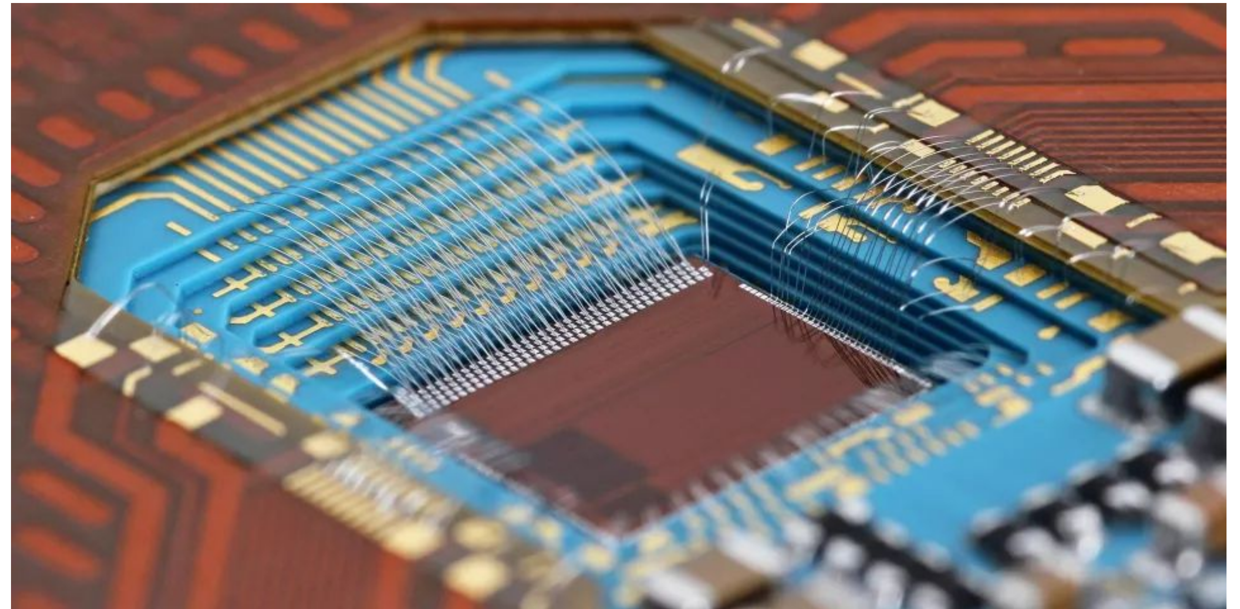




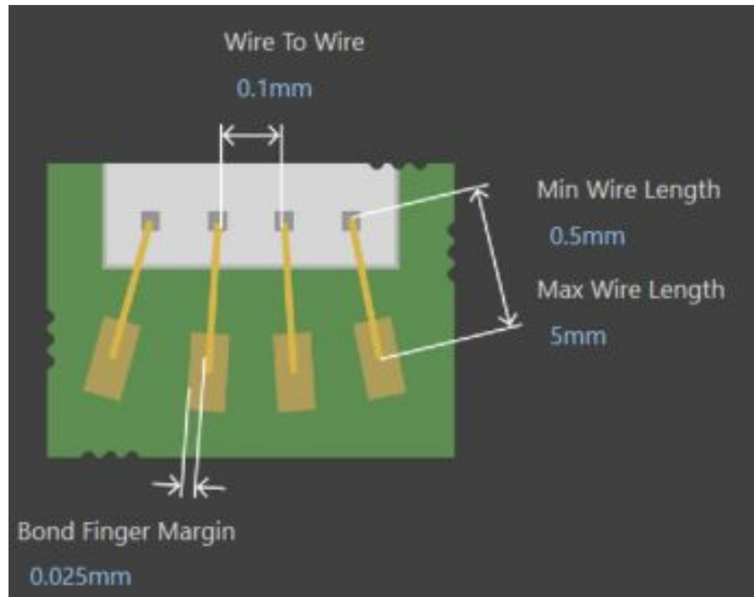


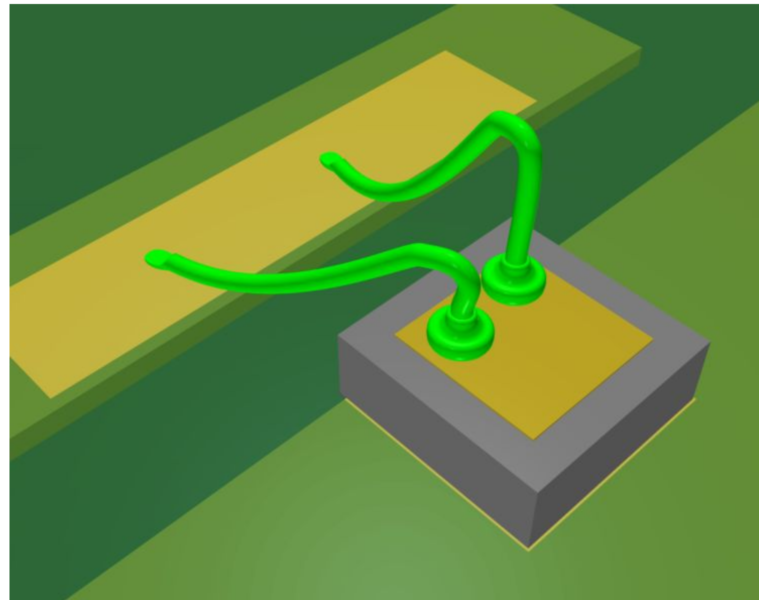
Capabilities: 3D Stacked die

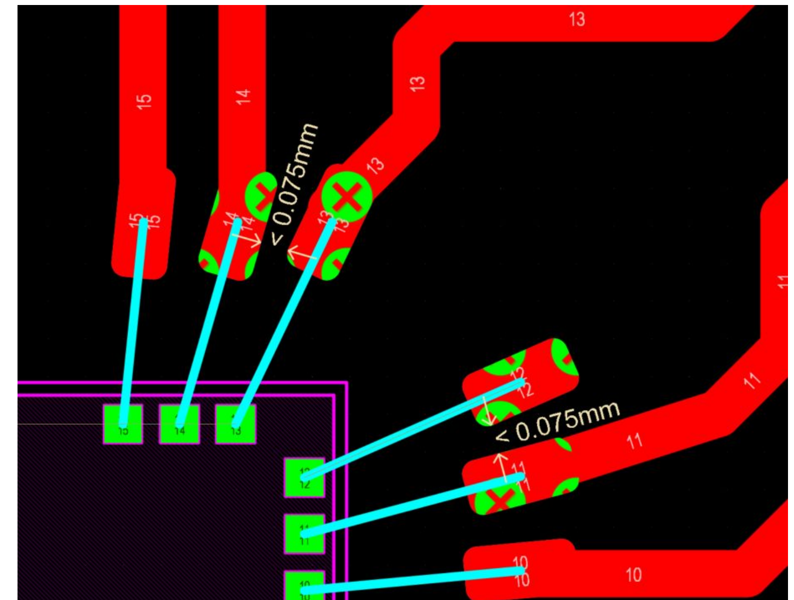




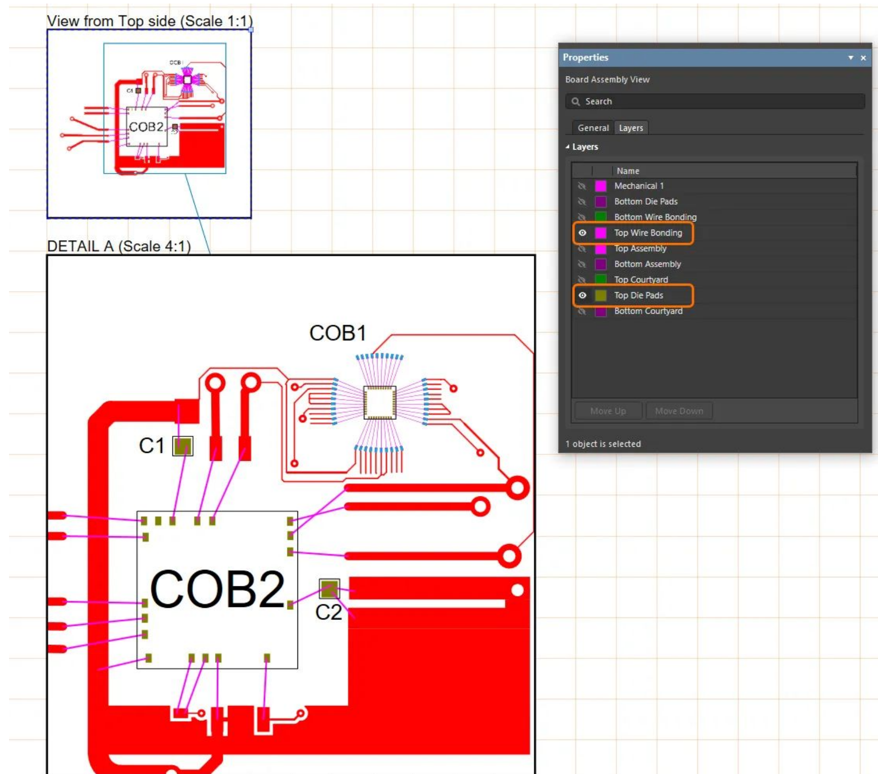
Capabilities: Design rules and DRC







Capabilities: output generation, draftsman



WireBonding-DEMO.csv

Wire Start	X [mm]	Y [mm]	Net	Die Pad Size X [mm]	Die Pad Size Y [mm]	Wire End	X [mm]	Y [mm]	Wire Diameter [mm]	Wire Length [mm]	Loop Height [mm]	Type
Pad COB1-1	49.85	97.054	+1.8V	0.1	0.15	Pad COB1-41	48.008	97.833	0.025	2.326	0.254	Ball
Pad COB1-2	49.85	96.907	OUT2	0.1	0.15	Pad COB1-42	47.958	97.554	0.025	2.326	0.254	Ball
Pad COB1-5	49.846	96.465	OUT	0.1	0.15	Pad COB1-45	47.856	96.662	0.025	2.326	0.254	Ball
Pad COB1-6	49.85	96.318	OUT	0.1	0.15	Pad COB1-46	47.85	96.352	0.025	2.326	0.254	Ball
Pad COB1-7	49.846	96.171	OUT1	0.1	0.15	Pad COB1-47	47.85	96.042	0.025	2.326	0.254	Ball
Pad COB1-8	49.85	96.023	Q1	0.1	0.15	Pad COB1-48	47.871	95.736	0.025	2.326	0.254	Ball
Pad COB1-9	49.85	95.876	Q2	0.1	0.15	Pad COB1-49	47.899	95.434	0.025	2.326	0.254	Ball
Pad COB1-10	49.85	95.729	Q3	0.1	0.15	Pad COB1-50	47.938	95.141	0.025	2.326	0.254	Ball
