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## Customer

A leading European company that provides banknote and securities printing services, smart cards, and cash handling systems.

## Problem Statement/Requirements

The customer manufactures tabletop currency processing systems that processes, sorts, and assesses the authenticity and condition of Bank notes. This currency-processing machine has various boards, sensors and SOMs (System Object Models) which are to be validated during manufacturing and assembly. The customer wanted to refine the testing efficiency by automating different stages of the testing process – from environment setup, sensor and SOM testing to debugging, and thus automating input files and test results validations. Along with this, the system should be able to generate multiple reports and graphs which depict manufacturing quality. Another requirement was to make the final reports and intermediate test results acquirable over the cloud for multiple geographic locations. This software will help the client enhance their efficiency by reducing manual errors, less setup and execution time, and reduce the need of highly qualified professionals in the testing line.

## Solution Methodology

SFO designed and developed a web based software for Test automation, debugging, monitoring and reporting. SFO also designed and developed a cloud based portal for monitoring the reports and graphs generated based on the manufacturing test results.

SFO's software team visited the client team to fully understand the environment where the product would be used. The team worked closely with the third party vendors of the client to acquire knowledge of sensor module. The team liaised with customer business / operation and engineering team to create product requirements and designed / developed early prototypes which could be evaluated during the software development phase. SFO's team consisted of multi-disciplinary members consisting of currency processor manufacturing and testing engineers, Software Architects, developers, Electronics engineers and Testing Experts.

SFO's solution was to automate the validations and testing in the manufacturing line by communicating with the sensors, EEPROM (Electrically Erasable Programmable Read-Only Memory) and SOMs to execute step by step testing processes. The solution provided a web based UI for configuring and controlling the testing steps and pulled multiple reports and graphs for the manufacturing quality. The software also applied regression models on the test results and plotted the success rates and failure trends.

Other highlights of the solution were:

- Customized low-cost solution was developed based on the sensor communication documentation provided by the client's third party sensor and board providers.
- UI based, drag and drop configurable test flow, and failure actions.
- Dynamic graphs and reports. Regression plots for success rates and failure trends.
- A web-based solution that allowed a semi-skilled operator to execute testing while a senior engineer monitored the success rate remotely on real time. Option also available for debugging and repetitive testing for senior engineers.
- Provision for multiple levels of authorization to the system.
- A Cloud based portal to help monitor the test results, intermediate files, reports, calibration data and logs remotely.

## Brief description of product:

### a) Software

- C++, Java J2EE, Spring, Hibernate, Angular JS, Bootstrap, HTML5, Amazon web service cloud, Jasper Dynamic reporting, Highchart

### b) Compliance

- CMMI ML5
- ISO 9001 : 2015
- ISO 27001 : 2013

## Impact

- a) A cost-effective and customized control and monitoring automation solution for manufacturing testing.
- b) Quick to install and operate.
- c) Cloud based monitoring of test status, intermediate results, reports, calibration data and logs.

## About SFO

SFO Technologies Pvt Ltd, the flagship arm of the diversified conglomerate, the NeST Group provides end-to-end design-engineering-software-manufacturing solutions to clients across geographies such as the USA, Canada, Europe, Middle East, South East Asia, Japan, Australia, and India. SFO has invested in building competence, scale and standards compliant process framework, in PCBA, fibre optics, Cable & wire Harness, Magnetics, High Level Assembly, VLSI design, embedded software development, etc. SFO's capabilities transcend the plain vanilla "Build-to-Spec or Build-to-Print" EMS and our ODM+ solutions are rapidly re-defining standards for the OEMs across Aerospace & Defence, Communications, Transportation, Healthcare and Energy & Industrial domains. .



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