



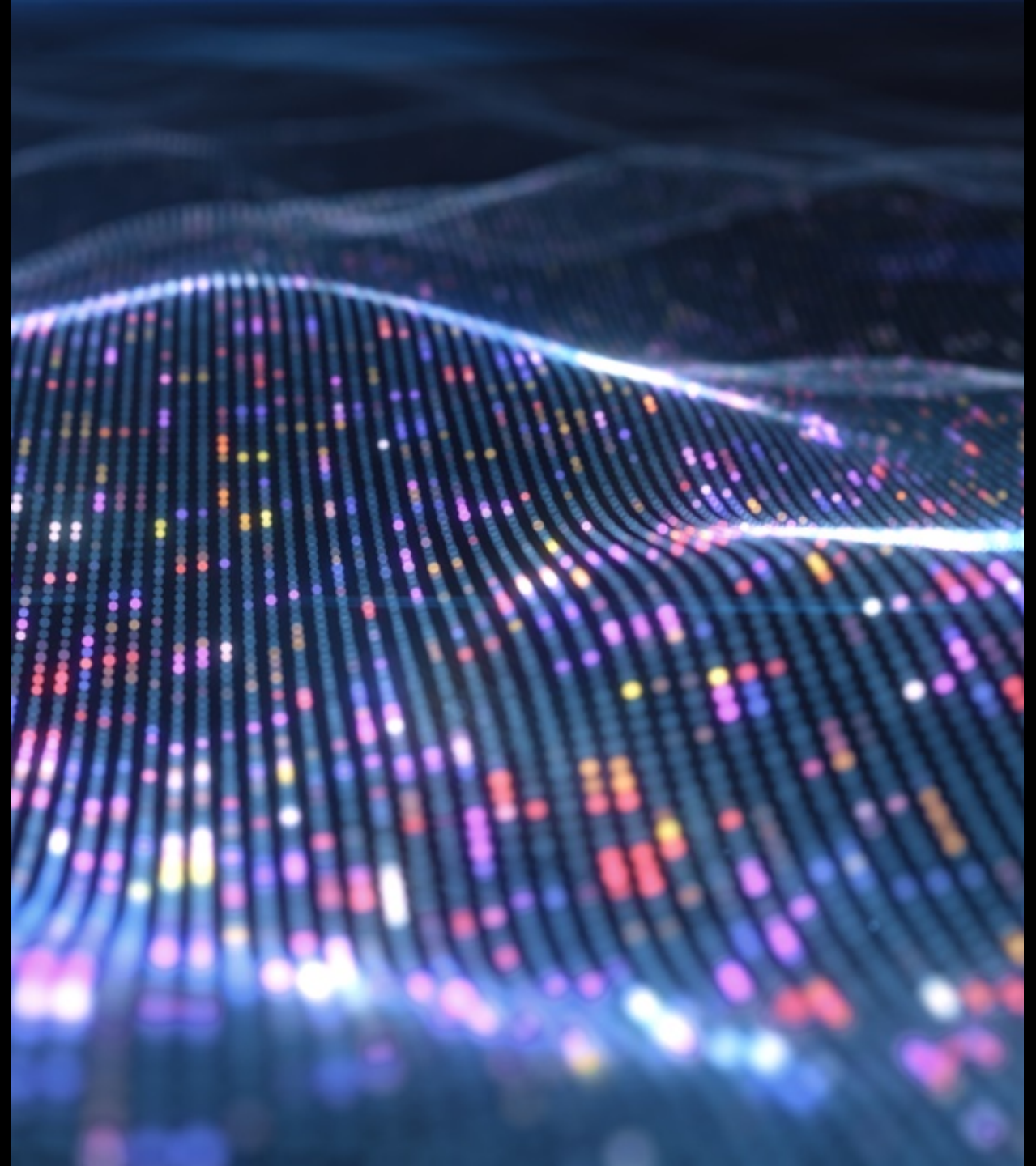
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Alliance
Partner

Digital Industries
Software

SIEMENS

PLM Quality Assurance
Case Studies



Siemens Expleo Partnership

Highly scalable automated regression testing of Teamcenter



THE OBJECTIVE

Improve the quality of builds and releases by early detection of bugs through large scale regression test automation.

