

## **Honda Facility Location Analysis**

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## INTRODUCTION

In June of this year, Honda announced that Greensburg, Indiana would be the site of its new automotive manufacturing plant. According to *Honda News* [1], the \$550 million facility will perform primarily stamping, welding, painting, plastic injection molding, and assembly operations to produce 200,000 fuel-efficient 4-cylinder vehicles per year. Several states took interest in the new manufacturing facility, as it will employ 2,000 people. States that submitted proposals to Honda include Illinois, Indiana, Michigan, and Ohio, with a last-minute bid from Wisconsin. We have been asked to assess Honda's decision to locate the plant in Greensburg, Indiana. In order to do this, we will evaluate the decision based on several key factors in facility location planning. This will include analyses on existing suppliers and customers, labor, government involvement, and various other considerations.

## EXISTING SUPPLIER AND CUSTOMER ANALYSIS

### *Suppliers*

The major suppliers for Honda's plant will include the existing engine plant in Anna, Ohio as well as other suppliers located primarily throughout Ohio. The Anna, Ohio plant, Honda's largest engine facility in the world, will provide 4-cylinder engines to the new plant. It is possible that Honda placed a large weight on proximity to the Anna facility in making their decision, as it manufactures an essential part for every vehicle produced at the new plant. Locating close to Anna would keep transportation costs at a minimum and increase flexibility in the production process. Thomas Klier, a senior economist at the Federal Reserve Bank of Chicago, claims [2] "Honda generally wants its assembly plants to be within 60 miles of its engine plant". This would leave only the Van Wert, Ohio site as a possibility, located just 51 driving miles from the Anna plant. The Greensburg location, although outside of the 60-mile radius, is still a decent choice located less than 150 driving miles from Anna. In general, Honda should have eliminated the Illinois, Michigan, and Wisconsin sites based on their distance from the Anna facility.

Aside from locating close to the engine plant, Honda should have taken into account the locations of other suppliers as well. Of the company's 535 suppliers, 150 are located in Ohio and 46 are located in Indiana [3, 4]. Had Honda based their decision on

the sheer volume of suppliers in Ohio alone, Van Wert or Octa, Ohio might have been chosen as the new site. Greensburg, Indiana would have been the next best option to keep suppliers close.

Honda did in fact perform an analysis to minimize the distance between the new plant and suppliers. The Senior Vice President of Honda Manufacturing USA, Larry Jute, presented this analysis at the 2006 Indiana Logistics Summit. In his presentation [5], he included Figure 1 shown below in which the blue “break even mileage line” indicates where the distance between suppliers is minimized. From the figure we can see that the three potential Ohio and Indiana sites highlighted in green are approximately the same distance to the line. This suggests that any of the three sites would be good facility locations in relation to their suppliers.