Pad COB1-12	50.2	95.504	Q5	0.1	0.15	Pad COB1-52	49.543	93.615	0.025	2.326	0.254	Ball
Pad COB1-13	50.35	95.504	DATA	0.1	0.15	Pad COB1-53	49.85	93.587	0.02	2.308	0.254	Ball
Pad COB1-14	50.5	95.504	CLK1	0.1	0.15	Pad COB1-54	50.157	93.534	0.025	2.326	0.254	Ball
Pad COB1-15	50.65	95.504	CLK2	0.1	0.15	Pad COB1-55	50.477	93.512	0.025	2.326	0.254	Ball
Pad COB1-16	50.8	95.504	VCC	0.1	0.15	Pad COB1-56	50.8	93.504	0.025	2.326	0.254	Ball
Pad COB1-17	50.95	95.504	VCC	0.1	0.15	Pad COB1-57	51.123	93.512	0.025	2.326	0.254	Ball
Pad COB1-18	51.1	95.504	Q2	0.1	0.15	Pad COB1-58	51.443	93.534	0.025	2.326	0.254	Ball
Pad COB1-19	51.25	95.504	Q2	0.1	0.15	Pad COB1-19	51.755	93.569	0.025	2.326	0.254	Ball
Pad COB1-20	51.4	95.504	VCC	0.1	0.15	Pad COB1-60	52.057	93.615	0.025	2.326	0.254	Ball
Pad COB1-21	51.575	95.729	IN1	0.1	0.15	Pad COB1-61	53.48	95.119	0.025	2.326	0.254	Ball
Pad COB1-22	51.575	95.879	IN2	0.1	0.15	Pad COB1-62	53.52	95.412	0.025	2.326	0.254	Ball
Pad COB1-27	51.575	96.629	CLK2	0.1	0.15	Pad COB1-67	53.55	96.945	0.025	2.326	0.254	Ball
Pad COB1-28	51.575	96.779	DATA	0.1	0.15	Pad COB1-68	53.52	97.246	0.025	2.326	0.254	Ball
