Impact of Overseas Tooling Sourcing by Automakers on U.S. based Tool & Die Firms:

Pathways to Revitalizing a Foundational Industry

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CAR's mission is to conduct independent research and analysis to educate, inform and advise stakeholders, policymakers, and the general public on critical issues facing the automotive industry, and the industry's impact on the U.S. economy and society.

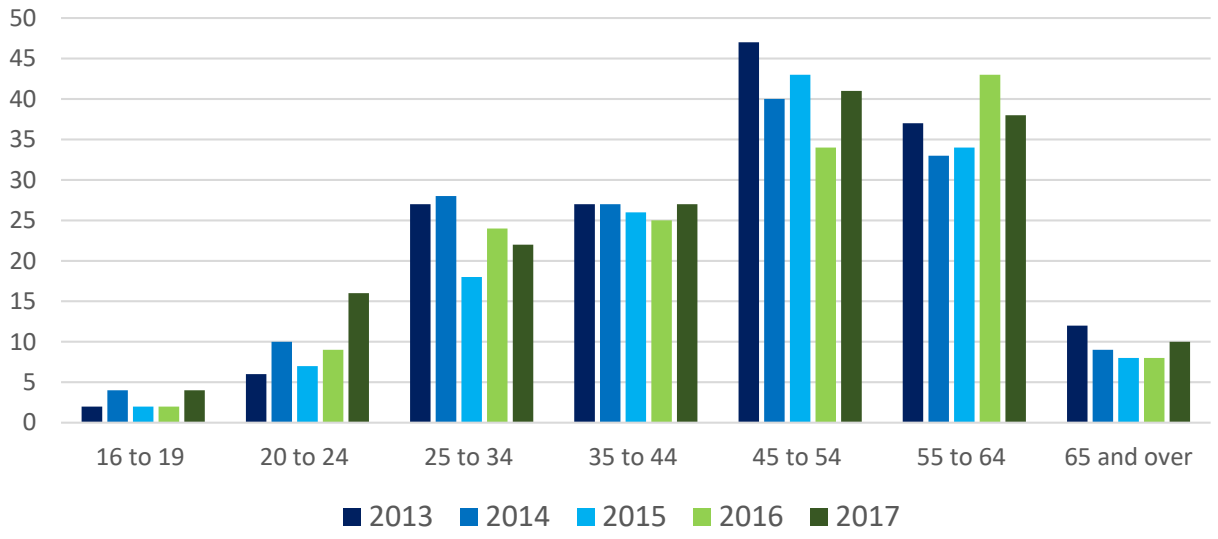
U.S. tool & die manufacturers have provided U.S. automakers a local source for new model tooling for more than a century. These tool shops have been an essential source of rapid response for building new tooling, incorporating engineering changes, and repairing or maintaining dies for automakers' stamping operations. The U.S. tool & die tooling industry has also played a foundational role for the domestic automotive and defense supply chain. Additionally, with the looming threat of trade wars, U.S. tooling manufacturers provide a hedge against potential tariffs on foreign produced dies and molds.

However, the U.S.-based tool & die industry is at a crossroads. U.S.-based shops have experienced a significant decline in new tools sourced from automotive customers over the past two decades. Enticed by initial cost quotes that reportedly are 35 to 40 percent lower than U.S. tool & die firms' prices, automakers that produce vehicles in the United States have increasingly sourced their tooling to low-cost countries (LCC)—such as China and Taiwan. Several U.S.-based automotive stamping engineering executives claim that even with fully-accounted costs of sourcing dies in LCCs; new tooling costs may be 20 percent lower than U.S sourced tooling. Additionally, often aided by government support, many LCC tool & die firms have installed world-class equipment and trained an increasingly capable workforce. This commitment has enabled some LCC shops to deliver new tools within the same period it would take to build domestically—despite the three to four weeks required to ship the dies via ocean freight.

While cost models continue to improve, CAR researchers think a more comprehensive accounting of financial costs associated with sourcing and producing new tooling in LCCs is needed. Such an analysis would account for costs that may not be considered—or are under-accounted for—in the current sourcing decision process. It is essential that these "difficult to quantify" risks be accurately considered in developing an effective die sourcing strategy. Such difficult to quantify costs include:

- **Capital costs could increase due to tariffs:** The development of tooling for the automotive industry is a long process, initiated as much as three years before launch. Increasingly, these long lead times place the manufacturers at risk for changes in trade regulation. If the U.S. imposes additional tariffs on new tooling, U.S. automakers may find it difficult to alter their LCC sourcing strategy quickly enough to avoid higher costs due to tariffs. For example, due to constrained domestic capacity, once domestic sources go out of business, manufacturers may find it problematic to revert to domestic sources. Moreover, re-sourcing tool & die production to other countries could erode any cost advantages of LCC sourcing—or include further tariff costs. Maybe "build it where you sell it" is the most risk-averse business practice.
- **Lack of locally available skilled trades talent:** The U.S. tool & die sector workforce is relatively old (Figure 1), with many die makers eligible to retire now or in just a few years. Additionally, few new candidates are choosing to enter the trade. Even given the challenges of a shrinking market, the U.S. tooling sector still must find qualified people to fill the positions vacated by the pending retirement of experienced, skilled tool & die makers. Without a pipeline for locally available tool & die talent, die maintenance, engineering change incorporation, and emergency die repair quality is likely to suffer.

