
SINA

Comfort for surgeon
Safety for patient

SINA Flex

Robotic telesurgery system

Do not make your whole body tired!

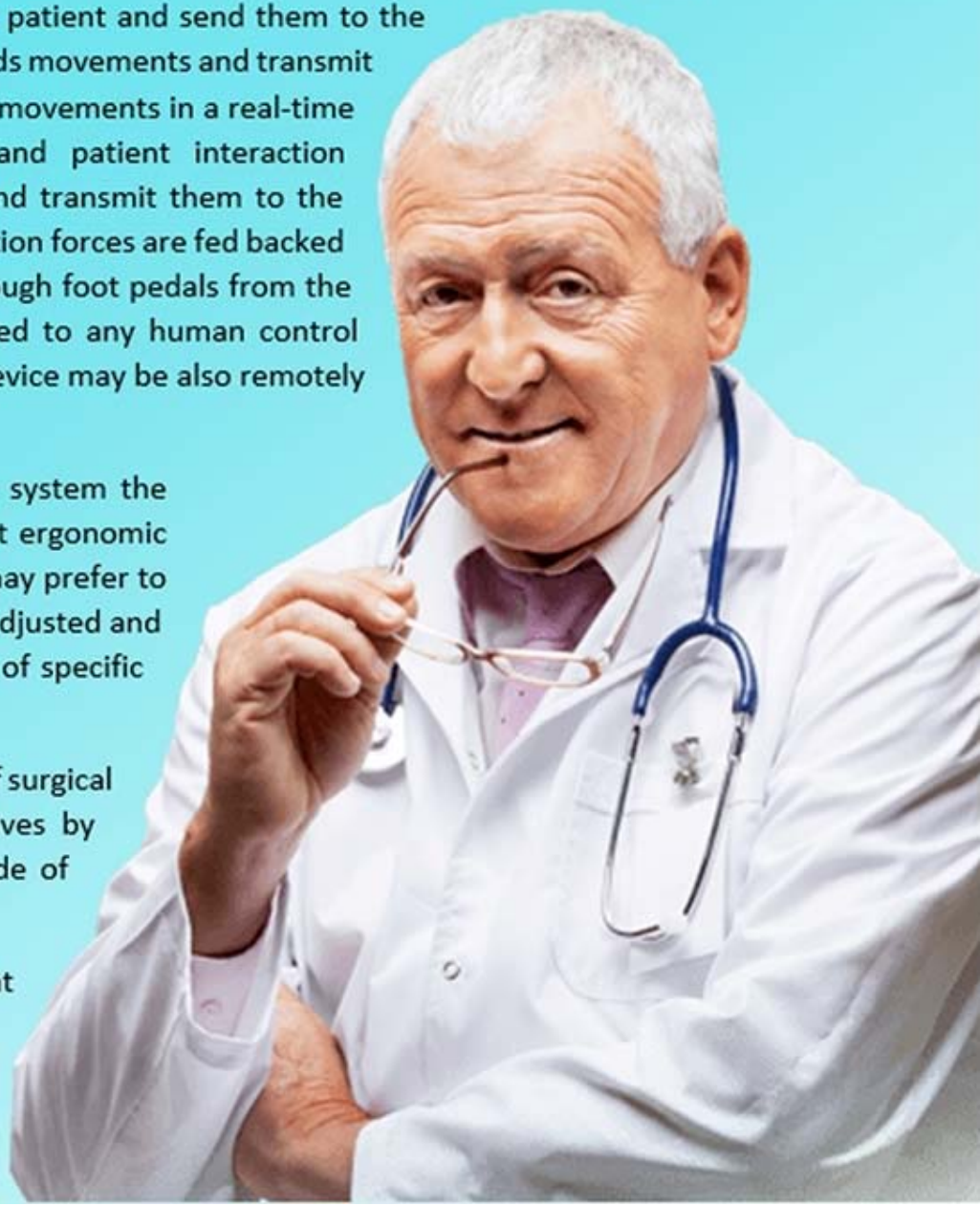
Just seat and do it with your wrist!

Sina$_{Flex}$ is a robotic surgery system which can be used for locally performing abdominal surgery operations in an ergonomic posture for surgeon and also remotely through internet or other communication channels. This system has two main subsystems including a master robotic console at the surgeon side and a slave robotic system at patient's side with two or three surgical robots which are installed on the sides of a specific surgery bed. A robotic cameraman called *RoboLens* is also integrated into the system to take the intra-abdominal images of the patient and send them to the surgeon's master console. The master robots receive the surgeon's hands movements and transmit them to the patient's side slave robots that mimic the surgeon's hand movements in a real-time manner. Simultaneously, the slave robots measure the robot and patient interaction forces/torques, including the pinch forces under instruments jaws and transmit them to the surgeon's side master robotic system. As a result, all tool-tissue interaction forces are fed backed to the surgeon's hands. The cameraman robot may be controlled through foot pedals from the surgeon's side or smartly track the surgery instruments with no need to any human control command. Other operating room equipment such as electro surgery device may be also remotely controlled from the surgeon's side master consol.