Pad COB1-31	51.375	97.304	Q1	0.1	0.15	Pad COB1-71	52.052	99.186	0.025	2.326	0.254	Ball
Pad COB1-32	51.225	97.304	Q2	0.1	0.15	Pad COB1-72	51.764	99.23	0.025	2.326	0.254	Ball
Pad COB1-33	51.075	97.304	Q3	0.1	0.15	Pad COB1-73	51.467	99.265	0.025	2.326	0.254	Ball
Pad COB1-34	50.925	97.304	Q4	0.1	0.15	Pad COB1-74	51.163	99.29	0.025	2.326	0.254	Ball
Pad COB1-35	50.775	97.304	Q5	0.1	0.15	Pad COB1-75	50.855	99.302	0.025	2.326	0.254	Ball
Pad COB1-36	50.625	97.304	Q1	0.1	0.15	Pad COB1-76	50.545	99.302	0.025	2.326	0.254	Ball
Pad COB1-38	50.325	97.304	GND	0.1	0.15	Pad COB1-78	49.933	99.265	0.025	2.326	0.254	Ball
Pad COB1-39	50.175	97.304	GND	0.1	0.15	Pad COB1-79	49.636	99.23	0.025	2.326	0.254	Ball
Pad COB1-40	50.025	97.304	GND	0.1	0.15	Pad COB1-80	49.348	99.186	0.025	2.326	0.254	Ball
Pad COB2-4	45.21	83.987	+1.8V	0.375	0.55	Pad C2-1	47.625	84.963	0.1	3.069	0.254	Ball
Pad COB2-16	37.972	89.154	+1.8V	0.375	0.55	Pad C1-1	38.862	93.726	0.1	5.033	0.254	Ball

WireBonding-DEMO

Altium Designer 25: Built for Modern Collaboration

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Altium Designer 25 **breaks down barriers** between engineering domains.

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