

WHITEPAPER

# Ranorex-Teamcenter RDP with Industrialisation Approach

Cost Effective Ready Solution



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Amit Deshpande has been with SQS since 2015 and holds a bachelor's degree in Mechanical Engineering. His area of expertise is manual as well as automated testing using a variety of tools. His core competencies include Test management, Automation framework design and Automated test suite management. He has worked extensively on Manufacturing, Supply chain management, ERP and PLM applications and successfully led many testing assignments for global customers.

# Contents

Management summary .....	4
Keywords. ....	4
Introduction. ....	5
Market analysis – need of the hour .....	6
Ranorex-TC RDP – the unique approach .....	7
Risk-based strategic solution .....	7
Use of Ranorex®: cost-effective automation .....	7
Industrialisation methodology: efficiency, reuse and sustainability .....	8
SQS-TEST®/Professional: seamless test management and execution .....	8
Ranorex-TC RDP solution. ....	9
Conclusion and outlook .....	12
References .....	12

## Management summary

We are all affected by the faster-moving world, the changing practices and expectations that go along with it. Manufacturers are no exception and consequently they are obligated to tackle the all-important issues of reducing time-to-market, meeting customer orders, and doing so economically.

To meet these demands and stay competitive, their Product Lifecycle Management (PLM) system is evolving, with frequent enhancements and shorter release cycles. This poses a unique challenge to the Quality Assurance services for PLM customers – deliver the same or improved quality in a shorter test cycle; hence emerges the need for a risk-based test automation approach and that too at an economical cost.

This white paper addresses the above challenges with its unique approach benefiting from:

- Risk based strategy of the **Rapid Deployment Package (RDP)**
- Lower licensing costs with **Ranorex®**
- Seamless test management and execution with **SQS-TEST®/Professional**
- Reusability, efficiency and sustainability through the application of **Industrialisation** approach.

This white paper also elaborates on the actual solution and challenges faced by the team in implementing this approach with Teamcenter as the PLM System and Ranorex as the driver for test automation.

## Keywords

PLM

TEAMCENTER

RANOREX

RDP

INDUSTRIALISATION

## Introduction

In today's world, the physical size of organisations is no longer a guarantee of success. Regardless of industry, geography or size, modern manufacturers are repeatedly plagued by challenges:

- Meeting time-to-market goals
- Lack of innovation
- Merging IT with business, the difficulties of managing a complex IT environment.

Improved design productivity and product data sharing are seen as the leading cures for these challenges, and in this demanding and complex landscape, PLM has emerged as perhaps the most important enterprise IT application for supporting product and service innovation.

PLM is, in a sense, an evolution of one of the most significant breakthroughs in manufacturing history – Henry Ford's assembly line. But an assembly line ends when the product is built; PLM is still evolving to be more like an assembly line on a continuous loop. It follows the product through the manufacturing stage into the after-market, and then swings back around to the concept and production phase. This closed-loop approach gives insights into product performance which can, in essence, turn a once-mediocre product into a genuine category leader.

In industry, **product lifecycle management (PLM)** is the process of managing the entire lifecycle of a product from its conception, through design and manufacture, to service and disposal. PLM integrates people, data, processes and business systems and provides a product information backbone for companies and their extended enterprise.

Definition of PLM [1]

Increasing globalisation, individualisation, digitalisation and competition are changing the face of the manufacturing industry as we know it. In addition, increasing safety requirements and voluntary environmental commitments by the industry are also contributing to the changes ahead. To meet the above changes and stay competitive, a company's Product Lifecycle Management (PLM) system must evolve with frequent enhancements and shorter release cycles.

For Quality Assurance, the major challenge here is to deliver the same or improved quality at the same (or lesser) cost and with a reduced cycle time. Currently, in IT projects, testing is neglected because of increasing time or cost constraints. This leads to a lack of product quality, followed by customer dissatisfaction and ultimately increased overall quality costs. The answer to this challenge is test automation, testing more for less. The effective use of test automation is critical for organisations aspiring to have frequent PLM releases. For most, reliable and cost-effective testing is the only way forward.

Therefore, the search for affordable, reliable and reusable automation solution is need of the hour. Our approach of risk-based testing model is to enable businesses to deliver efficient, reliable and cost-effective quality management. Our solution, the **Ranorex-Teamcenter Rapid Deployment Package** (referred as Ranorex-TC RDP), offers a customisable automation suite focusing on Teamcenter's key functionality in the core modules.

