

STEP System Solution

Infrastructure Requirements and Platform Support

STEP Trailblazer 9.0

The logo for SiiboSystems, featuring the word "SiiboSystems" in a white, sans-serif font. The "i" in "Siibo" has a small crown-like symbol above it. The logo is positioned on a large orange triangle that points towards the right.

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1 Platform and Software support

1.1 STEP Database server

Server Component	Supported software
Hardware architecture	x86-64 (aka. x64, AMD64, Intel 64)
Operating System (OS)	Red Hat Enterprise Linux 7.3+ / 6.8+ 64-Bit Oracle Enterprise Linux 7.3+ / 6.8+ 64-Bit (<i>UEK4/UEK3 or RHCK kernel</i>) ¹ MS Windows Server 2016 / 2012 R2 64-Bit ⁴
Database software	Oracle 12.2.0.1 64-bit SE2 and EE Oracle 12.1.0.2 64-bit SE2 and EE ² <i>Enterprise Edition may be needed if advanced Oracle options (like oracle RAC or Dataguard) are requested – this must be checked with Oracle. The STEP application itself does not require any EE features.</i>
Application Software (optional) ³	Oracle Java 8 SE (Java JDK 1.8.0_162+ 64-bit) STEP DB Server Toolbox

¹ UEK = Unbreakable Enterprise Kernel, RHCK = Red Hat Compatible Kernel.

² Stibo recommends using Oracle Database 12.2.0.1. Customers currently using Oracle Database versions prior to 12.1.0.2 must upgrade to a supported version when upgrading to STEP Trailblazer 9.0.

³ Required if customer has a DBA Support agreement with Stibo or if customer / hosting partner wishes to utilize the STEP DB Server Toolbox which includes scripts for e.g. Oracle RMAN backup and restore and Oracle Datapump export/import etc.

⁴ On Windows Server OS it is a requirement to run the English language version.

1.2 STEP Application Server

Server Component	Supported software
Hardware architecture	x86-64 (aka. x64, AMD64, Intel 64)
Operating System (OS)	Red Hat Enterprise Linux 7.3+ / 6.8+ 64-Bit Oracle Enterprise Linux 7.3+ / 6.8+ 64-Bit (<i>UEK4/UEK3 or RHCK kernel</i>) ¹ MS Windows Server 2016 / 2012 R2 64-Bit ² (including Microsoft Visual C++ 2015 Redistributable (x64)) ⁶
Server runtime environment	Oracle Java SE 8 (standalone) (Java JDK 1.8.0_162+ 64-bit) ³
Reverse Proxy	Apache 2.2.x (using mod_proxy) on RHEL6 / OEL6 ⁴ Apache 2.4.x (using mod_proxy) on Windows / RHEL7 / OEL7 ⁴
Application Software	STEP Trailblazer 9.0 STEP AssetPush ⁵

¹ UEK = Unbreakable Enterprise Kernel, RHCK = Red Hat Compatible Kernel.

² Windows is not supported for In-Memory installations.

³ New Java versions will be updated automatically once tested with the STEP software. This occurs during patching of the STEP Trailblazer software using the SPOT tool.

⁴ The STEP application utilizes the default Apache HTTPD installation on RHEL and OEL. On RHEL/OEL 6 this is version 2.2.15. On RHEL/OEL 7 the version is 2.4.6. The major version does not change, but security fixes are applied when using Yum to update the RPM package.

⁵ STEP AssetPush is configured if images from the STEP system are to be used in different formats for e.g. a website.

⁶ On Windows Server OS it is a requirement to run the English language version.

1.3 STEP InDesign Server

Server Component	Supported software
Hardware architecture	x86-64 (aka. x64, AMD64, Intel 64)
Operating System (OS)	MS Windows Server 2016 / 2012 R2 64-Bit ⁵ Mac OS X 10.10.x / 10.11.x / 10.12.x / 10.13.x Server 64-bit
Server runtime environment	Oracle Java SE 8 (Java JDK 1.8.0_162+ 64-bit)
Application Software	Adobe® InDesign® CC2018 Server (64-bit) ¹ Adobe® InDesign® CC2017 Server (64-bit) ² Adobe® InDesign® CC2015.3 Server (64-bit) ³ STEP Asset Push ⁴

¹ Supported on: Mac OS X Server v10.11, v10.12, and v10.13 and Windows Server 2012 R2 and 2016.

