IT solutions for logistics





Solvo.TOS

Maritime Container Terminals

Solvo.TOS Maritime Container

Solvo.TOS is a comprehensive container terminal operating system that manages container handling operations in real time, ensuring a rapid return on investment.

The system facilitates berth planning, vessel stowage, equipment control, yard operations, gate and truck visit coordination, rail management, empty depot handling, reefer-zone operations, CFS, and more.

A key benefit of Solvo.TOS is its fully integrated process optimization toolkit, included as a standard feature. It offers automated CHE pooling and routing, crane sequencing, container putaway based on predefined rules, and automated vessel and rail stowage planning.



Solvo.TOS includes terminal automation modules, offering seamless integration with on-board crane systems from different leading manufacturers.

Solvo.TOS for Maritime Container Terminal

- > Berth & vessel management
- > Gate & truck management
- > Yard management
- > Equipment control
- > Terminal automation
- > Customs clearance module
- > Rail operations management
- > Repair zone management
- > Truck operations management
- > CFS (stuffing/ restuffing)
- > KPI
- > Web
- > EDI
- > Billing
- > Empty container depot management
- > Automatic reefer monitoring
- > OCR integration
- > Integration with 3rd party software
- > DGPS integration
- > Customs inspection management

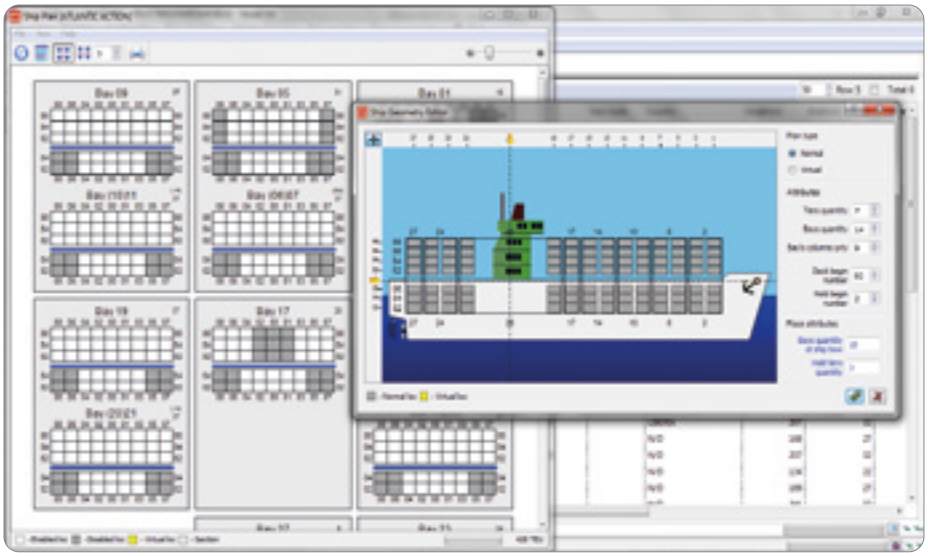
System access administration and user role management

Allows to build a tree-like structure of users, appoint roles and privileges and grant access depending on that. Each role can be assigned a number of privileges enabling a user to perform certain operations and have access to strictly defined sets of functions.

The system also enables single sign-on for TOS users in other environments such as MS Active Directory.

Business rules and strategies

Solvo.TOS enables the user to pre-configure various cargo flow algorithms based on rules and strategies. For example, one can easily configure dynamic stacking rules for containers in the yard taking into account hundreds of parameters. Based on that the system will automatically generate putaway jobs for CHE operators. Flexible and easily configurable rules also allow smart dispensing of empties, creating and optimizing CHE routes; automatic blocking of containers non-compliant with certain requirements (e.g. VGM) prevent operators from loading/dispatching containers, permitting trucks exit/entrance and more. In automated planning the system uses genetic algorithms to create a suitable work pattern for the future, e.g. in automated crane sequencing.



