

# SIEMENS

*Ingenuity for life*



**GEOMETRIC  
SOLUTIONS**

Automotive and transportation

## Chery Automobile

Quality drives Chinese automaker; on route to creating a world-famous name

### Product

Tecnomatix

### Business challenges

Improve product quality

Reduce production and maintenance costs

Expand brand image; strengthen competitiveness in the global market

### Keys to success

Dimensional tolerance analysis software that simulates manufacturing and assembly processes

Tecnomatix data in lightweight JT format

Siemens' extensive knowledge of dimensional management and expertise in implementation

### Results

Complete vehicle dimensional analysis helps meet the company's product quality targets

Production problems identified early in the product development cycle

**Tecnomatix software helps Chery diagnose and reduce design quality defects, achieving significant savings for each problem found prior to manufacturing**

### China, then the world

Chery Automobile Co., Ltd. ("Chery") was founded in 1997 by five state-owned investment companies with an initial capitalization of RMB 3.2 billion (nearly US\$500 million). Plant construction commenced in 1997 and the first car came off the production line on December 18, 1999. In August, 2007, the company's one-millionth car rolled out, signifying Chery's success in building an independent Chinese brand. As China's number-one passenger vehicle exporter for seven

years, the company is now on its way to creating a world-famous name.

Chery currently owns four brands: Chery, Riich, Rely and Karry. Its product line includes passenger vehicles, commercial vehicles and mini cars. Chery presently has the capability to produce 900,000 vehicles and engines, and 400,000 gear-boxes per year.

### Dimensional analysis

Quality, which is closely linked to product performance, reliability, comfort, styling and the customer's purchasing decision, is at the core of Chery's competitiveness. The company holds ISO 9001 and Rhine's ISO/TS16949 certifications. In recent years, it has initiated other quality control procedures, including the establishment of standards, strict project controls and new



### Results (continued)

Increased vehicle and process optimization

Avoided errors, eliminating rework time and costs (\$150,000 saved on one mold)



testing equipment and methods. To specifically address product quality, Chery has implemented: 1) structural analysis, process assessments, product and process design evaluation, and complete vehicle testing during the R&D stage; 2) process review and control at the design phase; and 3) the use of multiple testing methods, data analysis, and feedback at the production stage.

Dimensional analysis is one of the advanced concepts Chery implemented after seeing how valuable this practice has been to automobile assembly plants in developed countries. "A dimensional engineering team can help improve the quality of the car body," says Wu, Shiqiang, director, Process Technology Department, Engineering Planning and Design Institute I at Chery. "At the initial design stage, they can analyze whether the structure, positioning and assembly methods meet

technical specifications, and ultimately suggest how to optimize these factors to enhance the quality of body design."

Chery's first dimensional analysis method was based on the 2D dimensional chain calculations, which can be inaccurate and do not work well for complex products such as automobiles. That led them to look for a better method, which turned out to be Tecnomatix® software with its Variation Analysis (VSA) component, a powerful dimensional analysis tool used to simulate manufacturing and assembly processes and predict the amounts and causes of variation.

"After evaluating a number of possibilities, we were impressed by the powerful functionality of Tecnomatix, as well as by the fact that Siemens has an engineering team in North America dedicated to dimensional analysis," says Shiqiang. "We were also aware that Siemens has been collaborating with Ford over the years and we believed that they could provide us with valuable assistance. Those are the reasons we chose Tecnomatix."

#### Predicting problems before they happen

Chery uses Tecnomatix Variation Analysis software for manufacturing and assembly workflow simulations. The software performs the assembly process and builds the dimensional chain for the product virtually. Using the Monte Carlo principle, it determines post-assembly dimensional errors and analyzes the factors causing the errors.

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Wu Shiqiang  
Director  
Process Technology Department  
Engineering Planning & Design Institute I  
Chery Automobile Co., Ltd.

# *“By using the JT format, Tecnomatix reduces memory requirements by approximately 70 percent, speeding up the response of the system.”*

Wu Shiqiang  
Director  
Process Technology Department  
Engineering Planning & Design Institute I  
Chery Automobile Co., Ltd.

“This lets us assess and optimize the product design, configure part tolerance, improve the positioning and assembly processes, and manage and take control of downstream manufacturing errors,” says Shiqiang.

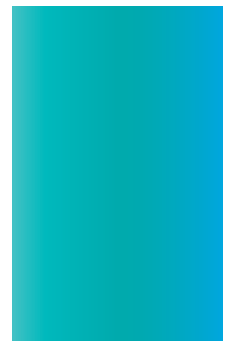
Tecnomatix is a 3D simulation system. It creates a 3D model that includes tolerance distributions of parts and components, installation and positioning methods, the assembly sequence, fixing methods, accuracy requirements, and measurement plans and methods. It offers simulation analysis results that closely reflect actual assembly conditions for complex shapes and relationships. An important factor in the success of Tecnomatix in this application is that the software uses the lightweight JT™ data format. “The quantity of data needed to represent a complete vehicle is very large,” explains Shiqiang.

“By using the JT format, Tecnomatix reduces memory requirements by approximately 70 percent, speeding up the response of the system.”

“From the beginning, we have had an ambitious plan for quality improvement, including complete vehicle dimensional analysis similar to what is done in North America,” says Wu. “Since implementing Tecnomatix, we have gradually established a comprehensive dimensional engineering process beginning with preliminary benchmark analyses and the definition of a dimensional technical specification, through to 3D virtual assembly and simulation, and quality control.” The dimensional engineering team is mainly responsible for dimensional analysis and quality control work for entire new vehicles, but also works on changes made to existing models.

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### Solutions/Services

Tecnomatix  
[www.siemens.com/tecnomatix](http://www.siemens.com/tecnomatix)  
JT  
[www.siemens.com/plmcomponents](http://www.siemens.com/plmcomponents)

### Customer's primary business

Chery Automobile Co., Ltd. is China's largest independent manufacturer of passenger cars.  
[www.cheryinternational.com](http://www.cheryinternational.com)

### Customer location

Wuhu, Anhui Province  
China

### Savings add up

The implementation of Tecnomatix Variation Analysis software and synchronized dimensional engineering significantly enhances Chery's ability to predict problems prior to production. For example, an assembly issue with one vehicle's headlights was found during the analysis. Fixing the problem in software before molds were made spared the company the 1 million Yuan (around US\$150,000) cost to modify a mold. "And of course, this also eliminated delay in manufacturing," says Shiqiang.

Dimensional engineering provides a quality management collaboration platform for engineers of different departments within Chery, including product design, engineering, manufacturing, fixture development, quality inspection, and quality control. So far, Chery has performed complete vehicle dimensional analysis for a number of



projects and has established a collaboration mechanism between product design and process planning. The Tecnomatix solution has enabled the company to analyze, assess and optimize vehicles in a systematic manner. "The idea is to solve problems in the early stages and minimize the waste of time and money," says Shiqiang. To date, dimensional engineering has been used for Chery's medium-to-high class vehicles. In the future, the company plans to expand its use to all vehicle models.

*The implementation of Tecnomatix Variation Analysis software...significantly enhances Chery's ability to predict problems prior to production.*



844-GEO-SUPT  
[support@geoplmm.com](mailto:support@geoplmm.com)  
[geoplmm.com](http://geoplmm.com)

### Siemens PLM Software

Americas +1 314 264 8499  
Europe +44 (0) 1276 413200  
Asia-Pacific +852 2230 3308

[www.siemens.com/plm](http://www.siemens.com/plm)

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