The *Sina*$_{Flex}$ system has a reconfigurable surgery console. Using this system the surgeon may sit behind the surgery console and adjust it for the best ergonomic posture of him/herself. Also for long lasting surgeries which surgeon may prefer to stand during surgery and reduced his fatigue, the console may be pre adjusted and reconfigured to standing posture with special ergonomic parameters of specific surgeon.

Also, the *Sina*$_{Flex}$ slave subsystem, has a modular design for placement of surgical robots, so surgeons may design their surgery architecture themselves by reconfigure the placement of surgery robots at one side or both side of surgery bed.

Using the Sina system, surgeon may use single or multiple use straight instruments for simple surgeries and also single use flexible instruments for more complex surgeries and through this way they may reduce the cost of surgeries.



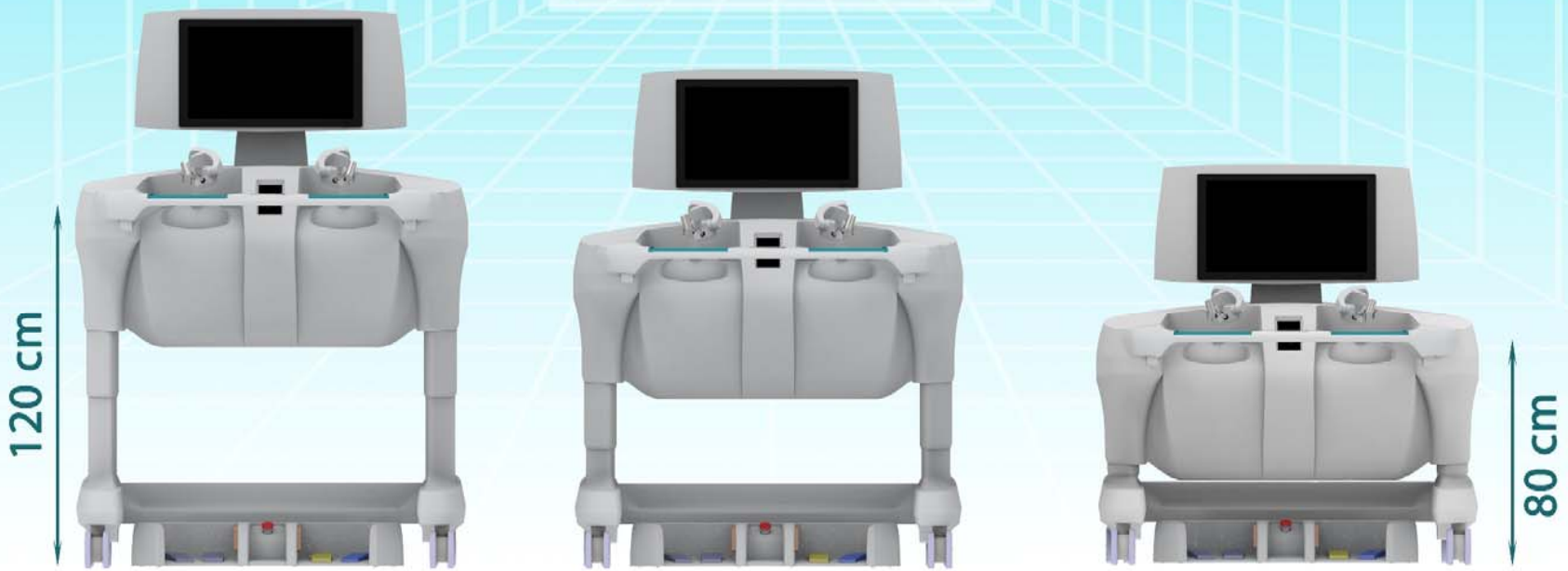
Which posture do you prefer?

Sitting,standing or reconfiguring during a long lasting operation!