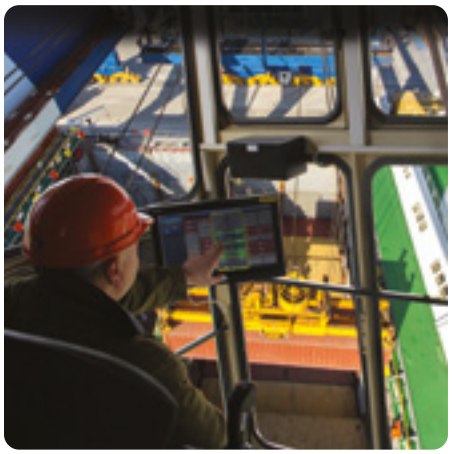
Vessel management

Enables managing sea and river transport vessel operations at the container terminal including loading and discharge planning, crane sequencing and real-time control.

- Register vessel calls (based on notices and messages from shipping line agents)
- BoL management
- Create and monitor monthly vessel processing plans
- EDI exchange with shipping lines for automated load planning
- Plan vessel loading/discharge operations in automatic, semi-automatic and manual modes
- Easy drag & drop planning using GUI
- Create and manage graphic vessel profiles and bay-plans;
- Create crane sequencing schedules for vessel loading and unloading
- Handle additional processes during vessel operations (for example, removal of hatch covers)
- Create and print the necessary documents

The module allows automated creation of time-sheets, bookings, loading and discharging lists.

Solvo.TOS also allows boosting efficiency of an STS-crane operator. Special GUI may be installed on the mounted radio data terminals inside the STS cabin enabling an operator to get load/discharge jobs from the system, control the whole process, easily confirm every move using a touchscreen display, change vessel stowage locations if needed and much more.



Berth planning

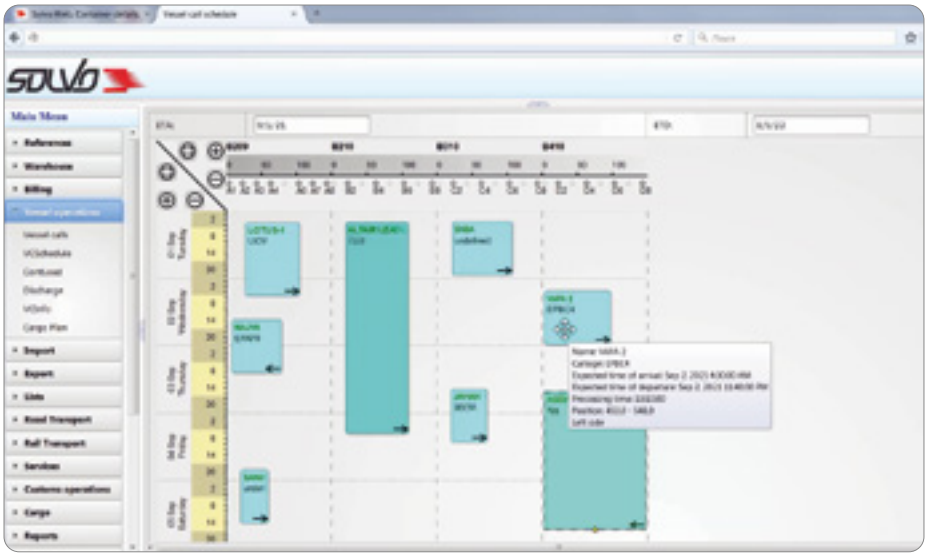
The Berth Planning Module creates vessel mooring plans, schedules, and optimizes berth usage time.

Efficiency

- Reduced berth downtime
- More effective berth as well as equipment and personnel usage

Allows

- Visualize and plan berths for vessels and vessel call schedules
- Automate and simplify the vessel processing sequence, process of allocating vessels from queue by berth (for more effective usage of berth length achieving maximum productivity).



