This is not a TMS coil holder

Discover in this brochure why TMS-Robot is much more than a coil holder...
Axilum Robotics TMS-Robot
Setting a new standard for Transcranial Magnetic Stimulation...
Since the development of the first TMS stimulator at the University of Sheffield in 1985\(^1\), TMS has known numerous technological improvements. In 2000, based on anatomical MR images of the subject, neuro-navigation allowed to personalize the definition of the targeted cortical area, improving the accuracy of the transcranial magnetic stimulations. However, subject’s head movements during a session, loss of contact of the coil with the scalp, variations in the orientation of the coil which is held by a human operator or attached to a rigid stand, and even variability of operator attention and experience, many factors explain why it remains challenging to obtain an accuracy of a few millimeters in a repeatable manner. Improving all these practical parameters is crucial to support the increasing use of TMS worldwide in neuroscience research, clinical trials or patient treatment.

Since 2000, development of robotics in the medical and surgical areas (neuro-surgery, mini-invasive surgery, orthopedic surgery, radiotherapy…) encourages technical procedures to become safer, more accurate and more easily repeatable. Axilum Robotics leverages 15 years of advances in neuro-navigation and medical robotics research by introducing the first and only robot specifically designed to assist Health Care Professionals and researchers in their TMS protocols.

By automating the positioning of the TMS coil under the supervision of a neuronavigation system, Axilum Robotics TMS-Robot improves accuracy and repeatability of TMS protocols while keeping a high level of safety for the patients.

Looking for TMS execution excellence

AUTOMATED POSITIONNING OF THE COIL ON TARGET
Once the stimulation targets and coil self-rotation have been defined in the neuronavigation system, Axilum Robotics TMS-Robot positions the coil tangentially at these targets, ensuring contact between coil and head, and compensates for any head movements during the session, keeping the coil position and orientation with respect to the brain.

IMPROVED ACCURACY AND REPEATABILITY
TMS-Robot will allow to considerably improve the accuracy and the repeatability of the TMS stimulation in healthy subjects and in patients with neurological or psychiatric disorders. In a study\(^2\) intended to compare navigated, robotic coil positioning with TMS-Robot to manual coil positioning for motor cortex mapping using healthy volunteers (\(n=1\)), absolute (\(n=2\)) and test-retest reliability (\(n=3\)) were significantly improved by robotic assistance (\(p < 0.01\) for all tests) by a factor of 2 (~3 mm vs. ~6 mm). Of special interest was the number of stimulations that were below 5 mm from the target. Whereas this rate was as low as 50% under manual conditions, it increased to 90% with the robot-controlled coil placement (\(n=4\)).

Access to new and innovative TMS protocols

ACCESS TO COMPLEX TMS PROTOCOLS
Axilum Robotics TMS-Robot is able to perform a wide range of tasks, from the simple holding of the TMS coil at a predefined target, to the controlled movement of the TMS coil along complex trajectories in the brain.

In a successful brain to brain communication experiment\(^3\), using TMS to trigger phosphenes in the receiver’s brain, Axilum Robotics TMS-Robot ensured a perfect repeatability during sessions consisting in up to 140 stimulations at the same target (\(n=1\)). Placement of hot spot for phoshene production has been defined on an MRI of the subject as well as two different coil directions to trigger or not phosphenes (\(n=2\)).

In an ongoing double blind clinical trial, the robot is able to position easily a heavy double coil Active + Placebo and to stay on target during a rTMS treatment session (\(n=3\)).

In other cases, with a large and complex stimulation area, the stimulation of a single target may be insufficient. The robot moving the stimulation coil at a constant speed along a specific path may be necessary to cover the whole targeted area (\(n=4\)).

---


Axilum Robotics TMS-Robot does not add a separate user interface. The operator can control the robot and define the desired movements and positions of the coil from the graphical user interface of a compatible neuronavigation system. The computer-controlled patient seat is reclinable and its height and depth can be set by a compatible neuronavigation system to adapt to the patient’s morphology.

**SAFETY**

The patient head is located in the center of the work hemisphere by means of the computer-controlled seat. Each joint of the robot arm is equipped with mechanical hard stops to limit their movement amplitude. Thanks to the hemispherical architecture of the arm, the coil cannot draw a straight line when moving from one side of the head to another, but only move around that hemisphere. This prevents the coil or the robotic arm to hit the patient’s head during coil positioning. Moreover, the robot’s embedded firmware limits the force applied by the coil on the head in real time for a safe and comfortable session.

**ACCESSORIES**

A seat booster is available as an option when the size of the patient is below 147 cm.

**DIMENSIONS AND WEIGHT**

Axilum Robotics TMS-Robot fits to any space and enters into most elevators thanks to its practical dimensions and reasonable weight. It can be moved easily on its integrated wheels.

Minimum height: 1955 mm
Base dimensions: 1530 x 770 mm
Weight: 374 kg
Financing your equipment

Whether you're looking for a complete robot assisted TMS system or a robotic assistant, support and servicing plans, several options are possible: purchase, rental or leasing, helping you optimize your budget according to your requirements.

Resources

DEMONSTRATIONS/HANDS ON OPPORTUNITIES
Axilum Robotics TMS-Robot is available for demonstrations and trial at leading worldwide TMS centers in France, Europe, and USA. Our Sales Team would be pleased to organize a meeting at any of these sites.

