



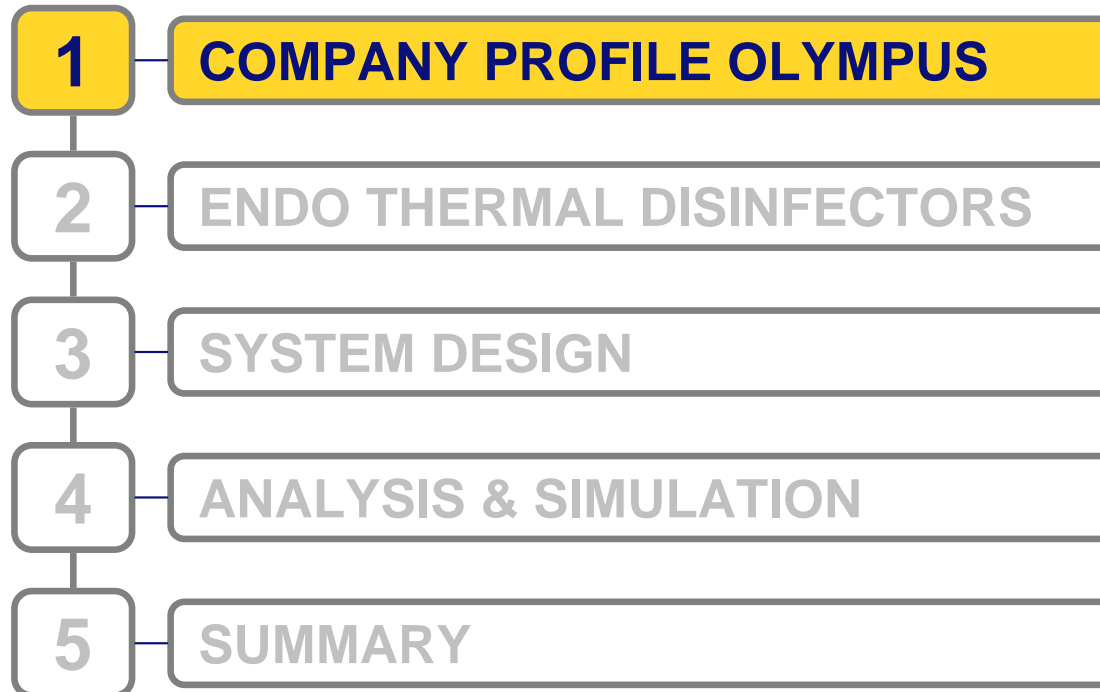
OLYMPUS

Your Vision, Our Future

Simulation und Auslegung von Systemen für die Endoskopdesinfektion

Dipl.Ing. Jens Waldmann
Olympus Winter & Ibe GmbH

Opto Digital Technology

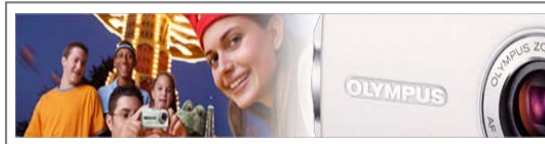


Company Profile

**OLYMPUS
CORP.**

- ◆ 33.000 employees (2007)
- ◆ 6,75 Billion Euro net Sales (2007)