Yard management and optimization

The graphical terminal layout offers a number of modes including a real-time bird's eye view, yard section and yard

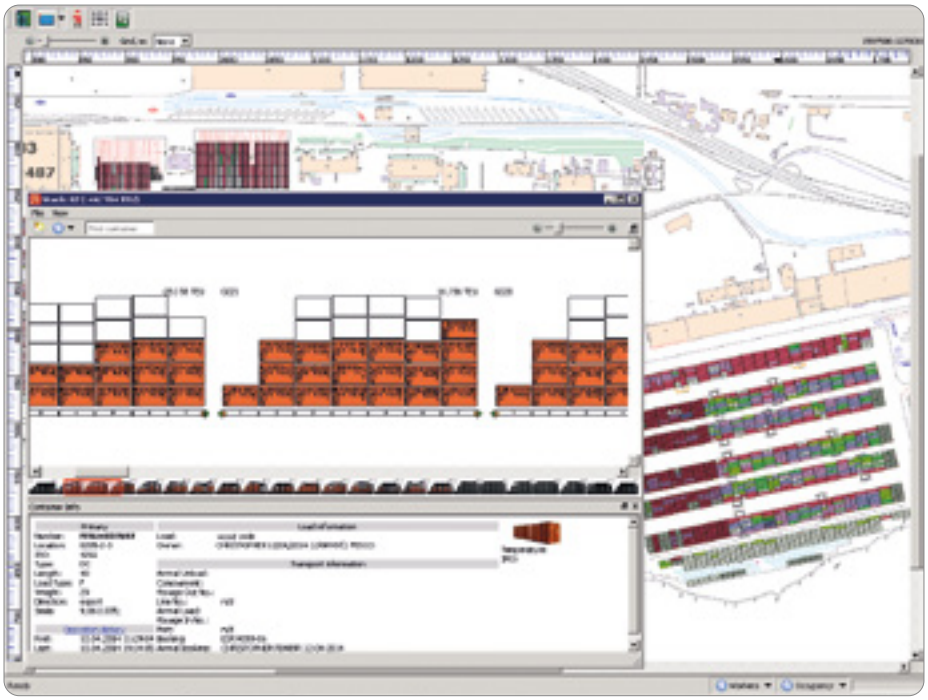
block views and helps dispatchers monitor all terminal operations in real time and take immediate action if needed.

The dispatcher can drill down to see detailed real-time info on specific zones, containers or equipment with just one mouse click. This is especially effective

whenever yard equipment units such as RTGs and RMGs or straddles use GPS transmitters. In this case dispatchers can

monitor all actions as they actually take place with no delay.

The GUI is fully customizable with regard to displayed information and design.



Yard management module features

- Yard planning – automatic and manual modes
- Automated job assignment to tallymen/receiving inspectors/ dockers via RDTs
- Dynamic stacking
- Management of reshuffles/ rehandles
- Hazard-class cargo management

Empty container depot management

Comprehensive empty container deport management allowing effective interaction with cargo holders minimizing expenses on empty container operations.

Smart automated algorithm for timely dispensing of empty containers taking into account various parameters such as maximum storage period, projected number of rehandles to be made, FIFO/LIFO.

Container terminal may create quotas limiting the number of empty containers from clients that can simultaneously be stored. If quota is reached Solvo.TOS automatically blocks the process of creating requests for container delivery before a new slot is available.



Reefer storage zone management

- Automated reefer-monitoring thanks to integration with RTE, Emerson Refcon or Identec solutions
- Organize automatic job issuing sequence for processing reefers while taking into account the job sequence and the need to quickly connect the container to a plug
- Ensures compliance with temperature requirements by notifying dispatchers when containers approach critical temperature thresholds



CFS (container freight station)

Allows effective management of stuffing, unstuffing, and restuffing operations as well as container maintenance and repairs, cleaning, generator connection, removal of hatch covers, manage returns.

Features

Weighing — different weighing modes supported, containers can be processed both in the yard or in advance in the berth zone as required. Thanks to the supported integration with weighing equipment one can:

- Automatically receive weighing information from the scales
- Reduce expenses for moving the dispatcher to/from the scales
- Eliminate the possibility of error when entering the weight in the System

VGM compliance module that allows:

- Full VGM accountability
- VGM data availability control, VERMAS support
- Automatically block the container from loading when a loading list is generated or on the attempt to load the container onto the ship
- Notify different users on the event of obtaining the VGM from scales indicating the method used for that, the declaration number, place of weighing, responsible organization and all other related parameters

Container inspection and x-raying

- Create customs and client inspection and automatically distribute work-orders
- Maintain a record of all operations related to load screening/inspection
- Automatically create jobs to pick up and drop off loads in the screening zone

Rail management and optimization

The rail transport processing module helps expediting rail car processing operations and planning. The module supports:

- Registration of train blocks specifying necessary parameters for each rail car
- Registration of rail car departure
- Grouping of rail cars into train blocks, processing of each rail car, train block or entire train
- Creating a monthly import/ export plan for rail transport
- Creation of work orders for shipping containers by rail

Freight train planning

The system automatically performs container load planning, after which the dispatcher can interfere and manually edit and change the plan if necessary using a handy GUI.