² Supported on: Mac OS X Server v10.10, v10.11, v10.12 and Windows Server 2012 R2.

³ Supported on: Mac OS X Server v10.10 and Windows Server 2012 R2. Support for InDesign Server CC2015 will end with the fall 2018 STEP release.

⁴ STEP Asset Push is configured to “push” images to a file system on the server to be locally available for the InDesign® Server application.

⁵ On Windows Server OS it is a requirement to run the English language version.

1.4 STEP AssetPush File Server

This server is required only if the customer wishes to use high-resolution images in remote locations (i.e. offices that are not at the same site as the STEP server) for STEP'n'design (using Adobe InDesign Client). One server for each remote office location that uses high-resolution images is required.

Server Component	Supported software
Hardware architecture	x86-64 (aka. x64, AMD64, Intel 64)
Operating System (OS)	Mac OS X 10.9.x / 10.10.x / 10.11.x / 10.12.x Server 64-Bit Red Hat Enterprise Linux 7.3+ / 6.8+ 64-Bit Oracle Enterprise Linux 7.3+ / 6.8+ 64-Bit (<i>UEK4/UEK3 or RHCK kernel</i>) ¹ MS Windows Server 2016 / 2012 R2 64-Bit ³
Server runtime environment	Oracle Java SE 8 (Java JDK 1.8.0_162+ 64-bit)
Application Software	STEP AssetPush ²

¹ UEK = Unbreakable Enterprise Kernel, RHCK = Red Hat Compatible Kernel.

² STEP AssetPush is configured to “push” images to a filesystem on the server to be locally available for the Adobe InDesign Server application.

³ On Windows Server OS it is a requirement to run the English language version.

1.5 Bomgar Jump Proxy Server

This server is required to establish a remote support access connection to the STEP environments.

Server Component	Supported software
Hardware architecture	x86-64 (aka. x64, AMD64, Intel 64)
Operating System (OS)	MS Windows Server 2016 R2
Software	Bomgar PAM Jumpoint proxy Bomgar PAM Jump Client Java Runtime (JRE) 1.8.0_xx (latest update) STEP Workbench Client Adobe® InDesign® CC2018 / CC2017 / CC2015 ¹ Browsers: IE 9/10/11, Firefox, Safari, Chrome, Edge for Windows 10 (manually tested only)

¹ Refer to the Adobe® InDesign® client requirements described below

1.6 STEP Client Requirements

1.6.1 Windows Client

Windows Client	
Processor	Intel based 2.0GHz Core i3 Ivy Bridge or newer
Number of Processor Units	1
Total System Memory	Min. 4 GB (8 GB recommended)
Operating System	Windows 7 / 8 / 8.1 / 10
Storage	Minimum 5 GB free disk space for STEP Workbench installation, including client cache Additional free storage required for usage of DTP applications
Software	Java Runtime (JRE) 1.8.0_xx (latest update) / 9.0_xx (latest update) STEP Workbench Client Adobe® InDesign® CC2018 / CC2017 / CC2015.x ¹ Browsers: IE 11, Firefox, Safari, Chrome, Edge for Windows 10 (manually tested only) Microsoft Excel: Office 2016 (32-bit, 64-bit), 2013, 2010, 2007, and 2003 ²

¹ Client version must match the server major version. Support for CC 2015 will end with the fall 2018 STEP release.

² In an upcoming STEP Trailblazer release, Excel Office 2003 and 2007 versions will no longer be supported. Customers should ensure that they are using a supported, newer version of Microsoft Excel.

1.6.2 Mac Client

Mac Client	
Processor Technology	Intel based 2.0GHz Core i3 Ivy Bridge or faster
Number of Processor Units	1
Total System Memory	Min. 4 GB (8 GB recommended)
Operating System	Mac OS X 10.10.x / 10.11.x / 10.12.x / 10.13.x ¹
Storage	Minimum 5 GB free disk space for STEP Workbench installation, including client cache Additional free storage required for usage of DTP applications
Software	Java Runtime (JRE) 1.8.0_xx (latest update) / 9.0_xx (latest update) STEP Workbench Client Adobe® InDesign® CC2018 ^{1 4} Adobe® InDesign® CC2017 ^{2 4} Adobe® InDesign® CC2015.x ^{3 4} Browsers: Firefox, Safari, Chrome Microsoft Excel: Office 2016 (32-bit, 64-bit), Office for Mac 2011 ⁵

¹ InDesign CC2018 is supported on macOS 10.11, 10.12 and 10.13.