Imaging



Medical Systems



Life Science



Industrial

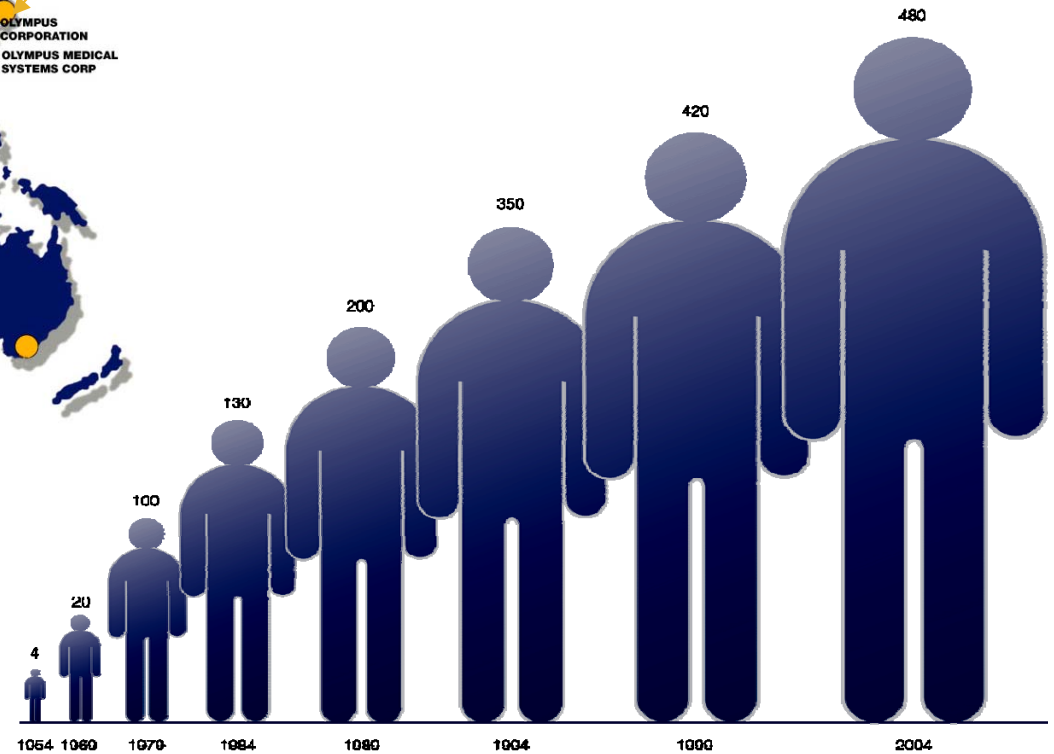


**Olympus
Winter & Ibe
GmbH**

Company Profile



Olympus Corporation Global Headquarter, Tokyo



Number of employees at Olympus Winter & Ibe

Instruments and Optics for minimal invasive surgery



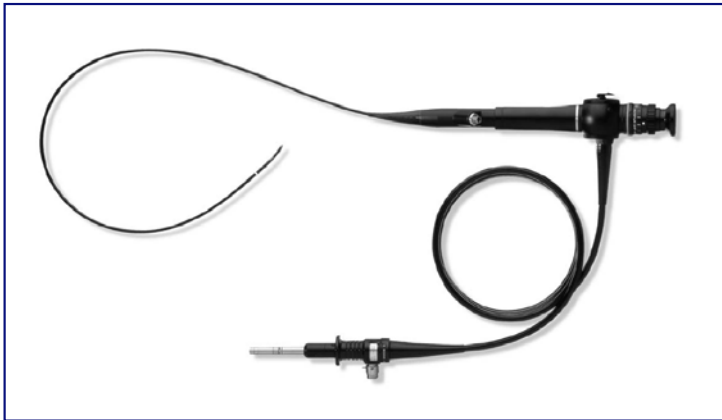
Video Endoscopes



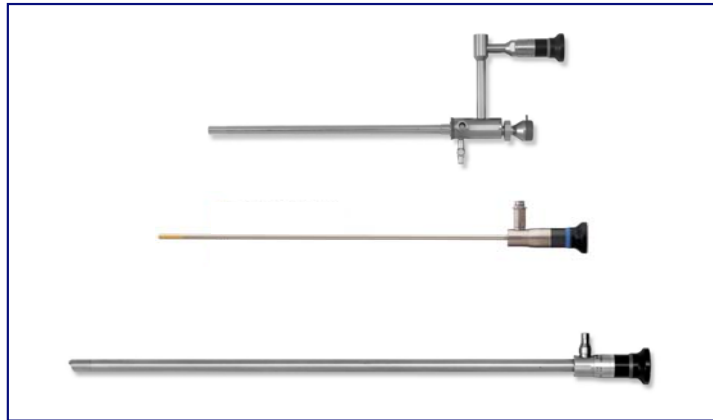
Urological / Gynecological Instruments



Surgical Accessories



Flexible Endoscopes