OCR integration

TOS can automatically register inbound or outbound trains and containers when integrated with the optical character recognition system (OCR).

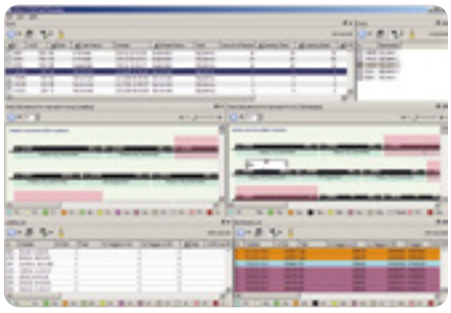
Meanwhile, pictures of containers and rail cars can be displayed on the client web-portal and attached as proof to the inspection certificate.

Rail operations optimization

The systems supports various optimization technologies such as dual-cycling for RS

when a reach stacker can discharge containers from a train into buffer locations

then move them to stack locations and bring the empty ones for loading on the way back, making one cycle instead of 2 or more which reduces empty runs and increases productivity.



Equipment control and optimization

The system supports all major types of CHEs used at container terminals worldwide. That means that Solvo.TOS allows setting and adjusting different operating patterns for CHEs depending on such parameters as class, lifting capacity, type of container, season, etc.

The system analyzes the available data about the road network of the terminal and builds the optimal route for a CHE. The entry of road data is carried out through the roads editor function — part of the Real-time terminal layout viewer and editor. User defines the key check points, permitted turns and delays. The user can also then set the availability of a stack for processing from a selected road.

All terminal equipment can be managed by the system automatically according to the dynamic stacking rules and strategies.

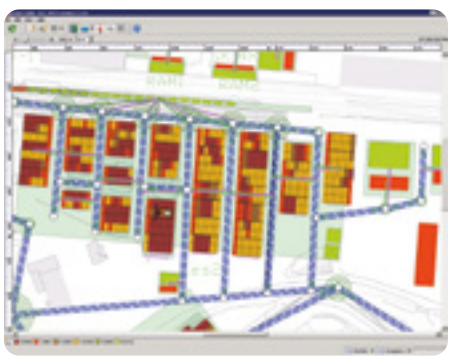
Dispatchers can view the list of assigned jobs. The system initiates a job to vehicle operators to place the container in the specified cell.

All operators and dockers can be equipped with handheld computers or vehicle mounted computers with Solvo.TOS mobile workstations installed depending on the necessity.

Solvo.TOS offers different types of mobile workstations and interfaces depending on the user role and mode of CHE. Both graphic touchscreen and plain text keyboard interfaces are available. All mobile data terminals run on Telnet client and use WiFi or GSM network to communicate with TOS.

The module features

- CHE route optimization
- CHE sequencing
- CHE job management
- Terminal tractor and trailer management