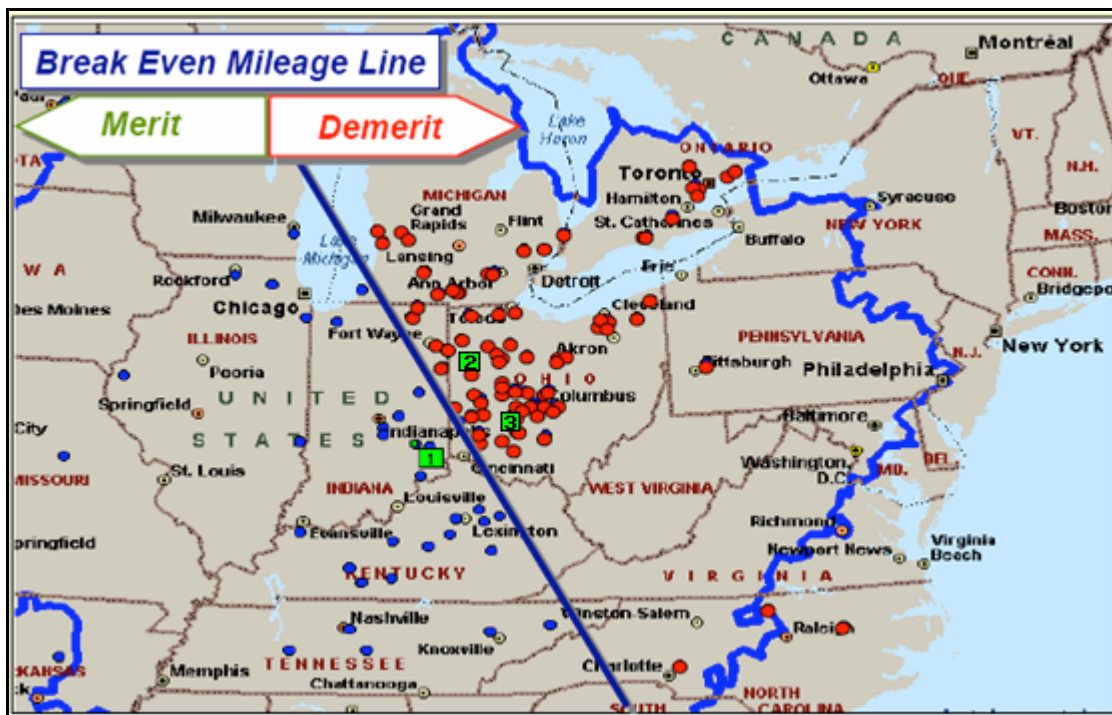


Figure 1: Break Even Mileage Line, and the three potential facility locations: (1) Greensburg, IN (2) Van Wert, OH (3) Octa, OH.

### *Customers*

Generally speaking, Honda has customers throughout the US. In order to minimize finished vehicle transportation costs, the company would want to choose a centrally located site for a new facility. In this sense, the Midwest is a good general location. In order to select the optimal location for their new facility with respect to

customers, Honda should have analyzed the market space the new facility would fulfill. We have conducted our own analysis to locate the optimal position for a new facility in the US. The minisum problem presented below was solved to find the best location, assuming that the new plant will serve the entire US market.

### *Minisum Problem*

This problem will minimize the sum of all distances from the optimum location to customers. The basic assumption of this analysis is that there is a strong relation between the size of the state markets and the number of vehicles currently on the road. In other words, those markets with more cars on the road today will have higher potential sales for the future. This means that the closer the facility is to those markets, the less expensive it will be for Honda to serve them.

The minisum analysis is shown below and on the next page, with calculations in Table 1 and the optimal location map of the US in Figure 2. Information about the number of vehicles was obtained from the Department of Transportation Vehicle Registrations for 2005 [6]. It should be noted that we used the 15 states with the most registrations in our analysis.

Table 1: Minisum Optimal Location Analysis.

Mean <b>48,158,459.00</b>					
X axis	Pop	Cum sum	Y axis	Pop	Cum sum
Washington	3,061,330	3,061,330	Florida	8,311,702	8,311,702
California	19,638,969	22,700,299	Texas	8,911,818	17,223,520
Texas	8,911,818	31,612,117	Georgia	4,208,585	21,432,105
Illinois	5,704,638	37,316,755	Tennessee	2,832,604	24,264,709
Tennessee	2,832,604	40,149,359	California	19,638,969	43,903,678
Indiana	2,694,941	42,844,300	North Carolina	3,583,762	47,487,440
Michigan	4,753,156	47,597,456	<b>Virginia</b>	4,066,886	<b>51,554,326</b>
<b>Ohio</b>	<b>6,362,255</b>	<b>53,959,711</b>	Indiana	2,694,941	54,249,267
Georgia	4,208,585	58,168,296	Ohio	6,362,255	60,611,522
Florida	8,311,702	66,479,998	Illinois	5,704,638	66,316,160
Pennsylvania	5,888,278	72,368,276	New Jersey	3,957,193	70,273,353
Virginia	4,066,886	76,435,162	Pennsylvania	5,888,278	76,161,631
North Carolina	3,583,762	80,018,924	Michigan	4,753,156	80,914,787
New York	8,973,047	88,991,971	New York	8,973,047	89,887,834
New Jersey	3,957,193	92,949,164	Massachusetts	3,367,754	93,255,588
Massachusetts	3,367,754	96,316,918	Washington	3,061,330	96,316,918

