V. The Collaborative Business Model

A. Objective

The objective of the collaborative business model approach is to provide a more competitive selection of tools, dies, and related services than any single tool and die supplier could offer individually. Through collaboration, the capabilities of the suppliers will continue to improve, perhaps evolving such that certain suppliers will develop specialty areas of expertise where they will become recognized as world leaders. The intent of the collaborative model is to encourage long-term relationships between a range of suppliers (with both overlapping as well as unique capabilities) and their customers. The principal benefits of the collaborative approach are:

- It is consistent with recent trends by the domestic automakers to outsource large "chunks" of the body structure; an approach already used when dealing with foreign tooling sources. A coalition of collaborating companies can manage the full range of products and services for a new vehicle including project management, engineering, prototype development, tooling construction and tryout, and launch support. A tooling coalition can be designed to manage the volume of work associated with an entire body structure or substructure.
- The collaborative model supports the total systems approach, thus avoiding shifting costs and problems from one part of the process to another.
- It promotes the development of niche specialties by suppliers. There are many small shops with narrow, but deep knowledge on various aspects of tool construction. These small suppliers have difficulty competing on large programs where broad capabilities are needed. These niche shops can better compete in their technical area if they are a part of a larger coalition of companies.
- It better supports the implementation of functional build. The nature of functional build is to identify the lowest-cost solution to quickly fix problems.

Many times the best solution is in another area of the process (e.g., change a simple part to correct a difficult problem in a complex part).

The size of the domestic tool and die supply base is likely to continue to contract as the worldwide capacity continues to increase from new shops in developing countries and significant productivity gains at existing shops. The collaborative coalition model provides a mechanism where the most capable shops have a better chance of competing. A competitive domestic tool and die supply base will enhance the competitive position of the domestic auto companies, which is the key to sustaining the domestic business.

Since the collaborative business model advocates a total systems approach for engineering, construction, and customer support for new tooling programs, the performance metrics should be adjusted to recognize this broader perspective. The old metrics were heavily skewed toward initial tooling cost, which is still understandably important. However, companies operating under a collaborative approach should be evaluated for additional performance measures such as:

1. **Total tooling cost achievement relative to budget**. The total tooling cost should include costs due to engineering changes since the collaborative approach should help reduce the number of required changes and manage how they get implemented.
2. **Percent of parts that pass production validation (PPAP) according to schedule** (100% goal).
3. **Launch rate**, particularly for measures about body quality, such as time required to achieve six-sigma quality for the body-in-white.

Two levels for the collaborative business model are presented below. The first level, Tool and Die Coalition, combines the resources of several tool and die shops and builds a collaborative model amongst the shops along with their customers. The second model is the Integrator Coalition. The integrator approach further broadens the scope from the tool and die shops to include complementary businesses, such as product engineering and assembly weld tools.

B. Description of Tool and Die Coalition

The range of products and services offered by tool and die shops is widely variable. Most shops offer a basic range of capabilities including prototype development, prototype fabrication, die design engineering, die construction and assembly, and preliminary tryout. On one end of the spectrum there are shops specializing in one or more of these activities; and on the other end exist "full service shops" offering all these capabilities and sometimes more.

The scope of capabilities of the tool and die collaborative business model exceeds what is typically offered today, even by a single full service company. For example, providing program management to support the development of multiple tooling projects across several suppliers. Another critical activity is early product design support, especially checking for product feasibility issues and identifying part design alternatives that do not affect part appearance in the body, but improve manufacturability, can be very important to reduce costs and head off future engineering changes. Additional services at the end of the tool making process include support for functional build evaluation and process launch support at the customer's facility. Figure 9 shows this range of possible supplier services from which a customer may choose for a given program.

Figure 9– Basic and Full Service Coalition Capabilities.

The expanded capabilities that are not typically handled by full service shops are coordinated program management responsibility and functional build. Coordinated program management extends the shops' reach both upstream and downstream from tooling construction, and can often include services and tools from other tool shops. Program management improves communication and scheduling coordination. Modular functional build (FB) involves sourcing groups of components (e.g., all panels that go into a single subassembly like a door or body side) and allowing the supplier to make tryout rework decisions based on how well the panels fit together (rather than making independent, isolated decisions panel by panel). The value of these services increases as the coalition responsibility increases to multiple modules, and the coalition approach expands the breadth of the group to handle multiple subassemblies on a program.

