ASiC
American Semiconductor Innovation Coalition

A Framework for reshoring of the Outsourced Assembly and Test (OSAT) industry to the US

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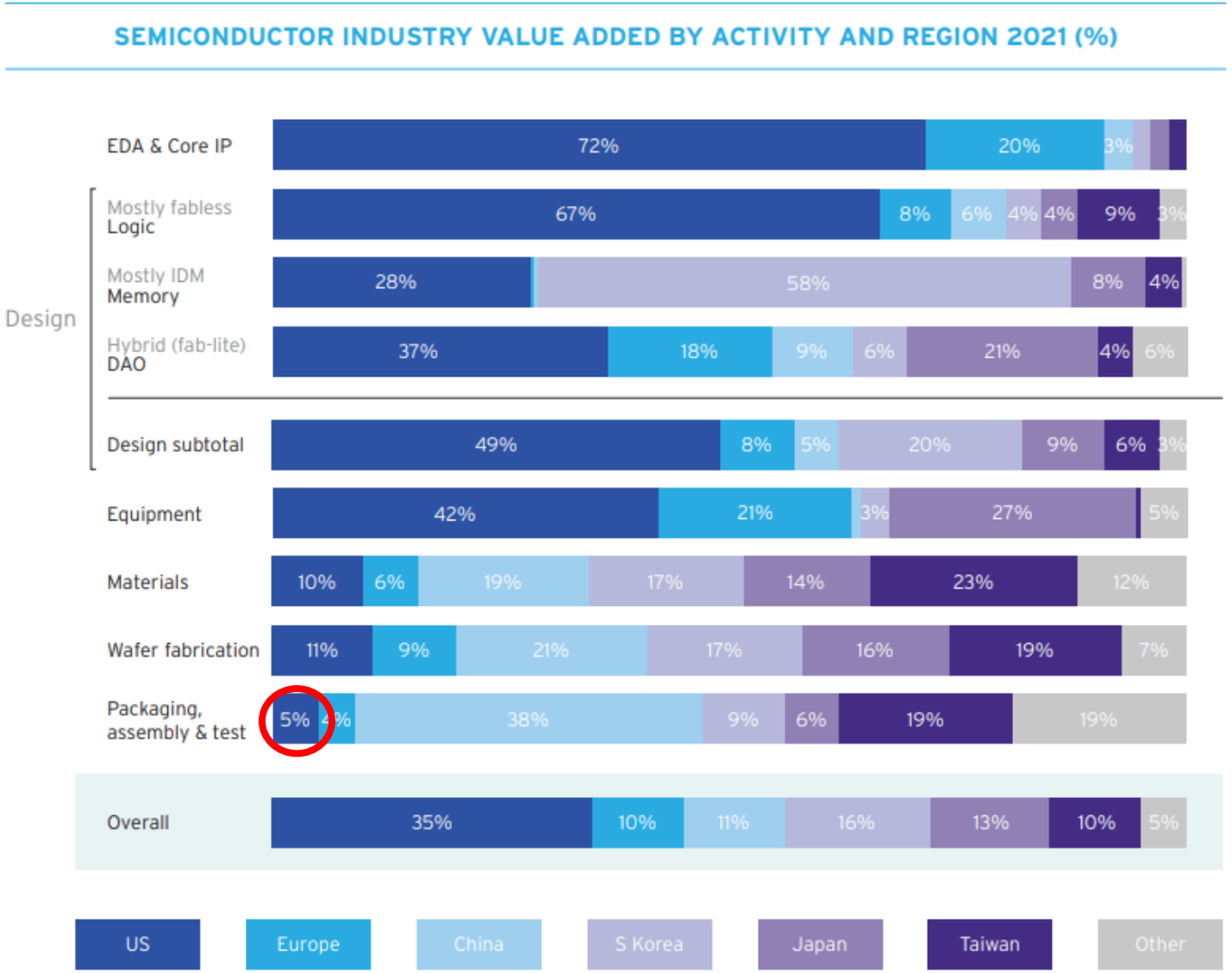
The US Houses only ~5% of the Packaging Industry (by Value Added)

Negative Implication:

- Surety of Supply

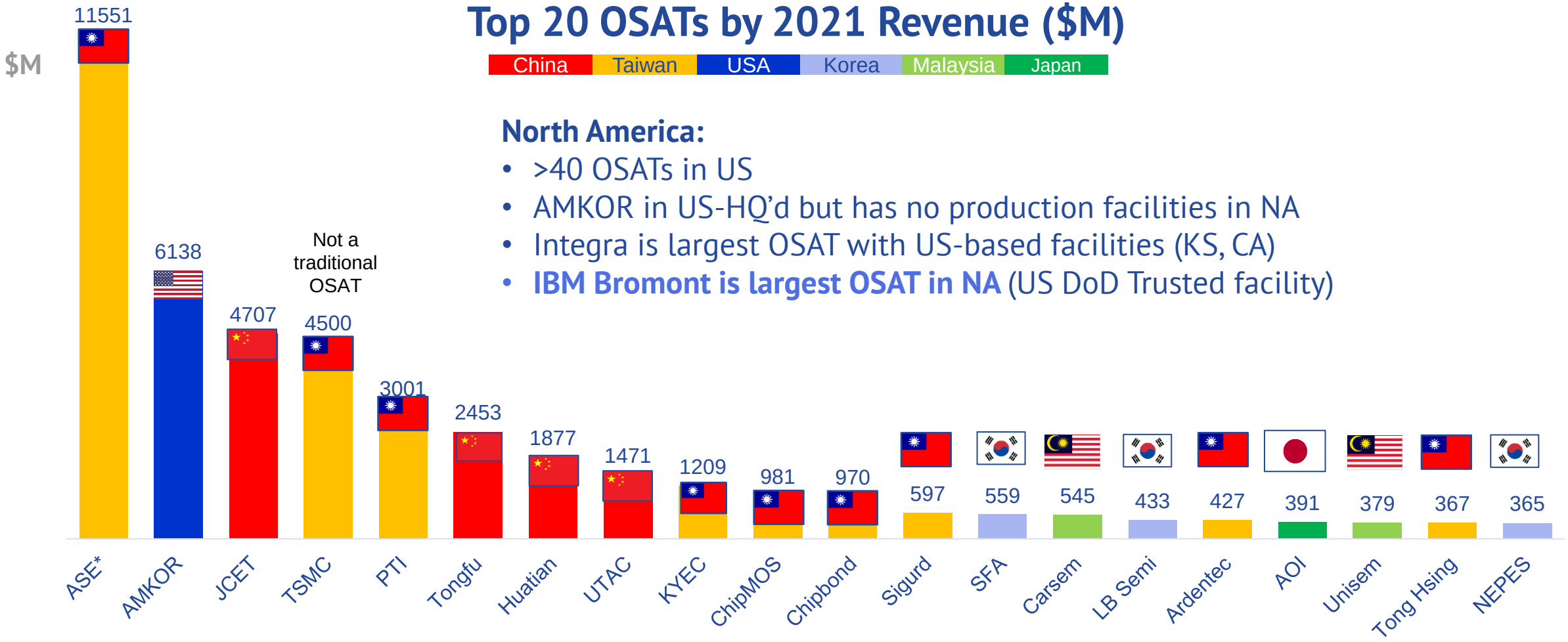
Packaging Assembly & Test is the weakest link in the Supply Chain for the United States.



Source: SIA, State of the Industry report, Nov'22

China & Taiwan Dominate the OSAT Landscape

Top 20 OSATs by 2021 Revenue ($M)



North America:

- >40 OSATs in US
- AMKOR in US-HQ'd but has no production facilities in NA
- Integra is largest OSAT with US-based facilities (KS, CA)
- **IBM Bromont is largest OSAT in NA** (US DoD Trusted facility)

**Includes SPIL but not USI*

Source: Adapted from TechSearch

OSAT Challenges in the US

SUPPLY / DEMAND

- Major OSATs are already engaged in capacity expansion in Asia
- US-based OSAT customers are largely not demanding US-based production
- Non-US customers (large market) are less sensitive to US-based production

FINANCIAL

- OPEX costs for US-based production appear to be higher than in Asia
- Automate to reduce labor cost (eg “lights out” factories at ASE in Taiwan)
- CAPEX run-rate can approach net income → sustainable?

