ARRI Medical

ARRISCOPE™
A NEW ERA IN SURGICAL MICROSCOPY
ARRISCOPe –
a fully digital 3D microscope

The ARRISCOPe is the world’s first high-definition, fully digital surgical microscope for stereoscopic viewing. For the first time in surgical microscopy, the operator’s visualization of the surgical site is not via an optical image path; instead the surgeon sees in his binocular a high-quality 3D digital image.

Why digital?

The digital image can be recorded and multiplied without any quality losses. Surgical assistants, students and staff can therefore follow an operation procedure in all its details and in three dimensions, bringing immense advantages for education and training.

On top of its immediate benefits, the digital platform offers the promise of further enhancements as new options to enrich the digital microscope image are developed.

Why ARRI?

As a global leader in motion picture technology, with nearly 100 years of innovative product development experience, ARRI is uniquely qualified to also play a pioneering role in medical digital image acquisition.

Used for many Oscar®-winning movies, the ARRI ALEXA digital camera system is the core engine of the ARRISCOPe, delivering high-contrast, sharp and brilliant high-definition images of the surgical field.
“There is no doubt that the future concepts of microsurgery will be substantially influenced by digital microscopy. The ARRISCOPE is the first approach that has the potential for that technological breakthrough. I am happy to be amongst the first users.”

Prof. Dr. med. Robert Mlynski, Rostock University Medical Center, Germany.
Digital raw capturing

An enlarged image of the surgical field, illuminated by two highly efficient LED lights, is captured on ARRI’s high dynamic range (HDR) CMOS sensor. From the sensor the raw image signal goes into a high-performance computer, where all of the image processing takes place. This efficient image processing unit does not convert the raw sensor data into a 3D video signal until any color conversion for different display devices or sensitometric optimization has been carried out. By manipulating the images in their raw state, full image quality is maintained and a perfect picture is seen on all displays.

It is also at this stage that image enrichment can take place, to enhance the surgeon’s view and the educational value. Once the image signal is processed, identical images can then be sent to multiple output devices.

Various video outputs with the same content and quality

- Digital HD binocular for the surgeon.
- Full HD 3D screening monitor for co-observer in the operating room.
- Additional full HD 3D viewing systems inside and outside the operating room.
- Full HD 3D recording.

Ergo-View

The world’s first digital binocular gives surgeons new freedom.

- It is possible to move freely in front of the eyepiece, so that the microscopic and surgical fields can both be viewed simultaneously.
- As the image is displayed on one plane, no accommodation of the eyes is necessary.
- The position of the binocular is independent from the optical path.
High dynamic range CMOS sensor
The custom-developed ARRI CMOS sensor is unique in its optimal balance between image sharpness on the one hand and high dynamic range, high sensitivity and a low noise floor on the other. This results in the best overall image quality for medical purposes, as proven by the sensor’s many cinematic applications. The sensor even has a higher simultaneous dynamic range and a wider spectral sensitivity than the human eye, allowing the possibility of enriching the visible image with additional information coming from invisible radiation such as IR.

Highly efficient LED illumination
The novel, multispectral LED illumination system of the ARRISCOPe delivers very bright and highly uniform illumination, optimized for representation on a video monitor. The cold light, without any UV or IR components, protects the patient by avoiding heat impairment. Color temperature can be adjusted by the multispectral LED, allowing the image representation to be optimized.

Easy, weightless and precise movement
The ARRISCOPe 6-axis stand is vibration-cushioned, moves easily, stabilizes immediately after positioning and features an optimized transient response. The state-of-the-art, pneumatic-driven mechanism is perfectly balanced, enabling smooth, precise movements for enhanced surgeon comfort and therefore ideal patient care.
Education in a new dimension – supporting the education of the next generation of surgeons

Educational benefits of the ARRISCOPE

The ARRISCOPE provides a stereoscopic view of the microscopic surgical field with exceptional image quality, supporting the education and training of surgeons.

- The surgeon’s exact view of the surgical site is provided to the audience (e.g. medical students or assisting surgeons) with the same image quality.
- The surgical team gets visually incorporated into the surgeon’s workflow to allow for a more efficient collaboration.
- Perception of the topography of the surgical site, as well as 3D shapes of anatomical structures, can be improved.
- Surgical workflows and strategies can be better communicated.

“The ARRISCOPE significantly enriches the educational value of our otological workshop because all attendees can follow proceedings with the best image quality and the highest level of detail.”

