

Semiconductor WEEK:

December 2, 2022

An overview of results and conclusions from recent reports at TechInsights

Chip Market Research Services

Storm Clouds are starting to roll in

- Order activity for semiconductor equipment extended its decline, slipping to 59 degrees
- Capacity Utilization Rates

Semiconductor Analytics

Last Week in the Semiconductor Market:

Semiconductor sales increased 2% last week in a holiday run. The IC weather cooled 0°F in Cool conditions. Zooming in on NAND this week, the 13-wk MA decline is just under -40%, while the rate is bottoming. TechInsights forecast its sales will reach \$47B in 2023 with a Y/Y decline of 12%, coming off an 11% drop in 2022.

TechInsights' IC Supply/Demand broke its 8-week run of tightening. Overall conditions eased back to tight, as NAND and OSAT weakened to Balanced. Auto, More Moore, and More than Moore Foundry held in shortage. DRAM, IDM, Analog & Power remain unchanged.

Electronics' Retail Prices have peaked before the holidays.

Chip History Center

People: Alex d'Arbeloff on Teradyne's history and the lessons he learned from co-founding and leading this legendary company.

People: Kumud Srinivasan, Director of Fab Automation, Intel discusses the status of Semiconductor Fab Automation at Intel in this 2004 interview.

The Chip Insider

Strategy and Tactics: The New Normal for Inventory. Fab-lite companies becoming Fabled.

Semiconductor Stocks

- *TechInsights' Semiconductor Stock Indices grew this week with the exception of Electronic Materials*
- *TechInsights' Semiconductor Stock Index was led up by SkyWater Technology*
- *TechInsights' Semiconductor Equipment Stock Index was led up by ASM International*
- *EDA Stock Index was led up by Synopsys*
- *Electronics Materials Stock Index slipped this week*
- *Hottest Stocks: ASM International, SkyWater Technology, ASE, Synopsys, Ansys, and Infineon*

TechInsights

The Chip Insider[®]'s Graphics File



November 2022

Storm Clouds are starting to roll in

- Order activity for semiconductor equipment extended its decline, slipping to 59 degrees
- Memory has fallen to October 2019 levels and isn't showing any signs of improvement as chipmakers continue to trim utilization rates to digest the built-up inventories
- TechInsights' Chip Price Performance Index continued to lose ground

Forecast as of November 2022:	2022	2023
Semi Equipment (\$B):	\$ 136.9	\$ 118.2
Sequential Change	7.9%	-13.6%
Capacity Utilization:	94.9%	84.1%
ICs (\$B):	\$ 515.9	\$ 485.6
Sequential Change	4.8%	-5.9%
IC Units (BU):	412.5	403.7
Sequential Change	4.6%	-2.1%
Electronics (\$B) :	\$ 2,556	\$ 2,453
Sequential Change	-0.7%	-4.1%

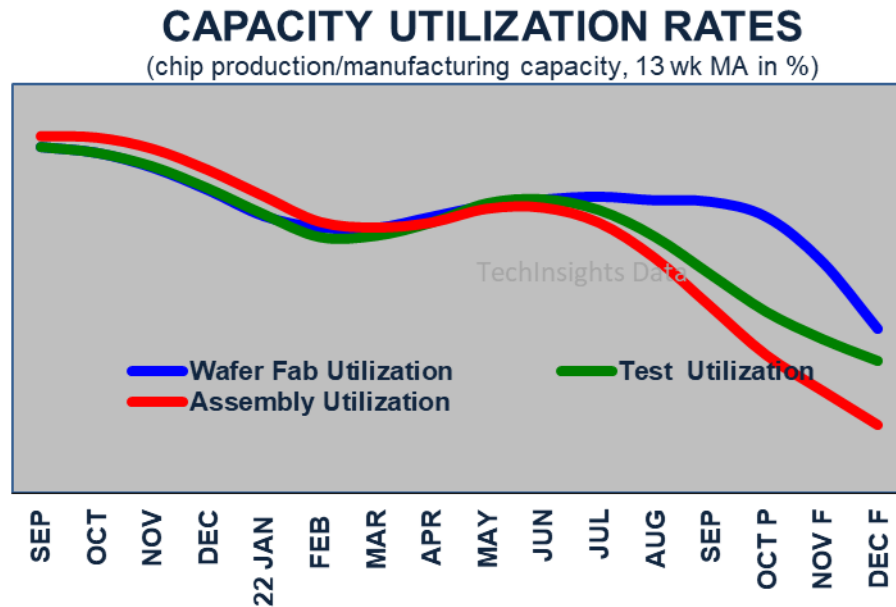
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The Chip Insider[®] Graphics