WORK FORCE

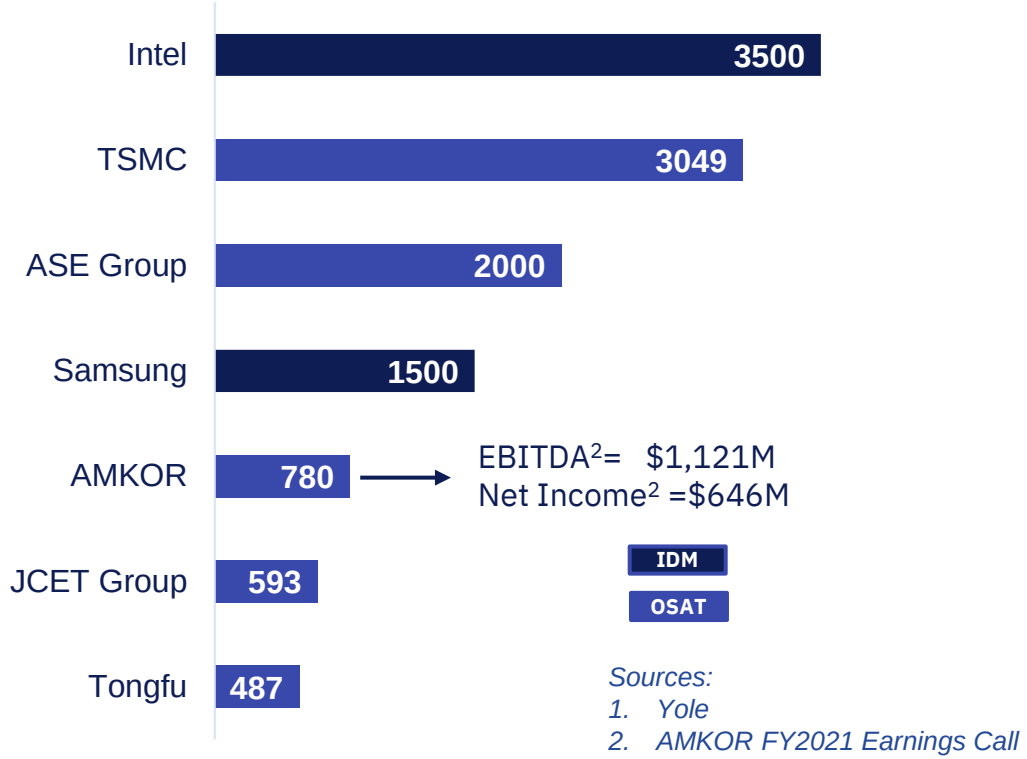
- Hiring of adequate labor for even a highly automated OSAT facility may be difficult
- Likely need to bring in labor from home facilities in Asia at least temporarily → cost adder

ECOSYSTEM

- Major ecosystem players (substrates, mold compound, underfill, etc) manufacture most of their product in Asia (for proximity with their customers)
- Chicken and Egg problem? OSATs won’t move to US due to lack of supply chain partners, supply chain partners likely won’t move until they see more OSAT activity in US

OSAT Manufacturing in US has two Major Barriers to Entry

Estimated 2021 CapEx spend for Packaging Activity[1]



Sources:
1. *Yole*
2. *AMKOR FY2021 Earnings Call*

5 Year GM% for Top 3 OSATs

. . . and this with all major manufacturing operations being in Asia.

Financial sustainability is a problem even if you have the initial CAPEX to launch.

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Is it hopeless then????

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What problem are we trying to solve here???

	PROBLEM	COMMENTS
1	**Surety of Supply for Defense??**	US has many small OSATs in US to service this market with Integra and NHanced announcing massive US-based expansions so is this really a problem?
2	**Surety of Supply more broadly (eg smartphones, automotive, AI, etc)??**	This requires massive capacity across the supply chain to locate in the US. Are we really looking to tackle this problem? What about system level manufacturing? Move that to the US too??

Target 20% of OSAT activity in the US?	WW OSAT ~$40B → 20% is ~$8B. About $1B in US today At-scale OSAT factory ~$0.5B → **14 full-scale factories**

Hard, but not hopeless . . . . .

Conditions for OSAT expansion into the US

1. American end-product companies to demand US-based content to drive demand for US-based OSATs (perhaps driven by government mandate?)
2. Robust and growing global economy → expanding demand overall so new US-based factories don't cannibalize existing Asia-based ones
3. Favorable US government financial support / on-going subsidies
4. High levels of automation upon factory bring up to mitigate labor cost
5. Strong work-force development programs sponsored by NSTC/NAPMP
6. Major OSATs to pressure supply chain partners to come with them concurrently with their facility bring-up. Note that cost of these facilities is typically much less than cost of OSAT factories.

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