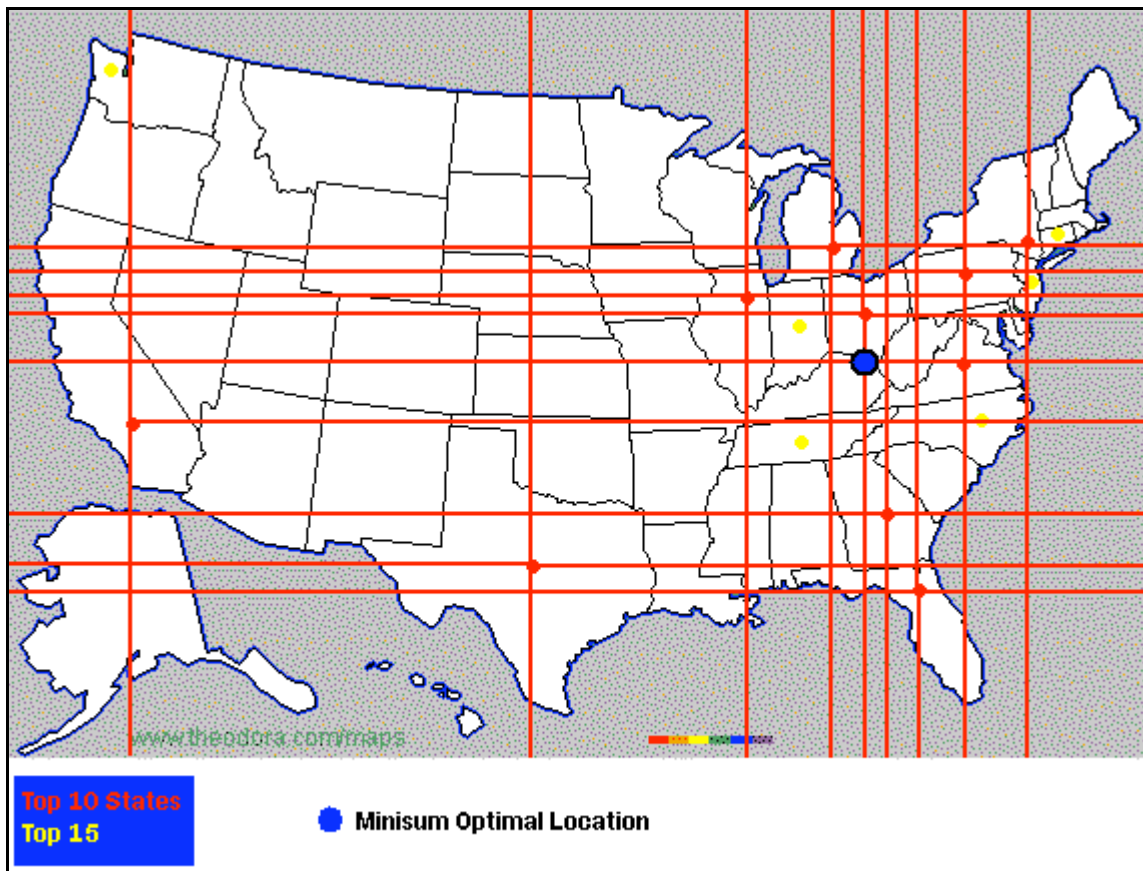


Figure 2: Minisum Optimal Location Map of United States.

The results of this analysis show that the optimal location for the facility would be on the border of Ohio and Kentucky. This optimal location would move as states become more developed, and the cities within them grow. The analysis was repeated using data from 3 different years, 1995, 2000 and 2005. All three minisum optimum locations were in Ohio, changing only with the 2000 data from central to southern Ohio. This means that the number of motor vehicles in the country is rising in a balanced east-west direction, while growing slightly faster south of Ohio (mostly because of California).

### *Other Customers*

Honda is also a major participant in motor racing, especially in the Indy Car racing circuit. Locating the new plant just 50 miles southeast of Indianapolis allows them to be close to this market. Koichi Kondo, president of Honda's US division told *Asia Times* [7] that “the Greensburg facility would put Honda close to the Indianapolis Motor Speedway, where its racing engines now play a major role... For more than 50 years,

racing has been a key part of the Honda culture, and we use racing to help train our engineers... Now Honda and Indiana are beginning a long race together". This additional market could shift the minimum result to the west, making the selected Greensburg location an acceptable choice.