Capacity Utilization Rates:

- Utilization rates are falling across the board

Capacity Utilization Rates: chart gives rolling averages for semiconductor wafer fab, test, and assembly



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Insights Interview:

Workforce Development Solutions...

with Ajit Manocha of SEMI



What the conversation is about:

- Labor shortages have become the echo pandemic from the ravages COVID has had on the economy.
- This is no truer than in the semiconductor industry, where Workforce Development has long been on the To-Do lists of many.
- Most industry efforts appear to be more about lobbying others to do something about workforce development.
- It's really hard to do something substantive about it but SEMI is.

[Click here to watch online](#)

Semiconductor Analytics

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Electronics' Retail Prices have peaked before the holidays.



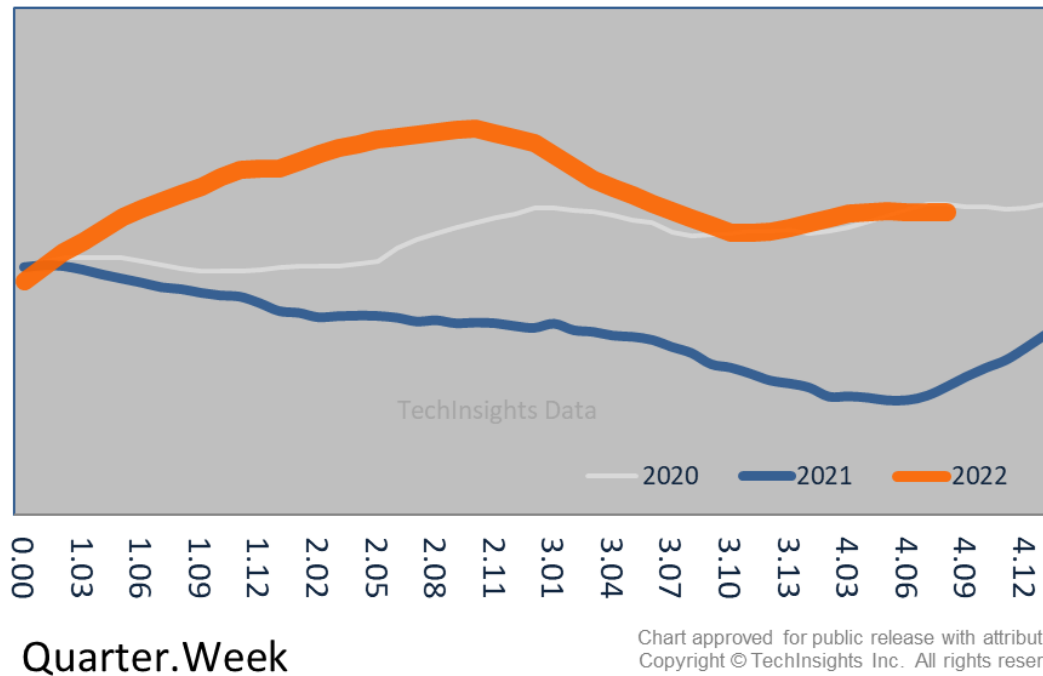
IC Weather Measures Order Activity S/D Measures Pricing Power

Electronics Retail Pricing Trends:

for PC notebooks Tablets Smartphones Cell phones Digital Cameras Appliances TVs

Electronics' Retail Prices have peaked before the holidays.