Rigid Endoscopes



Hand Instruments

Medical Device Technology



OR Integration



OR Electronic Devices



Endoscope Reprocessing Technology

Medical Device Technology



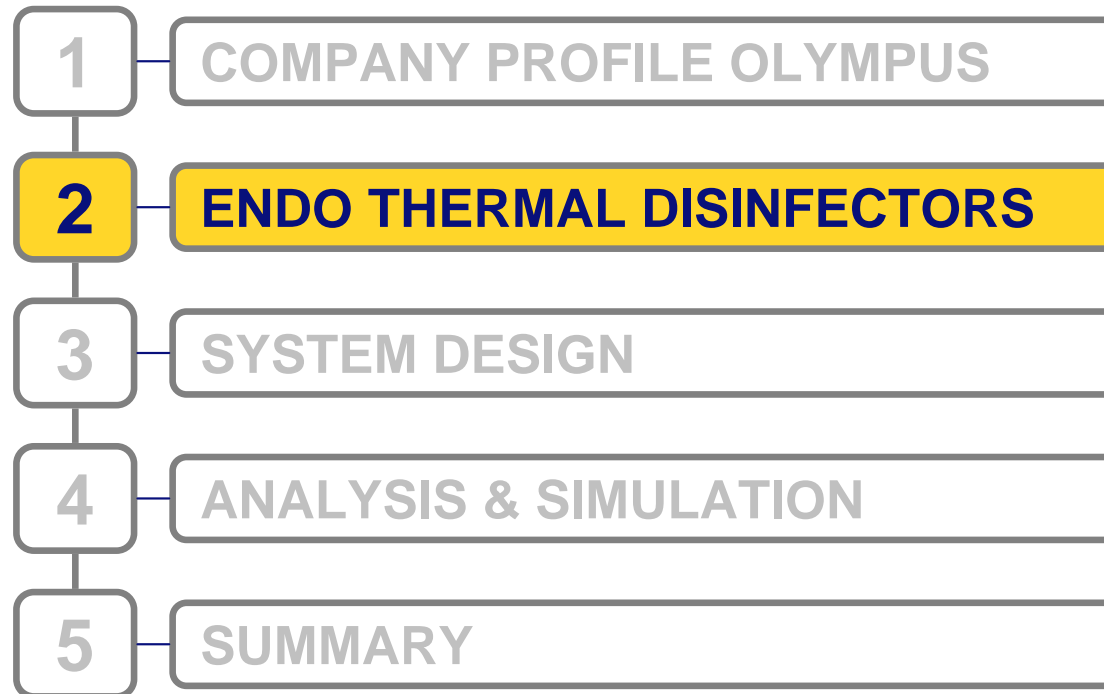
OR Integration



OR Electronic Devices



Endoscope Reprocessing Technology



Washer Disinfector



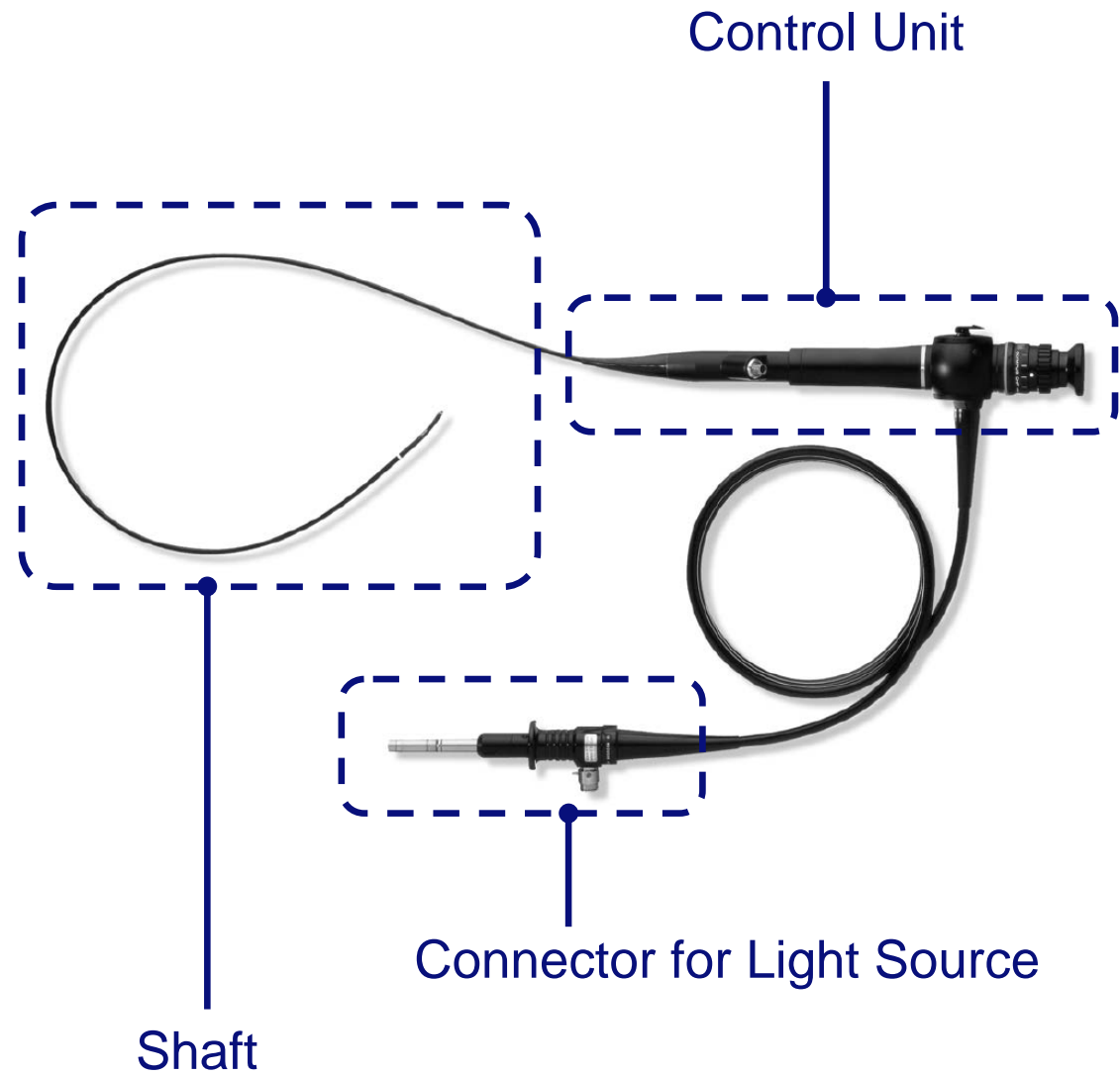
Washer Disinfector ETD-3

Washer Disinfector Basket

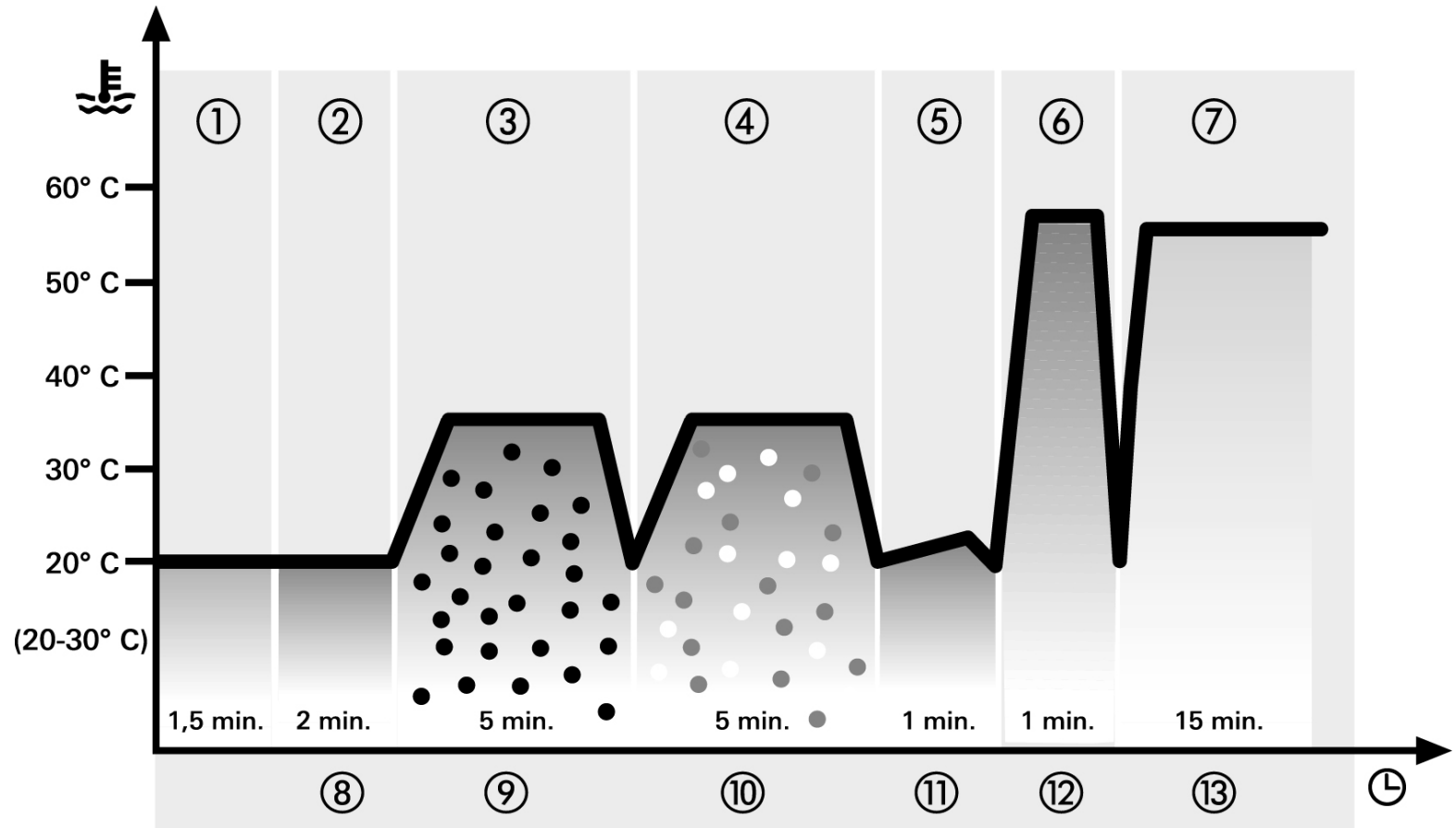
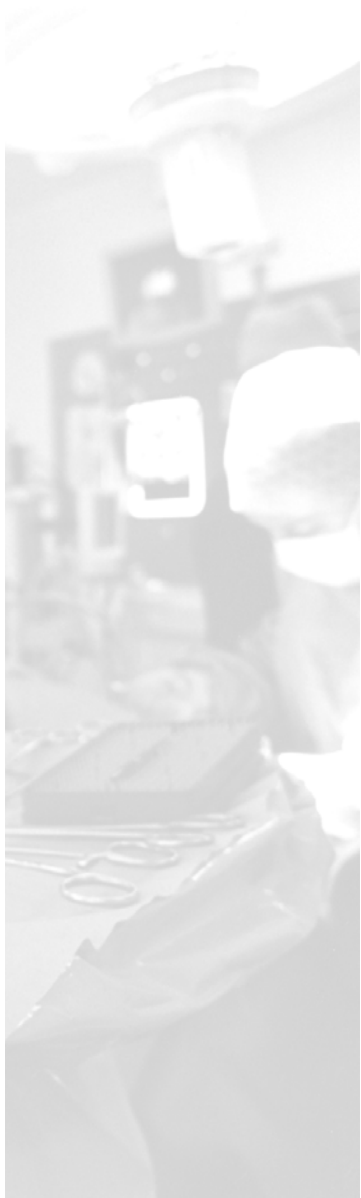