Customers can pick their own pack of test cases from a pool of hundreds of test cases based on a risk-based Heat Map. The RDP has been built using an industrialisation approach with a state-of-the-art Ranorex automation tool, integrated seamlessly with the SQS-developed test management tool **SQS-TEST®/Professional**.

**This unique approach with the selection of cost-effective tools and methodology will offer the customer manifold benefits.**

## Market analysis – need of the hour

The PLM market grew 8% to \$37.6 billion in 2014, another solid year in the face of continued fluidity in the global economy. Most of the PLM market leaders had strong growth, and all continued to make strategic acquisitions to expand their portfolios and, in some cases, enter new markets. Looking toward 2019, it has been forecast that the PLM market will grow at a compound annual growth rate (CAGR) of 5.9% to \$50 billion [2].

Siemens PLM has probably the largest PLM market share covered by multiple Teamcenter products developed in the past. These days, Teamcenter is Siemens PLM's flagship platform, absorbing all existing and newly-developed PLM products and customers.

As companies push for greater business agility at lower cost and for better quality Teamcenter releases, Ranorex-TC RDP will be able to harvest the economic benefits by driving the shift towards automation and risk-based testing. As Teamcenter's application landscape become more complex with increasing features and integration with other applications, the unique industrialisation approach will keep the maintenance and upgrade costs low for this solution, thus keeping it competitive in the cost-driven future markets.

# Ranorex-TC RDP – the unique approach

## Risk-based strategic solution

SQS being a strong advocate of process-based testing and associated risk-based testing models to enable businesses to deliver efficient and cost-effective quality management, SQS has successfully introduced **Rapid Deployment Package (RDP)** to the market. We have used the same Package model to develop the Ranorex-TC RDP package; this is identified on the basis of change/risk in Teamcenter's key functions across the core modules. Customers get to choose a pack of test cases which are representative of medium- and high-risk modules based on new functionality or changes delivered in upcoming Teamcenter releases, and which are more relevant to their Teamcenter configurations. The 'heat map' illustrated in Figure 1 highlights these modules.

This is a ready-to-use solution enabling businesses to achieve a faster time-to-market of their products.

## Use of Ranorex®: cost-effective automation

Ranorex® is the heart of this solution; it is developed by Ranorex GmbH, a software development company for innovative software test automation solutions. Ranorex does not have a scripting language of its own, instead using standard programming languages such as C# and VB.NET as a base. Ranorex® test automation can improve the Software testing process of a software product/software application; as with any automation, the initial investment is high, but the related benefits pay off quickly.

Ranorex® provides a runtime license for automation suite execution. Only a premium license is required for your automation development needs. Companies need NOT pay a high license cost during the execution phase and this is a great saving in terms of licensing fees. Also, the Ranorex® license costs just a fraction of HP UFT, its nearest rival, thus increasing the customer's infrastructure savings.



Figure 1: Module wise heat map for Teamcenter 10.1

At the same time automation solution providers seek friendly learning curve that allows you to get started quickly and become more productive instantly. During our development of this RDP, we also realised that the Ranorex® Studio offers easy-to-use test automation tools for creating reliable automated testing projects. It allows you to optimise robust test automation frameworks for any desktop, web or mobile application. Additionally, a cross-platform testing option is available on all stated platforms in one test scenario.

### Industrialisation methodology: efficiency, reuse and sustainability

Industrialisation or the Factory approach is the latest trend in the market which, although low key and not as flashy as Cloud, IoT or Big Data, will have a lasting impact on how testing services are delivered to the market.

**Industrialisation** has five disciplines [3]:

- Modularisation,
- Specialisation,
- Standardisation
- Automation and
- Continuous improvements

Industrialised test automation is the result of applying these five disciplines of industrialisation to automation itself – delivering on the vision to support SQS' strategic goals of increasing the share of industrialised managed service projects from a methodology point of view by supporting the efficient and successful application of automation. Our RDP approach nets a number of key benefits of this methodology:

- A test script is split into small, reusable test actions called Action Words. An already developed test sequence can be separated into multiple test actions, and you can then reuse these test actions in multiple test cases. This approach of breaking down the solution into manageable pieces introduces a high degree of modularisation and reusability.
- Used this way, maintenance and the cost of maintaining the RDP suite will be less.
- Defined and proven rigorous best practices at all levels of abstraction, ranging from flow and solution architecture to templates and structures, are deployed to manage assets.
- Going forward, people who work based on a factory approach can use their knowledge and experience from previous tasks in the same or a similar domain, allowing the factory as a whole to become much more efficient.