Figure 1: Metalworking Machinery Employee Age Distribution



Source: U.S. Department of Labor, Bureau of Labor Statistics

- **Diversification drives capacity constraints:** As automakers increasingly source tooling to LCCs, U.S.-based tool shops are responding by diversifying into defense and other non-automotive sectors to stay viable. This refocusing of capacity may lead to a lack of available capacity for timely engineering changes or die repair for automotive customers. Surviving domestic die shops may choose to increase their prices for urgent repair and re-work to reflect the disruption to ongoing non-automotive work.
- **Widening of the technology gap:** As the percentage of tooling sourced to LCCs continues to increase, foreign sources may be better able to invest in the latest technology than are U.S.-based shops can. Without new tooling business to support investment in the newest machinery and tryout equipment, U.S. tool & die shops may become increasingly technologically uncompetitive. A technologically weakened domestic tooling sector has dangerous implications for vehicle launches—and national defense which must depend on U.S tool and die shops for military support.
- **Nomenclature and communication errors:** Stamping dies are a highly complex manufactured product. Technical issues often require clear and concise communication to prevent mistakes in the die manufacturing process. Cultural and language differences often lead to difficulty in coordination when sharing die designs, press specifications, checking fixtures, sheet materials, and racks. Such cultural barriers subside over time but currently remain a challenge.
- **Logistical Issues with tryout materials:** Timely availability of certified tryout sheet materials must come from U.S. production-spec steel and aluminum mills. If tryout requires more blanks than allocated due to the degree of difficulty or engineering changes, the sheet material is often expedited to the LCC facility via air freight. Additionally, aluminum ages and must be used before it age hardens and cannot be used to make parts.

While die manufacturing continues to be on the critical path for automobile model launch, the U.S. tool & die industry is experiencing a rapid decline in business. CAR researchers believe that attempting to compete on cost alone is not a winning strategy in the current environment. The U.S. tooling sector must instead, compete on technological advancements and emphasize holistic manufacturing operational efficiencies over the production life of the dies. While there remains a small group of viable domestic shops surviving in the current market, their business model is significantly challenged. The U.S. tooling sector may never recover to its former robust status. However, CAR researchers think it is essential to proactively work to stabilize the tool & die sector—the foundation of the U.S. automotive, manufacturing, and defense industries.

To first stabilize the U.S. tool & die sector, and then improve their competitive position, CAR researchers think urgent action must be taken. To this end, CAR has identified three critical action steps to revitalize the sector:

1. Develop a comprehensive accounting of costs and implications for sourcing to low-cost countries. While sourcing from LCCs offers lower initial costs, it also leads to several costs or risks that may not be considered—or are at best, under-accounted for—in the sourcing decision. It is essential that these "difficult to quantify" costs be fully accounted for in developing an effective sourcing strategy.

2. Create a strategic effort to support U.S. tool & die as they implement new technologies. The automotive industry is moving toward automated, connected, electrified, and shared vehicles (ACES). Many automotive industry stakeholders believe that with the introduction of ACES vehicles model changeovers will be more frequent and product development timelines will shorten. If the U.S.-based tool & die industry is to survive and eventually flourish, it needs to not only catch up but leapfrog the LCC shops with accelerated implementation of new rapid tooling technology. These technologies include:

- Additive Manufacturing for new tooling sections, perishable details, and check aids
- Metrology advancements such as blue light scanning ILO checking fixtures
- Forming simulation software used for Gen 3 steel, high strength, and more formable aluminum, and sheet magnesium, as well as hot and warm forming processes
- Efficient die designs to minimize the number of operations and optimize die construction
- Die assembly simulation and optimization
- NC programming and simulation of milling machines

3. Promote a wide-scale commitment to manufacturing skills development. Any attempt to revitalize the sector must be supported with a commitment to develop a manufacturing skills pathway. The tool & die sector needs the support of educational institutions, government agencies, and related businesses to attract younger workers by making skilled trades education programs in all disciplines more available, accessible, and attractive to new workers.

CAR looks forward to working with stakeholders to create pathways for the U.S. tool & die sector to survive and thrive in the coming decade.