



**Value analysis information kit
for ZEISS EXTARO 300 for ENT**



Seeing beyond

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Why ZEISS?



ZEISS Visualization Systems

Continuing to support you in advancing surgical visualization

We understand your everyday challenges and expectations from a surgical microscope. These insights drive us in developing a surgical visualization system that supports you to push the boundaries of surgical care and bring your surgical experience to the next level.

ZEISS Visualization Systems elevate your complete surgical experience with:

- Legendary ZEISS optics that deliver brilliant, crystal clear resolution and bright illumination, fully integrated into a compact optical head.
- Superior ergonomics, maneuverability and workflow efficiency through its integration concepts.
- Second to none advancements in the fields of imaging technologies like **intraoperative fluorescence** and **3D visualization**.

For the period 2017 to 2020, ZEISS' Net Promoter Score (NPS) on its microsurgical products is **81**, which is exceptional compared to other companies.

1. Significantly higher than leading medical device and equipment companies.¹
2. On par with some of the strongest brands in the world such as Apple and Bose.²

The Net Promoter Score is an index ranging from -100 to 100 that measures the willingness of customers to recommend a company's product or service to others. It is used as a proxy for gauging the customer's overall satisfaction with a company's product or service and the customer's loyalty to the brand.

ZEISS visualization systems have won multiple awards in recognition of the quality and innovative nature of their design.



The UX Design Awards is a global competition with a specific focus on user experience.



The Red Dot Award is an international design competition for product design, communication design and design concepts.



Awarded by the editors of Mechanical Engineering magazine in recognition of ascending technologies that are poised to transform their fields.

¹ <https://customer.guru/net-promoter-score/industry/medical-products-and-equipment>

² <https://www.pcmag.com/news/the-best-brands-for-2020>

ZEISS and surgical microscopy

Global leader in advancing surgical visualization

...did you know

1st

The first surgical microscope OPMI® 1 from ZEISS was developed in 1953 specially for ENT surgeons. It is the progenitor of modern surgical microscopes.

10 million*

surgeries performed around the world every year by neurosurgeons using ZEISS visualization systems.

15 million*

Over 15 million cataract operations are performed with ZEISS surgical systems all over the world every year.

ZEISS and surgical microscopy in ENT

There's a reason that millions of people place their trust in ZEISS. Developing innovations, forging meaningful partnerships and ensuring deep commitment are all part of our DNA. In 1953, the first ZEISS surgical microscope was developed specially for ENT surgeons. Since then, ZEISS has redefined and set high industry standards, and our latest innovation EXTARO® 300 from ZEISS is continuing this legacy.

"EXTARO 300 will support our sales focus on the ENT segment, which has historically been a very important segment for the group, to give our customers technology ready for the future."

Dr. Ludwin Monz, President and CEO of Carl Zeiss Meditec AG

1847

Beginnings

Obsessed with precision, Carl Zeiss destroyed his first microscope in 1847. From then, through to the 3,000th microscope in 1876, and even today, only the best devices leave the ZEISS workshop.

1922

Partnerships

Maintaining close connection with users, who were often leading innovators themselves like Gunnar Holmgren, Horst Wullstein, Fritz Zöllner and others, has always been a key element at ZEISS.

1969

Commitment

Dr. William F. House pioneered the use of surgical microscopes and enabled astronaut Alan Shepard Jr to walk on the Moon! Dr. William F. House, known as the Father of Neurotology, developed a variety of new concepts in otology. ZEISS shares this commitment.