### SQS-TEST®/Professional: seamless test management and execution

The SQS-TEST® suite is integrated and bundled with the Ranorex-TC RDP package, thereby constituting a one-stop solution for the customer. It is a test management and functional testing suite that looks at the entire software quality lifecycle. The solution covers lifecycle aspects such as requirements management, test design, test execution and control, test planning, analysis, and reporting (Figure 2).

The RDP has exploited the capabilities of the Test Process Automation (TPA) module and integration add-on for Ranorex®. The TPA offers complex and flexible test environments and the control and utilisation of different drivers (for Ranorex®) and target systems.



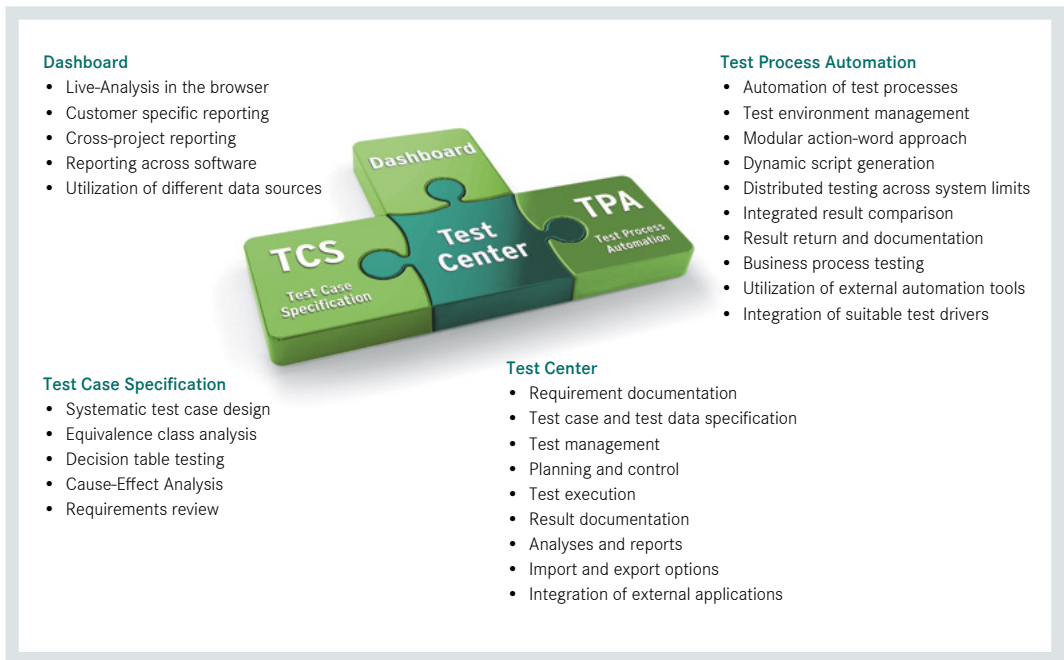


Figure 2: SQS-TEST® Suite overview

## Ranorex-TC RDP solution

There have been several advancements made in the field of software testing. Many frameworks and solutions have been developed to solve problems common to software vendors when it comes to testing their products. Test automation practices have evolved over the last decade. While linear test scripts gave way to structured ones that use test libraries, data was still embedded and modifying test cases required programming knowledge. This solution follows the newer approach of data-driven and keyword-driven testing which source the data and even the directives from external files, insulating the test designer from the complexities of scripting.

This has been powerfully combined to reduce the effort and time required for software testing, allowing software vendors to be very competitive and aggressive.