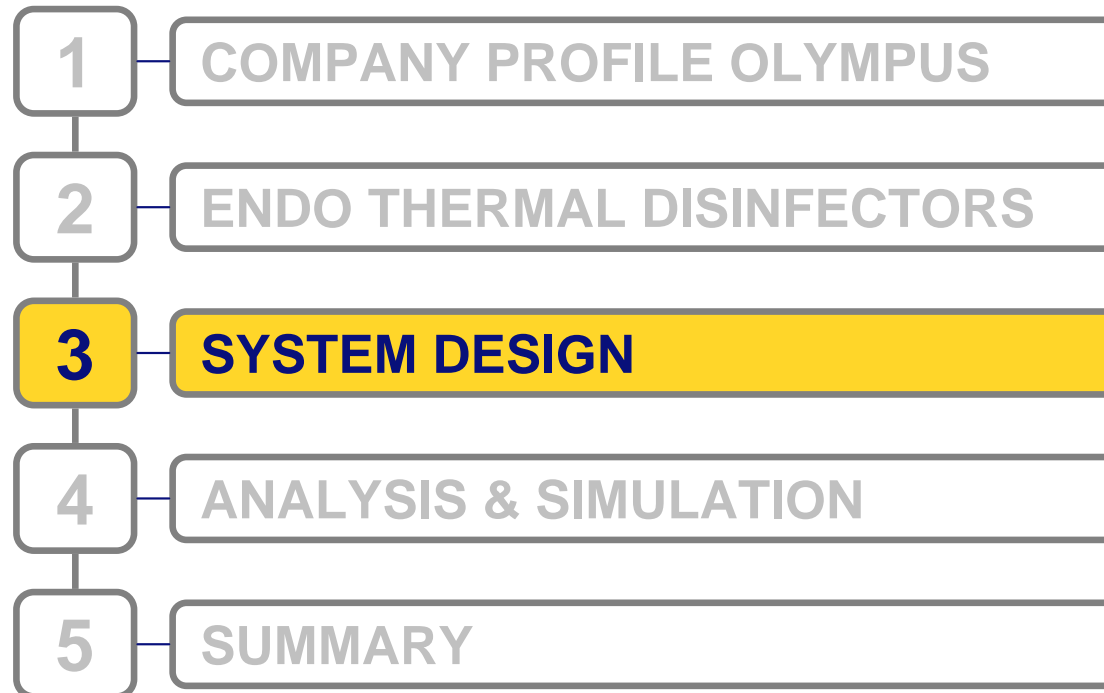
Washer Disinfector Basket

Flexible Endoscopes

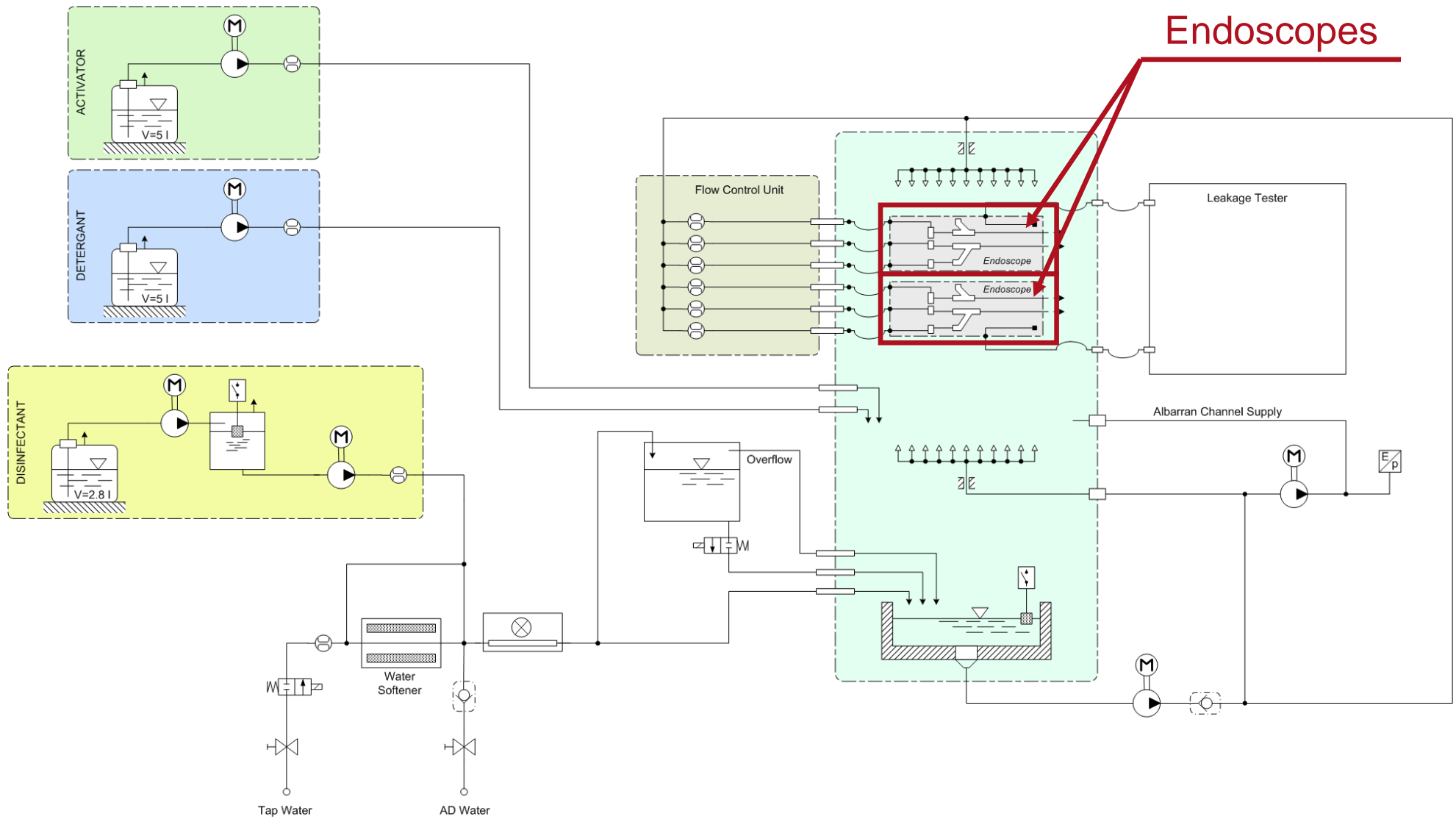


Disinfection Process

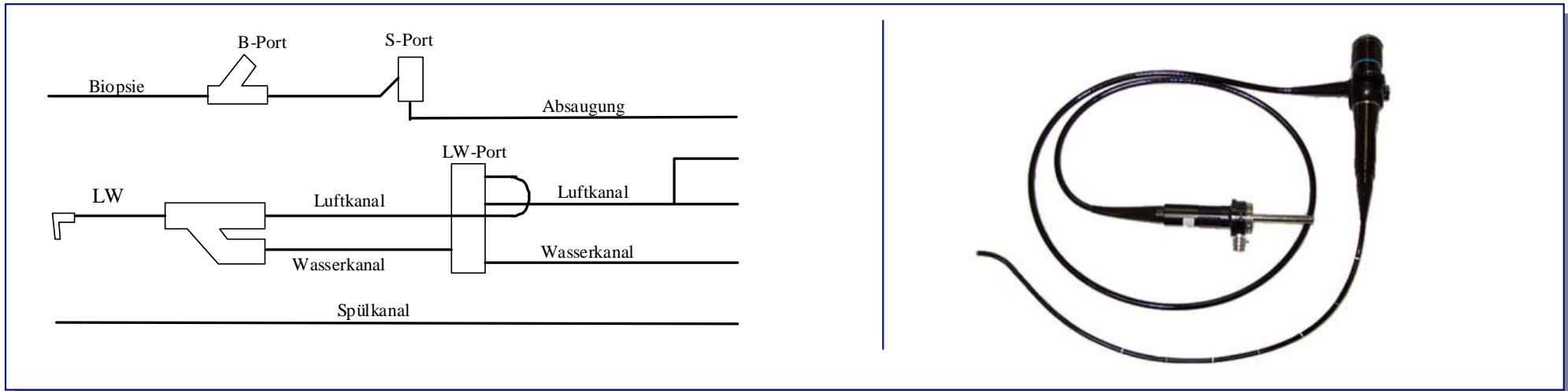




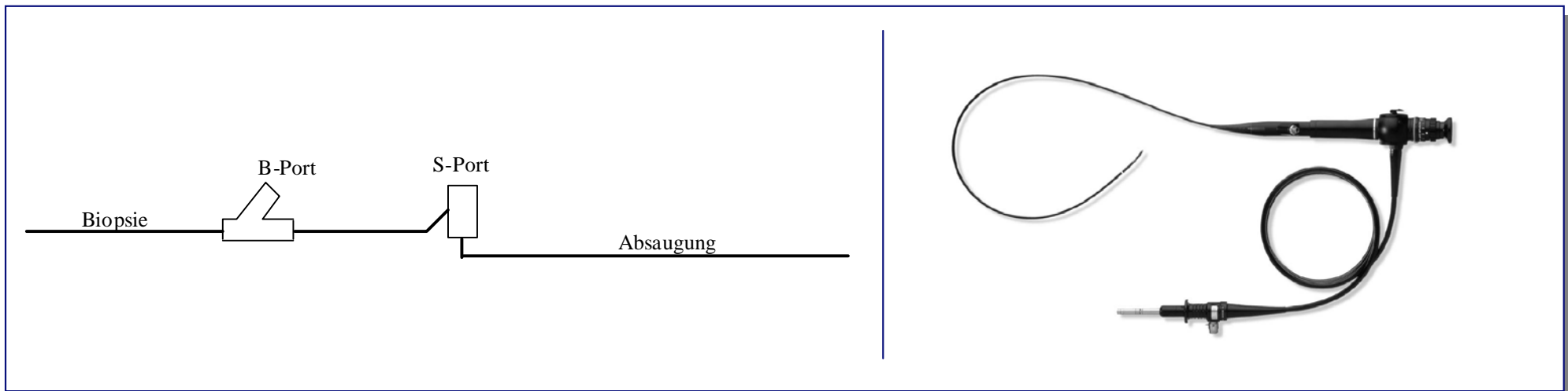
Fluid System Diagram



Endoscope channel systems