Electronics Pricing Barometer
indexed 13 week moving average



Source: Semiconductor Analytics

Chart approved for public release with attribution.
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Strategy & Tactics



Strategy and Tactics: *The New Normal for Inventory. Fab-lite companies becoming Fabled.*

Summaries:

The New Normal for Inventory: *One of TechInsights' most important indicators is the Inventory-to-Billings ratio, or the IB ratio. Currently there is a general belief by many that inventories are too high and need to be burned off before we can get out of the slowdown. At least that's the view from America and Asia. Just coming off SEMICON Europa and Electronica, the view from Auto-centric Europe was But at the 35,786 km level, there has generally been an over-supply that started sharply in early June. Old-timers like me are extremely worried the over-exuberance levels of the past two years could lead us into a massive ... the days before 2002. Personally, I'm not that worried in part because our Supply/Demand Heat map did show it abating more recently. Given the shift from Just-In-Time to Just-In-Case inventory control, this warming of Supply/Demand conditions begs the questions of*

- *How bad is inventory, really? ... and ...*
- *What's the new normal IB ratio?*

Happenings, Comments, Questions & Answers: *Fab-lite companies becoming Fabled. A new reason for this trend to emerge.*

*“History never repeats itself but it often rhymes.”
—as Mark Twain is reputed to have said*

[Contact us to get the full report and more](#)

TechInsights



People: Alex d'Arbeloff on Teradyne's history and the lessons he learned from co-founding and leading this legendary company. In his discussion of Nick DeWolf's business model, you'll find lots of the fundamental aspects to starting a business hasn't changed. You'll also find out why, as well as how successful start-ups are about more than innovation. Alex appears in 3 videos cover [Teradyne's Early Days](#), [Teradyne's Rise](#), and in Lessons Learned he covers his [Essential rules for running a semiconductor equipment company](#)



People: Kumud Srinivasan, Director of Fab Automation, Intel discusses the status of [Semiconductor Fab Automation at Intel](#) in this 2004 interview. Find out where Intel was at the time and what it saw ahead in fab automation. At the time, 300mm wafer sizes had just come into vogue and the industry was about to make the jump from Microchips to Nanochips as it moved scale from microns to nanometers.



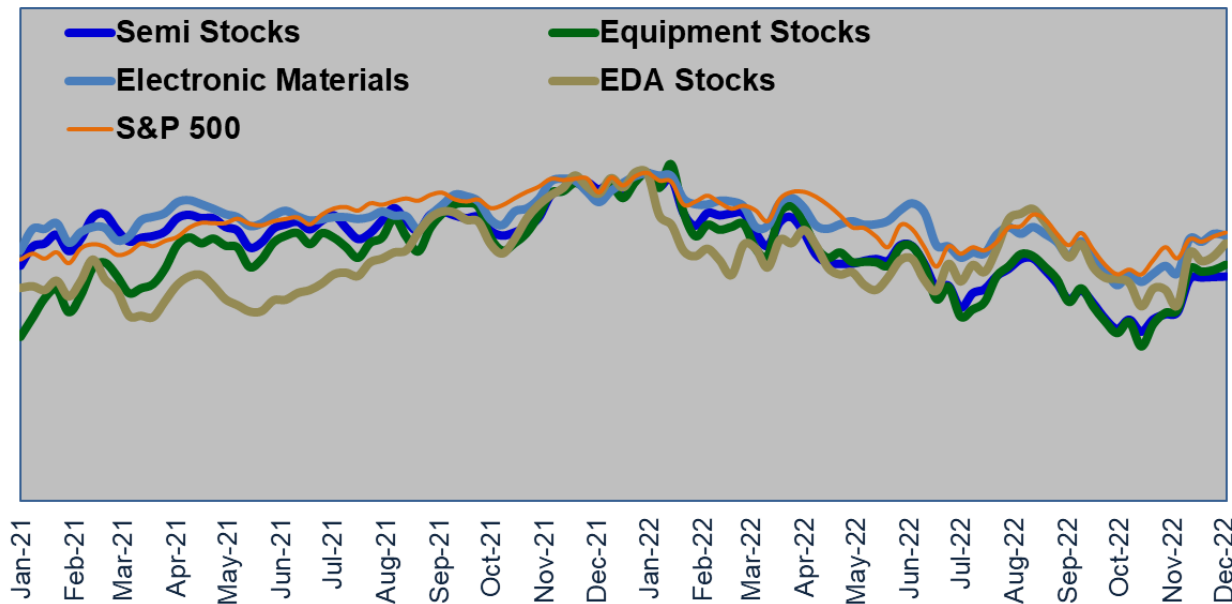
semiStockWEEK:

TechInsights' Semiconductor Stock Indices grew this week with the exception of Electronic Materials.



Semiconductor Industry Stock Performance Indices

(Stock Prices Indexed to 100 in last week of 2021)



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TechInsights' Stock Indices:

Semiconductors +0.1%
Equipment +1.7%
Electronic Materials -0.5%
EDA +4.0%

Semiconductor Stocks:

Weekly Growth and Forward P/E Ratios by Company

Weekly Gains			12/2/2022		
Semiconductor Stocks	Price Change	Forward P/E	Semiconductor Stocks	Price Change	Forward P/E
IDM			Fab-lite to Fabless		
Intel	0.2%	16	AMD	-0.2%	21
Micron	-6.4%	17	Analog Devices	0.9%	16
ON Semiconductor	-0.5%	16	Broadcom	2.1%	13
Samsung Electronics	-1.0%	-	IBM	0.2%	15
SK hynix	-3.8%		Infineon	4.0%	15
STMicroelectronics	0.8%	10	MagnaChip Semiconductor	-0.3%	36
Western Digital	-5.1%	9	MaxLinear	2.2%	9
Foundry & OSAT			MediaTek	1.7%	-
Amkor	1.9%	10	NVIDIA	3.7%	37
ASE	6.3%	8	Panasonic	-0.3%	13
GLOBALFOUNDRIES	-7.5%	29	Qualcomm	1.8%	10
JCET	0.3%	14	Silicon Laboratories	0.5%	38
SkyWater Technology	6.8%	-	Skyworks	1.1%	8
SMIC	-7.5%	13	Texas Instruments	0.2%	22
TSMC	0.1%	14			
UMC	1.2%	9			

Above Avg

Top 4-6

Top 1-3

TechInsights' Semiconductor Stock Index was led up by SkyWater Technology, followed by ASE and Infineon who were also top performers this week. 19 of the 29 companies finished in positive territory this week.

IDM -2.3%
 Foundry & OSAT +0.2%
 Fabless & Fablite +1.3%

AMD^{AMD} Analog Devices^{ADI} Amkor^{AMKR} ASE^{ASX} Broadcom^{AVGO} GLOBALFOUNDRIES^{GFS} IBM^{IBM} Infineon^{IFNNY.PK} Intel^{INTC} JCET^{600584.SS} Micron Technology^{MU} On Semiconductor^{ON} Panasonic^{PC} MagnaChip Semiconductor^{MX} MaxLinear^{MXL} MediaTek^{2454.TW} NVIDIA^{NVDA} Qualcomm^{QCOM} Samsung Electronics^{005930.KS} Silicon Laboratories^{SLAB} SkyWater Technology^{SKYT} Skyworks^{SWKS} SMIC^{SMI} STMicroelectronics^{STM} Texas Instruments^{TXN} TSMC^{TSM} UMC^{UMC} Western Digital^{WDC}

Chip Equipment & Related Stocks:

Weekly Growth and Forward P/E Ratios by Company

Weekly Gains			12/2/2022		
Equipment Stocks	Price Change	Forward P/E	Equipment Stocks	Price Change	Forward P/E
Wafer Fab:			Test:		
Applied Materials	0.8%	16	Advantest	2.6%	–
ASM International	9.2%	23	Teradyne	0.1%	24
ASML	2.3%	31	FormFactor	3.4%	27
KLA	2.5%	20			
Lam Research	1.3%	16	Assembly:		
Onto Innovation	-0.7%	–	BESI	3.4%	–
Nikon	-4.0%	–	Kulicke & Soffa	1.5%	13
TEL	1.6%	–	ASM Pacific Technology	1.5%	
Veeco Instruments	1.5%	14			

Above Avg

Top 4-6

Top 1-3

TechInsights' Semiconductor Equipment Stock Index was led up by ASM International who was this week's top performer. Most of the Equipment Companies finished above the weekly average.

WFE +1.6%

Test +2.0%

Assembly +2.1%

Applied Materials ^{AMAT} Advantest ^{ATEYY}

ASM International ^{ASMIY}

ASM Lithography ^{ASML} ASM Pacific ^{0522.HK}

BE Semiconductor ^{BESIIY.PK}

FormFactor ^{FORM} KLA ^{KLAC}

Kulicke & Soffa ^{KLIC} Lam Research ^{LRCX}

Onto Innovation ^{ONTO} Nikon ⁷⁷³¹ Teradyne

^{TER} Tokyo Electron Limited ⁸⁰³⁵ Veeco

^{VECO}

Electronic Materials Stocks:

Weekly Growth and Forward P/E Ratios by Company

Weekly Gains			12/2/2022		
EDA & Electronic Materials Stocks	Price Change	Forward P/E	EDA & Electronic Materials Stocks	Price Change	Forward P/E
EDA			DNP	-3.4%	–
Cadence	3.1%	36	DuPont de Nemours	0.4%	5
Synopsys	4.7%	33	JSR	1.5%	–
Ansys	4.2%	29	Shin-Etsu	-1.6%	–
Electronic Materials			SOITEC	0.7%	–
BASF	-0.2%	2	Tokyo Ohka	-1.4%	–
Entegris	0.0%	22			

Above Avg
Top 4-6
Top 1-3

TechInsights' EDA Stock Index was led up by Synopsys followed by Ansys.

TechInsights' Electronic Materials Stock Index slipped this week with JSR coming out on top.

Ansys, Inc. ^{ANSS} BASF ^{BASFY}
 Entegris ^{ENTG} Cadence ^{CDNS} DNP ⁷⁹¹²
 DuPont ^{DD} JSR ⁴¹⁸⁵ Shin-Etsu ⁴⁰⁶³
 SOITEC ^{SOI.PA} Synopsys ^{SNPS} Tokyo
 Ohka ⁴¹⁸⁶