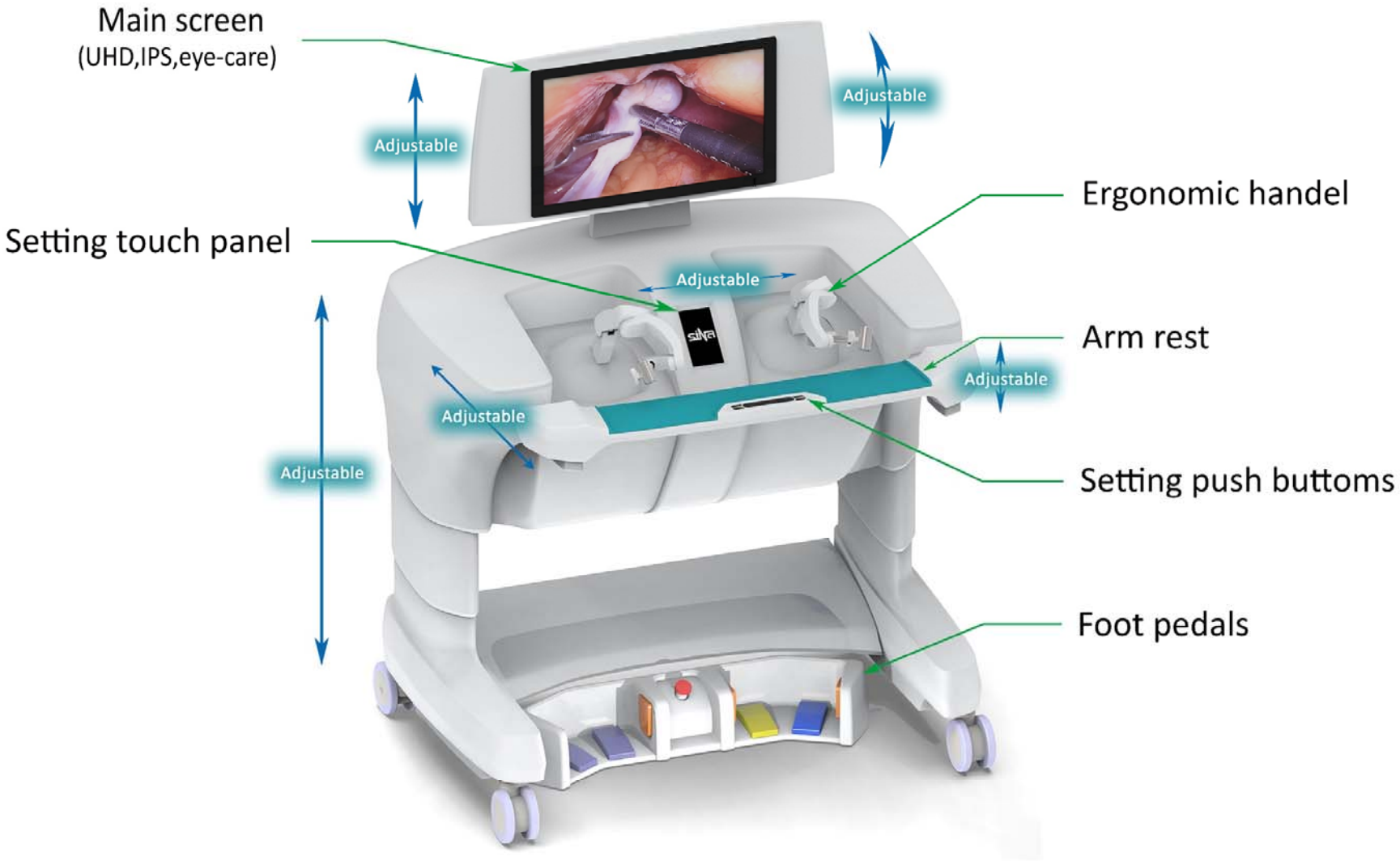
We offer a reconfigurable surgery console that brings best ergonomic posture for you.

The console may memorize the preset configurations and reconfigure from sitting to standing posture during surgery in less than 30 sec. So surgeon may operate both in sitting or standing posture to reduce his/her fatigue during a long lasting operation.

We think about your convenience!