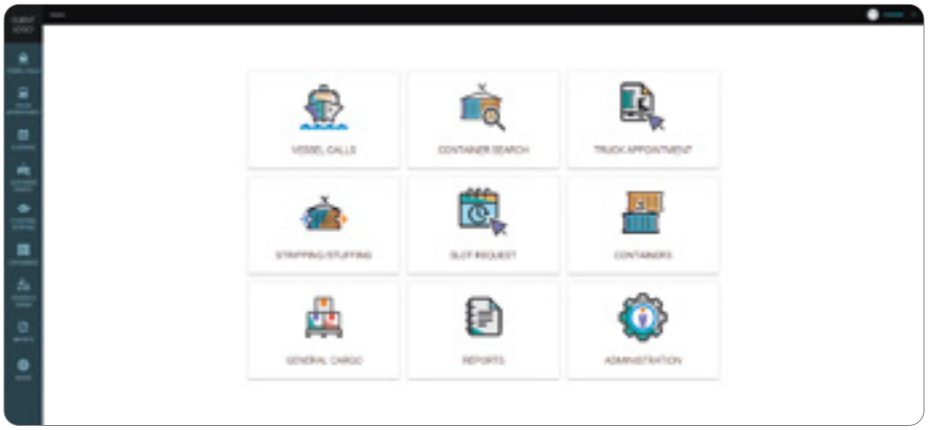


Truck visit, gate and pre gate operations

The functionality of the Gate management module features a WEB interface that allows freight forwarders submit truck visit requests to the terminal via Internet in advance. Those are called pre-bookings.

Creating preliminary requests for truck visits including export load containers, export empty containers, import container, and combined visits. An operator can select an available time slot.

Truck visits are automatically scheduled into available time slots, determined by the maximum number of vehicles that can be processed within each assigned window.



Features

- Truck driver accreditation (Permits)
- Automated gate security workplace (including a self-service kiosk for the gate-keeper)
- Vehicle buffer zone management
- Quota allocation for containers per time slot
- Outage control using e-signatures
- Integration with a character recognition system (OCR)
- Integration with the access control system
- Intelligent truck driver queue sorter

Invoicing and billing

The Solvo.Billing module calculates service costs based on tariff rates and prepares all necessary paperwork and invoices.

The module receives information regarding any performed operations (e.g. receiving loads, daily storage of cargo etc.), after which it tallies up the cost and transforms this into “services” (for example, “load storage per ton” , “storage of hazardous cargo”). Next, the Billing module calculates the cost of the services provided based on the tariff rate. The total cost can be sent to a dedicated gateway of an ERP system and presented as a report (Excel, Word, paper copy etc.). The module also enables invoicing for a range of container handling operations, including transfers, storage, stuffing and stripping, inspection, demurrage, etc.

EDI

The EDI (Electronic data interchange) module is used to automate the process of electronic data interchange

between the cargo terminal and its contract partners (most importantly, the shipping lines). The module transforms data sent from contract partners into mutually approved file formats and saves them in the management system’s database and does the same with the information will be subsequently sent from the terminal to contract partners.

Solvo supports all most common EDIFACT messages, as well as xml and xls files.

The module includes the following general functions:

- Creating service messages with information about the results (status) of EDI message processing
- Creating and editing initial codes used for transforming EDIT messages by the user
- Viewing EDI messages and monitoring their transfer status

Reporting & Notification

Notifications

The notification module is used to automate the process of notifying parties of interest regarding System events. Events are generated by the management system and are sent to the notification module, which can create notifications that can be sent to users.

The module includes the following general functions:

- Automatic sending of notifications to parties of interests using email or SMS in accordance with user-defined rules
- Assigning rules for automatic notification for specified System events
- Creation of static and dynamic mailing lists for each message
- Creating messages based on user templates
- Creating and editing message templates



Reporting and KPI dashboards

The user works with KPI indicators through a special web-based GUI. The main window is an interactive dashboard the user can easily manage. The panel or dashboard consists of tabs similar to those of a WEB browser. KPI dashboard are also available as an app.

Examples of indicators

- The number of processed containers at the terminal with existing resources and annual growth rate in the number of containers processed
- Crane performance (TEUs per year, processed by a crane, number of crane moves per hour)
- Dock utilization (number of vessels processed per year at one dock)
- Space utilization (TEUs per one hectare)
- Gate performance rating (number of container per hour received at the terminals via the gate, number of terminals per one gate line) etc.

Resource planning

The resource planning module organizes workers and equipment to maximize productivity per gang or individual. One can create day shift and shift plans, generate work as well as to determine the need for human resources and equipment.

The module allows to:

- Create single day shift plans with job distribution by activity type: vessel, truck, rail, intra-warehouse and assisting operations
- Create process-flow diagrams (PFD) specifying the required amount of resources and planned productivity
- Distribution of day shift plan jobs by shift worker
- Monitor operations for a selected day shift plan
- Automatically record jobs in the corresponding day shift plan that were performed independently of the plan
- Automatically record jobs in the corresponding day-shift plan that were performed independently of the plan
- Creating a report about the terminal's general resource and equipment requirements for a specify day shift plan as well as for a specific shift

Terminal Automation

The ability for TOS to support ASC and general automated operations.