THE CHALLENGE

- Teamcenter is continually enriched with new features requiring a thorough QA process as any other product handling complex workload
- Manual testing of thousands of test cases is not practical
- Test case automation is the only solution
- Test cases are complex due to customer customizations, Integration with different PLM & ERP Products

THE SOLUTION

- Automation of functional regression testing using Expleo Test Automation Framework taking full ownership of development, execution and maintenance
- Robust framework of reusable functions
- Saves time and effort for customers to build their automation test assets
- Lowers the cost to create and maintain test assets

THE RESULTS

8.2K+

Test cases automated

600k+

Executions till date

85%

Reduction in execution time

- Nightly and unmanned regression test execution
- Successful migration from 8.3 to 13.x
- Test coverage, early error detection, automation scalability, robustness and maintenance, adhering to release timelines
- Automated test cases are now the leading indicators of the quality of each build of Teamcenter
- Cost of automated regression testing over multiple releases and patches is significantly lower than manual regression testing.
- Ready to use Test Automation assets for Siemens Customers



Our partnership with Trissential/Expleo has allowed our customers to effectively automate their testing suite, enabling the reliability of business-critical functions as updates and patches are rolled out. We have seen customers greatly streamline their testing processes with test automation thanks to these solutions and we are delighted to be able to extend this Alliance bringing those benefits to all our Teamcenter customers worldwide.



- Joe Bohman, Sr. VP, Lifecycle Collaboration Software – Siemens Digital Industries Software

Siemens Software & Technology Partner since 2005
SI Partner since 2021



Wabtec Corporation

Automated Regression Testing



THE OBJECTIVE

Improve the quality of Teamcenter RAC and AWC build releases and early defect detection through regression test automation.

THE CHALLENGE

- Teamcenter builds and release cycles taking too long in highly customized engineering and manufacturing
- Application was not stable due to continuous enhancements and updates across multiple releases
- No defined Quality process which led to defects throughout the lifecycle
- Teamcenter performance issues not identified

THE SOLUTION

- Automation of functional regression testing leading to timely and efficient execution of complex modules within engineering and manufacturing
- Deploying quality testing leadership and SMEs to manage and deliver a well-defined test strategy across development and QA
- Delivered proven and robust framework of reusable functions for automation
- SUPER BOT application implemented to identify and manage Teamcenter performance issues

THE RESULTS

75%

Automated regression suite reduced 75% of resource effort

66%

Automation regression suite reduced cycle duration time by 66%

- 822 test cases automated including sanity and regression
- Increased Test coverage, early error detection, automation scalability, robustness and maintenance, adhering to release timelines
- No defect leakages within production 4+ releases
- Standardized quality levels across project and program



The Trissential/Expleo team continues to be instrumental to our entire Quality Assurance process across engineering. The team's expertise in engineering software testing and PLM automated regression has been a great asset in our agile journey.

The test case planning, development and execution led to success in our PLM deployments and reduced our time to release while increasing our ability to minimize and eliminate defects. We are very pleased with the success and results your team has provided over the years and look to your guidance and partnership as a trusted partner.

- QA Release Manager



Applied Materials

Teamcenter-CADx, AWC, Core+



THE OBJECTIVE

To implement an automation framework which

- Provides a platform to execute on different set of environments
- Reduces overall execution time without any manual intervention

THE CHALLENGE

- Complex test scenarios having different CAD/CAM integration like NX, Solidworks, iPEM, Inventor, SAP & Oracle
- Performance of Dispatcher Services which sends the requests and responses for approvals is inconsistent
- Performance of VMs for execution is challenging while handling multiple processes(Server and DB) at a time
- Portability of test scripts across different groups and sites to handle changes
- Run time approver assignment, multiple approvers, multiple logins

THE SOLUTION

- Use of a robust automation framework(UFT & Selenium) already proven at Siemens PLM and customized for integration with Legacy Applications, SAP and Clearcase to automate 30000+ test cases
- Automated Execution of Health Check as part of Sanity at start of Sprints for testing their legacy PLM apps
- Implementation of CT(Continuous Testing) with COBOTs(Collaborative BOTs) integrated with CI(Jenkins) and BI (Tableau) Tools for real time health report of system & analysis time reduction and quick turnaround in maintenance
- Implementation of Single User Experience Testing for all CAD and Tc-CADx for baselining the performance

THE RESULTS

12k+

Test cases automated

200k+

Executions till date

85%

Reduction in execution time

- Automated 9000+ RAC test cases using UFT & API and 500+ Active workspace and 2700+ Legacy test cases using Java-Selenium providing optimal test coverage for customer business processes
- Support quarterly major and minor releases by automated regression execution of 10k+ test cases every quarter
- Improved test coverage and reliability
- Easier/faster detection of issues due to changes in application behavior in different groups and sites
- Quality assurance partners for customer's PLM upgrade journey



The test automation helped improve testing of complex ECx workflows involving Siemens Teamcenter® and SAP® across multiple groups and sites. Guys, It is the most amazing moment we have all been waiting for. After the long planning phase, going through requirements and design, take the solution through development work, and making sure all is ready during Test and data migration activities. We have got to this moment with your great teamwork. Thank you for successful Cutover.



- Managing Director, IT Solution Management GIS, AMAT

THE OBJECTIVE

Improve the quality of PLM builds and CAD releases by early detection of bugs. Set up testing strategies and processes for the PLM/CAD releases and upgrades.