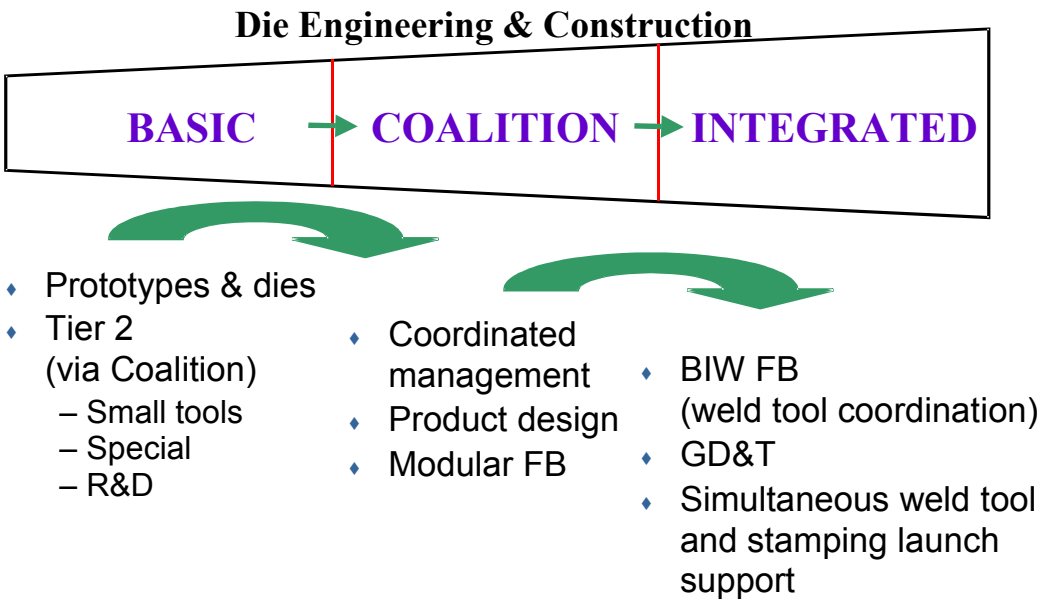

Figure 10 – Evolution and Expanding Role for Tooling Coalition.

Figure 10 illustrates the evolution toward expanded collaboration beginning with the basic tool and die supplier. The basic supplier provides dies and generally outsources other related activities. The expanded, collaborative supplier provides dies, but also provides coordinated management, early product design, and executes modular functional build. The highest level of collaboration extends the tool and die supplier into body-in-white functional build (beyond just the modular level), gets involved with product design

(geometric dimensioning and tolerances), and provides simultaneous launch support for assembly processes and stamping. These capabilities are not resident at the tool and die shops, but require an approach involving additional expertise as described in the integrator model.

Very few, if any, single suppliers have the capacity to offer the expanded range of products and services in Figure 9 for a major portion of a vehicle body. However, a coalition of tool and die shops can be formed that, in aggregate, does have the capability and capacity to handle large sections (if not an entire) vehicle. The conceptual organization shown in Figure 11 illustrates one approach for assembling the tool and die shops.

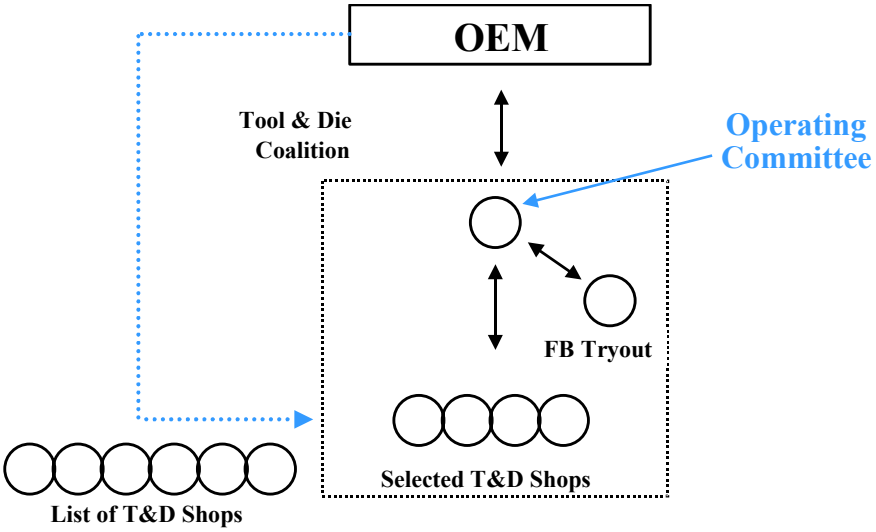

Figure 11– Tooling Coalition Organization.

