



# ALD Software Architecture

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## Executive Summary

**ALD Ltd.** is a world leader in the field of **Reliability, Availability, Maintainability, Quality, Logistics** and **Safety** Software.

ALD **RAMS solutions** (**Reliability, Availability, Maintainability & Safety**) were first released for commercial use in **1984** and been continuously improved for the past 25 years.

ALD solutions were adopted by hundreds organizations around the world including THALES, BAE Systems, NASA, MBDA, SAGEM, Lockheed Martin, Alenia, Marconi Selenia and many others.

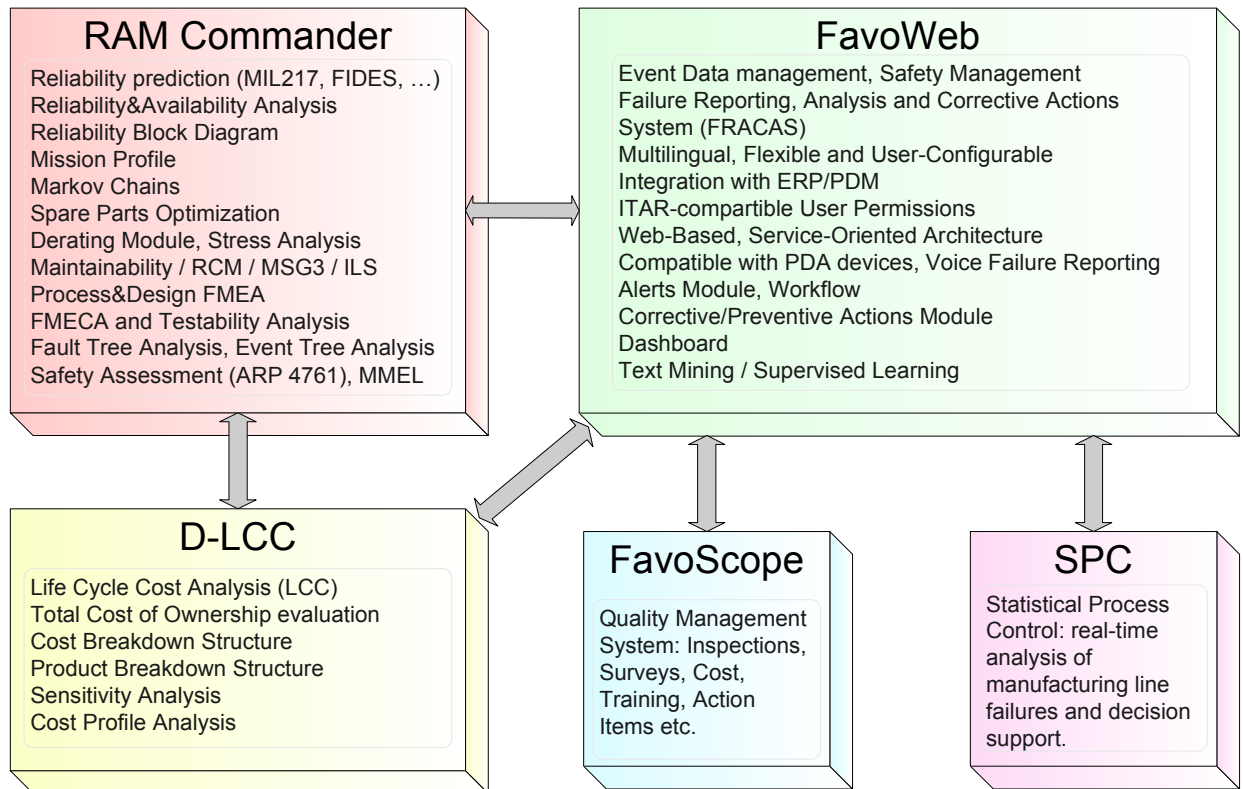
ALD has been a prominent partner to the FIDES committee and pioneer in implementing the FIDES standard in its solutions portfolio.

This document describes **ALD Software components** from the functional and technological points of view.

## Functional Overview

The diagram below illustrates the **ALD Reliability and Safety Software** components and their major functions:

### ALD Software Suite



ALD's Software Suite is a result of 25 years of expertise in development of Safety and Reliability analysis software for many of the world leading civil & military aviation, communication, space and electronics organizations including THALES, BAE Systems, Lockheed Martin, NASA, MBDA, SAGEM and more.

The software suite consists of a set of integrated tools covering **Reliability prediction, Availability, Maintainability Analysis, Safety Assessment, Quality Management, Safety Management, Industrial Process Control, Logistics Support** and more:

**RAM Commander** is the pioneering **Reliability and Safety software** for reliability professionals and design engineers. RAM Commander combines ingenuity of approach, calculation accuracy, and convenience of use. Designed by reliability engineers, RAM Commander covers the entire scope of engineering tasks related to reliability of electronic, electro-mechanical and mechanical systems. RAM Commander is modular software allowing a customer the flexibility of gradual addition of the modules to the package in accordance with the requirements of a project or the budget constraints. List of RAM Commander modules contains **Reliability, Maintainability, RBD, Fault Tree Analysis, Event Tree Analysis, Safety Assessment, Spare Parts Optimization/Provisioning, Derating, FMECA and Testability Analysis, Process & Design FMEA** and more.