² InDesign CC2017 is supported on macOS 10.10, 10.11 and 10.12.

³ InDesign CC2015 is supported on macOS 10.9, 10.10 and 10.11. Support for CC 2015 will end with the fall 2018 STEP release.

⁴ Client version must match the server major version.

⁵ In an upcoming STEP Trailblazer release, the Office for Mac 2011 Excel version will no longer be supported. Customers should ensure that they are using a supported, newer version of Microsoft Excel.

2 Virtualization and Cloud support

2.1 Virtualization support

Virtualization of STEP has officially been released on the following platforms:

- ◆ VMware ESXi 5+ for the following guest OS platforms:
 - Red Hat Enterprise Linux 7 / 6 x86-64
 - Oracle Enterprise Linux 7 / 6 x86-64
 - Windows Server 2016 / 2012 R2 x86-64
- ◆ Microsoft Hyper-V 2016 / 2012 R2 for the following guest OS platforms:
 - Windows Server 2016 / 2012 R2 x86-64 platform.

Stibo Systems do not support other virtualization environments than VMware and Hyper-V on x86-64 based platforms.

2.1.1 Scope and restrictions

Virtualization of the STEP application is supported using all supported OS platforms as listed above.

Virtualization of the STEP Oracle database is supported in non-production environments on all released OS platforms as indicated above.

Virtualization of the production database must be evaluated on a case-by-case basis based on system load and sizing expectations, and is conditional upon a performance test conducted joint by the parties and finally approved by Stibo in its discretion.

Virtualization of a DTP server is supported only on the Windows Server 2016 / 2012 R2 OS platform.

2.1.2 Licensing and support when using VMware

Regarding licensing of the Oracle Database on the VMware virtualization platform, there are no license violations as long as the VMware host environment is correctly licensed. This is independent of the supported OS being used. Oracle do not license at the OS level.

VMware licensing and “expanded support” when virtualizing the Oracle Database on their platform is described in the document *Understanding Oracle Certification, Support and Licensing for VMware Environments*:

http://www.vmware.com/files/pdf/solutions/oracle/Understanding_Oracle_Certification_Support_Licensing_VMware_environments.pdf

2.1.3 Requirements

The following requirements must be met by the system and infrastructure when considering virtualization using VMware or Hyper-V:

- ◆ Hypervisor must be VMware ESXi 5+ or Microsoft Hyper-V 2016 / 2012 R2.
- ◆ VMware or Hyper-V servers must be guaranteed to provide a constant capacity in terms of RAM, CPU power and I/O that is equivalent to that of a physical system.
- ◆ STEP version must be Trailblazer or newer.

- ◆ Stibo Standalone application server based on Oracle Java SE component.
- ◆ Oracle Java 8 (1.8.0_162+).
- ◆ Host processor must match (or be similar to) what is recommended in this document. Processors like the Intel low-power CPU's are not supported for production environments.
- ◆ Storage and network requirements must be met as described in this document.

If a performance problem occurs and Stibo and the client come to the conclusion that it is caused by the virtualization of the Oracle Database, the client is responsible for fixing the problem. Stibo will assist where possible.

2.1.4 VMware performance requirements



CRITICAL – Requirements for best VMware performance

It is critical that VMware is configured correctly for maximum performance.

This is done by following the recommendations in the whitepaper **Performance Best Practices for VMware vSphere**. Especially the sections on *Host Power Management in ESXi* and *Running Network Latency Sensitive Applications*.

This includes:

- Configuring ESXi policy to use “High Performance” power option
- Reserving CPU and memory resources

The **Performance Best Practices for VMware vSphere** can be found here:

v5.5:

https://www.vmware.com/pdf/Perf_Best_Practices_vSphere5.5.pdf

v6.0:

<https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/techpaper/vmware-perfbest-practices-vsphere6-0-white-paper.pdf>

v6.5:

https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/techpaper/performance/Perf_Best_Practices_vSphere65.pdf

2.2 Cloud support

STEP is supported in the following major cloud providers:

- Amazon Web Services – AWS
- Microsoft Azure Cloud ¹
- Oracle Cloud Infrastructure - OCI ²
- Oracle Cloud Infrastructure Classic - OCI Classic³

¹ When deploying STEP in Azure it must be observed that the Azure feature Accelerated Networking is a requirement for servers being part of a STEP environment.