* Based on internal calculations

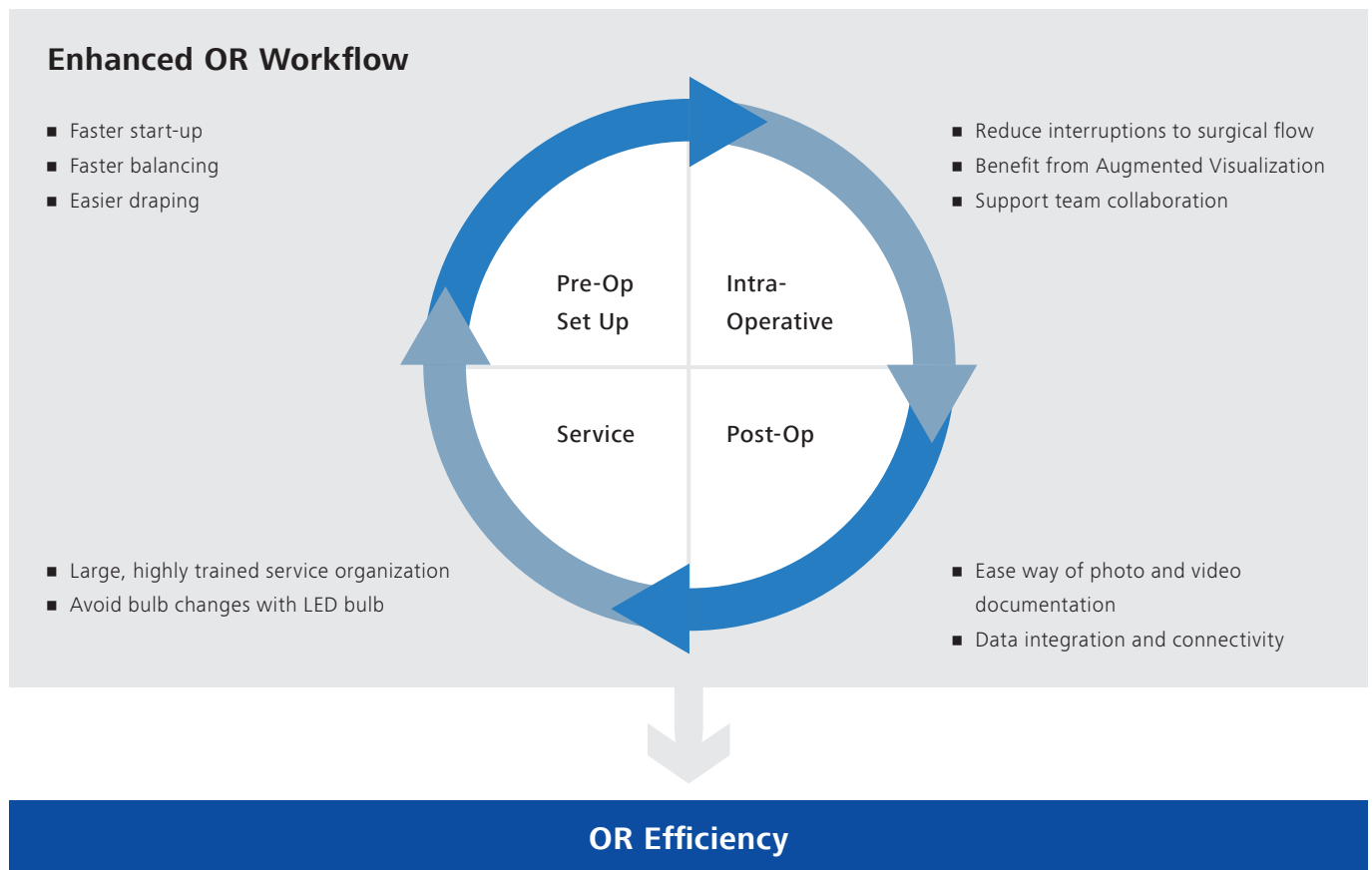
Executive summary

Hospitals and integrated health delivery systems are constantly looking for ways to improve efficiencies and outcomes in the operating room (OR), in a way that doesn't unduly burden the surgical team. To achieve these goals, surgical teams require technology, capable of performing complex procedures in simple, intuitive ways. Reliable performance for all of your patients is key.

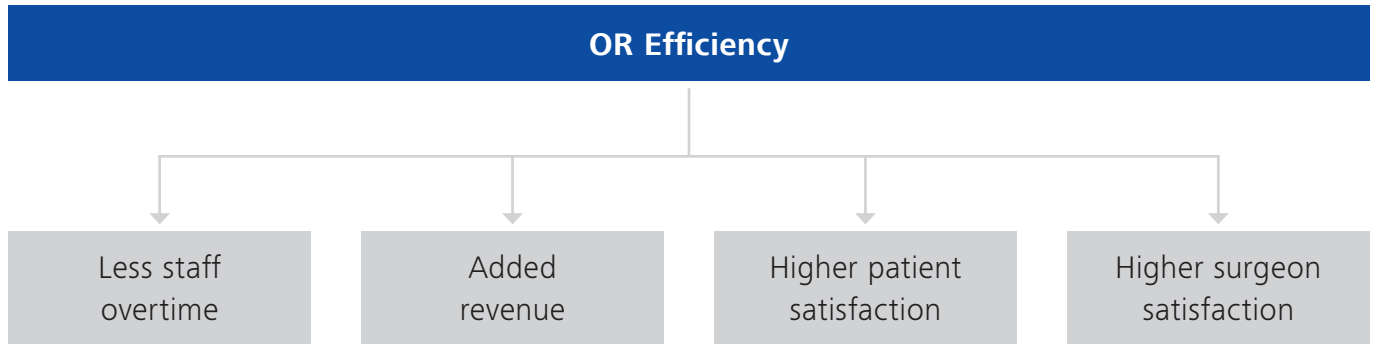
Experience breakthrough visualization capabilities combined with an optimized workflow when using ZEISS EXTARO 300 for tympanoplasty, myringotomy, stapedectomy, mastoidectomy and transoral laser surgery.