**FRACAS (FavoWeb)** is ALD's third generation, web based and user configurable **Failure Reporting, Analysis and Corrective Action System (FRACAS)** that captures information about equipment or the processes throughout its life cycle, from design,



production testing, and customers support.

FavoWeb has been adopted by world leading organizations who have been able to implement for the first time ever, a FRACAS application which seamlessly communicates with any given ERP system (SAP, ORACLE, MFGpro etc), while proving a user friendly, flexible yet robust failure management, analysis and corrective action platform.

**Life Cycle Cost (LCC)** analysis and **Total Cost of Ownership evaluation** are the basis for decision making for the wide range of industries and equipment: from IT systems to submarines. LCC analyzes the total ownership costs of various design alternatives and system's components over the projected life cycle of a system.

D-LCC (Decision by Life Cycle Cost) makes the LCC analysis easy and comprehensive. D-LCC is a key tool for managers, decision-makers, engineers, ILS personnel, and other staff involved in system acquisition, proposal writing, management, development, production and through-life support.

**FavoScope Quality Management System** is a web-based audit system for **quality process management** based on ISO requirements including management of inspections, surveys, costs, training, action items, corrective actions, report generator etc. The system is user configurable allowing easy and fast tailoring the organization specific needs/process.

**SPC (Statistical Process Control)** is software for real-time **monitoring of the manufacturing process** and its improvement, with decision-making support and a lot of statistical analysis and extensive reports. System gives the on-line possibility to evaluate process dynamics, detect unusual process behavior, degradation or negative dynamics of some parameters and react accordingly to improve performance, minimize defective products or prevent undesired events.

Software supports customizable measurement types, customizable screen and graphs, customizable for different industry types/production line types.

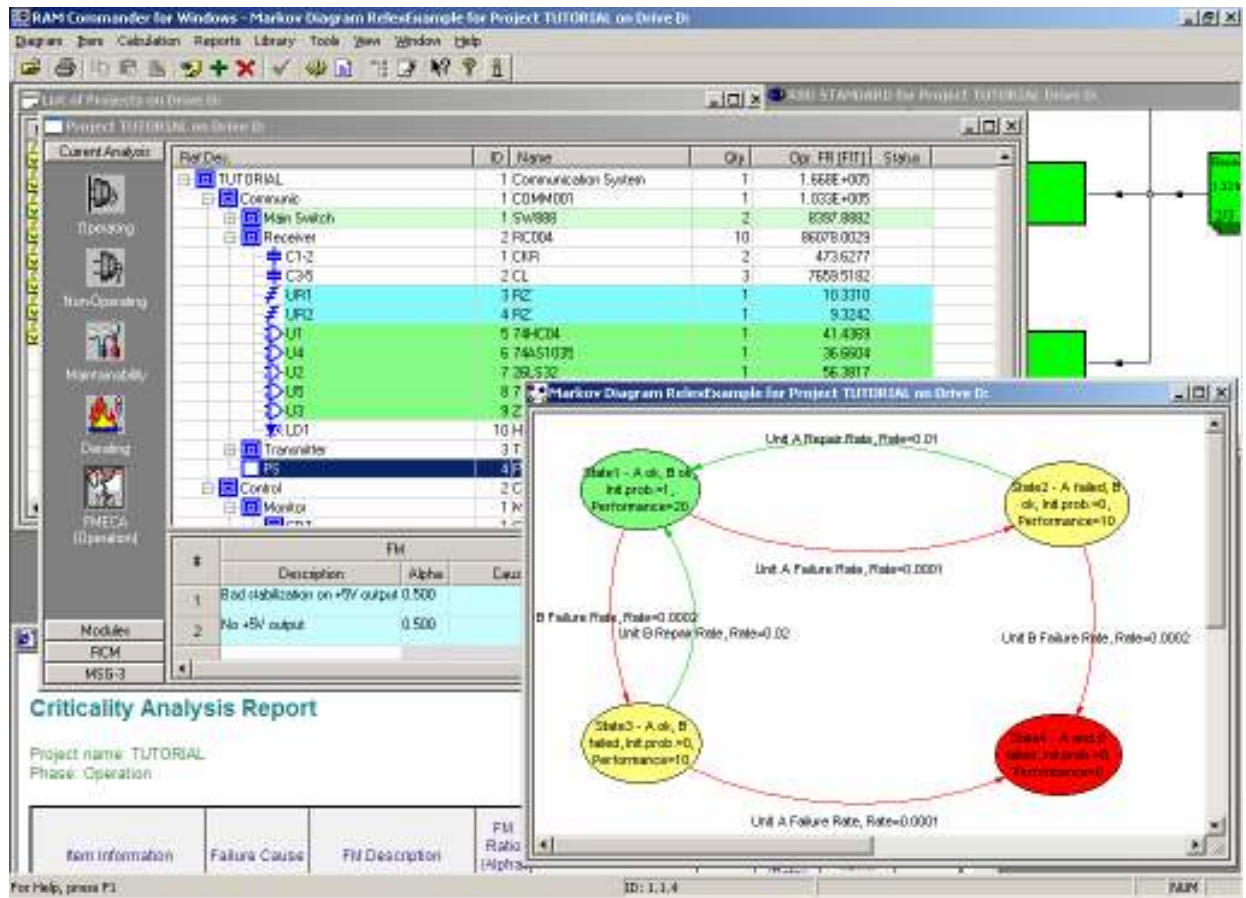
Except mentioned above off-the-shelf software products, ALD has also a set of specialized software tools which are provided as a part of customer – specific tailored solutions or consulting services – like Weibull calculation tool, Reliability Growth, Bootstrapping statistical tool and more.

