
ROBOTOL®
Increasing surgical precision
COLLIN

ROBOTOL®

The world's first robot dedicated to ear surgery

Precision engineered for surgeons

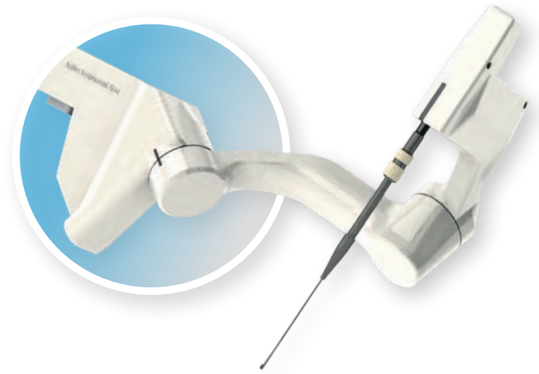
RobOtol® is derived from research initiated in 2005 by Collin, in partnership with the team of Prof. Olivier Sterkers and Prof. Yann Nguyen and the Inserm/UPMC UMR-S 1159 unit.

Technical concept

- → Mechanical architecture based on the concept of a pivot point.
- → 7 degrees of freedom.
- → Design for otological surgeries and ergonomics adapted to the constraints of the operating room.

Use of the instrument holder arm:

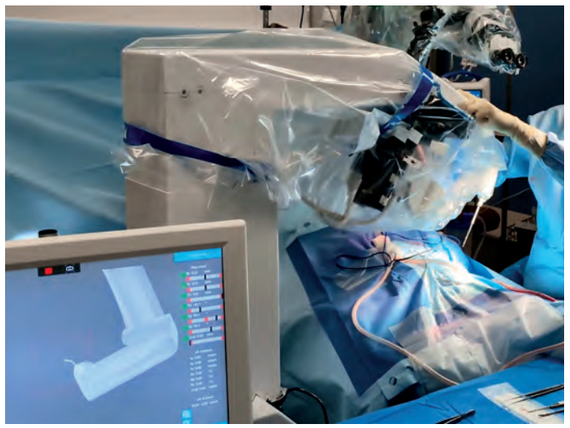
- → Enables visualization and access to all anatomical regions of the middle and inner ear with perfect stability(3) and micrometric(1) movement precision(2).
- → Eliminates tremors, drift, or involuntary movements with the human hand.
- → Ensures precise positioning, control of insertion axes, as well as translation, rotation, and distal movements(4).
- → Atraumatic insertion of cochlear electrodes array in both adult and children(5).
- → Enhancing precision on middle ear: ossicles removal(6) (or management) and tendons weakening.
- → Perform calibrated stapedotomy and perfect positioning of middle ear prosthesis(7).



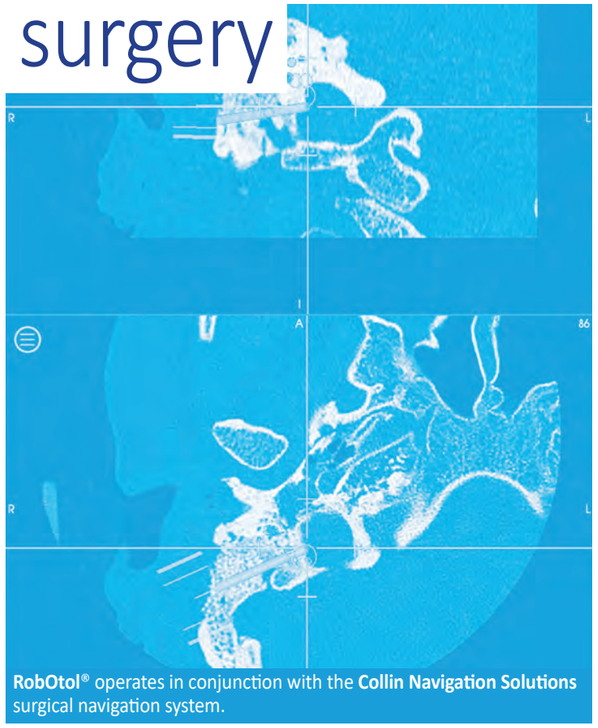
Use of the endoscope holder arm:

- → Allows surgeons to operate with both hands while adapting to the desired visual axis.
- → Provides precise control of translational and rotational movement speed(8).
- → Delicate management of tympanic flap and related dissection(9).
- → Easier manipulation of cartilages and grafts.