² In OCI – the DBaaS on VM shapes has not been certified.

³ In OCI Classic – the Database Cloud Service (DBCS) on SSD storage has not been certified.

All requirements (network and storage) must still be fulfilled as described in this document and the *Infrastructure Recommendation* being generated based on this document. These requirements are the same regardless of how and where the environment is hosted and whether it is a physical or virtual environment.

2.2.1 Hybrid setups

A hybrid setup with some servers placed on premises and others in the cloud is **not** supported. Such setup would not be able to fulfill the performance requirements, especially related to network performance.

2.2.2 Oracle licensing in AWS and Azure

When licensing Oracle in the cloud, Oracle has published the paper “*Licensing Oracle Software in the Cloud Computing Environment*” (<http://www.oracle.com/us/corporate/pricing/cloud-licensing-070579.pdf>) which describes how licensing works.

As of January 23rd 2018, Oracle has updated this document, indicating that within AWS (EC2 and RDS) and Azure, Oracle Standard Edition 2 may only be licensed on instances up to 8 vCPU's. If licensing Database Standard Edition 2 by Named User Plus metric, the minimums are 10 NUP licenses per 8 Amazon vCPUs or 8 Azure vCPUs.

Please reach out to Stibo Systems for the latest update on how AWS and Azure handles this.

3 Network requirements

3.1 STEP Server to Server Connections

All connectivity between servers within each environment must be direct connections. This can be achieved either through dedicated NICs or through point-to-point switches without the interference from any additional hardware and/or software.

Introduction of load balancing hardware/software, firewall hardware/software is known to cause degradation of performance and/or server/environment instability due to limitations and malfunctions in the introduced software/hardware.

Servers must have permanent IP addresses assigned, either by manually configuring network settings on the servers, or by dedicating a specific IP address for each server on the DHCP server. Server IP addresses must under no circumstance change while the application is in operation. This is particularly important for systems with multiple application and/or database servers.

All application servers in a STEP application cluster *must* be located on the same network segment / VLAN. Thus a firewall may never be located between application servers.

It is not uncommon that application and database are placed on different networks, and thus separated by a firewall. This is accepted by Stibo System as long as the network latency requirements mentioned below are still met.

3.1.1 Network bandwidth requirement

Minimum requirement is 1 Gbit dedicated network between all servers except to file servers. 10 Gbit is recommended for enterprise systems with a heavy workload profile.



IMPORTANT – STEP In-Memory requirement

10 Gbit network between application servers and database server is required when using the STEP In-Memory feature (licensed feature).

3.1.2 Network latency requirements

The requirements for network latency between application servers in a STEP application cluster and between application server(s) and database server(s) are:

- ◆ Maximum 0.2 ms with a 64 bytes packetsize
- ◆ Maximum 1 ms with a 32K packetsize

3.1.3 Server-to-server network requirements

Below table summarizes the inter-server communication requirements.

STEP Server – Server Network Requirements				
Source	Target	Protocol	Port	Comment
Application Server	Application Server	Cache coherency	5636	Used for internal STEP application clustering cache. Only relevant when having more than one application server.
Application Server	Application Server	InMemory	5999	STEP InMemory data communication/exchange. Only relevant when when having more than one application server and using STEP InMemory.
Application Server(s)	Database Server	SQL Net	1521	Communication between application and database. 1521 is the default port, so it could be different on any given installation.

3.2 Client to Server Connections

The below table summarizes the network requirements between the STEP client and the STEP servers *per concurrent user* (see term definition above):

Client & Server Network Requirements (per concurrent user)					
Application	Bandwidth	Recommended Max. Latency	Protocol	Port	Encryption Option
STEPworkbench	20 MBit/s ¹	25 ms	HTTP	80	HTTPS (Port 443)
STEP Web UI	20 MBit/s ¹	25 ms	HTTP	80	HTTPS (Port 443)
STEP'n'design Client	10 MBit/s ²	25 ms	HTTP	80	HTTPS (Port 443)
Stibo Support Client	20 MBit/s	25 ms	HTTP RDP SSH VNC SQL	80 3389 22 5900-5909 1521	HTTPS (Port 443)
Surveillance Agent	~30 MBit/s ³	25 ms	TCP/IP	5666 ³	SSH (Port 22)

¹ May be higher for clients that are uploading images. Any increase of the bandwidth requirement depends on the number and size of the images to be uploaded. The overall upload frequency with which images are uploaded contributes to the requirement as well.

