CASE 13

FORD MOTOR COMPANY AND DIE DEVELOPMENT

INTRODUCTION

Since the mid-1980s American companies have been altering their game to play Japanese-style. Major U.S. corporations started to revamp their corporate cultures recasting their investment practices to form cooperative links both vertically, down their supply lines, and horizontally, with universities, research labs, and their peers. By streamlining their lumbering corporate hierarchies, Corporate America has been emulating the Japanese by focusing on teamwork, quality and speed, and cost reduction. This new industrial pattern is called American-style keiretsu.

The automobile industry was no exception to this pattern, being deeply influenced by the Japanese approach. Along with the frustration of American manufacturers at being overtaken by Japanese auto manufacturers, the automobile industry in the U.S. received an additional source of inspiration for change. In a book called The Machine that Changed the World, based on the Massachusetts Institute of Technology (MIT) $5 million, five-year study on the future of the automobile industry in the late 1980s, researchers found that manufacturers of North America and Europe were relying on techniques that changed little since Henry Ford's mass-production system created in the 1920s. Given the state of the industry and the rapid gain in market share of Japanese companies, the MIT study concluded that American techniques were simply not competitive with a new set of ideas pioneered by the Japanese. Lean production, the Japanese approach, must supplant mass production in all areas of industrial endeavor to become the standard global production system of the twenty-first century.

One of the automobile manufacturers that represented a model of keiretsu was Toyota Motor Corp. of Japan, one of the twenty-four companies in the Mitsui Group. Toyota has been a tough competitor in the industry since its approach, mostly based on internal manufacturing capabilities built around its vertical keiretsu, known as the Toyota Group, has allowed the company to introduce its new car designs into showrooms in four years as opposed to five to eight for US and European manufacturers. Along with keiretsu, the notion of target costing was a key concept implemented by most Japanese manufacturers like Toyota and Nissan Motor Company. Under this approach, manufacturers adjust costs to a target level in order to reduce prices and keep their current profit margin per unit. Under the markup approach (followed by U.S. manufacturers) any increase in costs would derive in higher prices, making American automobiles more expensive (see Exhibit 1).

RELATIONSHIP WITH SUPPLIERS

In the late 1980s Ford Motor Company, the manufacturer of automobiles, trucks and related parts and accessories, began to rearrange its supplier system to a pyramid structure, whose shape is similar to Japan's famed vertical keiretsu (see Exhibit 2 for Ford's financial statements). Bob May, vice president of corporate procurement, and Bill Cunningham, vice president of marketing operations, are in charge of managing the sourcing strategy for Ford.

In the past, Ford's relationship with suppliers was built under the same characteristics of the typical U.S. system, in which a large number of suppliers, most of them with few engineering capabilities, dealt directly with assembly makers on the basis of short-term contracts, with limited interaction, communication and information exchange. On the contrary, the Japanese supplier system built under a tiered structure emphasizes long-term relationships by encouraging the share of information about new procedures and products between assemblers and suppliers (see Appendix for differences between the U.S. and Japanese supplier system). Bob May and Bill Cunningham were aware of the differences.

In its keiretsu efforts, these executives at Ford reduced the number of its first-tier suppliers and positioned some of those suppliers as second- or third-tier suppliers, as Exhibit 3 shows. Thus, Ford can more easily control its first-tier suppliers and get them further involved in its operation.

THE DIE BUSINESS

For any car manufacturer, the development and setting of a die represents a major component in the whole
process of designing and assembling an automobile. Although most car makers have in-house facilities to meet their die set requirements, only a few independent suppliers can compete with these die shops in quality, development time, and cost.

Getting a particular die developer involved in product engineering is beneficial to auto assemblers. Die development for body panels, a complex sequence of information processing activities that extends from clay models and line drawings to stamping dies made of steel, is a major part of process engineering. The die development process is not just an exercise on paper; die engineers need to act on the information they receive and make commitments before product development work is officially complete. If an auto maker hopes to reduce lead time and to lower the cost of engineering changes on a project, a die maker with outstanding performance should be involved in the project.

As mentioned, the U.S. automakers have produced many parts in-house, in part due to union resistance to shifting the work to external suppliers. But under pressure to hold down costs, the U.S. companies are buying more from outside suppliers. This has been a blessing to competitive die suppliers such as Ogihara Corporation.

