Automating hospital intralogistics

with robotics and automation

GIBOTECH AS
moving technology

Introducing robot technology

in the sterile supply workflow

Automation is the creation and application of technology to monitor and control the production and delivery of products and services. And automation comes with great benefits.

Production throughput will increase with the same number of employees and expand the capacity outside of normal hours. Robots can be placed in less desirable working environments than employees and using inexpensive square meters like basement etc. will lead to building optimization and a smaller footprint. Instrument management will improve with even use of instrument stock (first-in-first-out) and management of expiry dates.

Less manual work leads to higher quality and consistent results with 100% correct traceability and release employee time to clinical, quality and patient focused tasks.

Employee satisfaction will be greatly improved by less manual work resulting in a better working environment and improved ergonomics. Employees may spend more time on satisfying and value-adding work, and will have less sick days.

Various robot technologies can be applied in the sterile reprocessing departement depending on the area to be automated:

Free arm robots, AGVs (Automated Guided Vehicles), vision and weight systems, automated stock systems and lifts.

The Gibotech automation solution can be fully integrated with any reprocessing equipment and sterile supply management system.

The solution is based on a modular principle making it possible to customize to required demands and capacity.

Explore the benefits

of automating your sterile supply workflow

Increase production throughput

Applying robot technology to the sterile supply workflow enables a higher production throughput with the same number of employees. Robots can work 24-7, do not need breaks and holidays and have no sick days. With this, you can expand production capacity outside the normal operating hours.

Highest level of patient safety

Reducing manual work reduces the risk of human error. Robotics ensure a more consistent result leading to a higher level of quality, increased accuracy in traceability, and overall enhanced patient safety.

Improve your sterile supply workflow while creating the optimal working environment

Ensure a well-planned surgical schedule

To take full advantage of the automation and ensure the highest possible throughput puts demands on both the production planning as well as the surgical schedule planning. Combining automation with your sterile supply management system enables you to plan and optimize your production while limiting the non-productive time between surgical procedures.

Optimize instrument stock management

Automation of the sterile stock assists you in managing your instruments in less space. The stock robot supports management of expiry dates and first-in-first-out principles. Therefore, you are ensured an even use of instruments.

Improvement of working conditions

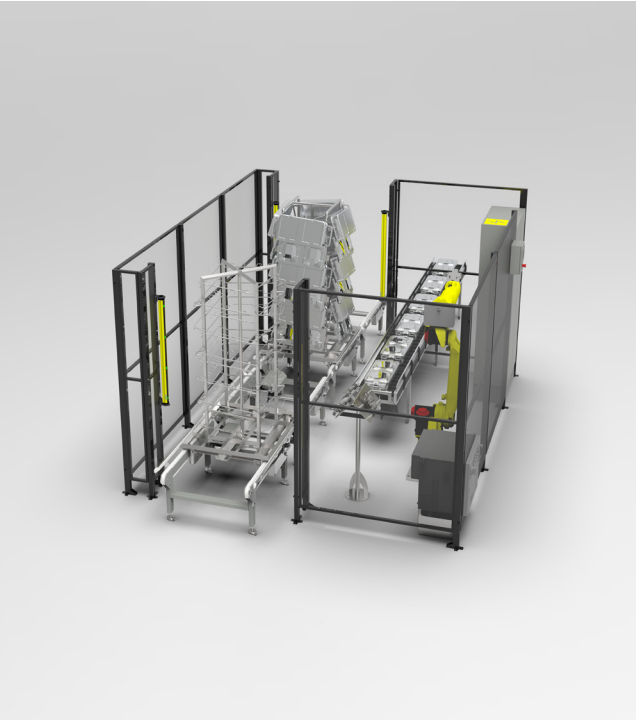
Introducing automation to the sterile supply workflow decreases staff turnover and relieves the physical burden on staff by removing cumbersome tasks. Instead, staff can focus on delivering value-adding work. Ergonomics are highly improved, thereby bringing down the number of sick days while creating the best possible safety and care for staff.

Efficient utilization of premises

Automating the sterile supply workflow can be adapted to your needs either in new hospital construction or in existing premises. Robots are flexible and have less requirements for the physical working environment than staff, making it possible to place in less desirable working conditions such as a basement stock area.