Enhancing surgical visualization, ZEISS EXTARO 300 helps to visualize precise anatomical structures and fine details for a better decision-making. The intuitive functionalities minimize interruptions and maximize focus on the surgery. Innovative data management solutions capture photos and record videos of every treatment, organized according to the surgical needs.

This document focuses on the operational and clinical value of the ZEISS EXTARO 300. It outlines how key features of the device and supporting services help to maximize OR efficiency – which we believe is the key priority for any OR.



Executive summary



What the impact looks like:

Less overtime: a 2018 study of 302 hospitals found that OR staff costs average \$10 (8,50€) per minute.³

Added revenue: fitting in an additional case, even a relatively simple ENT procedure, can yield \$1000-\$2000 (850€-1700€) in added net patient revenue per day.⁴

Patient satisfaction can be negatively impacted when start times are delayed, or the case gets canceled out of concern that it would be finished after the end of regularly scheduled hours.

Surgeon satisfaction: studies have shown turnover time to be a major factor surgeons say would make them change hospitals.⁵

³ Childers P, Maggard-Gibbons M. Understanding Costs of Care in the Operating Room. *JAMA Surgery*, 2018;153(4)

⁴ Pakdil F, Harwood T. Factors That Influence Efficiency in Performing ENT Cases: A Qualitative and Quantitative Analysis. *Journal of Medical Systems*, Vol. 29, No. 3, June 2005

⁵ Masursky D, Dexter F. Surgeons' and Anesthesiologists' Perceptions of Turnover Times. *Anesthesia & Analgesia*, 2011; 112(2)

Product overview

ZEISS EXTARO 300 allows you to save valuable time before, during and after each surgical intervention – and focus on what matters most: the patients.

Breakthrough visualization capabilities combined with an optimized workflow.



Enhance workflow with simple configuration changes for various ENT surgeries.

ZEISS EXTARO 300 has the ability to mount a co-observation tube or an additional external camera on either side to allow direct co-observation or documentation. The intuitive balancing system ensures that the microscope is perfectly balanced in only three steps.

Balancing as easy as 1-2-3.



OR turnover

Process re-engineering studies have identified surgical microscope setup as a common area where turnover time (TOT) delays occur. For example, a case study at a university hospital in the US asked surgical staff to list common causes for TOT delays.⁶ Among the causes they cited were:

- Nurses familiar with scopes have to share knowledge, especially when scopes are posted simultaneously in multiple ORs
- Moving equipment between rooms
- Replacing burned-out light bulbs

ZEISS EXTARO 300 is designed to make OR turnover more efficient. The integrated design with internal cables allows easy draping or use of asepsis caps with the system. Additionally it facilitates disinfecting and cleaning. With its innovative balancing and movement system, configuration changes and frequent repositioning will not be a burden on surgical procedures.

"My first impression with the new microscope was that it is really easy to handle and light weight in comparison to our OR microscope."

Prof. Mark Praetorius, University Clinics of Heidelberg, Germany



⁶ Pakdil F, Harwood T. Factors That Influence Efficiency in Performing ENT Cases: A Qualitative and Quantitative Analysis. *Journal of Medical Systems*, Vol. 29, No. 3, June 2005

Intraoperative workflow

Augmented Visualization

ZEISS EXTARO 300 enables a more accurate assessment of the surgical situation for better decision-making. Enhancing surgical visualization, the MultiSpectral Mode and the NoGlare Mode assist in making the right surgical decisions.

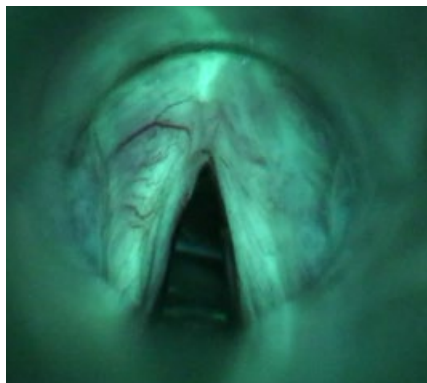
Visualization Enhanced.