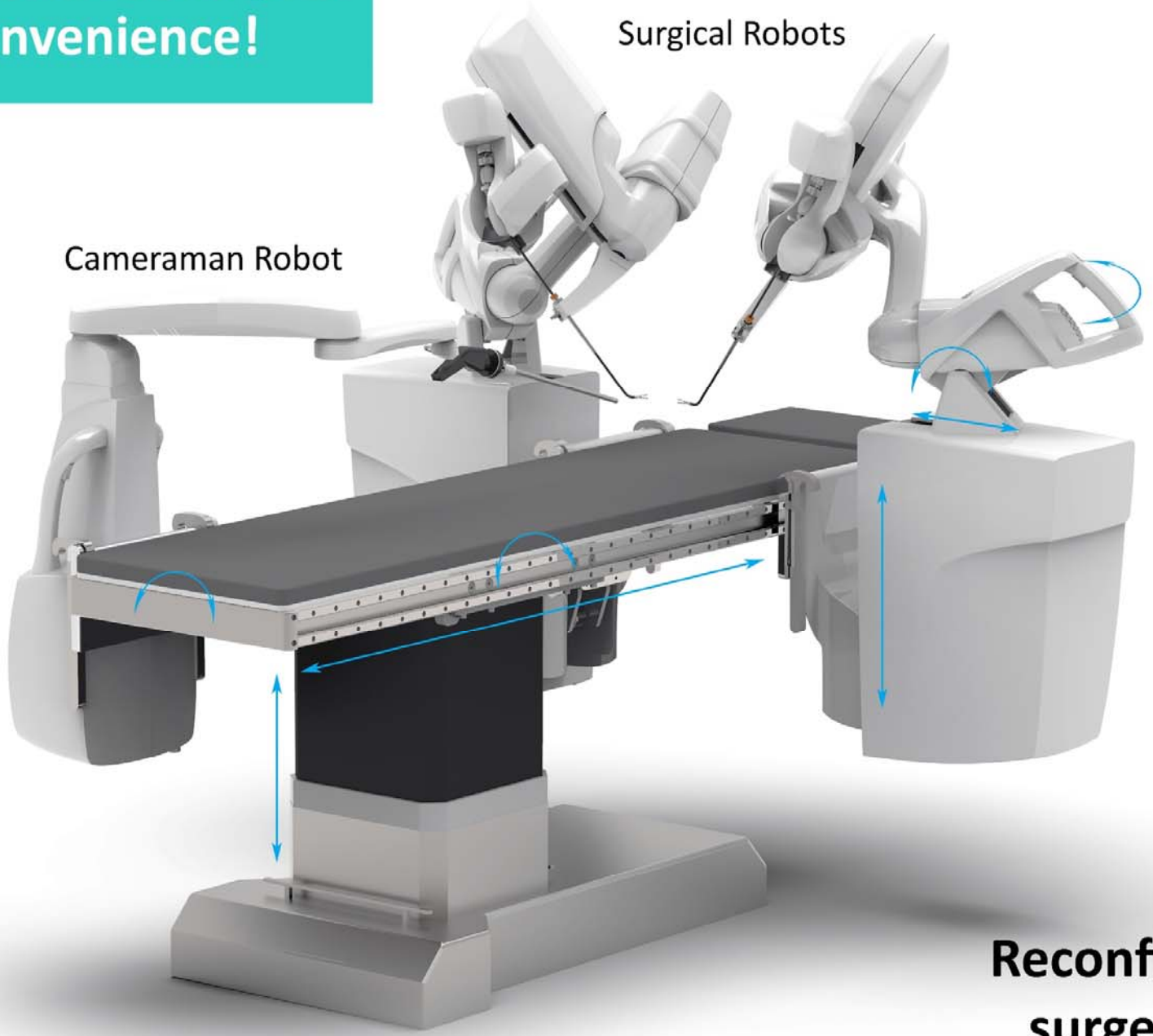


You may adjust almost every thing!



Reconfigurable Surgery Console

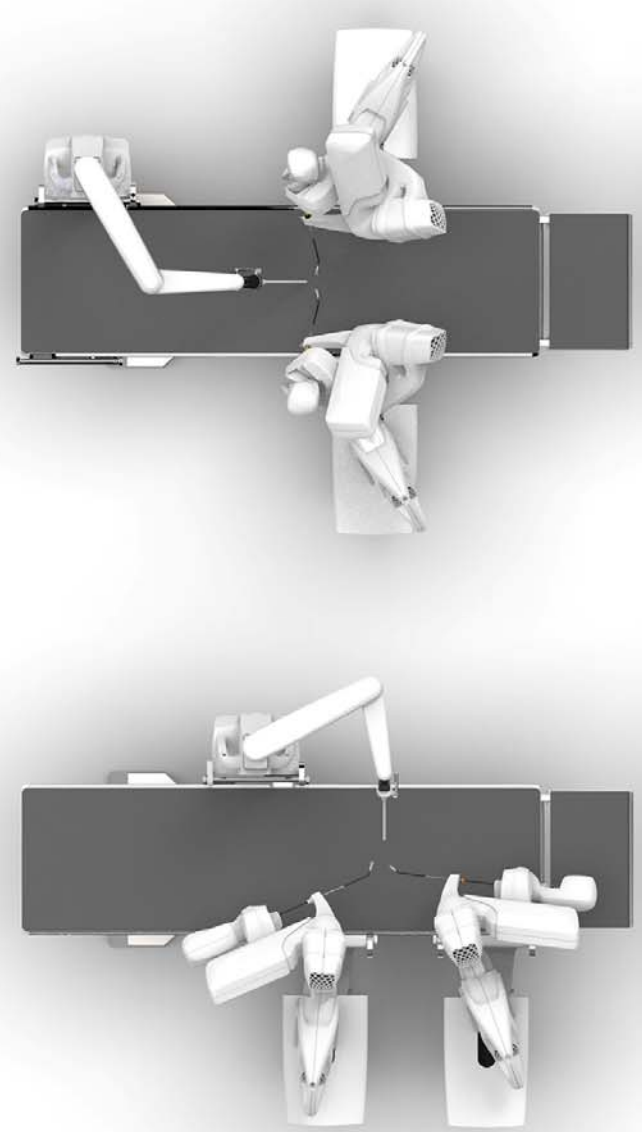
We also think about your surgery convenience!



