

## EXIGEN® SERVICES: CASE STUDY

STORAGE SYSTEM AUTOMATION:  
LOGISTICS AND DISTRIBUTION



### ABOUT CUSTOMER

Berghof Automationstechnik GmbH is a German high-tech company with more than twenty years experience in the industrial automation field. It specializes in design and implementation of automation solutions for various German customers and has a particular expertise in device and system control and test automation.

### PROJECT CHALLENGE

Exigen collaboration with Berghof started back in 1996 when one of our clients recommended Exigen's services to Berghof. At Berghof's request, we took on and successfully carried out a pilot project in the field of test automation.

In 1999 Berghof entrusted Exigen Services with a new project building software components for a system, which automated big book storage. This was the start of the logistics automation project series that we have performed for Berghof over a four year period running into 2003. (see table below)

Exigen Services was responsible for the high and low level system design, implementation, overall system testing, and (partially) product deployment.

### SOLUTION DELIVERED

The end software developed in the course of these projects

- ▶ controlled advanced production equipment (including storage equipment such as robots, automated loaders, elevators, and lifts)
- ▶ administered automatic test equipment in various production environments, highly optimizing logistics processes.

Due to the homogeneous nature of these projects, Exigen Services development team created in cooperation with Berghof a common framework of reusable components each performing a dedicated function (e.g. logging, message tracking, database control, event visualization, configuration support, process simulation, etc.). These components communicate with each other and with hardware controllers via TCP/IP telegrams.

In the course of development, we created a powerful library of classes useful for material flow control and warehouse management systems written in C++. The library consisted of universal and optimized classes for database operations, TCP/IP telegram handling, configuration, logging, messaging, scheduling and others common tasks. The class library was made to operate both under Windows and Linux operating systems.



A special tool GUI-equipped tool was created to run console applications as Windows NT services. Another useful application written by the development team was a universal editor for databases with ODBC connection featuring a flexible and powerful user interface fully adjustable for project specific databases via configuration file.

Exigen Services also created a number of debugging tools specifically for Berghof projects. One of them was a GUI application for emulating the sending and receiving of TCP telegrams with a user-friendly interface and telegram data validation. Another was an application that recorded the flow of telegrams in the real production environment for eventual inspection and debugging off-site

<b>KNO-Nova</b>	Order picking control system and material flow control system for the big book storage and distribution center in Stuttgart (Germany).
<b>Adidas</b>	Material flow control system for the biggest Adidas warehouse in Germany at Uffenheim.
<b>Apra-Norm</b>	Warehouse management system, material flow control system, and host interface for the new automatic storage of Apra-Norm group in Daun (Germany).
<b>Bebro</b>	Warehouse management system, material flow control system, host interface, and GUIs for workstations at Bebro GmbH's automatic storage facility built as part of the hardware production plant located near Nürtingen (Germany).
<b>Schreyer</b>	Warehouse management system, material flow control system, and host interface for a new automatic storage facility and distribution center in Metzingen (Germany).
<b>Soft-Carrier</b>	Warehouse management system, material flow control system, and host interface for an automatic storage facility and distribution center of Soft-Carrier GmbH located in Trier (Germany).
<b>DB Cargo</b>	Components for a big material flow control system that controls movements of cargo through domestic German railways.
<b>Busch-Jäger</b>	System for visualizing test results on electrical components produced in the Busch-Jäger Electro GmbH plant located in Lüdenscheid (Germany).

## TECHNOLOGIES

**Development Environment:** Visual C++ 6.0

**Operating System:** MS Windows NT 4.0

**Hardware Platform:** Intel PC


**Technologies:** ODBC, SQL, TCP/IP

**DBMS:** Sybase SQL Anywhere 7.0, Oracle, MS SQL Server

## PROJECT METHODOLOGY

In the course of each project Exigen Services project team members worked closely with Berghof development staff to carefully examine and work through the general system requirements in order to come up with a detailed requirement description. Among the major challenges Exigen Services had to overcome while working on Berghof projects were:

- ▶ Impossibility to reproduce the customer's HW environment on-site
- ▶ Several projects underway concurrently

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- ▶ Frequent on-site trips
  - ▶ Maintenance and support for the previously completed projects

In order to overcome these difficulties, project activities were performed in close cooperation with Berghof development staff at all times. The ongoing communication between the client and Exigen Services team included frequent on-site visits, regular conference calls and an adjusted work schedule.

## PROJECT SUMMARY

**Total effort:** 60+ person/months

**Duration:** 38 months

**Team size:** 3

**Pricing:** T&M

## ABOUT EXIGEN® SERVICES

Exigen Services is the leading application outsourcing services provider, and combines world class skills, recognized expertise in development methodologies, and industry experience to reduce risks, lower costs and deliver results. Exigen Services has pioneered a new approach to global application outsourcing, Outsourcing 2.0 that includes commercial terms that optimize financial alignment between client and vendor. As a result, Exigen Services makes IT outsourcing a much easier and more beneficial undertaking for global enterprises.

Since 2000, Exigen Services has been the global leader in the use of distributed Agile methods for rapid and precise systems development throughout the banking/ insurance/ brokerage, healthcare, telecommunications, government and media industries. Exigen Services has achieved high honors in a variety of independent lists and rankings, including *Brown & Wilson Black Book of Outsourcing* in 2008, *Global Services 100* in 2009, *Inc Magazine's* 2008 Inc5000 and is a top 10 provider of both outsourced product development and human capital development. Clients range from mid-sized growth companies to Fortune 500 organizations including Sun Microsystems, CSC, Universal Music Group, Standard & Poor's, T-Mobile, Westpac Bank and many others.

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CORPORATE  
HEADQUARTERS  
505 Montgomery Street  
San Francisco, CA 94111 USA  
+1 415 402 2600

sales@exigenservices.ru  
Phone: +7 812 327 9900

Anastasia Novoseltseva,  
marketing communications  
director, Exigen Services

For information  
on Exigen Services call your  
local worldwide sales, service  
and technical support offices:  
[www.ExigenServices.com](http://www.ExigenServices.com)

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