² Only page data download and save back will trigger any data transmissions. Image data will be downloaded from a local image repository (a 1Gbit LAN connection is recommended).

³ The surveillance agent will be running with only one instance per server and the required bandwidth depends on the individual surveillance agent software. Stibo uses Nagios (<http://www.nagios.org>) for server surveillance.

3.2.1 STEP Workbench and STEP WebUI

The STEP client is only opening a connection to the STEP server when the user performs actions on the client. This may be by pushing buttons, browsing the product hierarchy, uploading data, etc. Clients that are only logged on to STEP but otherwise are idle do not transmit or receive any data (no network usage).

A typical Workbench user is conducting data maintenance tasks, enriching data, and performing import and exports based on the STEP import and export managers, as well as uploading and downloading images.

A typical STEP WebUI user is conducting data maintenance tasks and enriching data as well as uploading and downloading images.

3.2.2 STEP'n'design Client (DTP) Client

This user will manually build pages in Adobe® InDesign®, and through the use of STEP Merchandiser. STEP'n'design is the STEP integration with Adobe® InDesign® and allows users to mount database information to an Adobe® InDesign® page.

The DTP client will only exchange data with the STEP system on two instances:

1. When loading page data
2. When saving page data back to STEP

It should be noted that image data needs to be loaded from a local image repository, vastly improving performance for remote users and reducing network usage.

3.2.3 Concurrent User

With the knowledge of how the client to server connection works, Stibo defines the term “concurrent user” as a user that is actively working in STEP by uploading and/or requesting data. An example for the behavior of a concurrent user would be:

- ◆ Select a product
- ◆ Wait 15 sec
- ◆ Select another product
- ◆ Wait 15 sec
- ◆ Select an attribute
- ◆ Wait 15 sec
- ◆ Change attribute data and save changes
- ◆ Wait 15 sec
- ◆ ...

This term is important when scaling or predicting network bandwidth for the network infrastructure. Only concurrent users will contribute to the overall network load.

3.2.4 Stibo Support Client

Stibo Systems must be able to access the STEP server(s) hosted by the customer in order to provide support. In case publishing is included in the solution, the customer must provide an InDesign client license that is available to the Stibo support/consulting teams.

3.2.5 Surveillance Agent

A surveillance agent will only be installed on customer servers in case a special DBA agreement is signed between the customer and Stibo.

3.3 STEP Server – External Server Network Requirements

The below table summarizes the network between the STEP server and other external servers for additional functionalities.

STEP Server – External Server Network Requirements				
STEP Server	External Server	Protocol	Port	Comment
Application Server	Mail Server	SMTP	25	Used to send mails from the STEP system
All STEP Servers	Time Server	UDP NTP	123	Access to time synchronization service
Application Server	SFTP Server	SFTP	22	Import/Export of STEP and patch data
Application Server	Stibo Update Server	HTTPS	443	Update service for STEP software: https://updates.stibosystems.com
Application Server	LDAP Server	LDAP LDAPS	389 636	External authentication using LDAP.
Asset Push File Server	Remote File Servers	RSYNC	873	Image replication/copying to remote locations
All STEP Servers	Backup Server	?	?	Must be provided by the customer in order to perform system backup
Bomgar Jumpoint proxy	Bomgar Appliance (Stibo)	HTTPS	443	Bomgar remote support access must be opened to the following addresses: support.stibo.com - 217.28.168.103 atl-bomgar.stibo.com – 217.28.163.56
All STEP servers	Bomgar Jumpoint proxy	HTTPS	443	Application and database servers uses the Bomgar Jumpoint proxy to connect to the Bomgar appliance at Stibo.

3.4 SSL Certificates

3.4.1 Self-signed certificates not supported

When configuring a STEP solution to use SSL encryption – which is typically done for external supplier access – it is important that only certificates from a trusted CA authority (like Verisign or Thawte) are being used.