DEMONSTRATION VIDEOS
Check out our demo videos on youtube.com/axilumrobotics to watch different robotic TMS systems implementing several procedures, such as rTMS on the DLPFC or brain mapping.

SELECTED PUBLICATIONS
Selected publications about Axilum Robotics TMS-Robot available on www.axilumrobotics.com

Financing your equipment

INSTALLATION AND TRAINING
The delivery and installation of your TMS-Robot will be organized by Axilum Robotics Support Team. Installation includes one day of training and hands-on with your staff and is organized by our highly qualified Support Team.

ASSISTANCE
Need help? Axilum Robotics Support Team assists you in getting the best of your equipment and running optimized TMS protocols. Whether you bought or rented the device, you are entitled to 1 year of remote assistance with unlimited phone, email and web support. Do you prefer a physical assistance? We can also participate to your preliminary experimental sessions or first patients.

MAINTENANCE
Axilum Robotics Support Team organizes servicing during the initial year of warranty. Wants to extend the warranty? Sign up for our maintenance contract. This includes at least 1 visit per year for hardware inspection and calibration check by our technical staff.

Training, Support and Servicing

Whether you need a complete TMS system or a robotic assistance to an existing TMS system, Axilum Robotics can provide you with the best solution for your needs.

COMPATIBLE TMS EQUIPMENTS

Neuronavigation Systems
Axilum Robotics has established partnerships with leading manufacturers Localite, Rogue Research and Syneika to ensure a seamless integration of TMS-Robot with their products equipped with an optional robot supervision module. The fully integrated TMS system takes advantage of the 3D optical tracking system provided by the neuronavigation system. TMS-Robot connects to a compatible neuronavigation system using a simple Ethernet cable.

TMS Coils and Stimulators
Axilum Robotics has established partnerships with leading manufacturers Magstim and MagVenture to ensure a seamless integration of TMS-Robot with their cooled TMS coils. Mechanical adaptors ensure stable, safe and calibrated mounting of TMS and rTMS coils onto the robotic arm. Flat force sensors, designed by Axilum Robotics are fixed to the inferior surface of the compatible coils.

Setting your robotized TMS system

Axilum Robotics TMS-Robot, in combination with a compatible neuronavigation system and a compatible coil connected to its stimulator, offers a full robot assisted TMS system allowing the automatic execution of an image guided TMS session planned in advance.

Whether you need a complete TMS system or a robotic assistance to an existing TMS system, Axilum Robotics can provide you with the best solution for your needs.

COMPATIBLE TMS EQUIPMENTS

Neuronavigation Systems
Axilum Robotics has established partnerships with leading manufacturers Localite, Rogue Research and Syneika to ensure a seamless integration of TMS-Robot with their products equipped with an optional robot supervision module. The fully integrated TMS system takes advantage of the 3D optical tracking system provided by the neuronavigation system. TMS-Robot connects to a compatible neuronavigation system using a simple Ethernet cable.

TMS Coils and Stimulators
Axilum Robotics has established partnerships with leading manufacturers Magstim and MagVenture to ensure a seamless integration of TMS-Robot with their cooled TMS coils. Mechanical adaptors ensure stable, safe and calibrated mounting of TMS and rTMS coils onto the robotic arm. Flat force sensors, designed by Axilum Robotics are fixed to the inferior surface of the compatible coils.
Axilum Robotics has been certified to match the requirements of UKAS and SCC ISO 13485 standard by the Notified Body SGS 0120. This certification confirms that the company fulfills the requirements applicable in Europe and Canada to organizations manufacturing and commercializing medical devices.

**TMS-Robot** is manufactured by Axilum Robotics.

Before use, please read user instructions carefully. Axilum Robotics TMS-Robot is not covered by health insurances.

### REGULATIONS IN THE EUROPEAN UNION

**Axilum Robotics TMS-Robot** is a Class IIa medical device. It holds the CE mark whose conformity has been assessed by Notified Body SGS 0120.

### REGULATIONS IN CANADA

**Axilum Robotics TMS-Robot** is a Class II medical device. It holds Medical Device Licence number 92610 issued by Health Canada according to the Canadian Medical Device Regulations, Section 36.

### REGULATIONS IN THE USA

**Axilum Robotics TMS-Robot** is not FDA cleared. Please note that the use of Axilum Robotics TMS-Robot for the positioning of Transcranial Magnetic Stimulation (TMS, rTMS) coil is considered investigational in the USA.

### REGULATIONS IN OTHER COUNTRIES

For regulations of **Axilum Robotics TMS-Robot** outside the European Union, Canada or the USA, please contact Axilum Robotics.
Axilum Robotics
TMS-Robot
Accuracy and repeatability
Safety
CE marked Class IIa and Health Canada licensed medical device
Axilum Robotics is a spin-off from the ICube laboratory Medical Robotics team in Strasbourg, France and has been founded in 2011. Based on an ICube proof of concept, the company has developed the first robot specifically designed for Transcranial Magnetic Stimulation (TMS) and provides with its partners robotic solutions intended to improve the TMS procedure for research and therapeutics. Axilum Robotics is ISO 13485 certified for its Quality Management System since 2013.

Contact us and follow us
Axilum Robotics
1, place de l’hôpital
67000 Strasbourg, France
+33 3 90 22 41 94
info@axilumrobotics.com
www.axilumrobotics.com