The schematic in Figure 11 shows one possible collaborative model to support a broad range of products and services for a major vehicle program. Although a coalition might assemble the multiple organizations into a coalition before bidding on a project, the customer (OEM in this case) may wish to select the specific suppliers they wish to have included or excluded based on their past experiences or other motivations. The coalition has to allow for the flexible entry and exit of T&D suppliers. Figure 11 shows a candidate list of loosely aligned suppliers outside of the dotted box. From this list, the customer chooses the specific suppliers to include in the program. The coalition may also include a functional build tryout group that evaluates panel buyoff decisions

affecting everyone in the coalition. This may be part of or separate from the coalition, depending upon the customer's wishes.

The "operating committee" serves as the principal interface with the customer, i.e., the single point of contact. This is viewed as one of the great advantages to the customer, as the customer no longer has to manage multiple T&D shops with multiple points of contact; the management function is handled by the operating committee. Generally, the organization of the operating committee would include a senior program manager that integrates program schedule information from the supplier shops, and coordinates activities across the group of companies. The senior program manager may also be involved in negotiating engineering changes that affect dies at the various shops. Another potential member of the operating committee is an independent monitor that helps to facilitate the coalition, monitor it for competitiveness (including benchmarking the competition), and provide a mechanism for recommending system improvements both to the customer and to the tool and die shops. Figure 12 summarizes the key roles embedded in the operating committee.

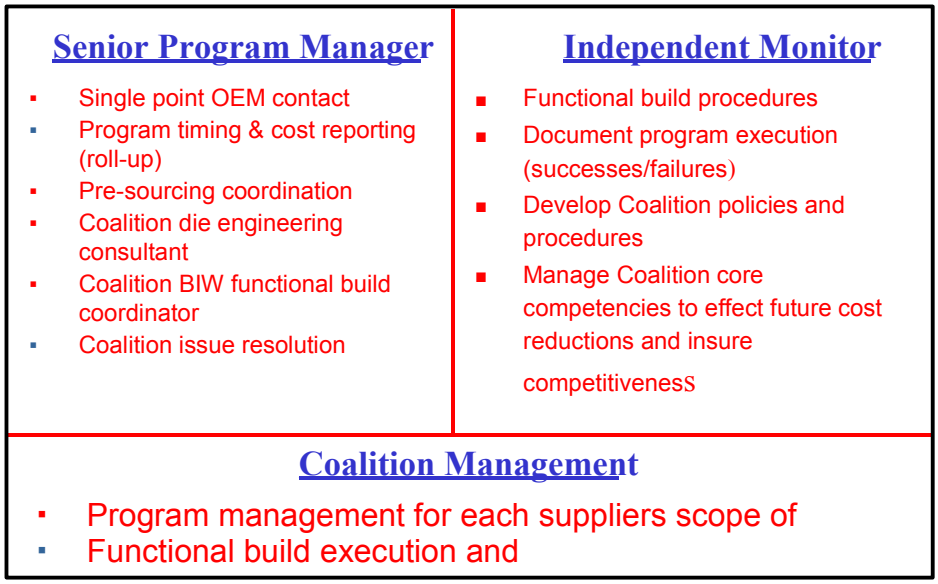

Figure 12 – Organization for Tooling Coalition Operating Committee.

C. Integrator Coalition

The integrator coalition model expands on the tooling coalition model to include other complementary functions, and offers the highest collaborative capabilities shown in

Figure 10. These activities are often associated with Japanese techniques that focus more attention on the manufacturability of the part designs and assessing the manufacturing process capability during the development process, rather than relying on initial engineering assumptions. The three key activities that the integrator model is intended to address are:

- **Body-in-white functional build**. The coalition model described above addressed the functional build benefit of evaluating parts at the subassembly or module level. For example, the coalition would be able to make decisions regarding changing a door inner panel, door outer panel, or reinforcement to guarantee an acceptable door assembly. A higher level of functional build can be achieved through the integration of modules. For example, the integrated coalition would be able to make decisions regarding changing a door assembly (and all its associated parts), body side, or the assembly process to guarantee that a door fits correctly the body side opening.