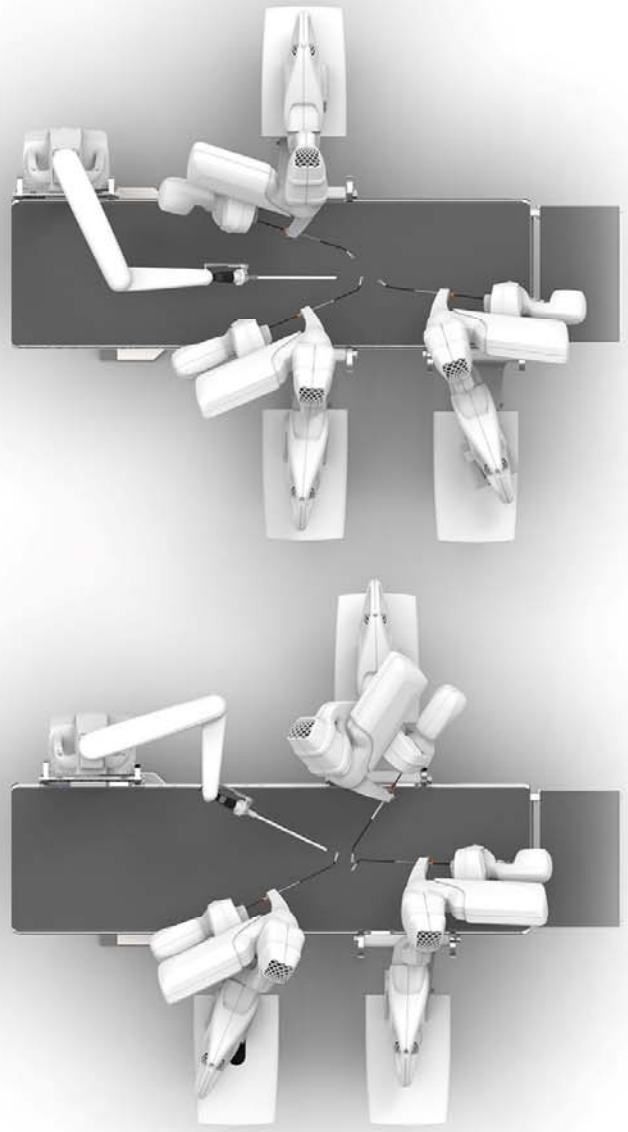
Reconfigurable surgery site

Design your own surgery architecture or select from Sina offer

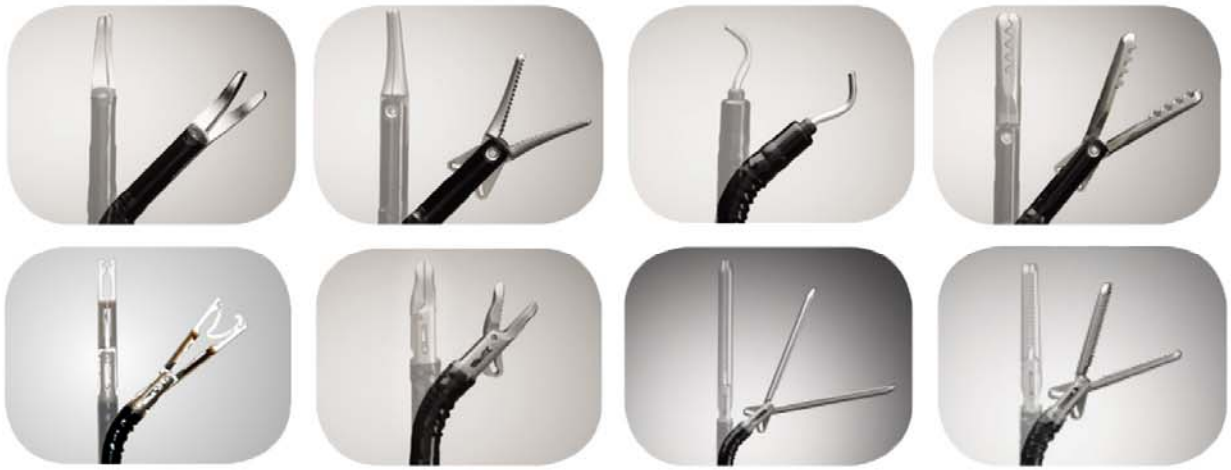
3 arms configuration samples



4 arms configuration samples



Just choose your favorite instruments and enjoy your surgery



Flexible

(single use)