Ogihara Corporation, a Japanese company, leads the die manufacturing business for the automotive market and is the largest die maker in the world. Ogihara is especially indispensable to those assemblers lacking capacities to develop the die set for large and complex body panel (e.g., a quarter panel or door) in a short period of time. Time-to-market is a crucial determinant of marketing success today.

Originally focused on supplying its die products only to Japanese car manufacturers, Ogihara started an international expansion in the mid-1970s. In 1984 Ogihara established a U.S. subsidiary, Ogihara American Corporation (OAC) in Howell, Michigan, extending its business from die development to stamping (see Exhibit 4).

The move proved to be successful. Based on its competitive strengths—the die expertise accumulated
**EXHIBIT 2**  
**FORD MOTOR COMPANY FINANCIAL SUMMARY 1985–1995**

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<td><strong>Automotive</strong></td>
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<tr>
<td>Sales</td>
<td>52,915</td>
<td>62,868</td>
<td>71,797</td>
<td>82,193</td>
<td>82,879</td>
<td>81,844</td>
<td>72,051</td>
<td>84,407</td>
<td>91,588</td>
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<td>Operating Income</td>
<td>2,902</td>
<td>4,142</td>
<td>6,256</td>
<td>6,612</td>
<td>4,252</td>
<td>316</td>
<td>(3,769)</td>
<td>(1,775)</td>
<td>1,432</td>
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<td>Net Income</td>
<td>2,012</td>
<td>2,512</td>
<td>3,767</td>
<td>4,609</td>
<td>3,175</td>
<td>99</td>
<td>(3,186)</td>
<td>(8,628)</td>
<td>1,008</td>
<td>3,913</td>
<td>2,056</td>
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<td>Revenues</td>
<td>4,700</td>
<td>6,826</td>
<td>8,096</td>
<td>10,253</td>
<td>13,267</td>
<td>15,806</td>
<td>16,235</td>
<td>15,725</td>
<td>16,953</td>
<td>21,302</td>
<td>26,641</td>
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<td>Net Income</td>
<td>504</td>
<td>773</td>
<td>858</td>
<td>691</td>
<td>660</td>
<td>761</td>
<td>928</td>
<td>1,243</td>
<td>1,521</td>
<td>1,395</td>
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<td><strong>Total Company Net Income</strong></td>
<td>2,516</td>
<td>3,285</td>
<td>4,625</td>
<td>5,300</td>
<td>3,835</td>
<td>860</td>
<td>(2,258)</td>
<td>(7,385)</td>
<td>2,529</td>
<td>5,308</td>
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<td>Total Assets</td>
<td>75,094</td>
<td>93,232</td>
<td>115,994</td>
<td>143,366</td>
<td>160,893</td>
<td>173,663</td>
<td>174,429</td>
<td>180,545</td>
<td>198,938</td>
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<td>Long-Term Debt</td>
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<td>32,113</td>
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<td>45,332</td>
<td>50,219</td>
<td>49,437</td>
<td>54,984</td>
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<td>Stockholder’s Equity</td>
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<td>18,493</td>
<td>21,529</td>
<td>22,728</td>
<td>23,238</td>
<td>22,690</td>
<td>14,753</td>
<td>15,574</td>
<td>21,659</td>
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<td>Total Cars and Trucks in</td>
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<td>North America (1)</td>
<td>3,585</td>
<td>3,876</td>
<td>4,040</td>
<td>4,313</td>
<td>4,131</td>
<td>3,632</td>
<td>3,212</td>
<td>3,893</td>
<td>4,131</td>
<td>4,591</td>
<td>4,279</td>
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<tr>
<td>Total Cars and Trucks outside</td>
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<tr>
<td>North America</td>
<td>1,966</td>
<td>2,075</td>
<td>2,131</td>
<td>2,349</td>
<td>2,477</td>
<td>2,391</td>
<td>2,411</td>
<td>2,047</td>
<td>2,053</td>
<td>2,262</td>
<td>2,327</td>
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<tr>
<td>Total Worldwide— cars and trucks</td>
<td>5,551</td>
<td>5,951</td>
<td>6,171</td>
<td>6,662</td>
<td>6,608</td>
<td>6,023</td>
<td>5,623</td>
<td>5,940</td>
<td>6,184</td>
<td>6,853</td>
<td>6,606</td>
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<tr>
<td>Total Worldwide— tractors</td>
<td>84</td>
<td>68</td>
<td>64</td>
<td>77</td>
<td>72</td>
<td>66</td>
<td>13</td>
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<tr>
<td><strong>Total Worldwide— factory sales</strong></td>
<td>5,635</td>
<td>6,019</td>
<td>6,225</td>
<td>6,739</td>
<td>6,680</td>
<td>6,089</td>
<td>5,636</td>
<td>5,940</td>
<td>6,184</td>
<td>6,853</td>
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Source: Ford Motor Company Annual Reports  
(1) U.S., Canada and Mexico
through experience bolstered by rapid market growth, the ability to cover all aspects of the die manufacturing process: starting the master model manufacture, die design, iron casting die construction, assembly of Body-in-White, construction of car body assembly lines and manufacture of pressings and subassemblies—Ogihara established trust and relationships with a large number of automobile manufacturers. Ford Motor Company was
among them as well as European automakers. In fact, Mercedes-Benz, the German luxury carmaker, started building in North America its new four-wheel-drive sport-utility (the M-Series) with 100% of Ogihara’s dies in 1997.