Loading of washing racks

Automatic loading of containers on washing racks



Application area:	Soiled area
Handles:	Containers
Task:	Separates lids and containers and loads them on to washing racks
Throughput:	Fills a washing rack in 6 minutes, handles 72 containers per hour
Container sizes:	592x285x112 mm, 470x285x112 mm, and 300x285x112 mm.

Empty containers and washing racks are automatically transferred into the cell by a conveyor. The washing racks stops on a turntable conveyor that rotates for the robot to fill all four sides of the washing rack.

A robot lifts the container lid followed by the container and places both in the correct position on the washing rack.

After the filling process is completed, the washing rack is transported out of the cell by the conveyor.

Fully automated process

The cell is completely automated ensuring a continuous flow of transportation and filling of washing racks. The robot is equipped with a changeable tool head allowing it to automatically change tools for different types of containers.

Transport to the washer-disinfectors can be handled manually, but using an AGV (Automated Guided Vehicle) will ensure a steady flow.

Loading of sterilizer racks

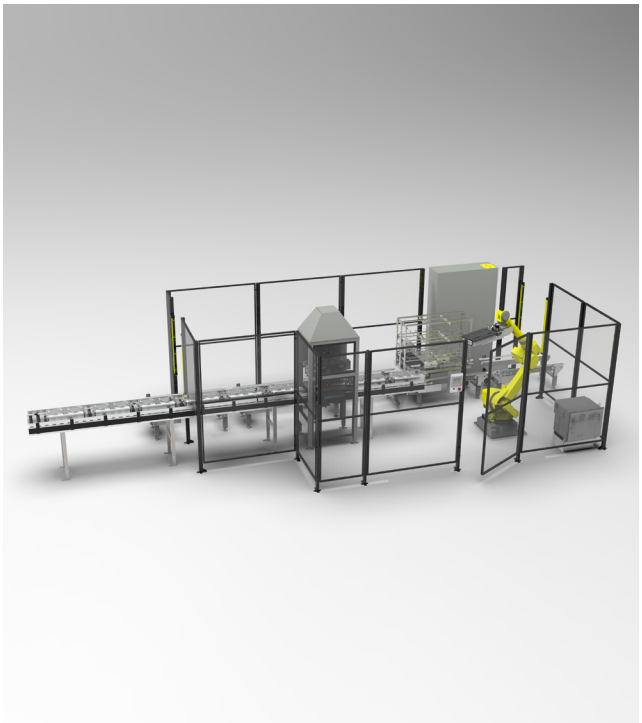
Automatic loading of containers on sterilizer racks

The sterilizer racks and containers are automatically transported by the conveyor into the cell.

The robot picks up the lid and places it on the container which is transported to the container locking device.

Each container is automatically locked and placed in the sterilizer rack by the robot.

When the rack is full, it is transported out of the cell by the conveyor.



Optimal placing of containers

The robot is designed to consider the weight of each container when placing them on the sterilizer racks.

The automatic weight consideration ensures that the heaviest containers are always placed at the bottom of the sterilizer rack, providing better working conditions and ergonomics for the staff.

Application area:	Clean area
Handles:	Containers
Task:	Loads containers on sterilizer racks
Throughput:	Loads 84 racks/hour
Container sizes:	592x285x112 mm, 470x285x112 mm, and 300x285x112 mm.

Loading of transport trolleys

Automatic loading of containers in transport trolleys

Application area:	Sterile area
Handles:	Containers and transport trolleys
Task:	Loads containers in transport trolleys
Throughput:	Loads 19 trolleys/hour
Container sizes:	592x285x112 mm, 470x285x112 mm, and 300x285x112 mm.

Containers and open transport trolleys are transported into the cell by a conveyor. The containers are picked up by a robot and placed in an open transport trolley.

When the transport trolley is full, the doors are automatically closed and the trolley is transported by a conveyor to the next task.

Tracking and sealing

The containers are loaded in transport trolleys according to orders from the surgical scheduling system. Tracking information regarding the loaded containers is sent to the sterile supply management system, ensuring documentation and traceability of each instrument.

When closed, the doors of the transport trolley are sealed and marked with a special tamper sticker, eliminating the risk of someone opening the cabinet inadvertantly before it reaches the operating room.