Self-signed certificates are *not* supported by the STEP solution.

3.4.2 Responsibilities

It is the responsibility of the customer / hosting partner to provide the required SSL certificates.

4 Storage performance requirements

Performance of the storage used for the database has been measured when testing scalability of the STEP solution. The I/O performance has been measured as IOPS.

The requirements on the database are up to 2,500 IOPS during normal operations and up to 5,000 IOPS during peak operations. The STEP Oracle Database uses a block size of 8 KB. The read/write ratio is typically between 60/40 and 70/30.

The application server (including shared storage) requires 500 – 1,000 IOPS.

4.1 AWS EBS storage considerations

4.1.1 EBS bandwidth

Depending on the chosen instance type, the EBS storage bandwidth varies. For example, the r4.4xlarge offers 3000 Mbit/s EBS storage bandwidth, whereas the r4.8xlarge offers 6000 Mbit/s. So if EBS bandwidth becomes a bottleneck, it is necessary to switch to the larger instance type.

4.1.2 EBS IOPS – Provisioned IOPS or General Purpose SSD?

Depending on the chosen SSD volume type, it is possible to control how many IOPS that are available. This is important to the database storage performance.

General Purpose SSD (gp2) offers 3 IOPS/GB and volumes can be striped to achieve higher IOPS than this.

Provisioned IOPS SSD (io1) offers 50 IOPS/GB.

It is thus important to choose the right solution that fulfills the storage performance requirements of 5.000+ IOPS at peak performance as described above.

4.1 Azure storage considerations

4.1.1 SSD storage

Performance testing of STEP in Azure shows that SSD storage is required for the Oracle database and for the shared storage covering workarea and upload for the application servers. In addition, SSD storage is preferred for the OS and software partitions of application servers as well as database server. In Azure, SSD storage is referred to as Premium storage. Instance types in Azure that supports the use of SSD storage will have 's' in its name like DSv3 or ESv3.

In Azure, asset data can reside on non-SSD storage like Managed Disks or Unmanaged Disks depending if data must be highly available by managing replicas in other datacenters.

5 High Availability considerations

To achieve system redundancy and an increased amount of system resources for large server solutions, STEP supports the following options for active/active and active/passive clustering.

5.1 Active/Active

This option requires both the database and application layer to become fully redundant with at least 2 active nodes. This can be realized in the following ways:

Application

Two or more application servers are configured as an Application Cluster. The cluster is managed by the STEP application (no OS cluster) and will load balance user sessions and processes automatically. In case of one of the nodes failing, user sessions will be automatically transferred and background processes will be automatically restarted on the healthy node.

Database

Database clustering is fully managed by Oracle. The active/active clustering option from Oracle is “Oracle Real Application Cluster” (Oracle RAC).

5.2 Active/Passive

Since active/active clustering can be very complex to setup, manage and has a very high price tag on the Oracle part an alternative is an active/passive setup, featuring at least two nodes.

Application

An active/passive setup is not directly possible with the application. It is however possible to setup multiple nodes and configure these for specific purposes. I.e. on a 3 node application setup the nodes can be dedicated individually for: Background processes, internal Java client users and external Web UI users.

In case of a breakdown the system can be reconfigured to utilize the remaining nodes.

Database

Active/passive clustering on the database is possible with different technologies and setups. The most commonly used is to setup an Oracle “standby” database server that either shares the database storage with the active node or features its own storage.

When using its own storage, the passive node is setup as a standalone database server that must be updated at regular intervals or realtime from the active node. There are multiple ways to update the passive node. The most common way is to utilize Oracle Dataguard.

About Stibo Systems

Stibo Systems provides global organizations with a leading multi-domain Master Data Management (MDM) solution. Stibo Systems enables its customers to better manage enterprise intelligence on a global scale, improve sales, and quickly adjust to changes in business requirements. Stibo Systems' STEP technology is a flexible MDM solution that provides a single trusted source of operational information for the entire enterprise. Stibo Systems offers industry-specific solutions, engineered and supported to meet the strategic information needs of global customers including: GE, Sears, Siemens, Target and Thule. Stibo Systems is a subsidiary of the privately held Stibo A/S group, originally founded in 1794 with corporate headquarters in Aarhus, Denmark.

For more information, please visit www.stibosystems.com.