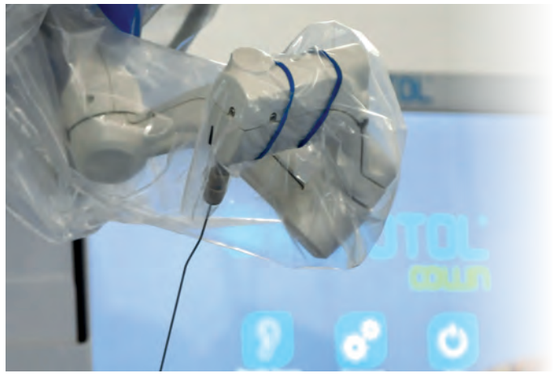
The secure motion



Designed for reproducible surgery



RobOtol® operates in conjunction with the **Collin Navigation Solutions** surgical navigation system.



Reproducible precision:

→ Controlled and repeatable surgical movements.

→ Independent control of insertion, translation and rotation axes, including distal movements[13].

Flexible endoscopic visualization:

→ Easy switching between 0°, 30° and 45° rigid endoscopes.

Dedicated surgical instruments:

→ Collin instruments designed for robotic surgery.

→ Dedicated insertion tools for all brands of cochlear implants.

→ Dedicated tools for middle ear applications.

Perimodiolar Insertion Tool

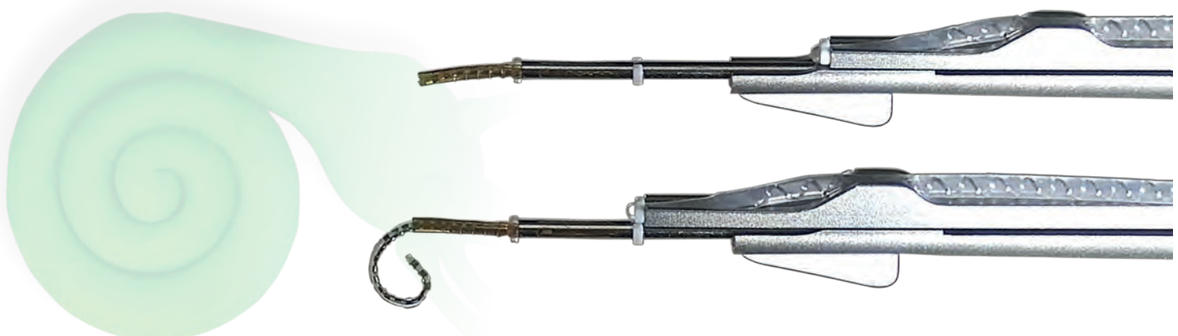
SILK: Soft insertion, low kinetics

→ Stable control during insertion and sheath withdrawal, minimizing translocation.

→ Consistently low speed prevents irregular movements, enabling smooth coordination between electrode insertion and sheath release. For cochlear structure preservation[11].

→ Micrometric measurement of the exact insertion depth[10].

→ Reproductibility and control of the movement[12].