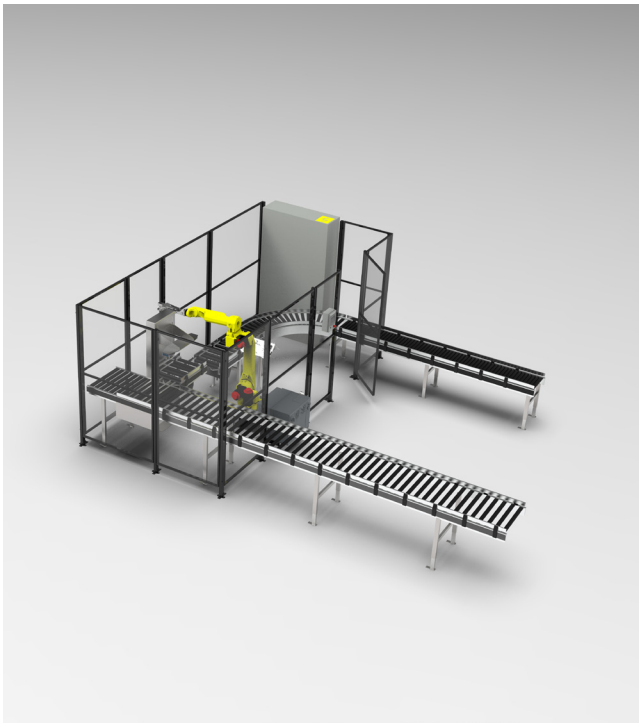
Unloading of instrument trays

Automatic unloading of trays from containers

This cell handles both fully loaded and empty containers with unlocked lids. Containers are transported by an infeed roller conveyor and make a temporary stop at the tray extraction station.

The robot lifts the lid and picks up the tray from the container. The container is forwarded and the lid is replaced on the container.

Finally, the separated container and tray are transported on their respective conveyors and forwarded to the next task.



Improvement of ergonomics

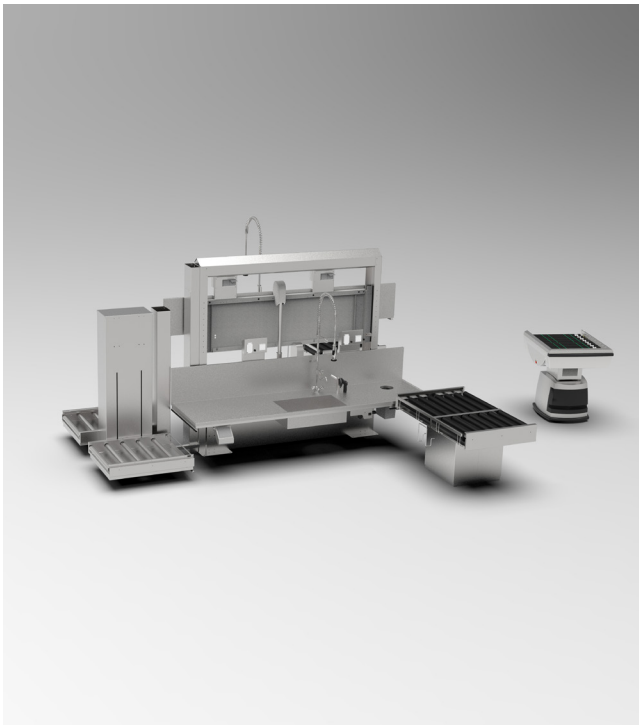
The cell is a completely automated process ensuring a continuous flow and unloading of trays from containers.

Integrating this cell in the sterile supply workflow decreases staff turnover and relieves the physical burden on staff by removing repetitive tasks such as unloading of trays. Instead, staff can focus on delivering value-added work.

Application area:	Soiled area
Handles:	Containers and trays
Task:	Unloads trays from the containers
Throughput:	69 containers/hour
Container sizes:	592x285x112 mm, 470x285x112 mm, and 300x285x112 mm.

Automatic tables and transport

Height-adjustable tables and AGV transport



Application area:	Soiled area
Handles:	Containers and trays
Task:	Automatic transport of washing racks to and from washing table
Throughput:	58 racks in/out per hour
Table specifications:	Max load on table: 100 kg Height adjustable: 630-1280 mm.
Container sizes:	592x285x112, 470x285x112 , and 300x285x112 mm.