Sample Channel System 1



Sample Channel System 2

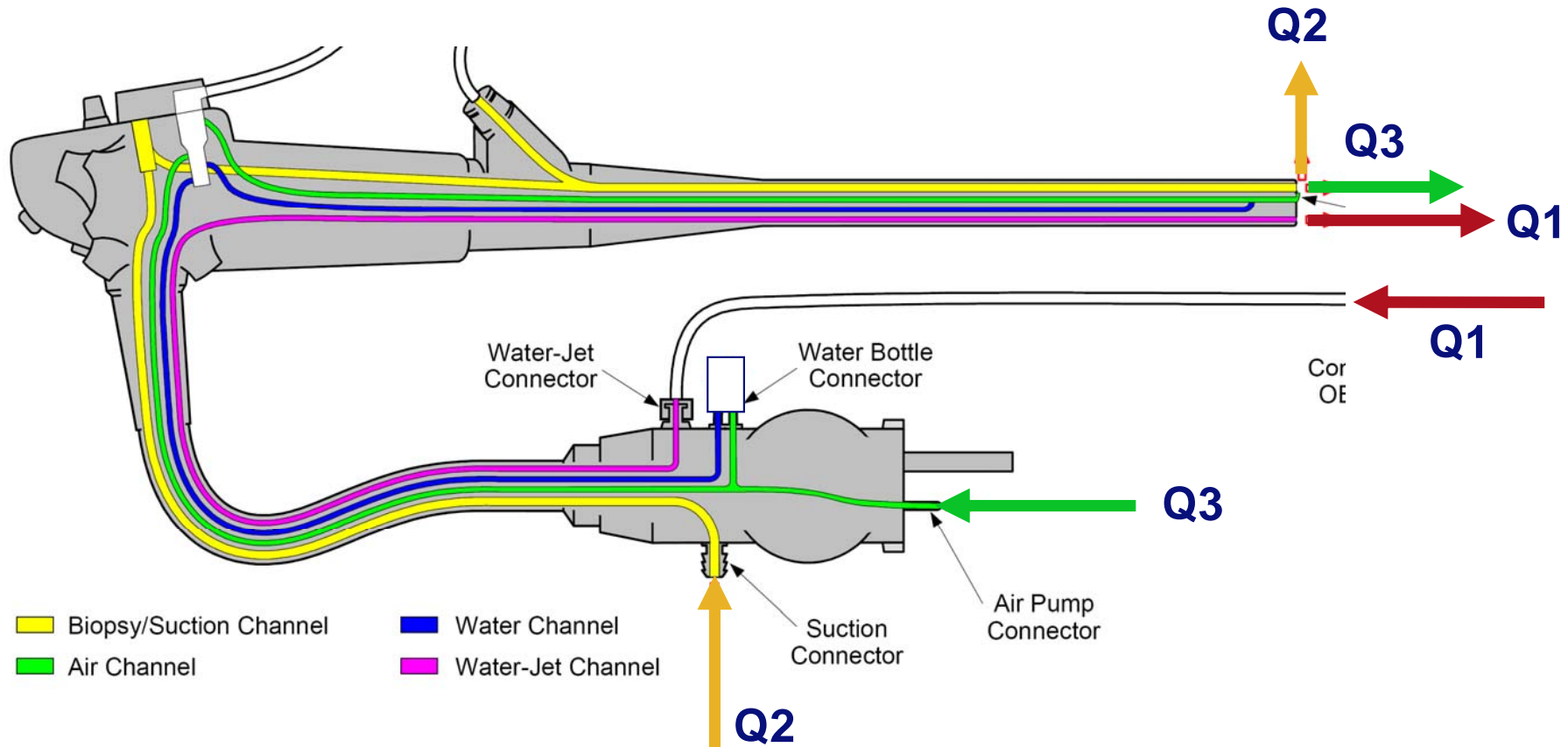
Endoscope channel systems

- Insgesamt mehr als **30** unterschiedliche Kanalsysteme
- Mehr als **300** Endoskoptypen
- Kanaldurchmesser zwischen **0.65 mm** und **6 mm**
- Kanallängen zwischen **400 mm** und **3500 mm**