Straight

(single or multiple use)

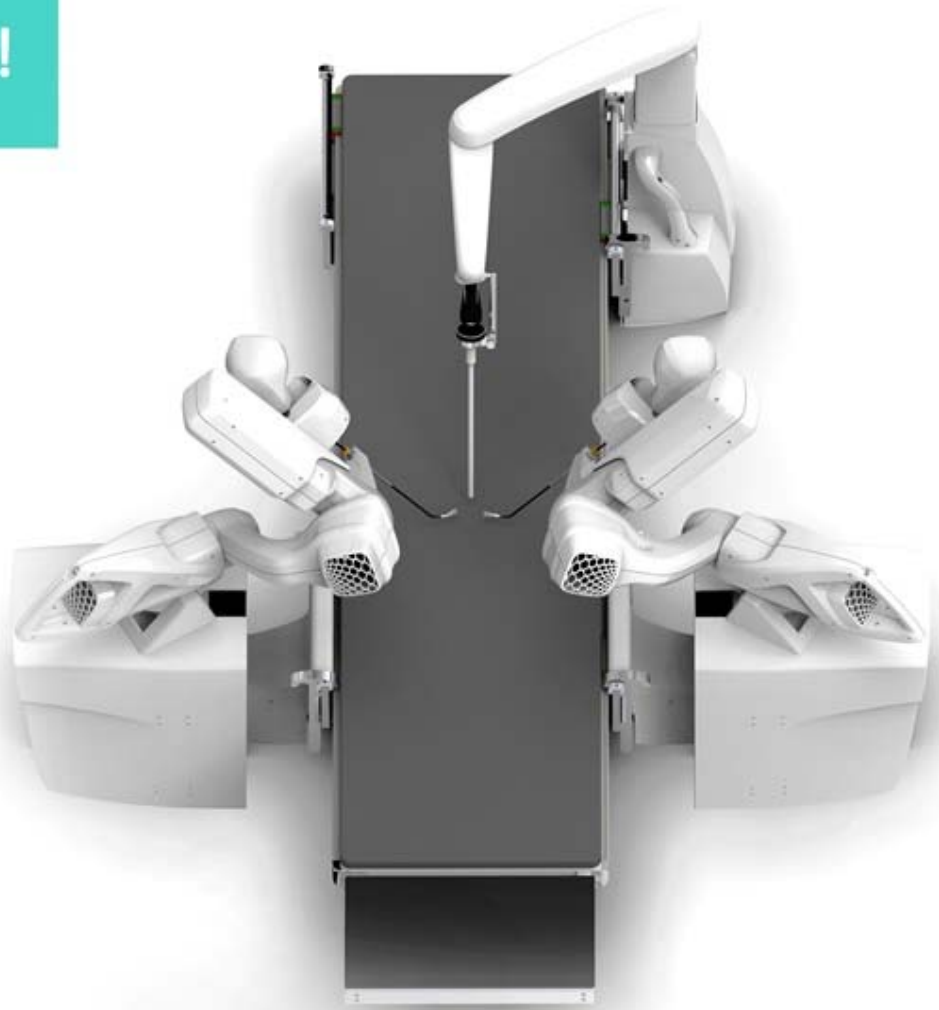
Be sure that we have thought about the best performance and quality