“ There’s the potential of having highly effective filters to be able to change your practice. I think it’s the next step in terms of improving overall quality of otologic surgery.”

Mark Syms M.D., Arizona Ear Center, Phoenix, Arizona, USA



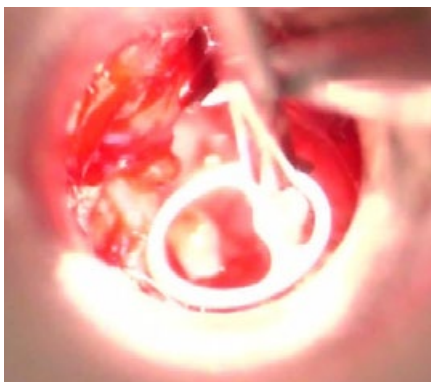
Vocal cords under white light



Vocal cords under MultiSpectral Mode*

Low-color contrast often makes it difficult to recognize critical anatomical structures.

The **MultiSpectral Mode** of ZEISS EXTARO 300 enhances this contrast, e.g. to better distinguish between vasculature and tissue.



Stapedectomy under white light



Stapedectomy under NoGlare Mode**

Sometimes light reflections complicate the surgical procedure.

The **NoGlare Mode** of ZEISS EXTARO 300 suppresses these obtrusive reflections, allowing for a faster and more detailed distinction of anatomical details and artificial implants.

* Application image courtesy of Prof. Marcel Kraft, Hirslanden Private Hospital Group, Basel, Switzerland

** Prof. Mark Praetorius, University Clinic of Heidelberg, Germany

Intraoperative workflow

Single-Handed Operation

Any adjustment or repositioning of the microscope can greatly disturb focus and cost you valuable time. Thanks to ZEISS EXTARO 300, procedures can be performed with maximum focus and efficiency.

Best in class.



Mode Control button

With the Mode Control button, ZEISS EXTARO 300 allows to activate all visualization modes and camera functionalities without taking the eyes off the surgical field.

Integrated varioscope

The integrated Varioskop® 230 from ZEISS can be operated with just one finger to maximize ergonomics. It enables to effortlessly set the field of view and focus over a wide working range of 200 to 430 mm. It allows any operation from short working distance to transoral laser microsurgeries (TLM) without additional configuration changes. Since the varioscope is integrated, there is no need to change the objective lenses.

"The visualization of the surgical field is very even and can easily be adapted with basically a one hand approach. A multifunctional button basically, which is really handy and neat. And also the feedback from the OR nurses was that it was really easy to handle."

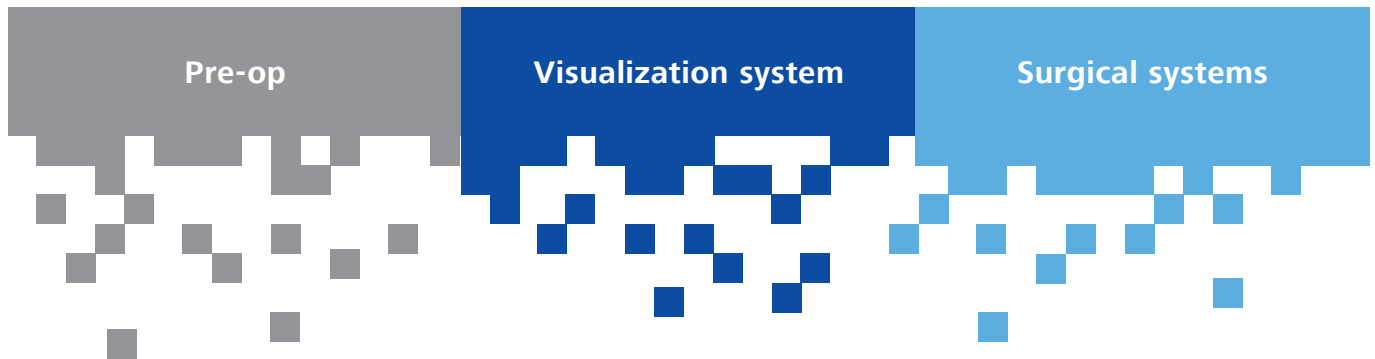
Prof. Mark Praetorius, University Clinics of Heidelberg, Germany



Post-operative workflows

Digital connectivity and digital data management

As surgery continues to evolve and increase in complexity, it has become a huge data generator. During a complex ENT procedure, millions of data points get generated.