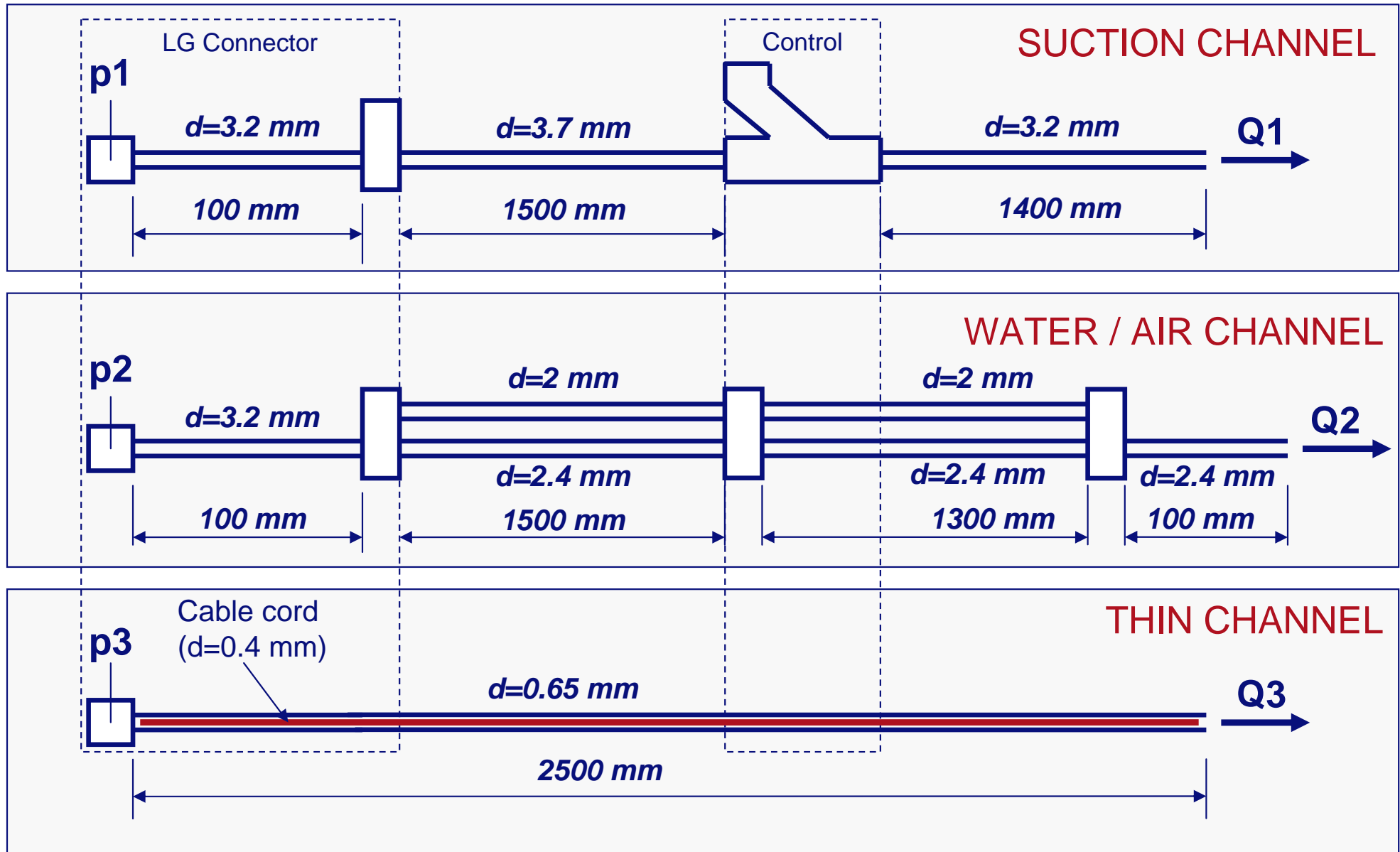
Simulation Targets

- Auslegung von Pumpen und Spüldrücken in den Systemen
- Verifizierung ausreichender Spüleistung aufgrund ausreichender Strömungsgeschwindigkeit ($v > v_{\text{krit}}$) für neue Endoskope
- Entwicklung neuartiger Überwachungssysteme (Kanalverstopfung, nicht verbundene Adapter, einwandfreie Verbindung und Flow)
- Nachstellen von Fehlerfällen (Kanalblockage, Schlauchleckagen, Pumpenabweichungen etc.)

Sample Investigation: Volumetric flow rate through scope channels ?



Simplified endoscope model (sample endoscope)