  The integrator model would be involved in a program pre-launch phase further "upstream" in the development process than tool and die shops normally participate. A product development process (timing and schedule of events) can be designed to include body-in-white functional build with significant improvements in lead-time, quality, and cost avoidance by eliminating unnecessary tooling rework often performed early in the process "just in case" it could cause a problem later downstream (see section IV.D Functional Build).

- **Product design**. The traditional North American design approach assigns numerous dimensional requirements to reduce the risk that a part meeting those requirements will fail. The extension of this approach is to tighten these requirements (reduce the tolerances) to further reduce the risk. Unfortunately, as the requirements increase, the manufacturing cost and lead-time for the associated tooling also increases. Incorporating more manufacturing understanding into the product design phase (i.e., with T&D shop and assembly tooling process knowledge) would improve the manufacturability of

the tooling and reducing cost and lead-time without any sacrifice in product quality.

- **Simultaneous tool and die and assembly tooling process validation**. Just as applying functional build at the module level reduces overall tool and die costs, incorporating the assembly tooling into the decision process further reduces cost and lead-time. Although it is feasible to validate the dies first and then move on to validate the assembly tools, the process would be faster and lower-cost (avoiding die rework) if the two processes were validated together.

Tool and die shops would need to team with other industry partners to assemble the collaborative integrator business model. An engineering company with product design capability and knowledge of product launch issues and management is needed. This company would likely be assigned as the lead organization for a program, helping to manage the tooling suppliers (dies and assembly weld tools). The tool and die shops would collaborate using the tool and die collaboration model described earlier. Another coalition of companies would include one or more assembly tool shops. Similar to the tool and die coalition, the assembly tool shops would likely form a partnership or coalition to provide the tooling for the body shop (see Figure 13).

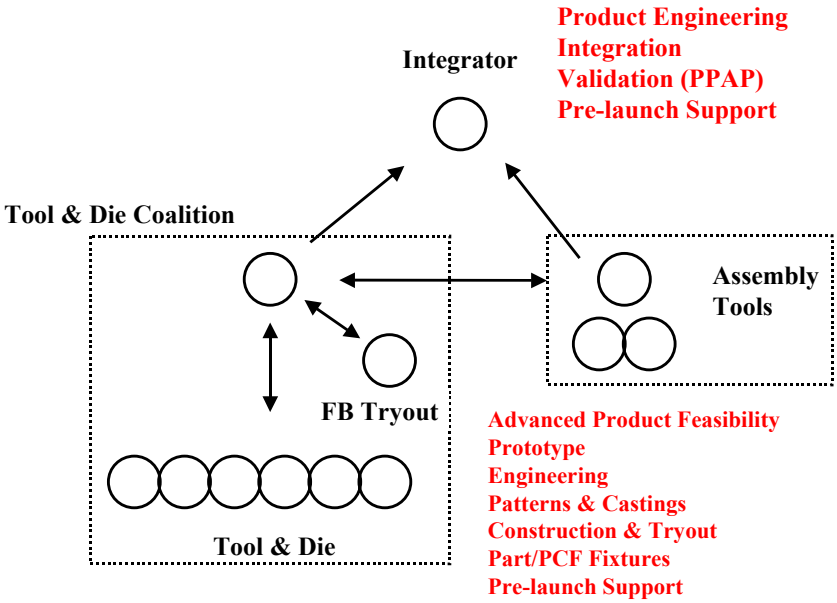

Figure 13 – Integrator Collaborative Model.

D. Synergistic Benefits and Cost Impact of Collaborative Model

The general collaborative model, whether for just the tool and die shops or for the integrator participants (engineering company and assembly tool shops), is shown in Figure 14. This figure illustrates a "pool" of companies with complementary products and services that can be drawn into a particular project based on the project demands and/or based on customer requests. In this fashion, the model does not discriminate as to who can join the coalition membership. Potential candidate companies include the die builders, mold builders, assembly weld tool companies, part checking fixture shops, and engineering integrators. In the event of an automaker wanting to source production as well, a stamping company may also wish to be included in the coalition. The organizational makeup and composition of each project team would depend on the customer.