The framework for this solution (Figure 3) has been built from scratch using industrialisation methodology as its pillars. Function libraries and action words were exhaustively used to modularise and increase the reusability of the components. Business functions were made into **Action Words**; they were in turn categorised into specific modules as per application functionality. Common functions

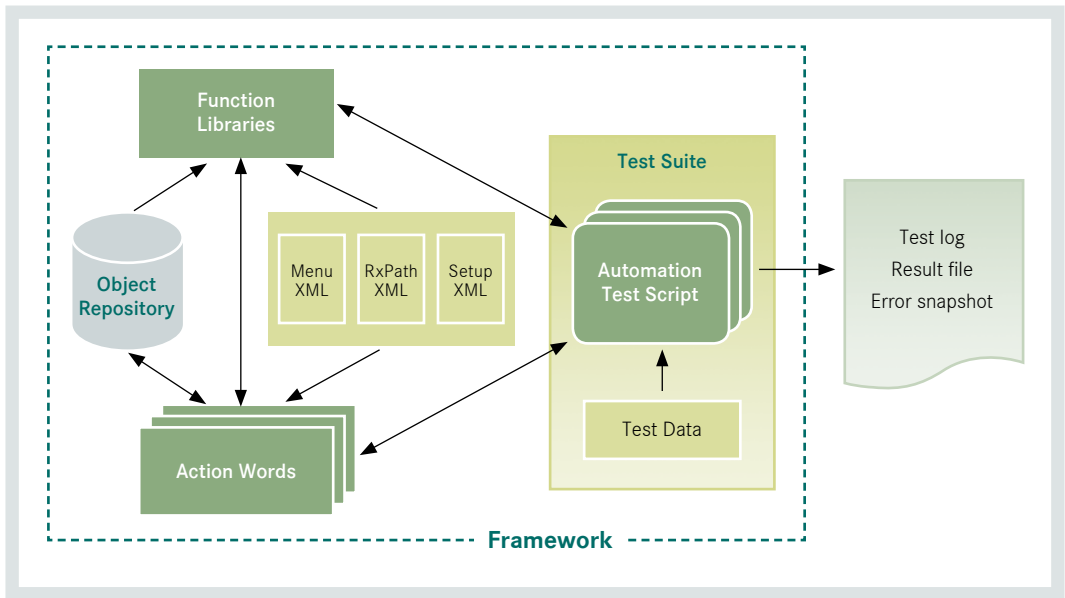


Figure 3: Ranorex® solution framework

are grouped into **Function Libraries** which can be reused across scripts. An **Object Repository (OR)** was created which is a collection of objects and properties by which Ranorex will be able to recognise the objects and act on this. **RXPath** XML was used to reference the application objects under test.

The framework structure shown in Figure 4 was developed in Ranorex® for the chosen solution; it depicts the various reusable framework assets (as displayed in the Ranorex® GUI).

Ranorex® is tightly integrated with SQS-TEST® / Professional (Figure 5) and the following steps are needed for successful SQS-TEST® integration:

- Installation of SQS-TEST® on local machine
- Creation of User/Access control
- Creation of workspace in Test Center

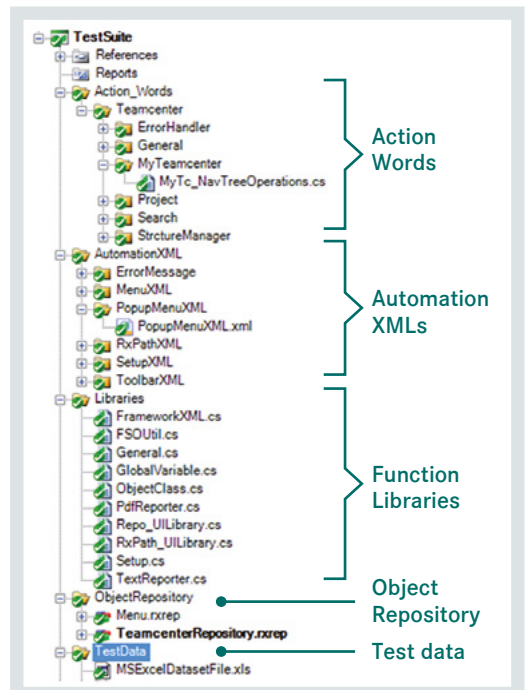


Figure 4: Detailed structure

- Activation of automation TAB
- Same workspace creation for TPA required for automation
- Folder structure creation in Test Center as per industrialisation standards
- Template generation of the Action Words created in Ranorex
- Setting test details in Planning & Control tab for execution

An inconsistency was observed with the execution of the automated scripts; sometimes they were failing at application logon. It was found that the Object Repository (OR) was getting corrupted and this led to script failures. The solution was to load OR for the Login dialog during runtime as the first step before executing any other steps in test script.

There were hurdles in storing and retrieving data to and from SQS-TEST® at runtime, and to handle this scenario, the team decided to store runtime data in external MS Excel files. This data was then retrieved from the Excel files whenever required in the test scripts.