Even before surgery, patient-related data must be managed, such as personal data, condition and CT or MRI imaging.

During surgery multimedia data is produced, such as procedure images and videos including fluorescence and surgeon voice recording.

Also information such as anesthesia data and pharmaceuticals or equipment used is part of the documentation.

High patient throughput and the associated documentation of this data can be tedious. The images and videos of multiple treatments need to be transferred to the computer and to be organized and stored afterwards. As the collection grows, the documentation gets time-consuming.

ZEISS EXTARO 300 offers digital data management with the ZEISS Connect App on the iPad, to simplify these post-operative workflows.

Documentation completed.

Post-procedure workflows

The **ZEISS Connect App**, an intuitive tablet app, simplifies documentation and automates the organization process. Network integration using DICOM standards via a wireless connection, allows data transfer. The Procedure Architect organizes your records according to your customized workflows.



Patient data safety

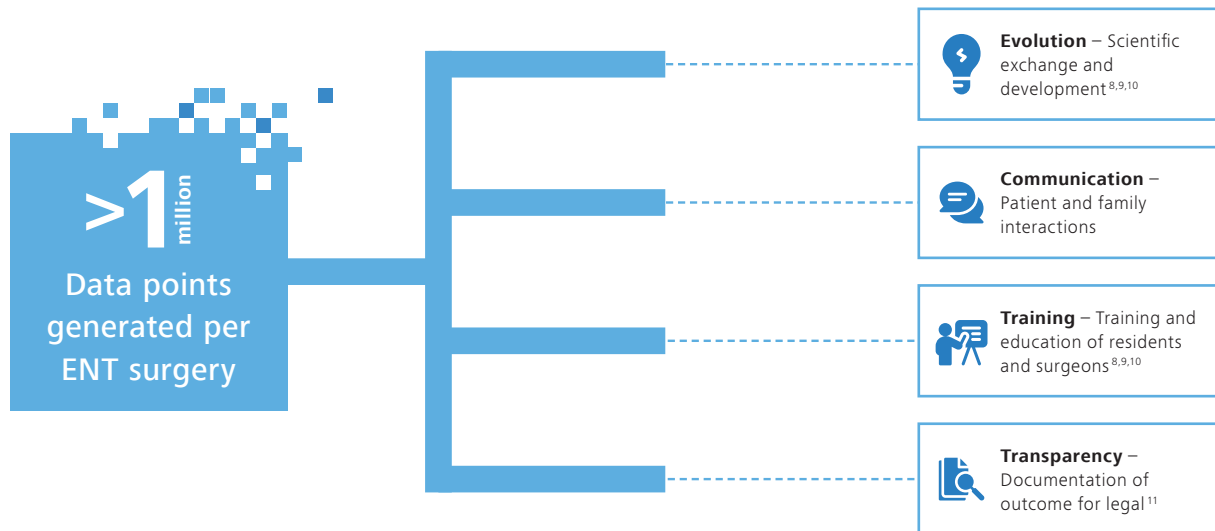
One of our main goals at ZEISS is to protect the privacy of the patient. We keep all patient data safe from external attack. Therefore, we provide several features with our products.

- A secure network, which helps you to protect it from outside attackers.
- Automatic lock, for locking your system after use.
- Backup configuration to secure patient data.
- Data encryption during transfers to ensure that nobody can see the data.

OR efficiency

Digital connectivity and digital data management

Managing surgical data allows numerous potential benefits. For example, analyzing and modeling data captured in the OR could help predict workflow and optimize OR efficiency.^{8,9} It could support future decision-making, drive quality improvements in surgery, and consequently improve patient outcomes.^{8,9,10}



Connecting with the digital future

To maximize these future opportunities, the OR equipment needs to be integrated within the overall hospital IT infrastructure. The ZEISS EXTARO 300 with the ZEISS Connect App offers an easy and efficient pathway to structured data management.