Containers are transported by AGVs (Automated Guided Vehicles) to the roller conveyor in the manual washing area.

The tray is removed from the container by hand and manually pre-washed.

The trays are placed on washing racks, which are picked up by AGVs and transported to the designated washer-disinfectors.

An AGV transports the empty containers to the cabinet washer-disinfectors.

Automatic integration with supply management system

This work station includes manual work and is supported by the conveyors and AGVs. Integration with the sterile supply management system ensures that all processes and handling encountered by the instruments at this work station are recorded.

When staff log in to the workstation on the touchpad, both the height of the workstation and the light is automatically adjusted to the specific requests of that employee. Ergonomics are highly improved for the staff, ensuring the best possible working environment.

Automated Guided Vehicle (AGV)

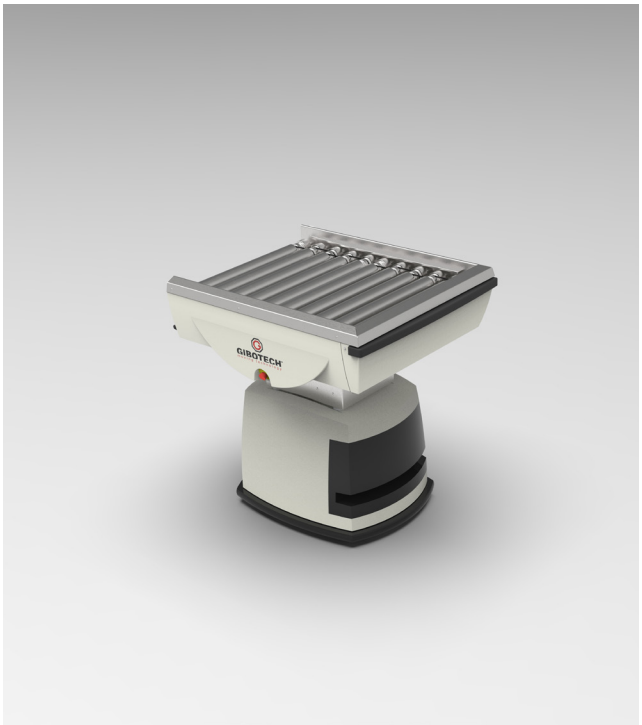
Automatic transportation with mobile robots

Automated Guided Vehicle (AGV) systems are in-house, floor-bound conveyor systems, consisting of automated guided vehicles, which transport your goods efficiently.

The AGVs navigate by scanning the contours of the surroundings with an integrated laser scanner, drawing up a map with easily recognizable features.

Any changes in the room - caused by people or vehicles moving around or stored goods - are masked out by the AGV on the basis of the recorded room characteristics.

Safety installations prevent collisions via application of laser scanner, additional 3D sensors and signalling devices.



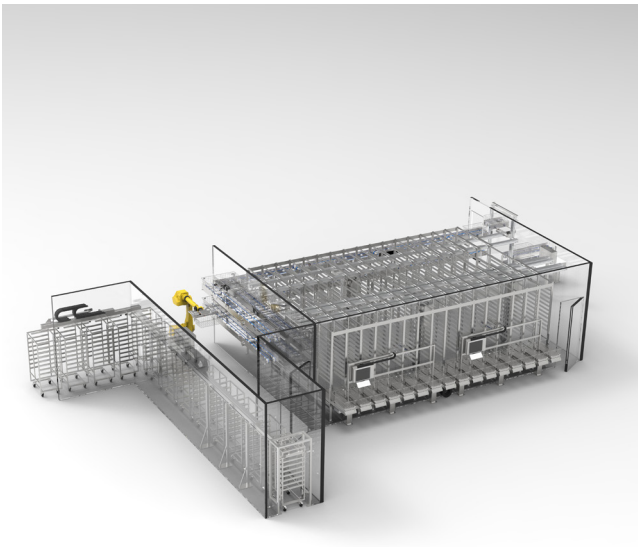
Automatic control system

Modern and user friendly command and control technology enables the best optimal flow of goods and materials.
Some key features in the AGV control system include the possibility to assign transport tasks and choose the best route between pick up and drop off locations. The control system also guarantees traceability of goods.
Due to simulative mapping during project design phase, implementation is quick and easy.

