

**Industry:**  
Automotive

**Organization:**  
Siemens Automotive

**Description:**  
Siemens Automotive, a division of Siemens AG, is a tier-one supplier of automotive and electrical — electronic systems and components with applications covering gasoline and diesel powertrain systems, safety and chassis systems, body electronics, electric motor drives and driver information systems. Worldwide sales in fiscal year 1999/2000 totaled \$3.7 billion.

**Business Problem:**  
Time and effort was lost in testing efforts because they were not using one testing methodology throughout the company.

**Rational Solution:**  
Rational Test RealTime

**Key Benefits:**  
Employed a consistent, company-wide testing methodology by using a single tool for all target architectures

Leveraged their vast wealth of experience and internal knowledge base with tools that supported their process through- out the development / testing lifecycle

Increased productivity due to shortened unit testing and component integration time

Successfully developed software and hardware simultaneously resulting in reduced time-to-market

**Rational** software

## Siemens Automotive Tests All Target Architectures with Rational Test RealTime

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Siemens AG, headquartered in Berlin and Munich, is a leading global electronics and engineering company, employing over 447,000 people in 193 countries, with worldwide sales in excess of \$74 billion in fiscal 2000 (10/1/99 - 9/30/00).

The United States is Siemens' largest market, where it employs over 73,000 and recorded sales of more than \$17 billion in fiscal 2000. Siemens leads the information and communications, medical, power, automation and control, transportation and lighting sectors by leveraging its unparalleled technological heritage and global network of innovation to deliver business results for its customers around the world.

### Test Requirements at Siemens Automotive

The electronic control units developed by Siemens Automotive SA are distributed to companies throughout the world. Some are produced in volume over one million units. This demands an extremely stringent development process that culminates in a fault-free end product. The process involves both hardware and software. In the case of software, testing accounts for approximately 50% of total development time. Tests are conducted in three phases:

1. Unit tests aimed at checking how the components of the application behave without any hardware constraints.
2. Software-hardware integration phase in a laboratory-simulated external environment.
3. Final validation in the actual environment (onboard a vehicle).

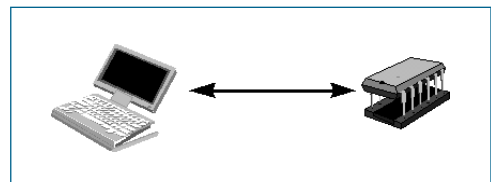
The Siemens development process has two main characteristics:

1. A wide range of target platforms is used. Siemens programs in C on Windows or UNIX host platforms for a wide range of targets including:
  - 80C166 and 80C167 on the ERT
  - evaluation board 68oXo with the Mentor Graphics' XRAY debugger
  - TI's TMS730 with the COSMIC simulator
  - 80C51 with the KEIL simulator
2. An iterative development process requiring non-regression test sets.

### The use of Rational Test RealTime Unit Testing feature at Siemens Automotive

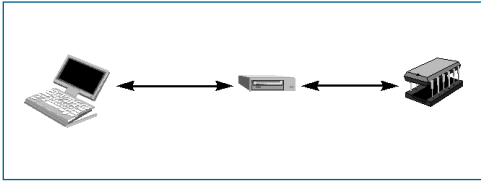
Since 1993, Siemens Automotive SA has chosen to use the Rational® Test RealTime Unit Testing feature for unit tests on all the electronic control units it develops.

The following pictures illustrate the test architecture used by Siemens in conjunction with Unit Testing feature:



*Rational Test RealTime Unit Testing feature used with a target monitor*

**IBM**®



*Rational Test RealTime Unit Testing feature used with a target emulator*



*Rational Test RealTime Unit Testing feature used with a target microprocessor simulator*

## Results

For Siemens, the main advantage of the Unit Testing feature of Rational Test RealTime lies in being able to use the same tool for all target architectures. The resulting benefits are numerous:

- Capitalizing on know-how is essential for broadcasting test methodology throughout the company. Because it is independent of the development environment, Rational Test RealTime's Unit Testing feature provides this capability. As a result, an engineer changing projects will be able to apply the same method to the new project, even if the development environment is different.
- By providing a unique test scripting language (same test and report language), corporate quality aspects are supported by Unit Testing.

The second major advantage for Siemens is the component test productivity gain provided by Unit Testing.

Test RealTime's powerful test language lets you specify component tests very rapidly. Introducing Unit Testing into the development process has allowed Siemens to drastically shorten its unitary testing phase and, thanks to higher component reliability, to reduce integration time.

The multi-target capabilities of Unit Testing now allow companies to develop software and hardware simultaneously and therefore greatly simplifies the software-hardware testing task. The time required to bring products to market has thus been diminished.

Over 80 Siemens Automotive developers today use Rational products on a daily basis. These developers are located at various sites throughout the world such as Toulouse (France), Regensburg (Germany), and Detroit (USA).

## About Rational

Rational provides a software development platform that improves the speed, quality, and predictability of software projects. This integrated, full life-cycle solution combines software engineering best practices, market-leading tools, and professional services. Ninety-six of the Fortune 100 rely on Rational tools and services to build better software, faster. This open platform is extended by partners who provide more than 500 complementary products and services.

### IBM Rational software

Dual Headquarters

18880 Homestead Road  
Cupertino, CA 95014

20 Maguire Road  
Lexington, MA 02421

Toll-free: (800) 728-1212  
Web: [www.ibm.com/rational](http://www.ibm.com/rational)