Access

- Use of customer defined workflows
- Easy mobile exchange of images and videos

Storage

- Effortless organization of images and videos
- Automated archiving



Integration

- Seamless integration into the IT landscape

Analysis

- Analysis of procedures for improvement

⁸ Vedula SS and Hager GD. Surgical data science: The new knowledge domain. *Innov Surg Sci* 2017;2:109-121

⁹ Stauder R et al. Surgical data processing for smart intraoperative assistance systems. *Innov Surg Sci* 2017;2:145-152

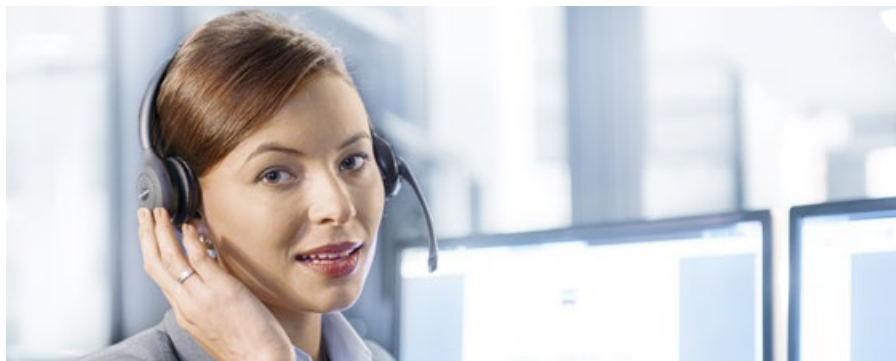
¹⁰ Maier-Hein L et al. Surgical data science: Enabling next-generation surgery. Available at: <https://arxiv.org/ftp/arxiv/papers/1701/1701.06482.pdf>

¹¹ Joo S Et al. *BMJ Quality and Safety* 2016; 25:911-913

ZEISS service leadership

Optimizing your operation. Customer Care from ZEISS.

To efficiently deliver good surgical outcomes for your patients you rely on the availability of your medical equipment when you need it. For maximum system uptime and convenience you might want to consider a service agreement for your ZEISS EXTARO 300. Depending on the service package you choose, OPTIME service agreements from ZEISS cover preventive maintenance, corrective maintenance and spare parts.



What is the cost of downtime in the OR?

The revenue per minute is \$74 (60€) for an otolaryngology operating room of an academic health system in the US.¹²

Customer care from ZEISS

At ZEISS, service and support is a strength.

94% of our customers have expressed their satisfaction with our services. We offer proven, comprehensive and award-winning support solutions.*

To deliver on our promise of partnership, the ZEISS standard is:

- On-site service response – up to next day for busy practices
- 20% of the service calls can be solved via phone or via remote*
- Globally more than 700 qualified engineers strive to provide fast resolution of issues if an on-site visit is needed*

- More than 6.000 individual ZEISS spare parts to resolve all technical problems*
- 93% on-time delivery and 91% overnight to the EU or the US*
- Industry leading Service Level Agreements (SLAs):

ZEISS OPTIME Contracts

¹² *Lean Management in Academic Surgery* Ryan M Collar, MD, Andrew G Shuman, MD, Sandra Feiner, RN, Amy K McGonegal, RN, Natalie Heidel, BS, Mary Duck, BS, Scott A McLean, MD, John E Billi, MD, David W Healy, MD, MRCP, FRCA, Carol R Bradford, MD, *FACS J Am Coll Surg* 2012;214:928–936. © 2012

* based on internal calculations

Patient safety

The average cost of an SSI incident in a hospital is

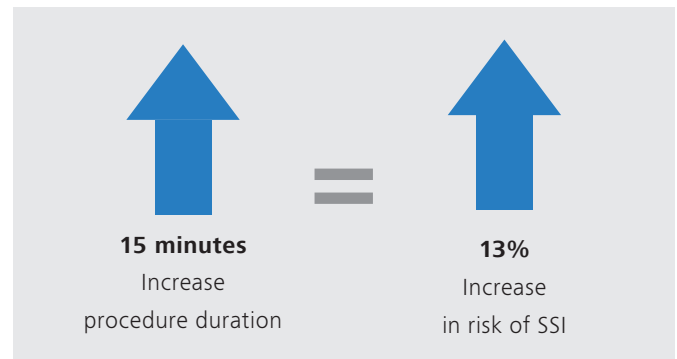
- in the US between **\$11,874 - \$34,670** (10.093€ - 29.470€)¹³
- in European countries up to **\$34.000** (28.900€)¹⁴
- in low & middle income countries: up to **\$29,610** (25.170€)¹⁴

While improving patient experience, intra-operative efficiency is important for a number of reasons, first among them is the impact on patient safety. Prolonged procedure duration is associated with several negative clinical outcomes, including increased risk of surgical site infection (SSI), as well as pulmonary complications.