Max payload:	100 kg
Velocity:	1,6 m/s
Navigation:	SLAM technology Hybrid with magnets
Charging:	Inductive or charging contacts
Safety installations:	Laser scanner, 3D sensors and signalling devices.

Storage system

Automatic storage and retrieval of sterile goods



Containers are transported by a conveyor to the automatic storage system. The storage crane handles one item per cycle and transfers items between one or more levels.

Incoming items are picked up and transported to the desired position in the racking system. The automatic storage contains shelves with double depth. If the item is positioned at the back of the shelf, the crane will automatically reshuffle the items.

The storage robot picks the items based on instructions from the supply management system and the system controls stock management, including management of expiry dates and first-in-first-out principles.

Handles:	Containers
Task:	Stores and transports containers in and out of stock
Throughput :	Double depth: 145 items/ hour Single depth: 250 items/ hour
Stock specifications:	11,880 racks Max load capacity: 50 kg
Container sizes:	592x285x112, 470x285x112 , and 300x285x112 mm.

Completely or partly sterile storage

The automated storage system is fully integrated with other sterile supply management systems and may be installed in either a fully or partly sterile version.

In the fully sterile storage system the sterilized instruments are transported in nets in open containers to and from a sterile racking system.

In the partly sterile storage system the sterilized instruments are transported in sealed containers and placed in a non-sterile racking system

Distribution Center

Automatic handling of incoming and outgoing goods

The Distribution Center handles incoming and outgoing goods in and out of the hospital, e.g. instruments, linnen and medicine.

The goods are transported in trolleys which may be transferred between levels by lifts connected to the in- and outfeed ramps by reversible buffer lanes.

Reception of priority goods may be manually transferred from the delivery ramps to a manual infeed station by the lifts. Full trolleys with sterile goods are transferred from the Central Sterile Services Department to the Distribution Center by gate. Trolleys to external hospitals are delivered to the ramps on a dedicated buffer lane and trolleys to internal departments are transferred to other levels by AGV or manual handling for further distribution.

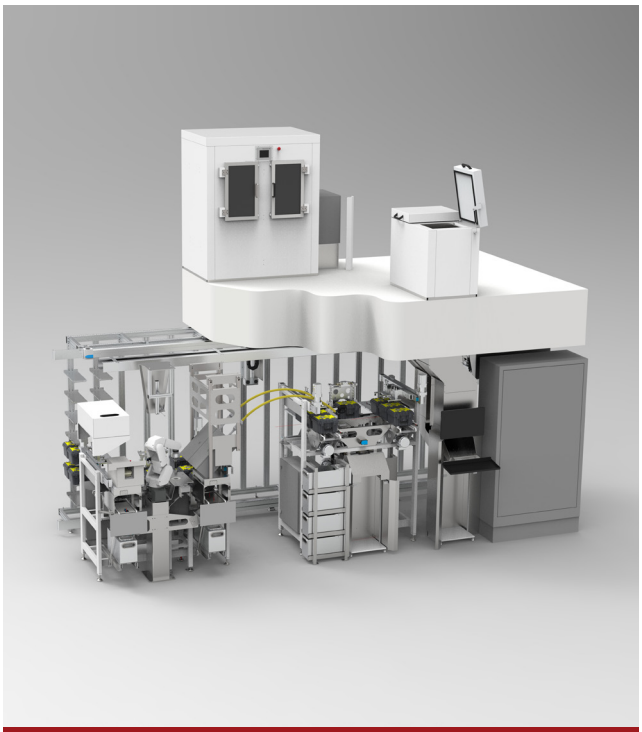
Modular design

The conveyors are modular in order to make the construction universal and scalable. The modules also make it possible to have different conveyor lengths.
Footplates are installed between the conveyor to enable manual transfer of priority trolleys between conveyors. The operator handles any rearrangements and ensures the correct position of the trolley on the conveyor.
Infeed guiding is placed at the end of the conveyors providing correct positioning. A belt conveyor at the end of the conveyor against the lift ensures secure two-way transition between the conveyors.

Handles:	Transport trolleys Other trolleys, e.g. linen trolleys
Task:	Reception, transportation and distribution of incoming goods
Throughput:	Incoming trolleys - 166/hour, 769/day Outgoing trolleys - 219/hour, 769/day

GiboSort

Intelligent handling and sorting of microbiological and biochemical samples



Handles:	Boxes and microbiological and biochemical samples
Task:	Empty boxes and sort and distribute samples
Throughput:	Est. 5000 samples/day, scalable
Vision system:	Scans samples and determines correct location
Capacity:	Elevator system - 24 boxes Storage shelf - 220 boxes.

