COSMOS is committed to providing its customers with the highest quality of design analysis software. Quality assurance department at COSMOS is responsible for verification and final approval of all COSMOS product releases on all supported platforms.

Metrics are used to measure software quality during the development cycle and to set release criteria for major releases and service packs.

Testing processes consist of manual product testing against documented web-based test plans and daily execution of a large number of automated regression tests. Quality assurance procedures are dynamic and evolving processes. New models are continuously added as test cases to the large array of existing problems in test database. Continuous efforts are made to develop new testing techniques and obtain new tools to check the products more rigorously.

In addition, the fact that more than 14,000 companies worldwide in all engineering related fields and applications use the COSMOS products is, by itself, a testament to the quality of the software.

The following document describes in more detail the processes followed at COSMOS to develop a world class design analysis software.
**COSMOS QA process details**

**Processes for current release**

COSMOS service packs are identified by a major and a minor number. For example, COSMOSWorks 2005 SP3.1 uses 3 as the major number and 1 as the minor number. Major service packs contain a large number of bug fixes and released at regular intervals. Minor service packs are released only on an as-needed basis to fix very critical bugs that cannot wait until the next major service pack release.

A list is prepared of all the bugs be fixed for every service pack. Specific bugs are selected based on severity, frequency of occurrence during regular software usage and the impact it has on the customers business. Identified bugs are fixed by the developers and verified by quality assurance department before each service pack release.

Typically, two types of tests are performed to ensure all functionalities work as intended in the service pack. Manual testing is conducted based on documented test plans covering all the major features of the software. Automated regression testing is conducted with over 7000 test cases covering all functionalities of the software.

If the tests detect any errors caused inadvertently due to the changes performed in the software code to fix the bugs, it is reported to the development for repair and further verification by QA. Service pack is also checked for installation on all supported operating systems, languages, and different license types. Any solver related bugs are added to the automated regression testing suite to prevent the recurrence of the bug in all future service packs and releases. Release notes are prepared listing all the bug fixes in a particular service pack and the information is relayed to the customers who initially reported the bug.

**Processes for new release**

COSMOS releases are identified by year, e.g. COSMOSWorks 2005, and each contains many new functionalities and customer-requested enhancements. Quality assurance gets involved in the development of the new release from the very beginning to ensure that quality is built into the software. Following are the QA processes followed for new releases:

**Unit Testing**

Every new functionality gets checked in accordance with a documented test plan. Unit testing covers:

**Correctness** – Working of new functionality as intended.

**Completeness** - All the items listed in the specification have been implemented and every button, dialog box and text field that is part of the new functionality are checked.

**Reliability** - Each required operation executes every time without failure or error.

**Usability** - Intuitiveness of user interface, with fewer operations required to accomplish task and has clear documentation.

**Boundary value testing** - Entering decimal values, negative values and incorrect numerical format.

**Blind test (New user testing)** - Tests are conducted by using the software like a new user who is completely unaware of how the new functionality has been implemented. The program is supposed to give appropriate informational, warning or error messages to guide the new user to use the functionality effectively.

Testing is performed using variety of test cases including verification models (models containing analytical solution) and real life customer models.
**User case scenario testing**

This includes testing the sequence of steps users typically employ to use the new functionality or enhancement in a real world environment. Test of the compatibility of new functionalities with studies or models created in the previous release of the software.

**System Testing**

Check new functionalities in conjunction with other features on all supported operating systems as well as in foreign languages. In addition, supporting documentation is checked such as online help and tutorials for new functionality.

**Performance Testing**

To ensure that the new functionality or enhancement doesn’t slow down the software when compared with previous releases, performance tests are conducted with very large models. On an on-going basis, models developed to verify and validate new functionalities and enhancements are added to automated regression testing suite and manual test plan database. Automated regression testing is conducted with over 7000 test cases covering all functionalities of the software. The test cases include all tutorial models, verification models, customer reported models and in-house developed models.

**Bug reporting process for Customers**

When customer finds a bug or wants to request an enhancement in the software they can report it to COSMOS technical support engineers. The technical support engineer verifies the issue and enters it in the Software Performance Report (SPR) database. Bug is then fixed by the developer and the fix gets verified by a quality assurance engineer. When the task is complete, COSMOS sends an email notification to the customer informing that the bug has been fixed along with the release and service pack number in which it is fixed.

**Beta testing program**

**What it is?**

When all the new functionalities and enhancements planned for the new version of the software have been implemented and checked in-house, a beta release goes to a limited number of customers who have the COSMOS subscription service. The primary purpose of the beta program is to have new functionalities tested by customers in real-life situations, and to receive feedback from them.

**How it works?**

Customers check the existing and new functionalities of the software and report bugs and suggest improvements to the product through a beta test web-site. Full-time staff, drawn from technical support, QA and product definition groups, verifies the bugs and enhancement requests from the customers and send them to developers to be fixed. For every valid bug or enhancement request reported, customers receive points based on the severity of the issue. The company awards prizes to those customers and VARs who have amassed the greatest number of points during the beta test period.
How it benefits customers?

The active participation of customers in the beta program helps to expose bugs early on in the software development cycle and leads to a fewer number of bugs in the commercial version of the software. Fewer bugs help to shorten the customer’s product development cycle, reduce cost and improve customer satisfaction.

Customers significantly benefit from the beta program by gaining:

- Improved stability & robustness of software that has already been tested by customers on a variety of software and hardware configurations.
- More complete new functionalities based on the comments and feedback about how the new functionalities actually perform in a real life environment.
- A smooth transition from the current release version to the new version of the software.