A meta-analysis of 81 studies found that the likelihood of SSI increased with increasing time increments; for example, a 13%, 17%, and 37% increased likelihood for every 15 min, 30 min, and 60 min of surgery, respectively.¹⁵

How ZEISS EXTARO 300 can improve patient safety

ZEISS EXTARO 300 supports disinfection success even in the time-sensitive environment of the OR. An integrated design with internal cables supports simple, quick, and effective cleaning, and helps prevent microbial contamination of your surgical visualization system – and your patients. Unlike other traditional surgical microscopes ZEISS EXTARO 300



uses an integrated LED surgical light instead of Xenon bulbs. Xenon bulbs burn brighter and hotter than LED lights, posing particular safety risks for pediatric patients. Clinical studies have documented how the most common complication is auricular burns and scarring during otologic surgeries. Furthermore, these studies conclude 300W Xenon bulbs are responsible for these injuries.^{16,17,18}



"The upgrades in the EXTARO 300 will be used throughout the whole procedure. There's no particular time that it is going to make it better. It is just going to make the whole procedure easier to do and have high quality outcomes in patient care. I think it will help me from start to finishing the whole procedure."

Mark Syms M.D., Arizona Ear Center, Phoenix, Arizona, USA

¹³ The Direct Medical Costs of HAIs in U.S. Hospitals and the Benefits of Prevention, R. Douglas Scott II, CDC, 2009. http://www.cdc.gov/HAI/pdfs/hai/Scott_CostPaper.pdf

¹⁴ Monahan, Mark, et al. Surgical site infection and costs in low- and middle-income countries: A systematic review of the economic burden, 2020; <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0232960>

¹⁵ Cheng, Chen, et al. Prolonged Operative Duration Increases Risk of Surgical Site Infections: A Systematic Review. *Surgical Infections*, 2017; 18(6):722-735. <https://www.ncbi.nlm.nih.gov/pubmed/28832271>

¹⁶ Marine Parodi, et al. Using a new otologic operating microscope: Unexpected complications. (*International Journal of Pediatric Otorhinolaryngology*, 2015).

¹⁷ James Batesa, et al. Otological surgery in paediatric photosensitive patients. (*International Journal of Pediatric Otorhinolaryngology*, 2018).

¹⁸ T. Edward Imbery, MD, et al. Thermal Variations of Operative Microscopes in Otolaryngology. (*American Academy of Otolaryngology*, 2017).

Bulb cost savings

Surgical lighting is one of the most important elements in the operating room. The surgical team must be able to see accurately – with clear visibility, adequate brightness, minimal shadows, and no glare.

Depending on the application care providers may prefer Xenon or LED bulbs. ZEISS EXTARO 300 offers an integrated LED light source with high color rendering index (CRI), whereas other microscopes only come equipped with Xenon or Halogen

lights. While Xenon bulbs provide enhanced visualization for certain procedures, LED CRI lights are clinically suitable for many of the most common ENT surgeries.

<p>ZEISS TriLED</p> <ul style="list-style-type: none"> ■ CRI rating of >85 ■ Emit very little heat ■ Long life, LED lights can last over 40,000hrs 	vs.	<p>Xenon</p> <ul style="list-style-type: none"> ■ CRI rating of 100 ■ Emit lots of heat and noise ■ Must be replaced, Xenon lights last approx. 500hrs
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While a LED CRI bulb can last 20 years, Xenon lights must be typically replaced four times per year. Below we present a summary of the annual out-of-pocket costs of using microscopes that only come equipped with Xenon bulbs.

40,000+ lifetime hours – 80x the hours of a Xenon bulb

		LED	Xenon
Lifetime hours		40,000+	500
Replacement costs	Bulbs	–	\$416.30
	Shipping	–	\$15
Total cost per microscope per year (2000hrs per year)		–	\$1,725.20
Replacement costs over life of scope (10 years)		–	\$17,252.00

Time savings worksheet

Calculate the potential time savings per day from advanced features of the ZEISS EXTARO 300. Time savings will vary by OR and by day, depending on the number and type of cases scheduled.

1. Reducing setup time (turnover time)

Use the calculation below to quantify time saved when a high number of shorter procedures (e.g. 6-8) are scheduled for the same day. Setup time savings will be the dominant factor on such days.

Turnover and setup time		Minutes
A. Minutes per case saved in draping (via integrated design)		
B. Minutes per case saved balancing microscope (via innovative balancing system)	+	
C. Total setup time saved per case (A+B)	=	

2. Reducing procedure time

Use the calculation below to quantify time saved due to the Augmented Visualization and Single-Handed Operation of the ZEISS EXTARO 300. This is most beneficial during procedures where the surgical team would otherwise need to reposition the scope part way through.