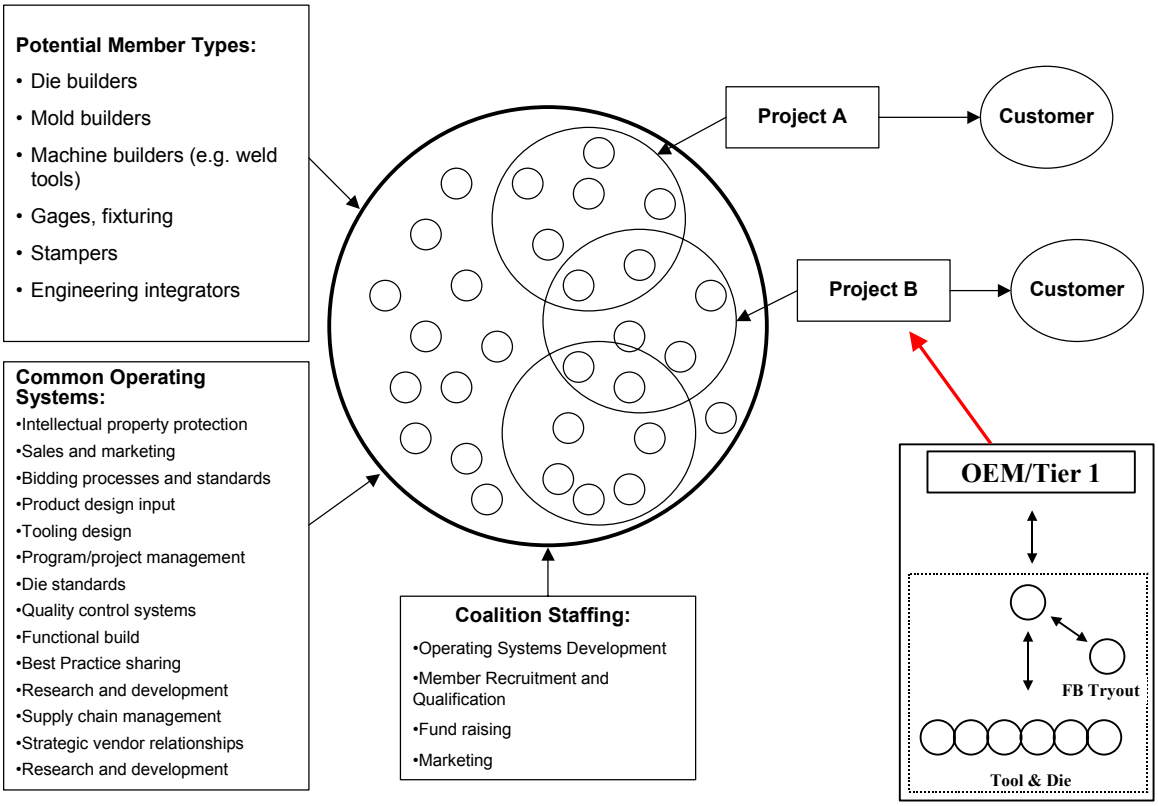

Figure 14 – General Collaborative Coalition Model.

The cost-saving benefits of the collaborative model are significant. The immediate short-term savings on tools approach 40%! The savings are shown graphically in Figure 15. These savings are accrued from the following areas.

A. **Manufacturing and Engineering Efficiencies – 10%**

   Discussions with tooling companies have indicated that efficiency savings by implementing lean practices (discussed earlier) can save 10% (this number varies by shop). Implementation is not necessarily tied to the collaborative model, but implementation by working with a coalition would greatly improve the efficiency and effectiveness of implementation through the sharing of lessons learned and simply the understanding of how quickly others are moving on their adoption of lean practices.

B. **Coalition Efficiencies – 5%**

   The efficiency of coordinating work amongst the coalition of companies, sourcing work to more efficient companies within the coalition, and balancing workload where capacity is available will save another 5%.

C. Product Design Input – 10%

   Identifying early design issues that could complicate manufacturing later on, and proposing design changes will result in reducing die engineering effort, tryout, and possibly engineering changes. The costs associated with these efforts are estimated to be 10% of the tooling cost.

D. **Lean Tool Standards – 5%**

   Current tool design standards are not as cost efficient as they could be. Identifying tool design standards that drive up cost, and recommending alternative approaches will reduce tooling costs by 5%.

E. **Functional Build – 10%**

   Effective implementation of functional build will reduce tryout time and tooling rework, thereby reducing tooling costs by about 10%. The savings increase on larger more complex parts and is less on smaller, simpler parts.