Prof. Dr. Joachim Müller, section cochlear implants and otology, department of oto-rhino-laryngology head and neck surgery, Munich University LMU, Germany.
A survey on the educational value of stereo vision

Attendees of the otological workshop titled *Microsurgery of the ear and the petrosal bone – 2015* at the Klinikum Großhadern hospital complex of Ludwig-Maximilian University in Munich confirmed the educational value of a stereo presentation of the surgeon’s perspective, shown on an external monitor.

A survey assessing the opinions of workshop participants about stereo views as compared to a standard 2D view confirmed that...

- Anatomical topography and 3D structures can be better perceived in 3D.
- The workflow of the surgical procedure is easier to follow in 3D.

Furthermore, a majority of attendees stated that displaying the surgical procedure from the surgeon’s perspective on a 3D stereo monitor could positively influence their own performance.

If you are interested in using an ARRISCOPE on a rental basis for a surgical course, please contact us!
Possibilities of digital microscopy

Having the operational image in full HD quality as a digital signal, as well as access to a powerful image processing chain, opens a wide range of possibilities for image augmentation and enhancement. The reason for enhancing the image is to provide the surgeon with better visibility of sensitive structures and to improve the surgeon's workflow.

Currently the additional clinical benefits of ARRISCOPE technology are being tested in close collaboration with clinical advisors.

ARRISCOPE research areas include:

Split screen with DICOM images
Preoperative data such as MRT or CT can be made comfortably visible in the binocular directly, as a split screen image or even superimposed onto the original image.

Spectral enhancement through look files
Specially created color 'looks' can be applied to the live image, significantly aiding the recognition of important structures.

Image measurements
Distances within the surgical site can be measured digitally and used, for example, to choose the correct size of an implant.

*Currently undergoing research. Not yet available for sale.
ARRISCOPE application samples of ENT surgery

Cochlear implantation
Prof. Prof. h. c. Dr. med. Thomas Lenarz
Medical University Hannover, Germany

Cholesteatoma removal
Prof. Dr. med. Joachim Müller
Munich University LMU, Germany

Atresia and vibrant soundbridge implantation
PD Dr. med. John-Martin Hempel
Munich University LMU, Germany

Bonebridge implantation
Prof. Dr. med. Robert Mlynski
Rostock University Medical Center, Germany

Tympanoplast after tensacholesteatom
Prof. Dr. med. Randolf Riemann
Elbe Clinical Center Stade, Germany

Infundibulotomy
Prof. Dr. Dr. h. c. Roland Laszig
University Medical Center Freiburg, Germany

Explore the highlights of these operations in 2D or 3D video!
www.arrimedical.com/videos
About ARRI

ARRI is the largest manufacturer of professional motion picture equipment in the world. Throughout its almost 100-year history, ARRI has been associated with constant innovation and revolutionary technologies in all of its core businesses. The Academy of Motion Picture Arts and Sciences has recognized ARRI employees and products with 18 Scientific and Engineering Awards.

The ARRI Group has over 1,200 highly-trained employees worldwide. Half of them are based in Germany, where the company has its headquarters in Munich and where the largest part of its business is concentrated. ARRI is involved in every aspect of the film industry: engineering, design, manufacturing, film production, visual effects, postproduction, equipment rental, studio lighting solutions and world sales. Manufactured products include cameras, lenses, lights and archive technologies.

ARRI Rental, with its worldwide network of subsidiaries, provides an unrivalled range of cutting-edge products to filmmakers wherever they might be shooting. Facilities in America, Canada, Europe, Asia and Australia, alongside more than 40 global partners, mean that film and television productions are never too far from world-class ARRI service and support.
On the postproduction side, ARRI Media has a number of facilities in Germany that provide state-of-the-art creative services, as well as the Webgate cloud service. From the uniquely well-equipped one-stop-shop in Munich to Europe’s biggest DI grading suite in Berlin and the Dolby Vision grading cinema at ARRI@Bavaria Film, ARRI’s post houses carry the vision of filmmakers through the final steps of the creative journey.

ARRI first became active in the field of medical technology in 1970. The ARRITECHNO 35 analog camera was one of the world’s best-selling operating room cameras. It was the first and only X-ray movie camera able to shoot in slow motion up to 160 fps. Used in the field of angiocardiography, 13,000 were sold worldwide.

In keeping with this tradition, the ARRI Medical business unit was established as part of the ARRI Group in 2013. Within this unit, expertise from all over the group is optimized to meet and exceed the technical demands of the medical industry.

More information can be found at [www.arri.com](http://www.arri.com) and at [www.arrimedical.com](http://www.arrimedical.com)