All these tools may be purchased and used separately, but the most benefit is received when they are used together as an **integrated solution**.

# Technical Overview

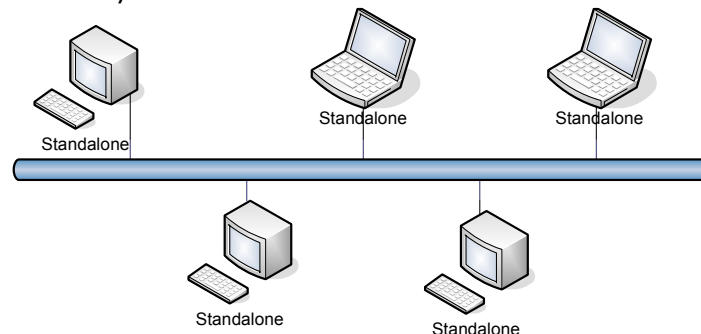
## RAM Commander

**RAM Commander** is a 32-bit Windows Application which can work in both standalone mode on a single computer with locally located database and in client/server configuration with common database located on server. RAM Commander Database contains multiple projects, where each project is a folder containing all available studies and analysis types (reliability, safety, Fault Trees, etc.).



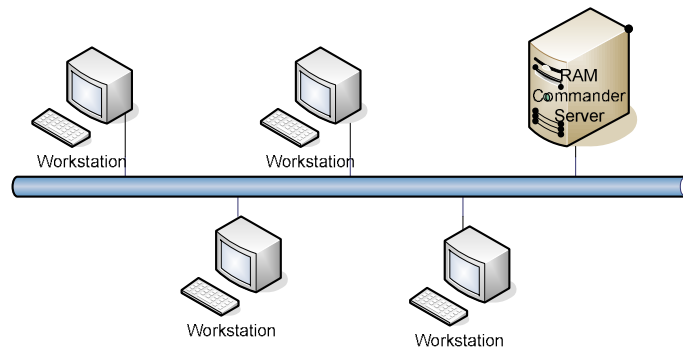
## Deployment

In a Standalone configuration there is no dedicated server. RAM Commander is installed on multiple computers, each of them may use local database (set of projects and libraries) or use database located on any shared network drive.





In Client/Server configuration separate RAMC server should be installed. Then multiple workstations may be installed for this server, RAM Commander software main components and databases are located on the server.



### **Connectivity**

Import/Export data from/to text, CSV, Excel, Access. Flexible import Wizard and Report Generator.

Web services (SOAP) connectivity to FavoWeb FRACAS (RAM Commander calls FavoWeb web services).

Special format for electronic components library import and reliability data import.

### **GUI Language**

English, Russian (tool tips), Chinese. Other languages are available on demand.

### **Licensing:**

RAM Commander requires license to run. It supports multiple licensing models – hardware plug, floating license, site license and computer-locked license file.

### **Technology used:**

Database: Pervasive SQL + MS Access

Application: Windows application, MFC. Some modules use .NET Framework.

### **Hardware and Software Requirements:**

Client/Standalone:

OS: Windows 2000/XP/Vista/7

Both 32-bit and 64-bit processors and OS supported.

Hardware: Recommended hardware configuration for installed OS version.

Generally it is:

- 2 GHz or higher Windows-compatible processor (Intel Pentium/Celeron family, or AMD K6/Athlon/Duron)
- 512MB RAM
- Free 100MB Hard Drive (for software installation only, required capacity depends on expected database sizes)
- 1024x768 x 24bit colors video adapter and monitor
- Keyboard and Mouse

Some modules require .NET Framework 2.0 installed.

Some modules require MS Word installed.

Server (if client/server configuration is used – not required for standalone):

OS: Windows XP/Vista/7/2003 Server/2008 Server

Both 32-bit and 64-bit processors and OS supported.

Hardware: Recommended hardware configuration for installed OS version.

Generally it is:

- 3 GHz or higher Windows-compatible Dual-core processor (Intel Pentium/Celeron family, or AMD K6/Athlon/Duron)
- 4GB RAM
- Free 1GB Hard Drive (for software installation only, required capacity depends on expected database sizes)



## FavoWeb™ FRACAS

**FavoWeb™ FRACAS** is a fully web-based application (no loading of applets and ActiveX controls) with server-side (database and web server) and client-side (web browser) developed using Microsoft technologies (ASP.NET, ADO.NET etc).

Failure Reporting & Corrective Action System  
Open Failure

Indicates required field

Failure Reporting Form

Report ID : 65

\* Report Date : 01/08/2000

Reported System

System ID : 061

System Name : RFcom

Owner/Operator : Interlease Aviation

Serial Number : 100122

Failed Part

Part No : 23-20

Part Name : DATA TRANSMISSION

Project : RFcom

Failure Detail

Reported By :

User Department :

Failure Type : LAMP INOPERATIVE

Hierarchical Tree - BOM

Powered by FavoWeb

<< >> Add Failure Save Submit

Application can be accessible on intranet or internet, supports Internet Explorer 6.0 and up, supports PDA devices (Microsoft Mobile-compatible). Application allows failure reporting by different methods – web browser, voice (patented failure reporting with voice recognition method), mobile devices, by mail and more.