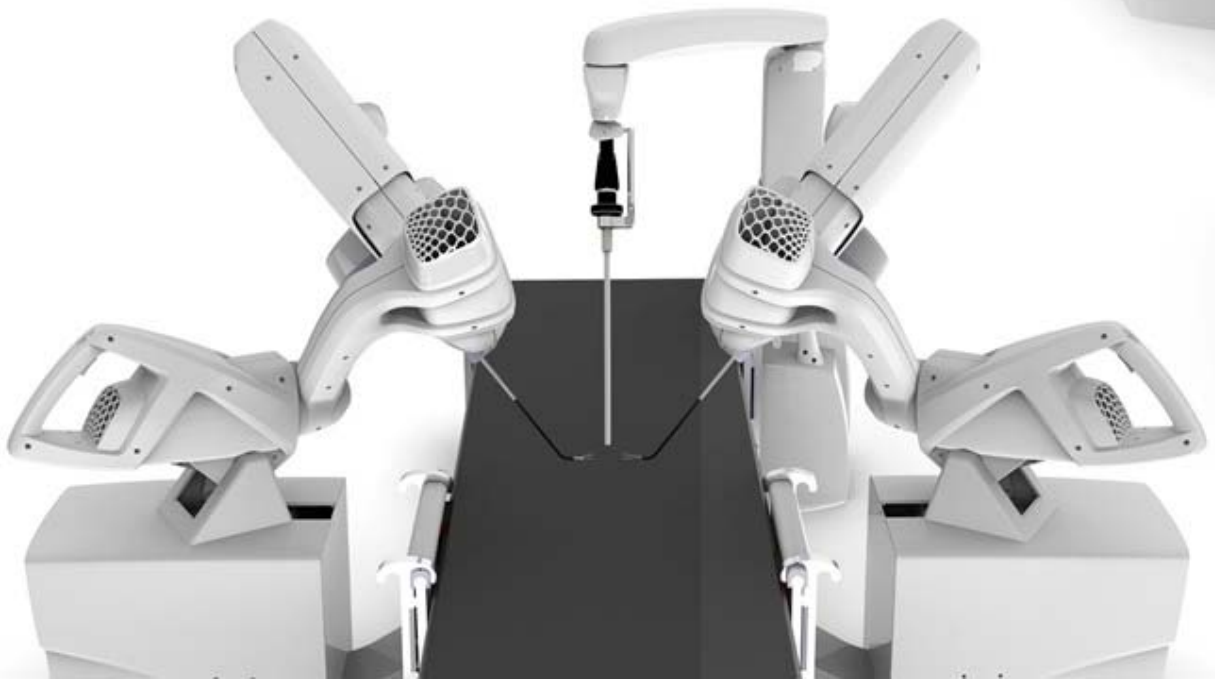
Surgical robot

Cameraman robot

Accuracy and Safety are our target!

Tremor reduction
Scale down up to 10X

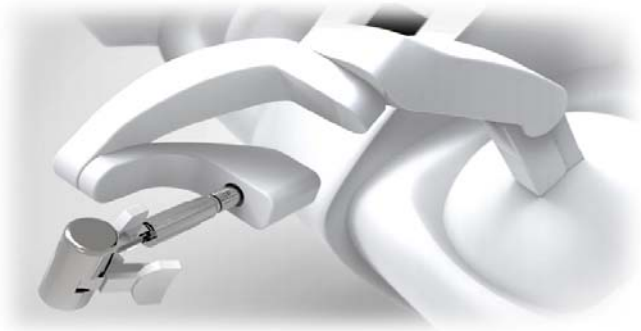




Master Robotic Console

Technical Specifications

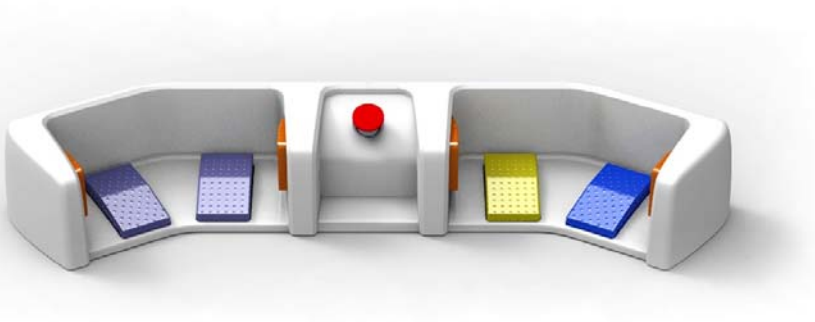
Master Robotic Console	
Console type	Ergonomic two postural (sitting and standing)
Total dimensions (L*W*H)	110*95*100 to 170 cm3
Total weight	120 kg
No. of total active DOFs	11 motorized joints
No. of total passive DOFs	6 encoded joints plus 3 joints for holding monitors
Local communication frequency	10 kHz
Main monitor type	IPS, eye-care
Main monitor resolution	4k (3840 x 2160 pixels)
Remote setting panel	SD **touch** panel
Posture setting panel	Push button
Automatic Setting parameters	Height (based on tool handle): 75-120 cm Distance between two master robots: 35-80 cm Arm Support: 65- 75 cm
Manual Setting parameters	Monitor height (based on base of it): 0- 20 cm Monitor depth (based on base of it): 0- 20 cm Monitor angulation (based on base of it): ± 10 degree
Left and right master robots type	**7 DOF Fully back drivable, 4 DOF force feedback**
Master robots DOFs types	3 force feedback DOF to control surgery instrument position and interaction forces 2 encoded DOF to control the surgery tool orientation