THE CHALLENGE

- No systematic testing approach and tools to know requirement / testing coverage and to gauge confidence
- A planned upgrade of Teamcenter with concerns around the various integration versions to select
- Development of automation suite to test Teamcenter and its integrations with multi-CAD products viz. AutoCAD, Inventor, SolidWorks, ProE, NX & Catia
- OS patch upgrade each month needs PLM, CAD and Integration validation

THE SOLUTION

- Identified and optimized the manual test cases for Automation
- Prepare Automation regression suite for Teamcenter and all CAD integrations
- For the upgrade Heat Map tool to assess upgrade risks with visual interpretation of impact analysis
- Teamcenter & CADx Compatibility Matrix to select right versions for upgrades
- Prepared Smoke suite for monthly OS patch execution and Production sanity and integrated ALM and Jenkins to trigger test cases via an email
- Active workspace- NX integration test automation

THE RESULTS

30%

Automation efforts saved

26%

Execution time saved

10%

Reduction in maintenance

- **Automated 700+ RAC test cases using UFT and 450+ Active workspace test cases with Java-Selenium providing 100% coverage for TI business processes**
- The 69 RAC and 44 AWC automated Smoke test suite is executed every month saving 75% worth of manual effort and compressing execution cycle time by 50%
- Efficiently performed QA in Agile development POC for PLM Teamcenter
- Quality assurance partners for TI's upgrade journey from Teamcenter 10.X to 11.6



This has never happened before and is an excellent testament to the value that our partnership with Expleo brings to our deployment activities. We can now announce to our business users that the upgrade is complete with a greater degree of confidence that we have deployed a quality build.

- Global PLM Director



Performance Testing

Highly scalable automated performance testing of Teamcenter

THE OBJECTIVE

Measure the existing production performance and compare it with the newly setup Cloud environment to validate that cloud is faster and better compare to On-prem environment.

THE CHALLENGE

- Upgrade of Teamcenter from 11.X to 13.X
- Multiple test environments were built with different configurations
- Needed through analysis so that necessary changes could be made to improve performance on cloud
- Client already has few configuration monitoring systems of their own which makes it a bit complex to automate

THE SOLUTION

- Developed 70+ Test cases to provide in depth analysis of the infrastructure performance
- Executed Load / Stress / soke and spike test
- Existing production on-prem readings were taken as benchmark
- Validation was done on test environments and pre-prod environments
- The results of the test environment were share so that necessary changes can be made to improve performance
- The entire performance suit was run pre-and post - production to calculate if there is any delta

THE RESULTS

54%

Processes shows improvement

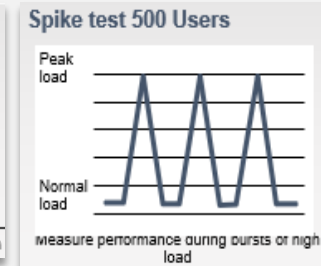
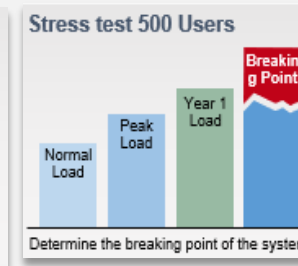
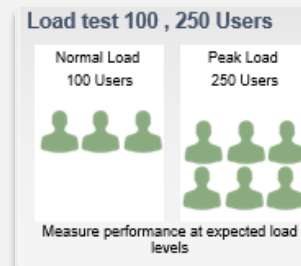
33%

Processes shows same performance

0%

Configuration errors

- Three execution per day on one environment to check performance on various time zones
- Considerable improvement in performance after migration
- Improvement is critical functionalities like login / quick search / JT load and send to structure manager and expand BOM
- The latest execution reading is now the benchmark for production environment
- Performance is monitored with every major or minor release and compared to benchmark value



Leading U.S. Automotive Giant

Performance Testing of customized Teamcenter

THE OBJECTIVE

To measure response times of transitions of 49 key functionalities across 7 modules – Europe and US users. To benchmark the transaction response times for various user load (50, 100 and 200 concurrent users)

THE CHALLENGE

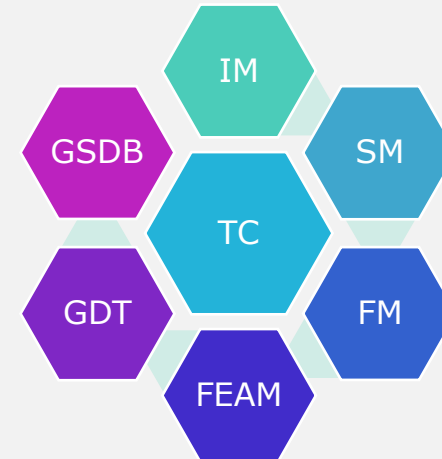
- No Performance testing conducted in the past and no NFR available
- Users from Europe complaining about Performance.
- Multiple Geo application – Users from US, Mexico and Europe
- Limited time window for Performance testing due to environment sharing between Functional QA, PT and UAT users