In addition to the facility being close to suppliers and customers, it must also be easily accessible by those suppliers and customers. The map in Figure 3 [26] shows that Greensburg, indicated by the red star, is conveniently located just off of Interstate-74 and US 421. According to the Greensburg Daily News [11], Indiana will be speeding up construction to have the interchange between I-74 and US 421 go both ways, making the new facility even easier to access by road. The plant will also be very accessible by rail. Larry Jutte made the statement that [4], "recently, rail lines were moved from our plant site in Decatur County. Ultimately, we will have a new line from our factory – with a substantial increase in business for Central Indiana Rail". The high accessibility of the Greensburg location would have increased its appeal to Honda.

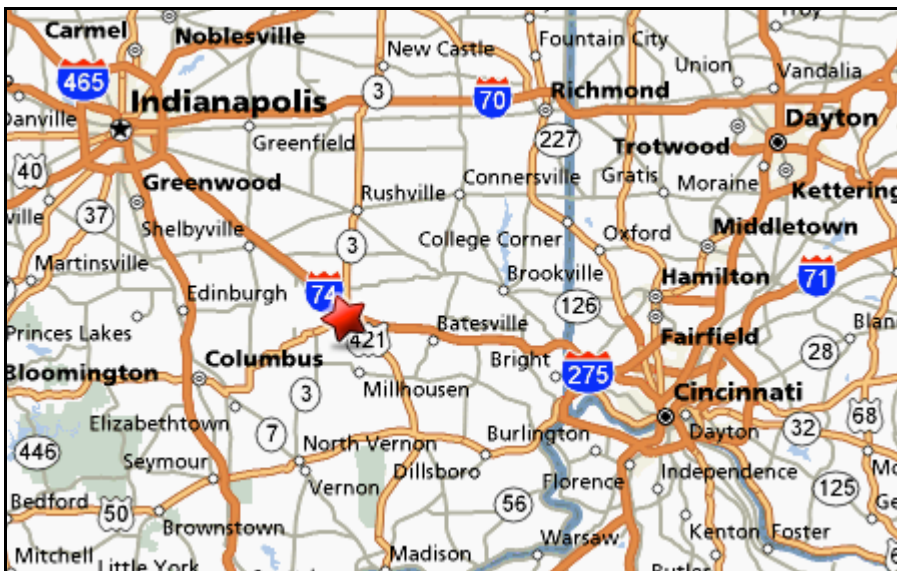


Figure 3: Greensburg, Indiana and Surrounding Highway System.

## LABOR ANALYSIS

### *Unions*

Although *National Public Radio* [8] reported in January of 2006 that "Nissan and Honda are entirely non-union", organized labor is still a concern for Honda. The article [8] continues, "but their wages and benefits are very much set in Detroit by what the



UAW negotiates with Ford, GM and Chrysler". Organized labor is certainly something Honda considered when choosing the location for its new facility. Table 2 below shows information from the *Bureau of Labor Statistics* [9] on the size of the unionized workforce in the three states where the plant was most likely to be located: Illinois, Indiana, and Ohio.

Table 2: Union Membership in Selected Midwest States.

Union Membership <sup>(1)</sup> of employed wage and salary workers in Midwest states, annual averages, 2004 and 2005 (Numbers in thousands)						
State	2004		2005		2004 to 2005 Membership	
	Total members	Percent of employed	Total members	Percent of employed	Net Change	Percent Change
United States	15,472	12.5	15,685	12.5	213	1.4
Illinois	908	16.8	927	16.9	19	2.1
Indiana	311	11.4	346	12.4	35	11.3
Ohio	759	15.2	804	16.0	45	5.9

Footnotes: (1) Data refer to members of a labor union or an employee association similar to a union.

The table shows that Indiana has the lowest unionized workforce by a large amount, but also has the highest growth rate. The statewide growth is definitely a concern for Honda, but the more pertinent issue for any auto manufacturer is one specific union, the United Auto Workers (UAW). This extremely powerful union has caused many problems of late for the "Big 3" American automakers. To examine UAW's influence in and around the potential plant sites, information has been taken from the UAW website [10]. Table 3 below shows the location and size of the closest UAW council to each potential site. The Fithian, Illinois site had no council within 60 miles, so it was assumed there is no current UAW presence in the city.

Table 3: Local United Auto Workers Councils.

City	State	UAW Council	Size
Greensburg	IN	Connersville, IN	200
Van Wert	OH	Lima, OH	5,500
Octa	OH	Columbus, OH	1,250
Fithian	IL	None	NA

From Table 3, it can be seen that the UAW has a much larger presence in and around both Ohio sites than either of the sites in Greensburg, Indiana or Fithian, Illinois. Based on the analysis of total statewide union representation and local UAW presence, it



is clear that the Greensburg, Indiana site is best. The combination of low statewide participation in unions and extremely small UAW Council make it unlikely that the UAW will be able to establish a foothold in the new Honda plant there.