**FORD’S RELATIONSHIP WITH OGIHARA**

In 1986 Ford’s Wixom Factory, the facility that produced the Lincoln model, awarded a large die stamping order to OAC, becoming the first independent stamping company with its corporate base in Japan to win a contract for major body stampings from any of the Big Four US automakers.

Ogihara Japan was able to provide Ford with a die set for the stamping of Ford Lincoln Continental at OAC’s facility in Howell, Michigan. To do so, OAC completed Phase I installation in December 1986, setting up one tandem line and two transfer processes for stamping automotive body parts. Through these lines, OAC began production of panels for Ford’s Lincoln Continental in September of 1987. Then, OAC also started to stamp the panels for Mazda cars assembled in the United States.

These large orders were the lifeblood to improve productivity. As Ford gained OAC trust, OAC has relied more on Ford. As a result, Ford began to use OAC not only to produce panel stamping for other models, but also to assemble some auto body parts. Furthermore, Japanese staff often visits OAC, in order to maintain face-to-face contact and close communication in the die development process between Ogihara Japan and Ford.

In December 1988, OAC completed its Phase II expansion plan to produce Ford Lincoln Towncar panels and installed a new tandem line. In December 1991, OAC completed the Phase III expansion plan for the production of Ford Lincoln Mark VIII and added yet another tandem line. During this period, as Ford gradually shifted its panel orders to OAC from Budd, its German supplier, the Japanese company became one of the two or three largest independent suppliers of major steel body stampings to Ford in the U.S. in terms of parts numbers.

On December 14, 1994, Ford’s Jaguar division sold a stamping factory in Telford, UK to Ogihara. It is very rare for an auto parts supplier to acquire a whole process in an auto manufacturer’s plant. Ford intends to subcontract die development and panel stamping for Jaguar to Ogihara’s plant in the UK.

By 1995 Ford depended on only three suppliers, Ogihara, Carmax (a Canadian supplier), and Budd, for its large-scale panel stamping. Virtually all body and structural stampings in the new sports sedans were purchased from die-stamping companies. Bob May was
quite happy about this accomplishment as a corporate procurement executive.

**DIE AND PRODUCT DEVELOPMENT**

While many parts makers were removed from Ford’s first-tier, Ogihara Japan and OAC succeeded in establishing a strong relationship with Ford.

Under the leadership of Bob May and Bill Cunningham, Ford has actively built closer reciprocal commitments with such a high-performing die developer group, Ogihara Japan and OAC, in order to improve the product development performance. Thanks to Bill Cunningham’s involvement, customer inputs on product features and design were more effectively reflected in the product design process. It was not until Ogihara Japan and OAC were involved in Ford’s product engineering that Ford was able to effectively reduce die lead time, which is the critical path in the product development process. Exhibit 5(a) - (c) summarize the pattern of engineering activities associated with development of die set for a large and complex body panels. Exhibit 5(a) shows the timing chart of a typical Japanese process. Japanese auto makers spend about twenty-six months in developing a die.

**Exhibit 5(a)**

**Timing Chart of Die Development: A Typical Japanese Case**
Furthermore, most die sets for Japanese assemblers are manufactured in their in-house die facilities. In the case of a compact car produced by Subaru, the in-house rate of die set reaches about 80 percent. For comparison the timing chart of the past Ford Lincoln is illustrated in Exhibit 5(b).