GiboSort automates the task of handling blood samples in order to minimize the risk of errors occuring in manual sorting and shorten the lead time to significantly improve efficiency.

Samples are transported from local docters in specially designed transport boxes, delivered at the hospital and to GiboSort's internal delivery system. Transport boxes are placed in elevators and transported to the sorting robot that empties the boxes and sorts the samples for analysis in the laboratories.

Empty boxes are sent back through the elevator system, so the service staff receives the same number of boxes as were delivered, and transport staff always has empty boxes in the car for next pick up.

Intelligent robot

GiboSort is designed with an intelligent sorting robot based on concepts and products from industrial solutions.
The robot recognizes the content of the boxes using a vision camera and empties the boxes one sample at a time. The vision system also determines if the sample are centrifuged or not, and boxes containing emergency samples are prioritized.
Unrecognizable samples are delivered to a special problem case for manual handling.

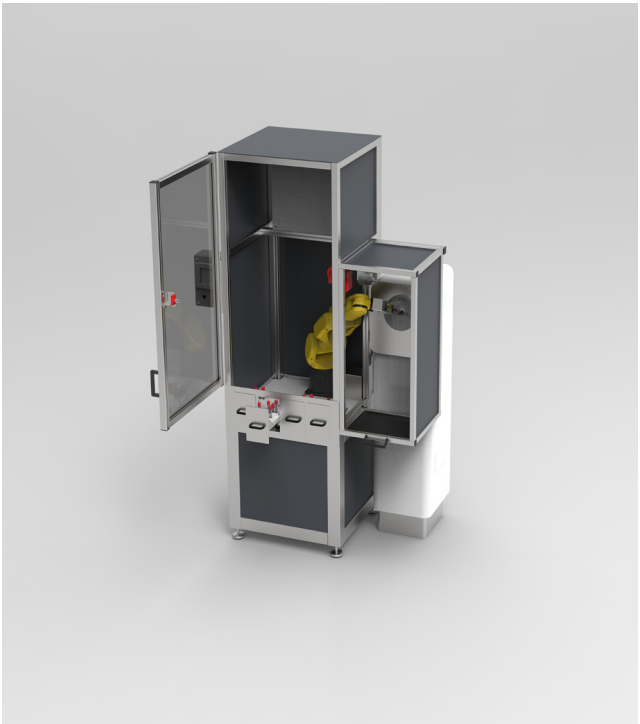
Blood sample handling

Robot cell for automatic handling of blood samples

This cell is designed to automate the distribution of blood samples to a specific location.

The cell consists of 4 drawers, a robot, a vision system and a delivery position for a receiving unit.

The robot automatically picks up one test tube at a time from racks with up to 25 glasses. The position is determined by a vision system which is connected to the robot and a sensor determines if there is a test tube in the receiving unit. If the unit is empty, it is ready to receive a test tube and the robot will get a signal to continue. The robot will continue until all test tubes have been transferred and stops automatically if the receiving unit is full.



Integration with hospital intralogistics systems

The blood sample handling cell may be fully integrated with hospital intralogistics systems and is designed with an intelligent robot based on concepts from industrial solutions.
Once the test tubes are placed in the receiving unit, they are automatically transferred to the correct laboratory by the internal pneumatic tube system, thereby limiting the number of potential errors occuring in manual handling.

Model:	Fanuc 200iC LR Mate
Handles:	Racks with blood samples
Task:	Pick up blood samples from rack and place sample in receiver
Throughput:	1 sample/10-15 seconds
Vision system:	Camera registers samples in the rack
Rack size:	25 samples
Drawers:	4

Gibotech designs and provides innovative robotics and automation solutions for the industry and healthcare sector. Our solutions help create a safer, integrated and better utilized facility that supports efficiency and consistency, enabling healthcare professionals to focus on delivering the best possible care for patients.

The Gibotech automation solution can be fully integrated with any reprocessing equipment and sterile supply management system. The system is based on a modular principle making it possible to customize to required demands and capacity.

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