Solvo.TOS supports Konecranes C-Pics, Kalmar Smartrail and Liebherr integration for precise positioning of loads thanks to the DGPS modules built in the cranes.

Solvo.TOS integrates with Konecranes Autostop to enable TOS-guided RTG/ RMG movements.

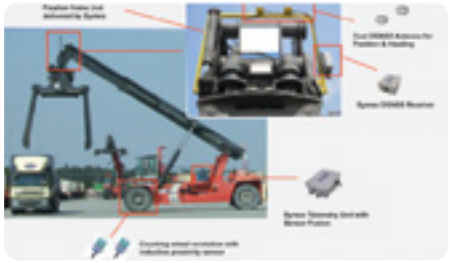
The module enables you to directly communicate with onboard crane systems to control crane moves in real-time e.g. Konecranes Autostop thus semi and fully automated crane operations are supported by Solvo.TOS.

Automated positioning of containers and equipment using external global positioning systems

Solvo.TOS features integration with the differentiated global positioning systems (DGPS) — receivers that are either portable or mounted on the handling equipment and utility vehicles as well as with grab sensor devices or on-board load positioning systems. Enables determining the coordinates and the location where the load was taken or stowed when the load was grabbed or released by the CHE.

It also allows determining the position of the handling equipment and utility transport vehicles in real time.









Among Solvo.TOS users

Solvo.TOS Efficiency



Terminal Operating Costs

- Improved and more efficient usage of container handling equipment
- Optimized usage of space
- Decrease operating costs by eliminating empty runs for loaders, saving fuel and power, and extending the equipment lifespan
- Reduced rehandles and reshuffles

Labor management

- Improved efficiency of personnel management
- Prevention of unexpected situations and emergencies during technological processes
- Reduction in work time for all terminal operations
- Increased labor performance by 15 to 25%

Operations Control and Document Management

- Increased speed and efficiency of data exchange between all freight processing parties at the terminal
- Guaranteed real time access to operational information
- Reduced paperwork
- Consolidated database for all transactions

Customer Servicing

- Increased speed of processing vessels, trucks and trains thanks to such features as automated and semi-automated planning of arrivals, departures, loading/discharge operations
- The protocol feature enables access to container's processing history and an operator's work history for any time period
- Improved service for freight owners by providing them accurate container information
- Optimized strategies for freight placement operations

Logistics

- Optimize container flow and achieve 100% traceability
- Increase data accuracy (up to 99.9%): know who, what, where and when at the port in real time
- Choose optimal handling procedure depending on container type, amount of available resources and other factors
- Optimize use of the terminal's operation areas: space utilization can be increased by 5 to 20% for different zone types

Solvo.TOS architecture, integration options and reliability

Solvo.TOS has a state-of-the-art tree tier structure:

- **Client-end software at work stations**
- **Application server software with active components/ WEB server**
- **Database server**

To provide fail-safety, a dual backup is used, namely the database server which can be used as an applications server and vice versa. Cluster configuration with unified external storage is also available as an option.

Solvo.TOS can be integrated with third-party solutions such as ERP, GOS, PMIS and many others via a set of predefined intersystem interfaces (gateways). Thanks to the modular structure of TOS, a high flexibility at selecting the optimum configuration that fully meets the customer's needs is achieved.

The client-server architecture and the modular structure of TOS enables adding new modules to the system in line with the changing needs of the customer.

Solvo.TOS has a service-oriented architecture (SOA). The individual modules interact with the kernel and each other via standardized protocols.

The system architecture enables adjusting those parts and modules of TOS that have load increments by transferring them to separate servers.

Contact us

Solvo Europe B.V.

The Hague,
The Netherlands

Solvo International d.o.o.

Beograd,
Republic of Serbia

Solvo Latin America

San Paolo,
Brazil

Solvo Italia

Rome, Italy

Solvo Middle East

Dubai, UAE

sales@solvo-world.com

solvo-world.com