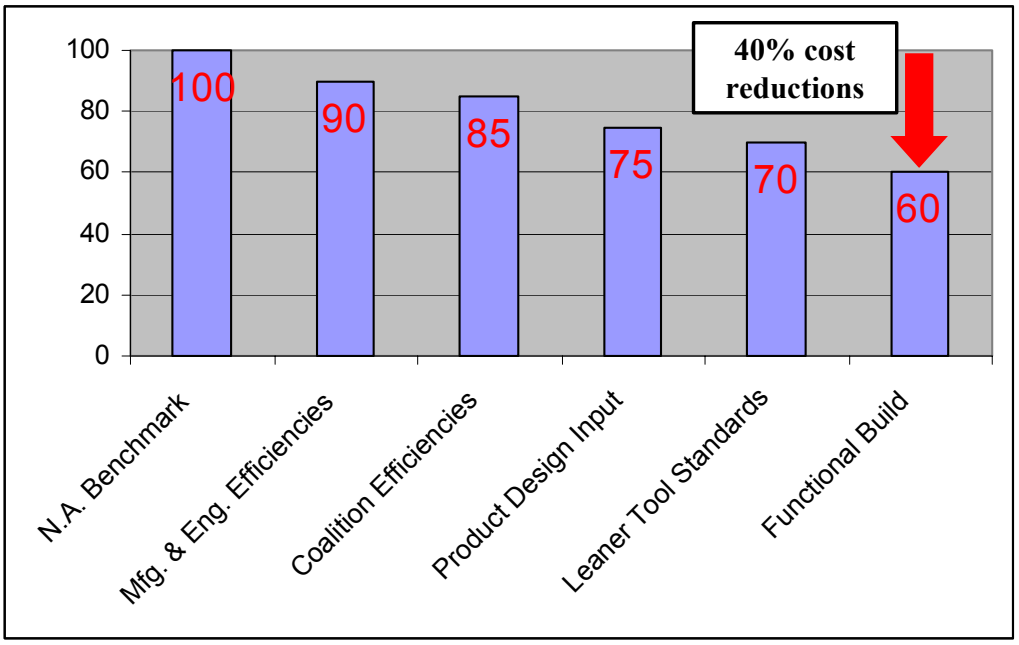

Figure 15 – Cost Reduction Opportunity Through Collaboration.

In addition to the purpose and benefits of the coalition discussed earlier, there are a number of synergistic opportunities, including:

- Sales and marketing efforts.
- Development of standardized processes for bidding and resource deployment including functional build procedures and methods.
- Development of tooling standards.
- Standardized project management methods and software.
- Improved utilization of coalition resources (e.g., engineering workstations and personnel, machining equipment, pattern shops, tryout presses, etc.).
- Improved ability for small, niche shops to develop their expertise and still compete successfully on larger programs that would otherwise be beyond their ability.
- Financing resources and leverage for volume purchasing of standard components.

E. Implementation Issues of the Collaborative Model

There are a number of implementation steps to the collaborative business model, some with many possible solutions. The list below, although far from exhaustive, identifies some of the key issues in assembling the collaborative model.

- **Tool and Die Collaboration** - Building trust and open communication between companies, who are otherwise industry competitors, is difficult and requires the involvement of a neutral third party. The coalition of companies needs to agree on a common mission, vision and operating principles. Further, the coalition needs to develop a business plan that outlines current capabilities, needed capabilities and growth areas, research and development, marketing, etc.
- **Operational Decision Making** – Many sensitive business decisions are required including ownership structure, governance, staffing, and membership (the process of how companies are allowed to join). The bidding process when multiple coalition companies desire the same piece of work needs to be managed within anti-trust regulations.
- **Internal Sourcing** – The process of sourcing tools and services within the coalition is critically important to be fair, avoid anti-trust guidelines, and still promote the development of niche players (recognizing that some companies are superior to others in some areas.) Ideally, certain suppliers would be identified as the preferred supplier because of their technical capability, but this is difficult and can violate anti-trust laws. One approach is to use an independent facilitator that can help identify appropriate sourcing, perhaps using customer input. A heuristic (formula) that achieves the desired result fairly (strives for the lowest cost while maintaining a profitable coalition enterprise) is one approach.
- **Anti-Trust** – Companies have to be concerned about sharing cost and pricing information with companies that are otherwise competitors. The coalition can demonstrate that their collective businesses offer a competitive product that justifies the collaboration, but the communication of certain information must be managed. (See Appendix for a sample Anti-trust Guideline for the coalition.) Individual companies still retain the right to intellectual property in their field of services.