On the previous development process, Ford had negotiated arm’s length contracts with separate companies to carry out different manufacturing steps (e.g., molding suppliers for models, casting specialists for casting, machine shops for cutting and finishing, and jig suppliers for jigs). Such fragmentation made it difficult to conduct die making steps in parallel and thereby compress manufacturing lead time. Furthermore, managing many suppliers complicated Ford’s engineering organization and made coordination within the company difficult.

Moreover, Ford lacked smooth communication flows between upstream and downstream operations (e.g., product engineering and die development). The product engineers in Ford were not encouraged to take manufacturability considerations into account, which imposes a greater problem-solving burden on downstream process. At Ford, upstream and downstream processes were serially conducted, and information flows were unilateral from upstream to downstream;
the designers of Ford had “throw-it-over-the-wall” mentality.

However, Ogihara Japan and OAC helped Ford create intensive communications between upstream and downstream. Since involved in product engineering, Ogihara Japan and OAC have frequently made counterproposals to Ford’s product engineers. Ford has also accepted active and continuous flows of feedback information from the Ogihara Group. This pattern is typical of traditional auto development projects among Japanese firms. The early involvement is not just starting earlier; it is the exchange of information and insight to prevent problems before they become a die-development problem. The downstream (Ogihara) “front loads” information to the upstream (Ford) before it starts development. This helps Ford to “do it right the first time” and affords Ogihara earlier exposure to product designs and specifications, further reducing problem-solving lead.

As a result, Ogihara Japan and OAC, although geographically separated, have been able to offer Ford a vertical package from die-development, including planning and design, to stamping. What is even more important, the two companies’ computers are linked perma-
This relationship between Ford and Oghara has helped Ford reduce lead-time by integrating and overlapping some steps in the die development chart. To the extent that Oghara accumulates expertise to develop a particular die set for the Lincoln models, Ford can benefit from better design quality and lower cost. This accumulation of engineering expertise becomes a competitive edge to Ford. Additionally, having one source for both die development and stamping facilitates knowledge exchange between the two stages. Oghara is able to detect potential production problems early on and thereby improve component quality.

Ford had spent ten more months in developing its die set than the average Japanese makers until getting Oghara involved in its product engineering. As Ford has increased its reliance on Oghara Japan and OAC, the time required to develop die set has gradually decreased. Ford has skillfully learned Japanese style die development process from Oghara Japan and OAC, as well as successfully had Oghara Japan and OAC participate in its product engineering. Therefore, as shown in Exhibit 5(c), Ford has been able to compress the development cycle by quickly constructing prototypes and dies, and by boldly overlapping product engineering and die construction.

However, Bob May, in particular, is aware of potential problems in this relationship. By increasing its dependence on Oghara for its product design process, Ford may not only lose some bargaining power. While managing the long-term relationship with Oghara, Ford must carefully control pricing for die set or stamping. But losing engineering expertise in die development also may make Ford vulnerable in this key capability in the long term. Bill Cunningham does not agree with Bob May’s concern.

**CHALLENGE IN THE FUTURE**

Along with the changes in its relationship with suppliers implemented since the late 1980s, Ford has renewed its effort to reduce costs and increase efficiency. In January 1995 the company announced the launching of a globalization project called Ford 2000, in which product divisions around the world were consolidated to share capabilities and resources, with an estimated cost savings of $3 billion a year. Under this project, Ford wants to build a worldwide relationship with a smaller group of suppliers, reducing their number to only one-third of those currently used. The project is expected also to rationalize more than 200 different systems for parts numbering, purchasing, and dealing with suppliers, so that the same rules apply in every division, factory, or region.

In 1996 the relationship between Ford and Oghara seemed to be at its highest point, increasing Ford’s dependence on Oghara Japan and OAC for its product development process each year. Ford awarded additional long-term contracts to Oghara for its Lincoln division. At the same time, Ford provided Oghara with its prospective engineering technologies in return for Oghara’s strong commitment to product engineering. Today, Ford allows Oghara to join in certain R & D efforts and requires Oghara to focus not on specific components, but on the total vehicle.

**QUESTIONS**

1. For Bill Cunningham, responsible for the planning and the implementation of global strategic actions, how would the changes into a keiretsu-style relationship with suppliers in the industry as a whole, and in Ford in particular, have affected his task?

2. Given the current relationship between Ford and Oghara, what are the main strategic implications for Ford in the short and long run? And why do Bill Cunningham and Bob May have different opinions?

3. Would you consider that Ford should keep the terms of its relationship with Oghara as they are, or would you introduce some changes to it? If so, what are your specific recommendations?