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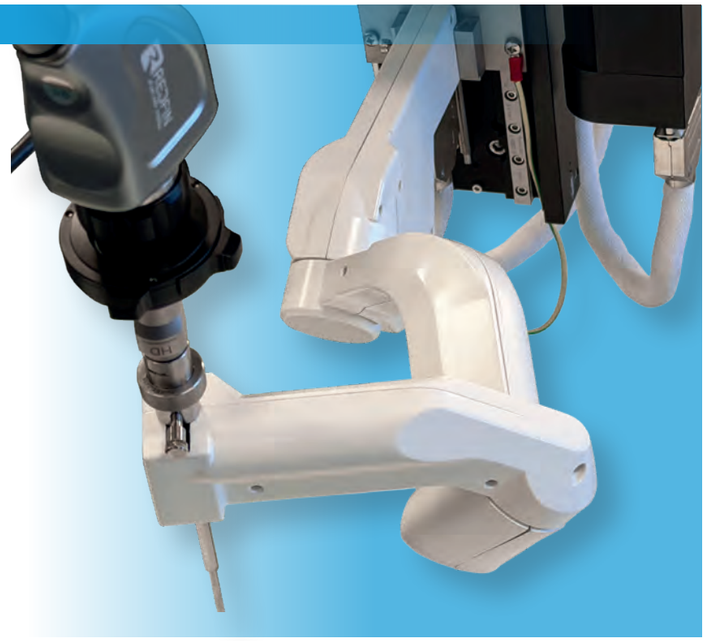
Technical specifications

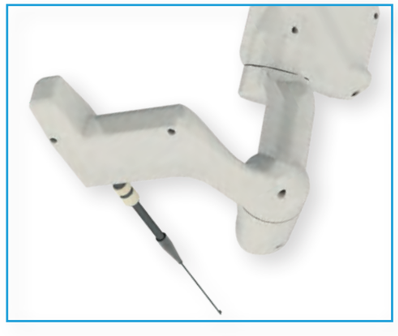
Arm for endoscope

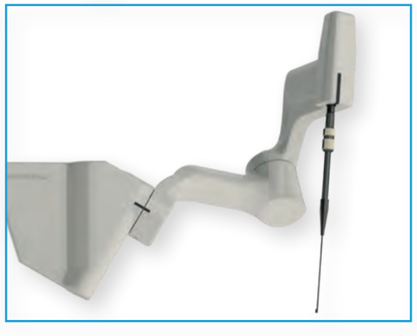
- **Angular Resolution:** 0.3°
- **Stability**:
  Ensures a steady arm position and a jitter-free image feed.
  Bimanual operation is possible while adapting to the desired visual axis.
- **Optic Interchangeability**:
  Allows for switching between various rigid endoscopes (0°, 30°, and 45°) during surgery.
- **In-situ Cleaning**:
  Intraoperative lens cleaning and rinsing without the need to remove the endoscope.
- **Ergonomics**:
  Ergonomic design reduces physical strain on the surgeon[15].
- **Universal Compatibility**:
  Optics are compatible with all brands of video and camera systems.



Active arm for instruments

- Controlling the speed and acceleration of electrode insertion.
- Steady and controlled motion throughout the procedure.
- Reduced insertion speed: 0,1 mm/s.
- Micrometer precision beyond human capabilities.
- Enhanced safety through atraumatic insertion[6].
- Reduces the risk of additional hearing loss or vestibular symptoms.
- May contribute to the preservation of the residual hearing loss[14].
- Optimal control at every step.
- Compact design with a minimal footprint.
- Left or right fold.





Key Figures & Milestones

- **First and only surgical robot in the world** dedicated to otology
- **2019 - First worldwide cochlear implantation** (*Pitié-Salpêtrière Hospital*)
- **2021 -** First bilateral implantation in children (*CHRU Brest*)
- **Thousands of surgeries** performed since 2019
- **Over 80 surgeons** regular users of **RobOtol®** (*2026*)

References

[1] RobOtol: From design to evaluation of a robot for the middle ear surgery. Doi: 10.1109/IROS.2010.5650390

[2] From conception to applicationof a tele-operated assistance robot for middle ear surgery. DOI:10.1177/1553350611426012

[3] Technical Specifications available in user guide. IO-RBT1000-101-NUT-FR-XXXX-X

[4] Robot-based assistance in middle ear surgery and cochlear implantation: first clinical report. Doi: 10.1007/s00405-020-06070-z.