### Flexibility

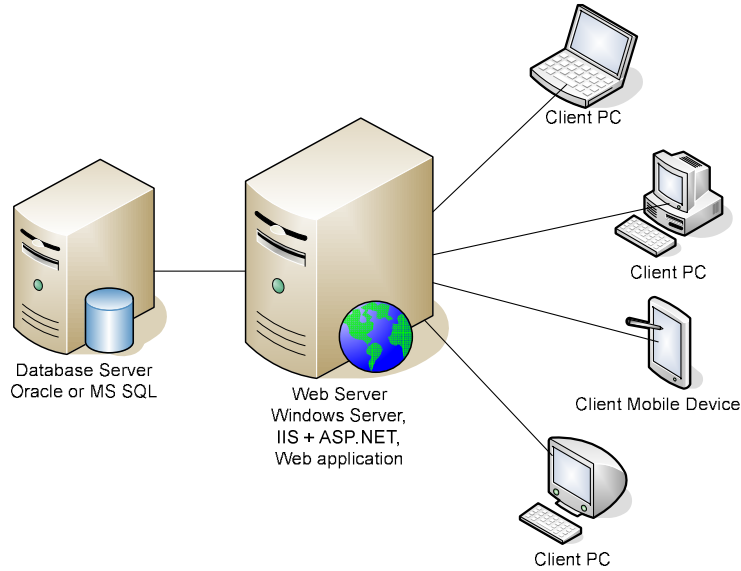
FavoWeb™ FRACAS is highly flexible, customizable and user configurable system. Each application is tailored to the specific requirements of the customer/project. Users can modify the system without the need for programming knowledge.

FRACAS package includes an administrative tool used to customize screens and forms including product families, reporting phases, input forms and fields. The system administrator can change permissions for user groups, add new users, and even change the language for the user-interface. Data can be filtered according to user permissions determined by organization customization. Attachment limits (size, type) are set through the tool by the customer. Fields can be logically interconnected (automatically filling list values depending on values of other fields) using a filter tool. All fields can be set to a hidden attribute so that they will not appear on the form but exist in the database. Fields can also be set as required fields.

Business logic is also customizable as are distribution lists and procedures. Users preparing reports may customize reports and save report templates for quick retrieval and use. This tool enables the organization to build a totally customized FRACAS system that is built according to the organization's processes and business logic.

**Deployment**

FRACAS package it is installed on the web server (MS Windows Server + IIS+ASP.NET Framework) and database server (Oracle or MS SQL Server database)  
 FavoWeb™ FRACAS supports the use of Oracle, SQL Server and MSDE databases for the various configurations of the application.



The overall system architecture is shown in the figure below. The central application is on a server. There is no need for dedicated client workstations, reducing lifecycle cost and enhancing user comfort.



**Security**

FavoWeb™ FRACAS supports high data security level – customizable access rights per user/user group on the level of each data field on each dialog/data form.  
 FavoWeb handles data security in 5 different layers: application, platform, domain, database, and configuration. These circuits of security guarantee that sensitive information does not fall to the wrong hands, both within the organization and outside of it.  
 At the application level the administrator can define a set of rules for each group of users. This includes: modeling opening, adding new failures, updating library data, etc.  
 FavoWeb system supports LDAP protocol for user authentication. The system communicates with Directory Services systems (such as Active Directory by Microsoft or iPlanet by Sun).



### **Connectivity**

One of the most difficult problems in large organizations is the complications that arise from multiple databases. These begin with multiple data redundancies and end with critical miscommunication. FavoWeb is compatible with other organization databases including ERP systems and can interface, acquire and export from other Oracle systems, SQL Servers, SAP, third party FRACAS as well as legacy systems.

FavoWeb can be integrated with almost any legacy system that is already in use in the organization:

- Integration with PDM systems
- Oracle, SQL Server, DB2 support
- CRM integration (Siebel, MS, etc.)
- Mail server (IMAP4, POP3)
- ERP, SAP, Oracle application
- Any standard protocol support

### **GUI Language**

Fully multilingual application, user-customizable languages and GUI elements (captions etc.)

### **Licensing:**

FavoWeb™ requires license to run. License is installed on the web server and allows specified number of simultaneous user connections and usage of specified modules.

### **Technology used:**

Database: MS SQL Server or Oracle.

Application: ASP, ASP.NET web application.

### **Hardware and Software Requirements (Server):**

Hardware:

- Pentium 4, 5GHz, 32-bit
- 4 GB RAM
- Network Bandwidth & Adaptor at least 100 Mbps.
- 40 GB Hard Disk