### ***Availability***

One large concern for Honda when determining the best location for their new facility was the availability of labor. Jay Baron, Chief Executive of the Center for Automotive Research (CAR) in Ann Arbor, Michigan explained to *Asia Times* [7] that “with General Motors Corp and Ford closing plants in the Midwest, there are plenty of skilled trades people looking for jobs”. This was one of the major factors that led Honda to narrow their location search to the Midwest. Unemployment rate data from the *Bureau of Labor Statistics* [12] for the nearby metropolitan areas are shown in Table 4.

Table 4: Metropolitan Unemployment Rates near Potential Sites.

City	State	Unemployment Rate
Greensburg	IN	4.1%
Van Wert	OH	5.6%
Octa	OH	4.2%
Fithian	IL	4.6%

The information above demonstrates that none of the potential sites has an extremely high rate of unemployment. Therefore, it is important to consider the size of the potential employment pool. Because each of the four candidate cities is very small, the combined populations of the three biggest cities within ~60 miles were used. Table 5 below uses information from the *US Census Bureau* [13] to depict the population size of the surrounding metro areas for each potential site.

Table 5: Total Surrounding Metro Population.

City	State	3 Largest Cities within 60 mi.	Total Metro Pop. within 60 mi.
Greensburg	IN	Cincinnati, Columbus (IN), Indianapolis	3,824,000
Van Wert	OH	Findlay, Ft. Wayne, Lima	581,000
Octa	OH	Cincinnati, Columbus (OH), Dayton	4,666,000
Fithian	IL	Champaign, Danville, Decatur	269,000

Table 5 shows that both the Greensburg, Indiana and Octa, Ohio sites have a much larger employment base than their competitors. This fact was compounded by

Honda's concern that both of the Ohio sites may cannibalize the workforce of their nearby suppliers. As Ohio's Lieutenant Governor and head of the Ohio Department of Development told *The Plain Dealer* [14], "Honda said a major reason the automaker chose Indiana was its concern that putting the 2,000 high-paying assembly jobs in Ohio would lure workers away from Honda suppliers". Further labor incentives offered by the Indiana plant were highlighted by Greensburg Mayor Frank Manus in *Asia Times* [7] that the plant would be a "real shot in the arm for Greensburg", because a bearings plant that had been in the town for more than 40 years left in 2000. He goes on to say that the city "went from an unemployment rate of just 1.5% in 2000 to 5% today. We've been actively trying to attract new factories". Based on all of the previous information, it is clear that from a labor perspective, the Greensburg, Indiana site is optimal for Honda.

## GOVERNMENT INVOLVEMENT ANALYSIS

### *Incentives from State Proposals*

Incentives from proposals can influence a company's facility location choice. The director of the Automotive Communities Program at the Center for Automotive Research, Kim Hill, said [15] that the decision would not be decided on the amount of state incentives because "that's not the way Honda works". Even if it is not a major factor under consideration in the facility location planning process, it is still one that cannot be overlooked either.

Indiana offered some pretty impressive incentives with their proposal to Honda. The state government promised Honda \$141.5 million in incentives. Approximately \$41.5 million of this would go directly to the company, in the form of tax credits (\$22 million), abatements (\$18 million), and training assistance (\$1.5 million) [16]. In addition, another \$44 million was promised to improve the roads and infrastructure for the factory, and \$56 million to improve the roads and infrastructure for the general area [17].

Although exact incentives from other competing states are not known, it is assumed that these states also put together attractive incentive packages. Fred Burkhardt, the Walworth County Economic Development Alliance Executive Vice President, said [18] that the company was offered "a very healthy incentive package" from Wisconsin.

### ***Taxes***

As was already mentioned, the bids placed by competing states likely had great tax credits. With that said, corporate tax rates of the different states would still be a consideration for Honda. Table 6 below summarizes 2006 corporate income tax rates, as reported by the Federal Tax Administration [19]. From this table, it appears that Illinois has the lowest tax rate for companies, followed by Wisconsin. It should be noted that Michigan's single business tax is 1.9% of the sum of federal taxable income, compensation paid to workers, dividends, interest, royalties paid, and other items.