The Prior Week's Close	TechInsights' Indices of Chip Industry Stocks				Weekly Growth				Companies Up	Max Growth	Companies Down	Min Growth	Range of Growth	S&P 500	S&P 500 Growth
	Semi Stocks	Equipment Stocks	Materials Stocks	EDA Stocks	Semi Stocks	Equipment Stocks	Materials Stocks	EDA Stocks							
29-Apr-22	77.8	78.2	88.2	75.7	0.0%	-2.9%	0.9%	0.7%	22	21.1%	-32	-14.9%	36.0%	86.7	-3.3%
06-May-22	78.6	78.3	87.3	72.6	0.9%	0.1%	-1.0%	-4.1%	30	12.0%	-25	-11.7%	23.7%	86.5	-0.2%
13-May-22	79.0	78.1	87.5	71.4	0.5%	-0.1%	0.2%	-1.6%	28	8.2%	-25	-10.0%	18.2%	84.4	-2.4%
20-May-22	78.6	77.3	88.3	74.5	-0.5%	-1.1%	1.0%	4.3%	22	17.9%	-30	-7.7%	25.6%	81.9	-3.0%
27-May-22	82.3	81.9	90.9	78.7	4.8%	6.0%	2.9%	5.6%	48	30.3%	-7	-7.8%	38.1%	87.2	6.6%
03-Jun-22	82.1	82.0	92.6	78.9	-0.3%	0.1%	1.9%	0.3%	29	7.7%	-26	-4.6%	12.3%	86.2	-1.2%
10-Jun-22	77.8	77.3	90.3	73.8	-5.2%	-5.7%	-2.5%	-6.5%	6	9.7%	-49	-11.9%	21.6%	81.8	-5.1%
17-Jun-22	72.0	69.1	82.3	71.2	-7.5%	-10.6%	-8.9%	-3.6%	2	4.0%	-53	-17.3%	21.3%	77.1	-5.8%
24-Jun-22	72.5	72.1	82.0	77.8	0.8%	4.3%	-0.3%	9.3%	41	12.8%	-14	-19.4%	32.2%	82.1	6.4%
01-Jul-22	67.2	64.9	79.3	73.5	-7.3%	-10.1%	-3.3%	-5.6%	3	6.1%	-52	-20.1%	26.2%	80.3	-2.2%
08-Jul-22	70.7	66.6	80.5	77.5	5.2%	2.7%	1.5%	5.5%	47	20.5%	-7	-4.8%	25.3%	81.8	1.9%
15-Jul-22	71.7	68.5	80.3	75.8	1.4%	2.8%	-0.2%	-2.2%	32	10.1%	-21	-9.1%	19.2%	81.1	-0.9%
22-Jul-22	74.9	74.7	84.9	81.5	4.4%	9.1%	5.7%	7.5%	52	66.7%	-3	-8.3%	75.0%	83.1	2.5%
29-Jul-22	76.6	77.2	86.7	88.8	2.4%	3.3%	2.2%	9.0%	39	12.4%	-16	-9.9%	22.3%	86.7	4.3%
05-Aug-22	79.0	80.1	85.1	90.1	3.1%	3.8%	-1.9%	1.5%	47	33.8%	-8	-17.1%	50.9%	87.0	0.4%
12-Aug-22	79.2	79.6	86.8	91.2	0.3%	-0.6%	1.9%	1.3%	33	22.3%	-22	-17.4%	39.7%	89.8	3.3%
19-Aug-22	76.4	77.0	85.1	88.0	-3.6%	-3.3%	-1.9%	-3.6%	9	17.4%	-46	-8.1%	25.5%	88.7	-1.2%
26-Aug-22	73.1	74.0	83.1	83.9	-4.3%	-3.9%	-2.3%	-4.7%	2	1.1%	-53	-17.8%	18.9%	85.1	-4.0%
02-Sep-22	69.2	68.4	79.6	79.4	-5.4%	-7.5%	-4.1%	-5.4%	1	2.1%	-54	-16.1%	18.2%	82.3	-3.3%
09-Sep-22	71.4	71.8	83.3	82.7	3.2%	4.9%	4.6%	4.2%	50	13.1%	-5	-9.5%	22.6%	85.3	3.6%
16-Sep-22	68.3	67.3	78.8	77.0	-4.3%	-6.2%	-5.4%	-6.9%	4	2.3%	-50	-24.2%	26.5%	81.3	-4.8%
23-Sep-22	64.5	63.7	76.0	74.4	-5.5%	-5.5%	-3.5%	-3.4%	3	1.6%	-52	-15.8%	17.4%	77.5	-4.6%
30-Sep-22	62.0	60.8	72.5	74.1	-3.9%	-4.4%	-4.7%	-0.4%	5	4.7%	-49	-11.7%	16.4%	75.2	-2.9%
07-Oct-22	64.3	63.6	75.3	73.2	3.7%	4.6%	3.9%	-1.3%	46	9.8%	-7	-7.8%	17.6%	76.4	1.5%
14-Oct-22	61.4	57.6	73.3	67.4	-4.6%	-9.5%	-2.6%	-7.9%	8	5.8%	-47	-16.1%	21.9%	75.2	-1.6%
21-Oct-22	64.4	63.1	75.3	71.8	4.9%	9.6%	2.8%	6.5%	45	21.9%	-10	-5.2%	27.1%	78.7	4.7%
28-Oct-22	65.6	65.8	77.2	71.4	1.8%	4.3%	2.5%	-0.5%	42	11.5%	-13	-24.7%	36.2%	81.8	4.0%
04-Nov-22	66.1	66.5	75.4	67.7	0.9%	1.0%	-2.4%	-5.3%	32	20.3%	-23	-21.5%	41.8%	79.1	-3.3%
11-Nov-22	74.1	76.5	83.9	80.5	12.1%	15.0%	11.3%	18.9%	53	37.4%	-2	-8.0%	45.4%	83.8	5.9%
18-Nov-22	74.5	75.8	83.2	78.5	0.5%	-0.8%	-0.9%	-2.5%	24	12.4%	-31	-22.2%	34.6%	83.2	-0.7%
25-Nov-22	74.6	76.2	85.1	79.7	0.2%	0.5%	2.4%	1.5%	36	5.6%	-19	-3.8%	9.4%	84.5	1.5%
02-Dec-22	74.7	77.5	84.7	82.8	0.1%	1.7%	-0.5%	4.0%	38	9.2%	-16	-7.5%	16.7%	85.4	1.1%