Procedure time		Minutes
D. Minutes per case saved due to faster decision-making (via visualization modes)		
E. Minutes per case saved due to all reachable functions (via Mode Control)	+	
F. Minutes per case saved by avoiding scope repositioning (via Varioskop® 230)	+	
G. Minutes per case saved by avoiding change of objective lenses (via Varioskop® 230)	+	
H. Total procedure time saved per case (D+E+F)	+	
M. Total setup time saved per day (K X L)	=	

3. Reducing post-OR time

Use the calculation below to quantify time saved due to digital data management. When performing multiple procedures per day, the documentation is time-consuming. The ZEISS Connect App simplifies the data capture and automates the organization process.

Post-OR time		Minutes
I. Minutes/case saved due to digital data management (via ZEISS Connect App)		

Total time savings		Minutes
J. Setup time savings per case (C)		
K. Procedure time savings per case (G)	+	
L. Post-OR time savings per case (H)	+	
M. Total minutes saved per case (C+G+H)	=	
N. Number of procedures per day	x	
O. Total time saved per day (L x M)	=	

Competitive comparison

Below are the key factors evaluating different options. We invite you to compare the ZEISS EXTARO 300 point-for-point with traditional microscopes.

Requirements for consideration	ZEISS EXTARO 300	Traditional microscope	Benefit
LED light source with high CRI	Yes	No, only available with Halogen, Xenon or LED with low CRI	Conventional support
Modern design with internal cables	Yes	No, only external cables causing a longer cleaning time	Faster setup and TOT
Integrated varioscope	Yes	No, potentially must be repositioned or objective lense has to be exchanged	OR time savings
All functions reachable via the multifunctional knob	Yes	No, all functions are spread across the microscope	OR time savings
Augmented visualization modes	Yes	No additional filter modes, potentially making decisions more difficult	OR time savings
Internal video documentation	Yes	No, only extern video system	Post-OR time savings
iPad integration	Yes	No connectivity	Post-OR time savings and OR efficiency
Availability and reliability	Yes, via ZEISS Customer Care	Conventional support	Cost savings and improved uptime

Technical data

EXTARO® 300 from ZEISS

		Packages			
		Pure efficiency	Augmented Visualization	Premium	
Magnification	5-step magnification changer	●	●	●	
Focus	Varioskop 230, working distance adjustable from 200 to 430 mm	●	●	●	
Illumination	TriLED provides natural colored light at high intensities	●	-	-	
	TriLED with LightBoost providing Xenon-like intensities	□	●	●	
Single-Handed Operation	Unique user interface and intuitive balancing process allow smooth and effortless single handed operation of the microscope	●	●	●	
Tube	Straight binocular tube	○	○	○	
	180° tiltable tube	○	○	○	
	Foldable tube f170/f260	○	○	○	
Eyepieces	10× wide-field eyepieces	○	○	○	
	12.5× wide-field eyepieces	○	○	○	
Augmented Visualization	Augmented Visualization Kit includes GreenColor Mode and enables: MultiSpectral Mode NoGlare Mode	-	●	●	
	NoGlare Mode	-	□	□	
	MultiSpectral Mode	-	□	□	
Documentation	Essential: integrated HD-video (1080p) recording on USB-attached storage, HDMI output, trigger from microscope or with remote control	□	□	-	
	Digital data management: integrated HD-video (1080p), HDMI output, ZEISS Connect iPad App for camera control including smart recording and media data management according to customer-defined workflows	-	-	●	
	ZEISS Connect DICOM Interface	-	-	□	
	iPad docking station	-	-	□	
Co-observation	Stereo co-observation package with straight tube, incl. beamsplitter and TriLED with LightBoost providing Xenon-like intensities	10× eyepieces	□	□	□
		12,5× eyepieces	□	□	□
Laser adaption	Laser package contains: - adapter for laser micromanipulator - microscope focus lock - external focus slider that allows to jointly move microscope and laser focus point	□	□	□	
Asepsis	Asepsis starter kit consists of drape adapter ring for VisionGuard® splash guard and packs of resterilizable covers	□	□	□	
	Drape starter kit	□	□	□	

● Always included ○ Configurable □ Optional

The statements of the doctors in this brochure reflect only their personal opinions and do not necessarily reflect the opinions of any institution with which they are affiliated. Prof. Mark Praetorius and Mark Syms M.D. have a contractual or other financial relationship with Carl Zeiss Meditec AG or Carl Zeiss Meditec, Inc.



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