THE SOLUTION

- Load, Stress and Endurance testing – To benchmark results and know application performance from Europe location
- Testing during US-Europe overlap time to get the actual network bandwidth
- HP LoadRunner with load agents in US and Europe
- Pre as well as Post tuning test executions – total 16 test execution rounds

THE RESULTS

- **Highly customized, an integrated solution based on Teamcenter IT platform.**
- **A PLM (product lifecycle management) solution which addresses in-house EE/SW specific needs**
- Improved / Better user experience – All major Performance issues detected with this testing are corrected by Siemens with TC server configurations settings
- Able to identify the concurrent users limit on environment
- Worked with Siemens to configure and tune right parameters



Leading Global Automotive Seat Manufacturer

Load Testing of Multi-site Teamcenter instance

THE OBJECTIVE

- To performance test Teamcenter multi site instance and benchmark the results
- Ability to size the infrastructure and analyze the impact with user growth
- Capture the user experience from 4 geographic locations

THE CHALLENGE

- High user concurrency – 2000 for load test and 1800 for soak test
- Customer specific customized Teamcenter and many 3rd party interfaces controls (NX, CATIA and MS Office)
- Multisite architecture / Environmental setup (distributed employees, Partners and Vendors)
- Large legacy data handling, CAD data, Large assembly creation, Large file upload /download

THE SOLUTION

- SSO and non SSO tests, Well defined workload model
- Robust Framework for Performance Testing
- Six Sigma – Result reporting and comparative analysis
- HP LoadRunner 12.5 used as performance tool
- Proven process and methodology for conducting various types of Performance tests. Type of Performance Tests conducted:
 - Load test
 - Stress test
 - Soak test

THE RESULTS

- **Development driven Performance testing helped us in Horizontals and Vertical scaling of Infrastructure base upon Performance test results**
- Ability to size the Teamcenter environment as per workload Improved user experience – Six Sigma results reporting
- Release over release, location wise data and metrics available

Teamcenter, Active Workspace Automation Customers

Current & Past



The Trissential Story

2002: The Idea

The consulting industry needed another option – “a one stop shop” different from large SIs and local staffing

2003: Founded

Founded by Wisconsin native Keith Korsi – NAM CEO. Nine months later, first clients signed and first Essentialists™ hired to Minneapolis office

2015: Acquisition by SQS

SQS, the leading Quality specialist for digital business, acquires Trissential

2018: Merged with Assystem

Assystem Technologies, leading international engineering organization, acquires SQS

2019: Parent company rebrands as (expleo)

SQS/Assystem Technologies is now Expleo Group, and Trissential is an Expleo Company



\$1bn

in revenue

30+

countries in action

15,000

innovation-driven experts



A SOLID 40+ YEAR TRACK RECORD

Building on the
legacy of Assystem
Technologies
and SQS



HIGHLY SKILLED EXPERTS

Leveraging unique
know-how across
key industries



A TRUSTED TRANSFORMATION PARTNER

Recognized by
market leaders
for driving change



Supporting you with a deep range of services

BUSINESS TRANSFORMATION

OPERATIONAL EXCELLENCE

SUPPORT

INNOVATION MANAGEMENT & SOLUTIONS

TRANSFORMATION CONSULTANCY

DIGITAL TRANSFORMATION

PRODUCT & PROCESS ENGINEERING

MANUFACTURING & SUPPLY CHAIN

QUALITY & TESTING

CUSTOMER SUPPORT & MAINTENANCE

Design thinking
& lean startup

Business agility
& lean

Hyper automation

Systems engineering

Smart
manufacturing

Quality performance
management

Manufacturing
support

Innovation lab

Business analysis
& transformation

Advanced UI
& total experience

Product design
& engineering

Re-engineering
& prototyping

Quality assurance
& execution

Customer support &
after sales engineering

Sustainable design

Strategic consultancy
& CX

Big data, analytics, AI
& advanced algorithms

Product & process
lifecycle management

Manufacturing
engineering

Product testing

Environment, health
& safety

Go-to-market
strategies

Digital portfolio
management

Architecture
& integration

Embedded systems

Supply chain
excellence

Software testing
& integration

Lifecycle cost
optimization

Hydrogen
& energy solutions

Circular economy

Cybersecurity

FPGA & electronic
systems

Predictive
maintenance

Autonomous control /
ADAS

People & change
management

IoT & edge computing

RAMS

Software monitoring
& maintenance

E-mobility

Project management
office

Software quality
engineering

Training & upskilling

Digital twin &
digital thread



(expleo)



Let's connect.

CLICK HERE to schedule 30-minute
introductory call with our PLM Quality Team