Table 6: Corporate Income Tax Rate Comparison.

State	Tax Rate	Tax Bracket
Illinois	7.3	Flat Rate
Indiana	8.5	Flat Rate
Michigan	Single business tax	Flat Rate
Ohio	5.1 - 8.5	50,000
Wisconsin	7.9	Flat Rate

### ***Workers' Compensation Costs***

Another consideration in deciding facility location is workers' compensation insurance costs. According to the Department of Consumer and Business Services, Indiana employers have one of the lowest workers' compensation premium rates. In a 2006 ranking of states (including Washington DC) from highest premium rates to lowest, Ohio was ranked #12, Illinois #20, Michigan #39, and Indiana #50. Indiana ranked second lowest only to North Dakota [20]. The Columbus Dispatch also notes [3] that in Ohio state benefits "are more generous and continue longer than in Indiana, and although Honda is self-insured, it generally matches state benefits".

## **ADDITIONAL CONSIDERATIONS**

### ***Previous Success Stories***

In order to select a location, Honda probably looked at their previous successes in different regions. Honda already runs successful production operations in Anna, East Liberty, and Marysville, Ohio, which probably helped in giving the Midwest the edge over the South. The East Liberty and Marysville auto plants, which currently assemble most of Honda's car models, would be very similar to the new facility. In this way, the

two proposed Ohio sites might have been a safer choice, as Honda is already familiar with establishing similar facilities in the state.

### ***Land Value***

Land value impacts facility location planning, especially when dealing with a large amount of land, as is the case with the 1700-acre site for Honda. In the acquisition of land, the company offered 75% above the assessed value. As most of the proposed sites were rural, we can compare the agricultural land values for the five competing states. The Office of Social and Economic Trend Analysis provide average values per acre from 2001 [21]. These land values are summarized below in Table 7. If Honda based its decision on land values alone, Wisconsin would be the optimal site for its new facility.

Table 7: Average Agricultural Land Values.

<b>State</b>	<b>Average value per acre</b>
Illinois	\$2,450
Indiana	\$2,450
Michigan	\$2,250
Ohio	\$2,400
Wisconsin	\$2,000

### ***Expansion Space***

Room for expansion is another factor in facility location. If a facility plans to expand, it is important not to choose a location that inhibits expansion. While the new Honda plant will employ 2000 initially, it will be designed to handle 3500 people [22]. The company plans to expand within the new facility, and may eventually decide to build additional facilities for further expansion. These additional facilities could perform various functions, including assembly operations or parts production.

When Honda opened up bids for the manufacturing facility, they required sites of at least 1,000 acres for their 1 million plus square foot plant. The Greensburg, Indiana proposal exceeded this requirement, offering 1700 acres [11]. An aerial shot of the Indiana site in Figure 4 shows ample room for expansion [5]. Walworth County, Wisconsin pitched two potential sites with 1,600 and 2,000 acres each, also allowing for expansion space [23]. The Fithian, Illinois site was similarly 2,000 acres [24]. It is

assumed that all states proposed large enough sites to allow for expansion, making expansion space less of a deciding factor for Honda.



Figure 4: Aerial shot of Greensburg, Indiana site.

### ***Environmental Regulations***

Environmental regulations may play a part in determining facility location. This is unlikely in Honda's case though, as they are a very environment-conscience company. According to a company statement [25], the new plant will use "advanced methods of energy and emission reduction with the goal to become a 'zero waste to landfill' factory".

### ***Weather***

The climate of the facility location is important primarily for transportation purposes. An extremely snowy location could pose transportation problems for the facility during the winter months. This was probably not a main consideration in Honda's decision, as all five of the Midwest states competing for the Honda plant have similar weather patterns. However, Michigan and Wisconsin do have higher snowfall averages, making them less favorable locations than Illinois, Indiana, and Ohio.

## **CONCLUSION**

Based on our analyses of existing suppliers and customers, labor, government involvement, and various other considerations, Honda has made a very good decision in locating its new facility in Greensburg, Indiana. Alternative sites in Illinois, Michigan, Ohio, and Wisconsin did not prove to offer the company as many advantages as the Indiana site. The well-chosen facility location will aid Honda both in producing its 4-cylinder vehicles efficiently and expanding its US operations.

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