1	COMPANY PROFILE OLYMPUS
2	ENDO THERMAL DISINFECTORS
3	SYSTEM DESIGN
4	ANALYSIS & SIMULATION
5	SUMMARY

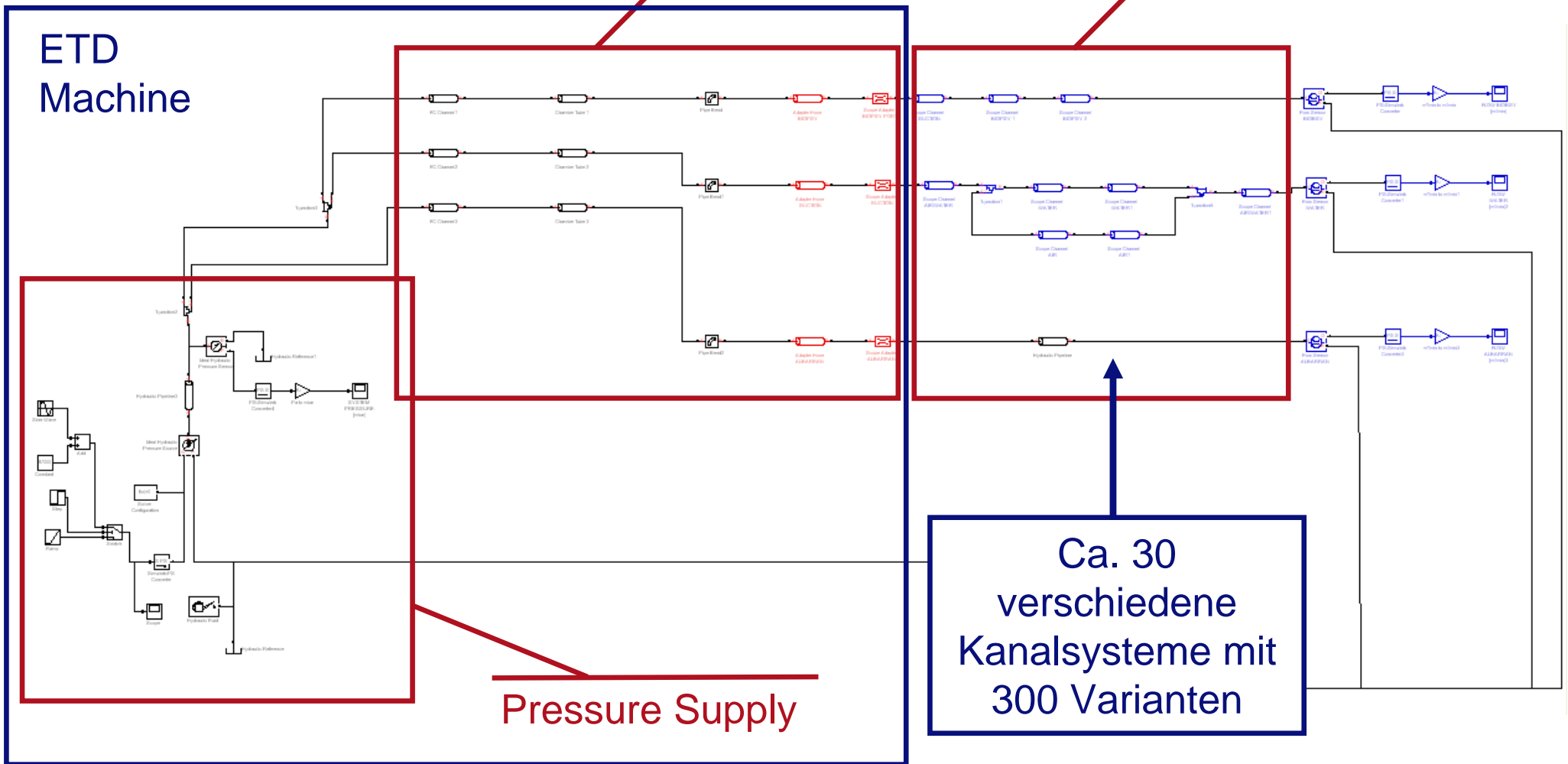
Simulation Model



Internal Tubing

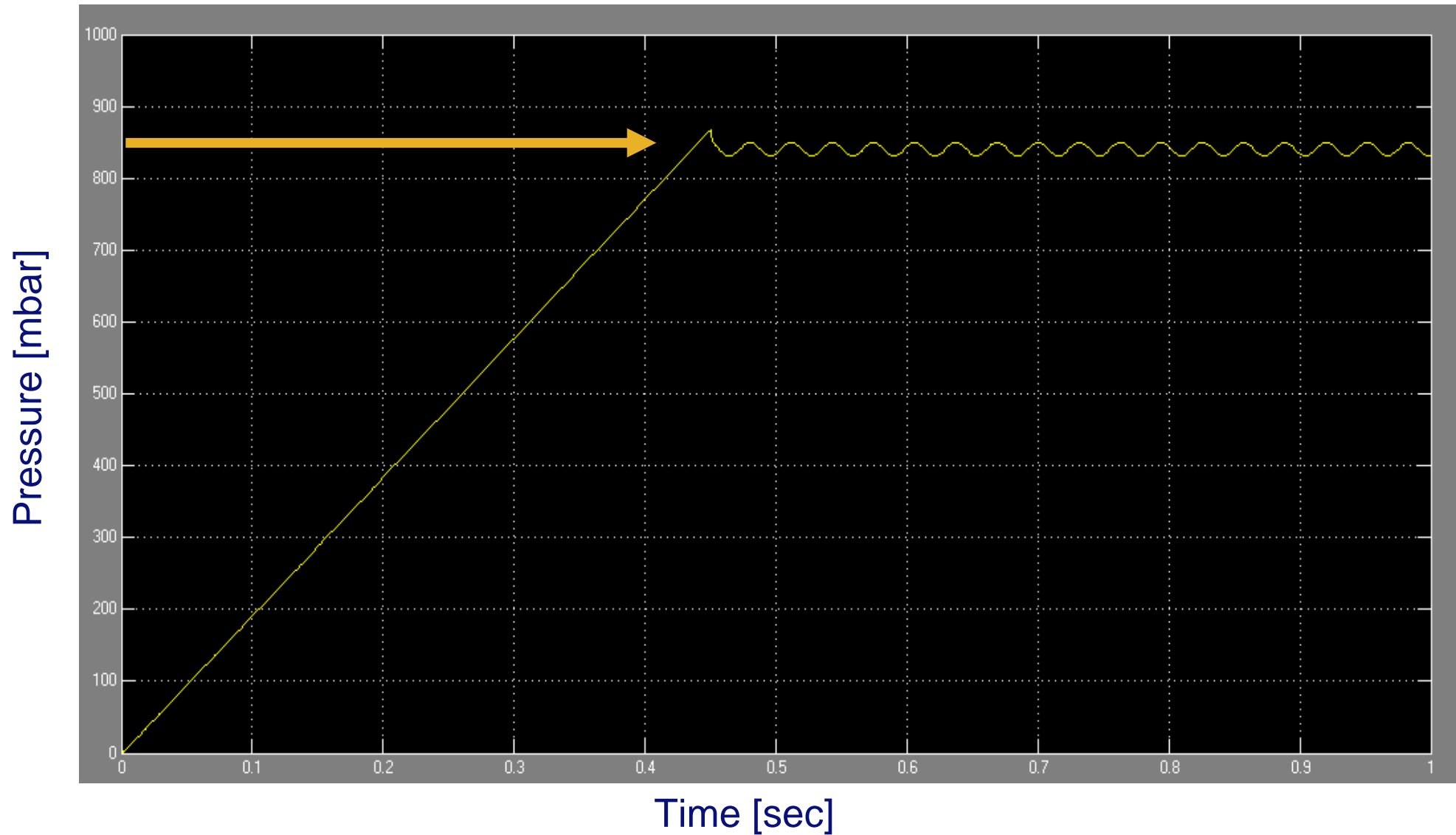