This Ranorex®-based solution provided a clear and easily understandable reporting interface that required minimum user interaction. Report files generated during test execution were descriptive and helped to reduce time in finding out what went wrong with the script execution, supported by error screenshots. Report files are based on XML and can be shared with other applications. There are quick links to jump to action items and code lines, or to allow Ranorex® to automatically open Ranorex Spy to see why an object was not found. The report template can be configured and modified as needed.

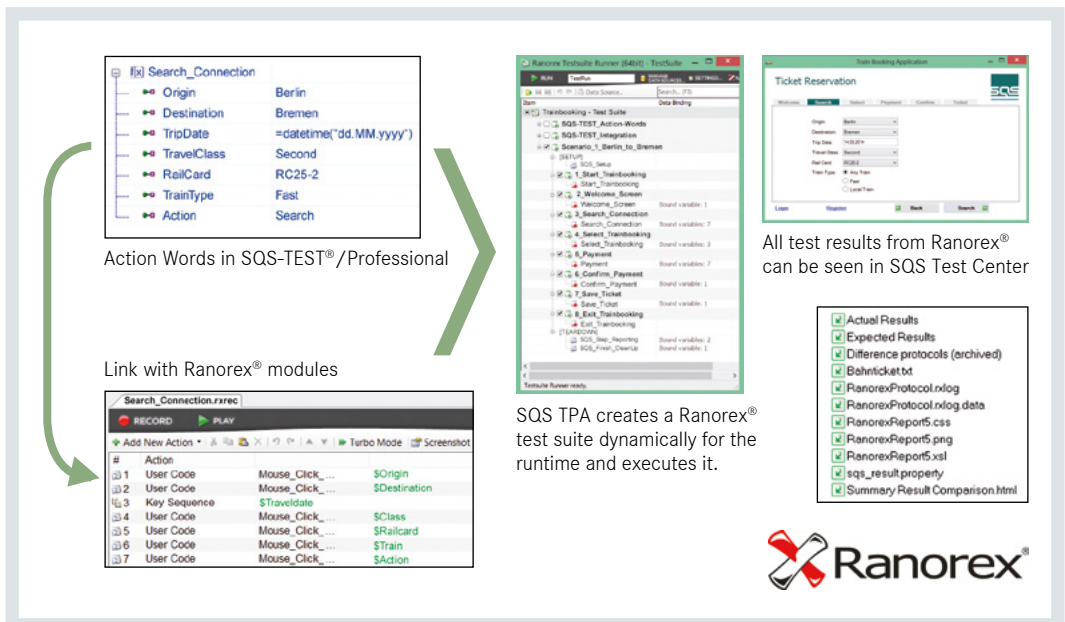


Figure 5: Overview of Ranorex integration with SQS-TEST® / Professional

## Conclusion and outlook

Software testing industry has been seeking automation that is within budget and reasonably priced that would lead to an early ROI.

The main reason why automation efforts fail is due to failure to break even in terms of investments. The widely-used automation tools available in the software testing industry charge a high premium on licensing. Hence, there is a heavy initial investment required and it takes long time to get any ROI; this leads to frustration for customers and, as a ripple effect, a negative impact on automation budgets which further discourages innovation in Test automation.

Also, there is an ever-growing need for automation tool frameworks that are reliable and easy to use. The overall goal is to increase test efficiency with a high degree of reuse and to increase effectiveness by combining different testing methodologies and tools to build optimised test automation solutions.

From a maintainability and reusability perspective, this approach has the following advantages:

- A test script is split into small reusable test actions
- An already developed test sequence can be separated into multiple test actions, which can then be reused in multiple test cases

- Modules & libraries can be shared within the test team, increasing flexibility across the whole QA team
- Automated test steps, scripts and libraries can be reused
- Minimal maintenance – compared with other automation tools, Ranorex requires very little maintenance
- Test cases and test data can be combined using different data connectors for CSV, Excel, and SQL queries

This unique approach introduces benefits in terms of industrial test automation and creation of a rapid deployment package for Siemens Teamcenter with the use of the cost-effective Ranorex® automation tool. This enables reuse of the test automation framework, test scripts and testing assets as accelerators for reducing delivery time and further driving down costs.

**“Increase of productivity in a society is founded in specialization and industrialism”**

Adam Smith [4]

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