Master Robotic Console

Technical Specifications (Continuation)

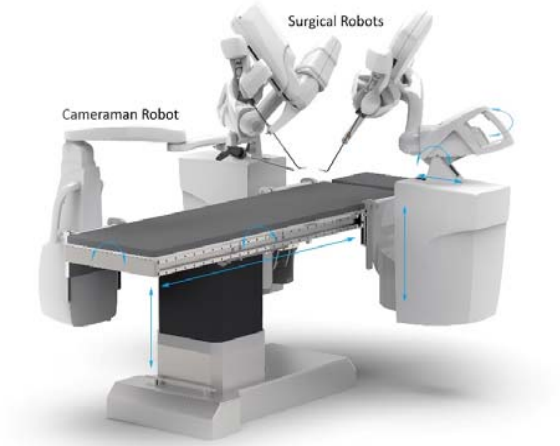
	1 encoded DOF to control the surgery tool 360 degree infinite rotation
	1 force feedback DOF to control the surgery tool grasping and pinch force to soft tissues
Handles types (optional)	Open surgery instrument type
	Stylus type
	Ergonomic type
Workspace of each handle	20*20*20 cm3
Accuracy of position recording	± 0.1 mm
Accuracy of orientation recording	± 0.1 degree
Resolution of position recording	0.01 mm
Resolution of orientation recording	0.01 degree
Repeatability of position recording	0.1 mm
Repeatability of orientation recording	0.1 degree
Movement indexing (clutch):	Up to 20 cm in each direction
Movement scaling:	Up to 10X scale down
Rang of force feedback at each direction	10 N
Rang of pinch force feedback	5 N
Accuracy of directional force feedback	± 1 N
Accuracy of pinch force feedback	± 0.5N
Resolution of directional force feedback	0.5 N
Resolution of pinch force feedback	0.25 N
Repeatability of directional force feedback	± 0.5N
Repeatability of pinch force feedback	± 0.25N
Foot pedals:	Foot pedals for controlling the laparoscopic camera
	Foot pedals for activating the electrocautery
	Foot pedals to switch the electrocautery instrument
	Foot pedals to switch between active instruments (2 of 3)



Slave Surgery subsystem

Technical Specifications

Slave Surgery subsystem	
Surgery bed type	Straight with Adjustable head support and longitudinal double rail
Total dimensions (L*W*H)	200*220*Max.215 cm^3
Total weight	260 kg
Surgery bed total active DOFs	3 motorized joints
Surgery bed movements range	Height: 77-107 cm
	Pan angle: -15 to 15 degree
	Tilt angle: -15 to 15 degree
Surgery bed total manual DOFs	1 head support
Quantity of surgery robots	2 or 3 (optional)
Each Surgery robot total active DOFs	7 motorized joints
Surgery robots active DOFs	2 DOF spherical mechanism for laparoscopic tool orientation
	1 DOF for tool insertion
	1 DOF for tool tip rolling
	2 DOF for tool wrist pitch and yaw motion
	1 DOF for grasping
Each Surgery robot total manual DOFs	5 manual adjusting DOFs
Surgery robots manual movements range	Longitudinal displacement: 175cm
	Vertical displacement: 50cm
	Lateral displacement: 36cm
	Pan rotation: ± 70 degree
	Tilt rotation: ± 30 degree



Slave Surgery subsystem

Technical Specifications (continuation)

Cameraman robot total active DOFs	3 motorized joints
Cameraman robot total manual DOFs	2 encoded compatible passive joints
No. of total passive DOFs	13 to 18 (depend on qty. of surgery robots)
Local communication frequency	10 kHz
Remote setting panel	SD touch panel
Workspace of each surgery robots	20.000 cm3
Accuracy of surgery robots position	± 0.1 mm in each direction at no load operation
Accuracy of surgery robots orientation	± 0.1 degree in each direction at no load operation
Resolution of surgery robots position	0.01 mm
Resolution of surgery robots orientation	0.01 degree
Repeatability of surgery robots position	0.1 mm in each direction at no load operation
Repeatability of surgery robots orientation	0.1 degree in each direction at no load operation
Rang of force detection at each direction at instrument tip	10 N
Rang of pinch force detection	40 N
Accuracy of directional force detection	± 1 N
Accuracy of pinch force detection	± 0.5 N
Resolution of directional force detection	1 N
Resolution of pinch force detection	1 N
Repeatability of directional force detection	± 1 N
Repeatability of pinch force detection	± 1 N
Instruments type	Single/multi use straight instruments
	Single use flexible instruments
Electro surgery type	**Accepting monopolar (not included)**

Robotics & Medical Innovators

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