Links to Conference Call Transcripts

December 2nd

[Marvell Technology, Inc. \(MRVL\) Q3 2023 Earnings Call Transcript](#)

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[Synopsys, Inc. \(SNPS\) Q4 2022 Earnings Call Transcript](#)

[NXP Semiconductors N.V. \(NXPI\) 6th Annual Wells Fargo TMT Summit](#)

[Applied Materials, Inc. \(AMAT\) Presents at Wells Fargo 6th Annual TMT Summit Conference \(Transcript\)](#)

[NVIDIA Corporation \(NVDA\) Credit Suisse 26th Annual Technology Conference \(Transcript\)](#)

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[Intel Corporation \(INTC\) Credit Suisse 26th Annual Technology Conference \(Transcript\)](#)

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[Western Digital Corporation \(WDC\) Credit Suisse 26th Annual Technology Conference \(Transcript\)](#)

[Micron Technology, Inc. \(MU\) 6th Annual Wells Fargo TMT Summit Conference \(Transcript\)](#)

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Links to Conference Call Transcripts

[NXP Semiconductors N.V. \(NXPI\) Credit Suisse 26th Annual Technology Conference \(Transcript\)](#)

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[International Business Machines Corporation \(IBM\) Management Presents at Credit Suisse 26th Annual Technology Conference Call Transcript](#)

[Analog Devices Inc. \(ADI\) Q4 2022 Earnings Call Transcript](#)

[Agilent Technologies, Inc. \(A\) Q4 2022 Earnings Call Transcript](#)

November 17th and before

[Applied Materials, Inc. \(AMAT\) Q4 2022 Earnings Call Transcript](#)

[Camtek LTD. \(CAMT\) Q3 2022 Earnings Call Transcript](#)

[Kulicke and Soffa Industries, Inc. \(KLIC\) Q4 2022 Earnings Call Transcript](#)

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[Advanced Energy Industries, Inc. \(AEIS\) Q3 2022 Earnings Call Transcript](#)

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[Cirrus Logic, Inc. \(CRUS\) Q2 2023 Earnings Call Transcript](#)

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- IC Equipment Forecast:
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- [Substrate Processing Equipment Shipments – V22.11](#)
- [Substrate Processing Equipment Installed Base – V22.11](#)
- [Chamber Shipments – V22.11](#)
- Supplier Shares – V22.03

Test Connectivity Reports:

- Test and Burn-In Socket Report : V22.07
 - Quarterly Report: V22.10
- Probe Card Report: V22.05
 - Quarterly Report: V22.09
- Device Interface Board Report: V22.08
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