- **Finance (internal and external)** – Internal financing decisions and identifying the control and flow of capital is important. Many shops would prefer to have a purchase order directly with the customer. But this would result in multiple purchase orders and tend to weaken the single-point-of-contact management. A mechanism is needed that allows for coalition-level decision making when a decision is best for the whole, but perhaps not for an individual company. One such possibility is a central pool of funds to support cost and revenue sharing. Lastly, most companies have their own external financing relationships, but the coalition might consider developing a coalition-specific source for capital.

F. Recent Experiences with the Collaborative Model

The Center for Automotive Research (CAR) at Altarum has been working on the collaborative model for the past year. Many of the observations in this report were developed through experiences gained in developing the model in close cooperation with several die shops and with the input of the domestic OEMs. CAR was chosen as the independent facilitator because of its knowledge of the industry, its reputation in the industry, and its access to OEM management for seeking guidance.

The coalition calls itself the US Tooling Coalition (USTC), and the member companies are:

- American Tooling Center
- Atlas Tool, Inc.
- Autodie International
- Hercules
- QMC Die Tech.
- Riviera Tool Company
- Ronart Industries, Inc.
- Sekely Industries
- Thunder Bay

Besides the comments made in previous sections, the basic necessary elements for creating a collaborative organization were present amongst this group from the beginning. First, the die shops had already communicated with one another prior to

approaching CAR for help in forming the coalition. Hence, they had the understanding that cooperation was necessary for survival, and the desire to cooperate. Second, with the addition of CAR to the group, the intellectual capital necessary for the coalition to work, i.e., functional build, digital technologies, lean manufacturing, tooling know-how, etc. fell into place. Third, the coalition concept was consistent with the customers' business direction of working with fewer companies and developing the so-called tier 0.5: engineering through turn-key startup (launch support). Lastly, the coalition was able to identify the initiatives necessary to reduce costs and make the coalition cost competitive (see section V.D. Synergistic Benefits and Cost Impact of Collaborative Model).

Once the coalition had developed a workable plan, several other companies, such as product engineering and assembly tooling suppliers, approached the USTC indicating that they were willing and eager to work with the coalition in preparing competitive bids to the OEMs.

CAR's primary role has been to act as a neutral, independent participant, helping to create a dialog between competitors, technology partners, and their customers. Through interviews with the OEMs and the die shops, CAR identified several critical areas for improvement, including communication between the customers and the suppliers, antagonistic relationships that had developed, in part, due to the poor communication, and cost reduction opportunities.

Another major responsibility for CAR was the creation of the quote to a customer. The reason was the sensitive nature of individual shop quotes used to create the coalition quote revealing the cost structure of the companies. Hence, CAR was the neutral entity to collect the various cost information and develop a heuristic on how the overall coalition quote would be established, and how the various dies would be distributed amongst the various coalition members. The process did raise concerns over the members' varied pricing strategies, and the heuristic was adjusted several times to accommodate those differences.

The response by the OEMs has been varied, but generally positive. One of the OEMs is very supportive, entertaining a coalition bid on a vehicle program, and working with the coalition on developing a program of long term cost reduction initiatives. Another OEM is very interested in the coalition concept, especially if the coalition can

demonstrate immediate cost reductions, as opposed to long term cost reductions. They are also willing to consider the broader integrator coalition approach. The third OEM is supportive of any new strategic concepts and has shared various experiences and suggested new business opportunities it would be willing to entertain, if presented by the coalition. Hence, each OEM sees the benefits of the coalition and is willing to enter into a collaborative relationship, albeit of a varied nature, to reduce costs. This is an indication that the coalition can provide the lower tooling cost of the Asian model, while maintaining the flexibility of US model, namely the ability to work with the different engineering and business systems of the US OEMs.

There are still challenges remaining. For example, it takes extra time and effort to coordinate and balance the multiple priorities of the coalition. This becomes especially critical near the submission deadline of a quote, because the OEM can add or change demands on the format and content of the quote. Under such tight time restrictions it becomes difficult to communicate with everyone and obtain a consensus decision.

The ultimate question will be: was it worth it? In the coalitions view, there are not many other options. The business climate is changing, and the industry is consolidating. Customers expect a lower-cost supply chain, which can only occur through cooperation both up and down the supply chain as well as across the supply chain. In other words, suppliers must cooperate with their customers, suppliers, and competitors. The impact of this effort will be long term and will change the way automobiles are built.