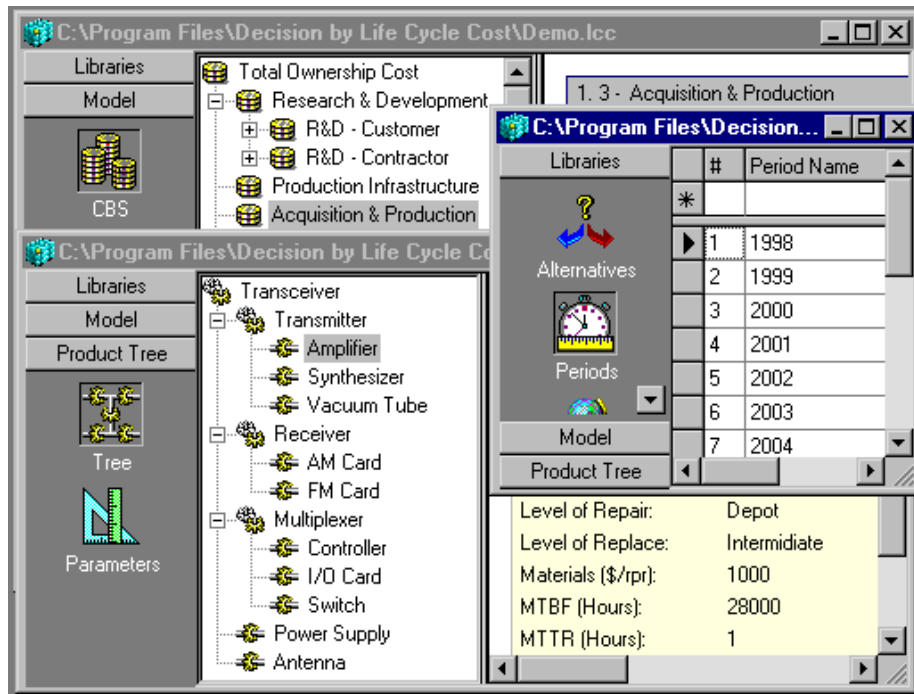
Software:

- OS: Windows 2003 Server, Windows 2008 Server
- Microsoft IIS Installed
- .NET Framework 3.0
- Microsoft Excel 2003 installed on the server
- Oracle 10g - Enterprise Edition or MS SQL 2005



## Life Cycle Cost (LCC)

**D-LCC** is a 32-bit Windows application connected to MS Access database.



### Deployment

D-LCC application is installed locally to client PC together with its MS Access database. However database (MS Access MDB data file) may be installed on a network location allowing multiple users work with the same database over the LAN.

### Connectivity

Import/Export data from/to text, CSV, Excel, RAM Commander.  
Customizable Import Wizard, Export of all data to Excel.

### GUI Language

Currently English only, other languages available on demand.

### Licensing:

D-LCC requires license to run. It supports multiple licensing models – hardware plug, floating license, site license and computer-locked license file.

### Technology used:

Database: MS Access  
Application: Windows EXE application, MFC.

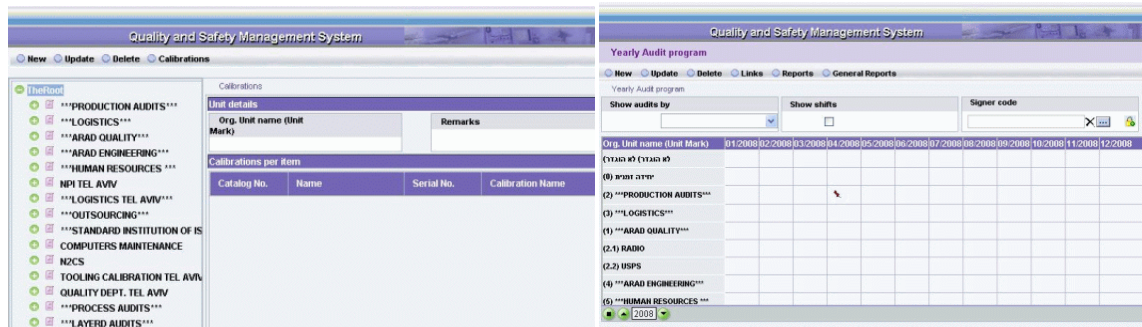
### Hardware and Software Requirements:

OS: Windows 98/2000/XP/Vista



## FavoScope Quality Management System

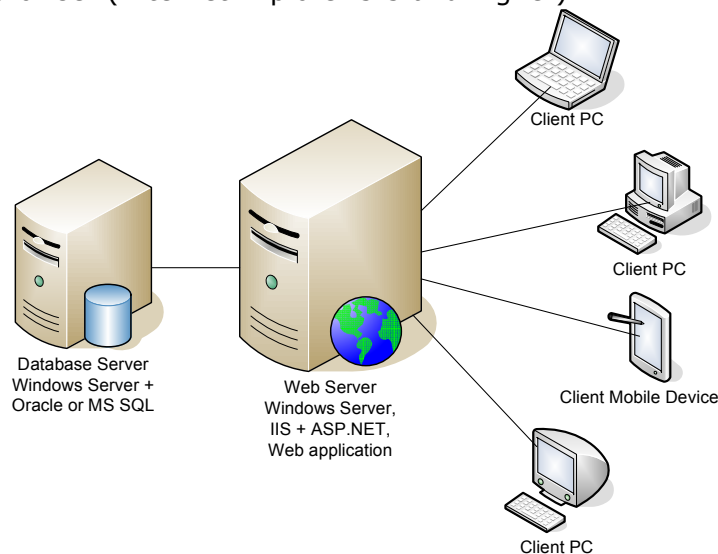
**FavoScope** is web-based application developed using Microsoft Technologies (ASP.NET) and working with Oracle or MS SQL database.



### Deployment

FavoScope QMS is web application connected to database. It is installed on the web server (MS Windows Server + IIS+ASP.NET Framework 1.1) and database server (Oracle or MS SQL Server database).