[5] IMPROVEMENT OF THE INSERTION AXIS FOR COCHLEAR IMPLANTATION WITH A ROBOT-BASED SYSTEM. Doi : 10.1007/s00405-016-4329-2 Technical Specifications available in user guide.

[6] PR Lefebvre Comparative Study RobOtol vs Manual insertion. Doi : 10.1159/000540577
Atraumatic insertion of a cochlear implant pre-curved electrode array by a robot-automated alignment with the coiling direction of the scala tympani. Doi: 10.1159/000517398

[7] Atraumatic insertion of a cochlear implant pre-curved electrode array by a robot-automated alignment with the coiling direction of the scala tympani. Doi:10.1159/000517398

[8] Robot-Assisted Middle Ear Endoscopic Surgery: Preliminary Results on 37 Patients. Doi:10.3389/fsurg.2021.740935

[9] From conception to application of a tele-operated assistance robot for middle ear surgery. Doi:10.1177/1553350611426012

[10] Technical Specifications available in user guide. IO-RBT1000-101-NUT-EN-XXXX-X

[11] IMPROVEMENT OF THE INSERTION AXIS FOR COCHLEAR IMPLANTATION WITH A ROBOT-BASED SYSTEM. Doi: 10.1007/500405.016.4329.2
PR Lefebvre Comparative Study RobOtol vs Manual insertion.
Doi: 10.3390/audiolres16020051

[12] Icro-CT Evaluation of Robot-Assisted Insertion of CI632 Implant in Human CadavericTemporal Bones. Doi: 10.1002/lary.70559

[13] Technical Specifications available in user guide IO-RBT1000-101-NUT-FR-XXXX-X

[14] Robot-assisted electrode insertion in cochlear implantation 2 controlled by intraoperative electrocochleography – a pilot 3 study. Doi: 10.3390/jcm11237045

[15] Middle Ear Endoscopic Surgery: Preliminary Results on 37 Patients. Doi: 10.3389/fsurg.2021.740935

Dedicated to ENT

ROBOTOL®

Increasing surgical precision

Precision as a standard, not a challenge.

→ True innovation doesn't just add features; it removes constraints. By choreographing precision, **RobOtol®** allows the surgeon to focus solely on the surgical intent, turning complex maneuvers into a seamless flow. **RobOtol®** enables precise movements. By providing unparalleled safety of actions and movements, the system becomes a natural extension of the surgeon's hand.

→ Already active in leading ENT departments, **RobOtol®** is a trusted partner in providing the safety of actions and movements required for the most delicate procedures.

→ Giving surgeons greater autonomy in what really matters: caring for patients and improving their lives.

→ **RobOtol®** design is focused on:

- Ear Surgery (specific size, adaptable).
- No single use needed except for the sterile covers.
- Mobility (no room dedicated).
- No need of any additional/structural work in OR, nor any additional staff.
- Possibility to connect to any brand microscope/endoscope tower both in input and in output.
- Possibility to upgrade and update the device as needed.
- Several scientific publications discuss the full range of RobOtol's applications

→ **Risks related to the device are controlled**:

Electrical, thermal and mechanical risks: protection is integrated into the device and compatible with its operating environment.
Biological risk: cleaning and disinfection are performed according to standard protocols.
Use errors: : training provided by the Collin team and clear instructions for use help prevent errors.
Software and cybersecurity risk: reliable operation and protection against digital threats.

RobOtol® and Collin Navigation Solutions®

- Coupling with surgical navigation

⚠ Read the instructions IO-RBT1000-101-NUT-X-XXXX-X before use.
RobOtol®, manufactured by Collin, is a class IIa medical device placed on the market since 2019.
This medical device is a regulated healthcare product bearing the CE marking issued under n° 0459, in accordance with the applicable European regulations.
Reserved for use by qualified healthcare professionals only .

UDI-DI RobOtol: 3664533000448
Basic UDI-DI RobOtol: 3664533RBT-1000LD

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