Client side is web browser (Internet Explorer 5.5 and higher).



### Security

Web forms security or SSO (Single Sign On).

Role-based permissions configuration on data forms level.

### GUI Language

Fully multilingual, user-customizable languages, captions etc.

### Licensing:

License per web server.

### Technology used:

Database: MS SQL Server or Oracle.

Application: ASP.NET web application.

### Hardware and Software Requirements (Server):

Hardware:



Pentium 4, 5GHz  
4 GB RAM  
Network Bandwidth & Adaptor at least 100 Mbps  
40 GB Hard Disk

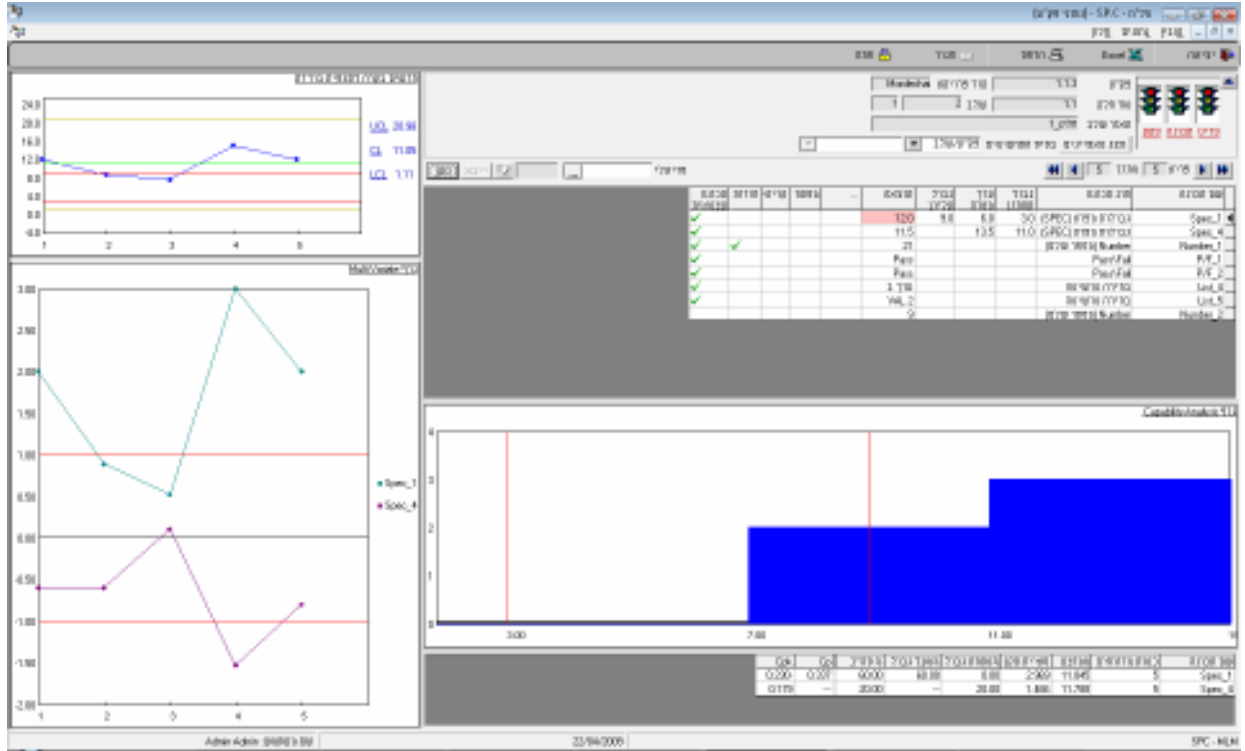
Software:

OS: Windows 2003 Server, Windows 2008 Server  
Microsoft IIS Installed  
Microsoft Excel 2003 installed on the server  
Oracle 10g - Enterprise Edition or MS SQL 2005



## SPC (Statistical Process Control)

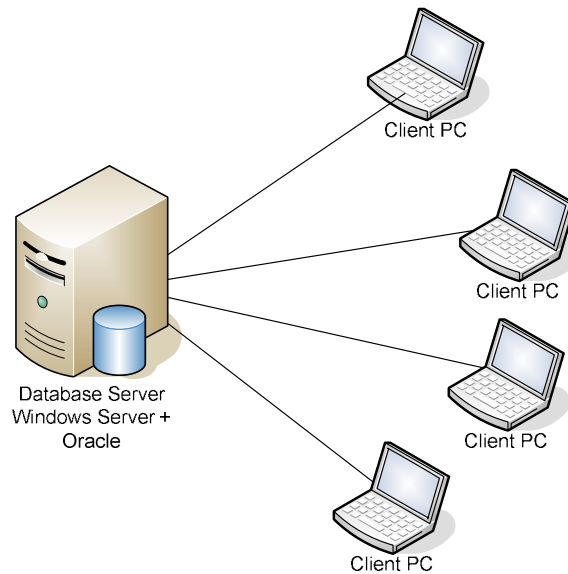
SPC is a 32-bit Windows application connected to Oracle database. Application is working in Client/Server mode, multiple application instances are connected to the same database.



SPC Software performs also real-time data acquisition from hardware sensors.

### Deployment

Oracle database is installed to separate Oracle server, client applications are installed locally to client computers and connect to database.



### Connectivity

Application may call FavoWeb FRACAS web services.



**GUI Language**

Multilingual.

**Licensing:**

Site license per client.

**Technology used:**

Database: Oracle

Application: Windows EXE application, MFC.

**Hardware and Software Requirements:**

OS: Windows 98/2000/XP/Vista

## Tools Integration

All ALD Software tools may be installed and used independently, but the best result is achieved when they are used as an integrated software package.

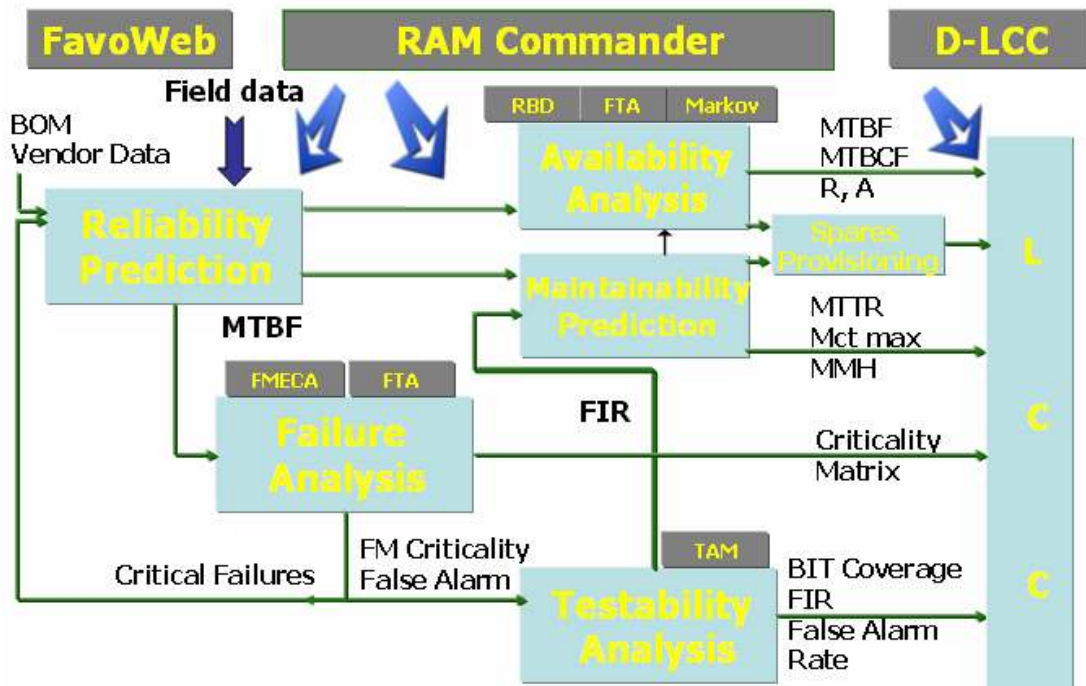
See the product life cycle diagram below which shows which tools are used on which product life stages:

### Product Life Cycle

Concept & Definition	Specification	Design	Production	Operating and Maintenance
<b>RAM Commander</b> Reliability prediction, Reliability analysis, Maintainability prediction, Stress analysis, Spare parts provisioning, Failure mode and effects analysis, Fault tree analysis, FMECA and Testability Analysis, System Safety Assessment				
<b>D-LCC</b> Life Cycle Cost) LCC (analysis and Total Cost of Ownership evaluation), Evaluation and comparison of alternative design approaches, Comparison of alternative strategies, Identification of cost effective improvements, Project's budget and economic viability assessment				
			<b>FavoWeb</b> Failure Data Collection ,Failure data analysis ,safety management ,corrective actions ,Incident Trends Analysis, Risk Prioritization, Timely monitoring of incidents, Text mining	
			<b>SPC</b> Statistical Process Control for Real-time monitoring of the manufacturing process	

The diagram below explains one of many possible options of information flow between RAM Commander, FRACAS and D-LCC:

### RAMS-ILS Data Flow & Software

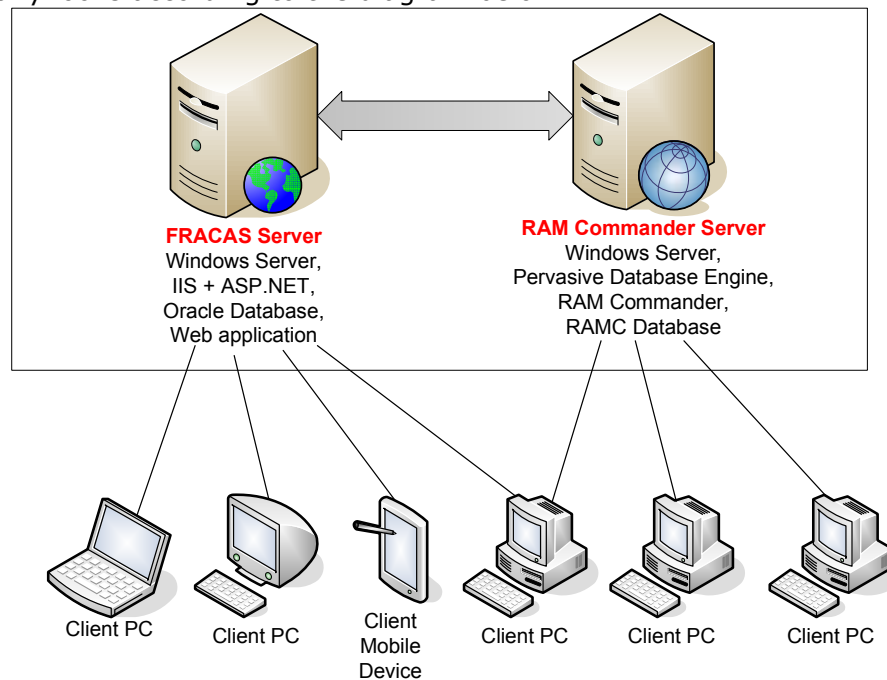


The most important is integration between two our main Safety and Reliability tools - **FavoWeb FRACAS** and **RAM Commander**.

During the design phase of product life cycle the reliability prediction and analysis, FMECA, FTA, Safety Assessment etc. is performed in RAM Commander. Calculated failure rates, possible failure modes and their effects and other data are used as initial information by FavoWeb FRACAS at the beginning of the field use stage.

During the field use real failure statistics is accumulated, different new failure conditions arise, maintenance problems appear. It requires additional redesign or reconsideration using RAM Commander. Field failure rates, new failure modes etc. collected by FavoWeb FRACAS are then used by RAM Commander to perform additional analysis cycle and give redesign recommendations. It is done by the means of web services.

The typical configuration of integrated FavoWeb FRACAS and RAM Commander inside the same company looks according to the diagram below:

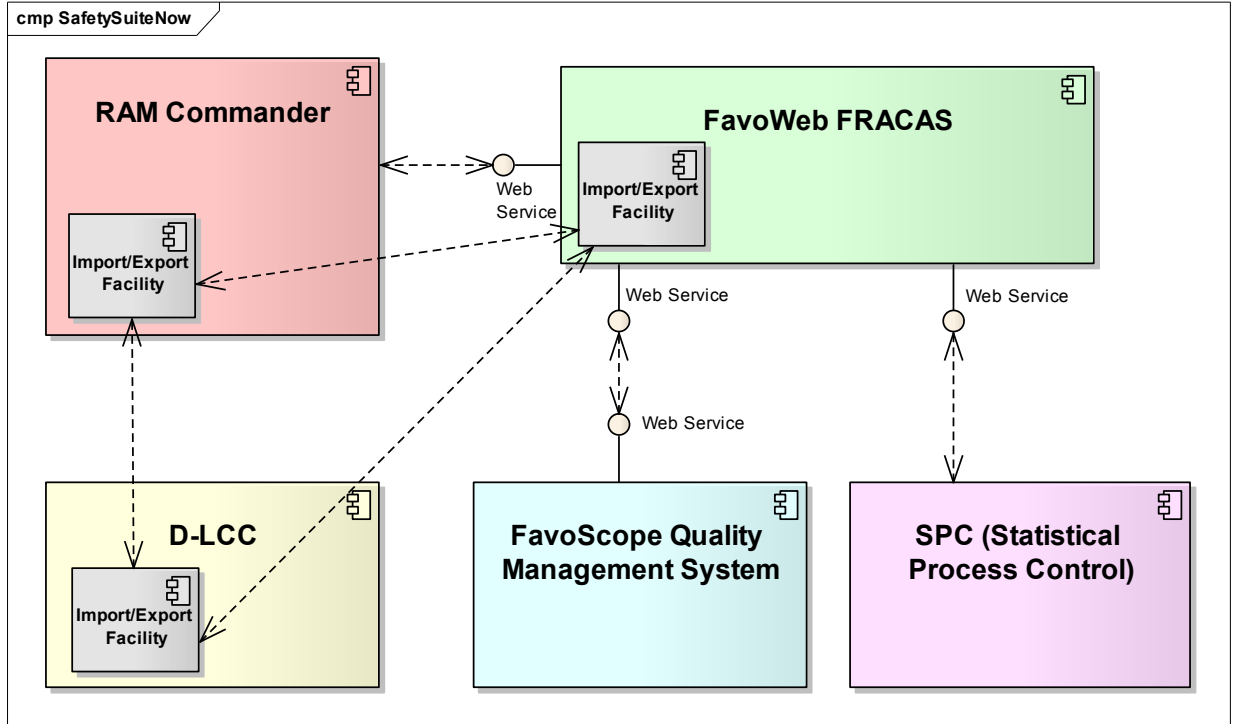


**D-LCC** uses Bill of Materials, reliability data (failure rates), maintainability data (MTTR), testability and criticality data for life cycle cost evaluation. D-LCC receives this information from **FavoWeb** or **RAM Commander**. It is using D-LCC import/export facilities.

**FavoScope** Quality Management System is integrated with **FRACAS** and takes care of corrective actions and manages actions, inspections, action items which come from FavoWeb FRACAS Corrective/Preventive actions module. It may be done by using web services or using common database for both products.

**SPC** (Statistical Process Control) application may work together with **FavoWeb FRACAS** and report manufacturing process failures to FRACAS as well as receive different control action items from FRACAS. It may be done by using web services or using common database for both products.

The diagram below illustrates the communications between software systems described above, and communication ways (web services, file import/export facilities and common databases):





For more information about ALD Software products and ALD Reliability, Safety and Quality Services please contact us or visit our website:

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