Endoscope

ETD Machine

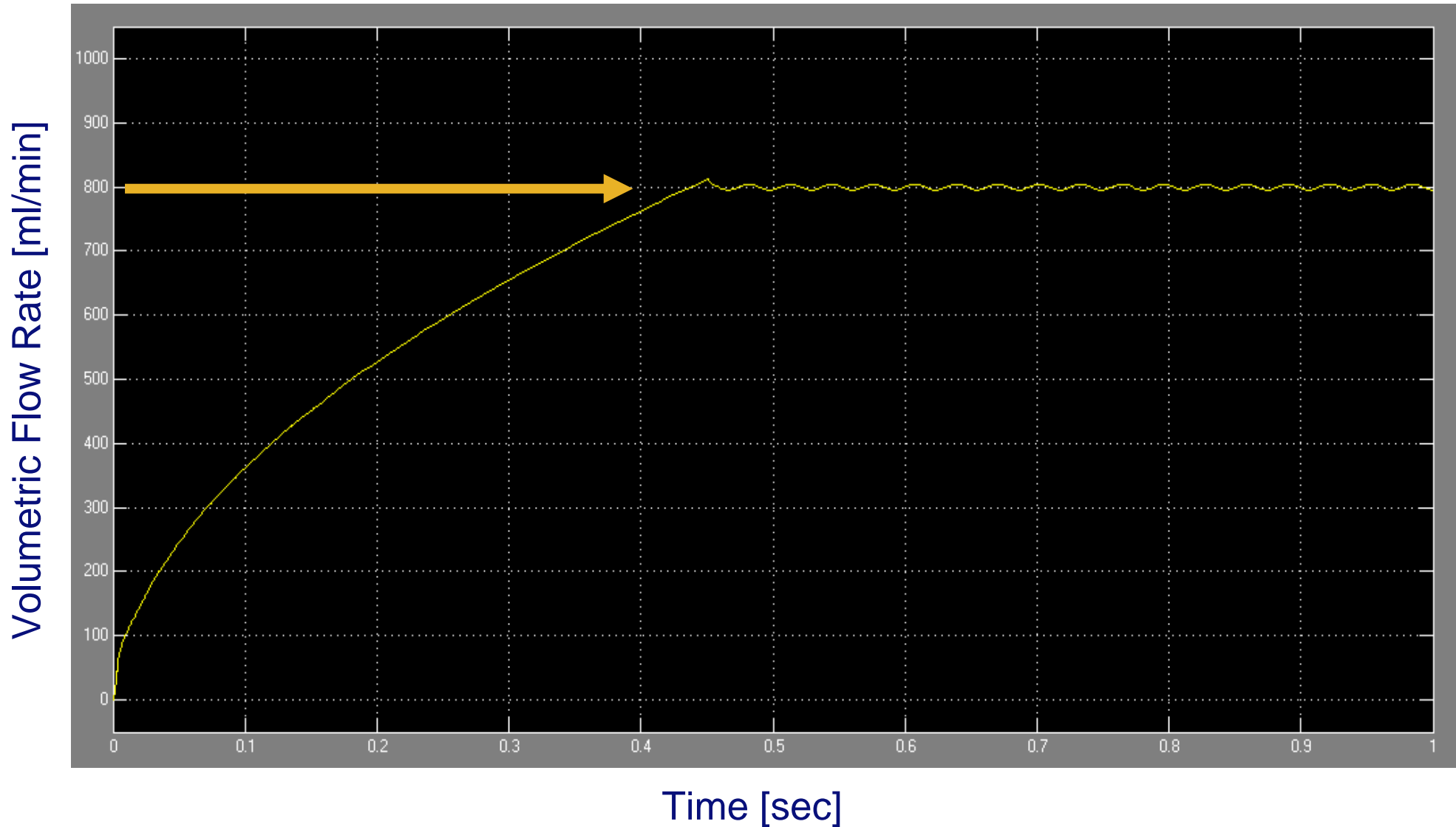


Pressure Supply

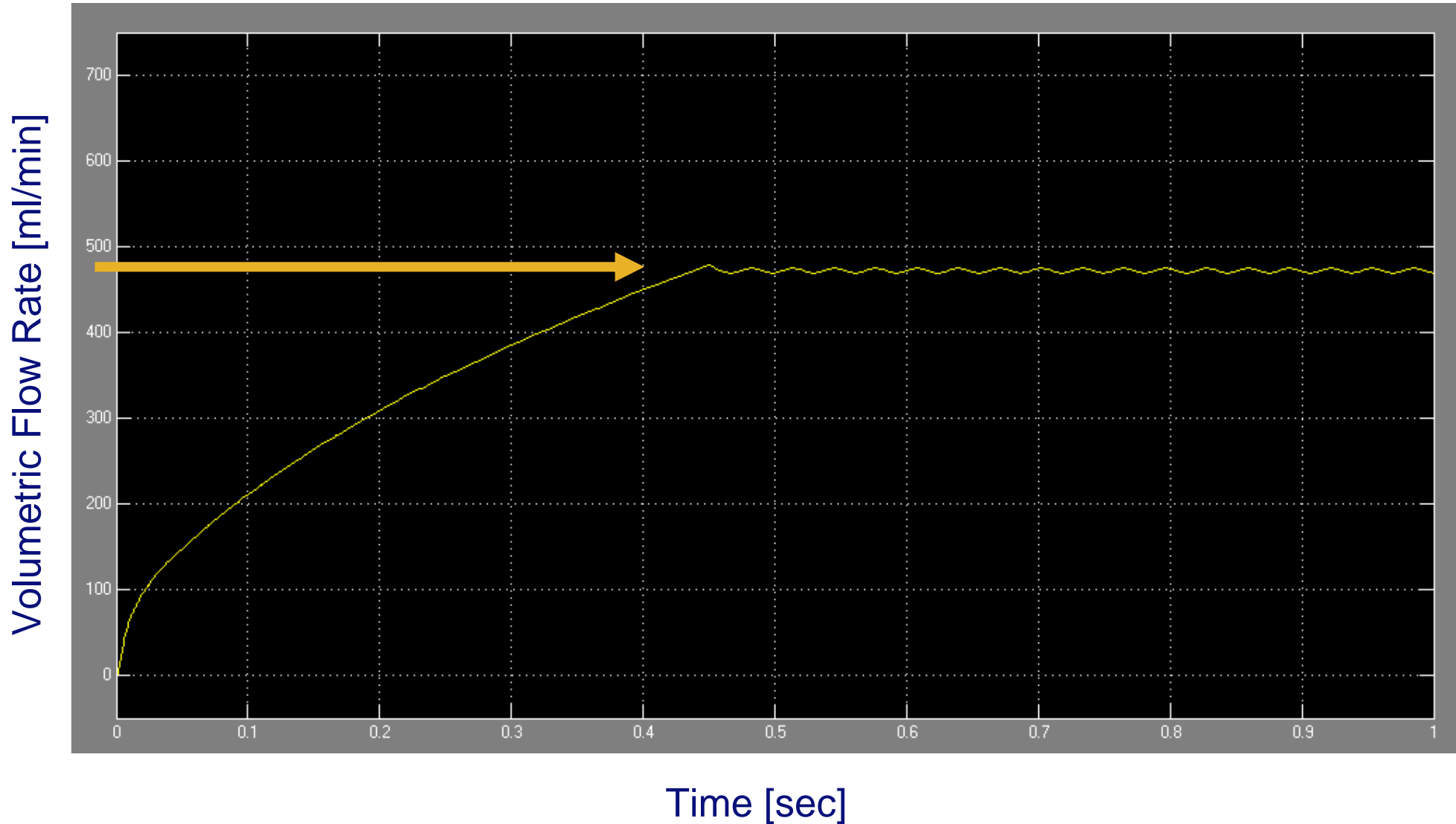
System Pressure



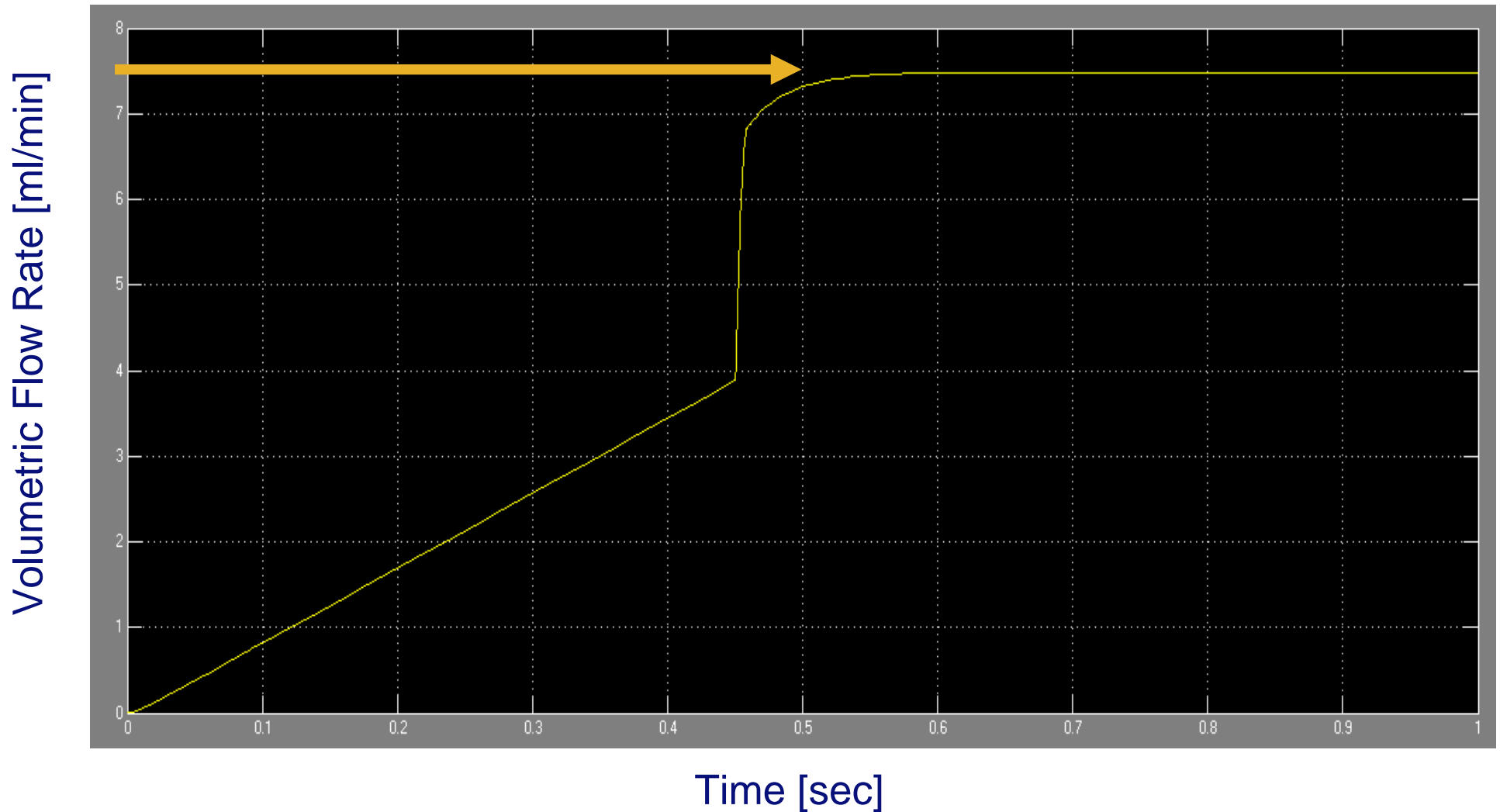
Flow Rate through Biopsy Channel



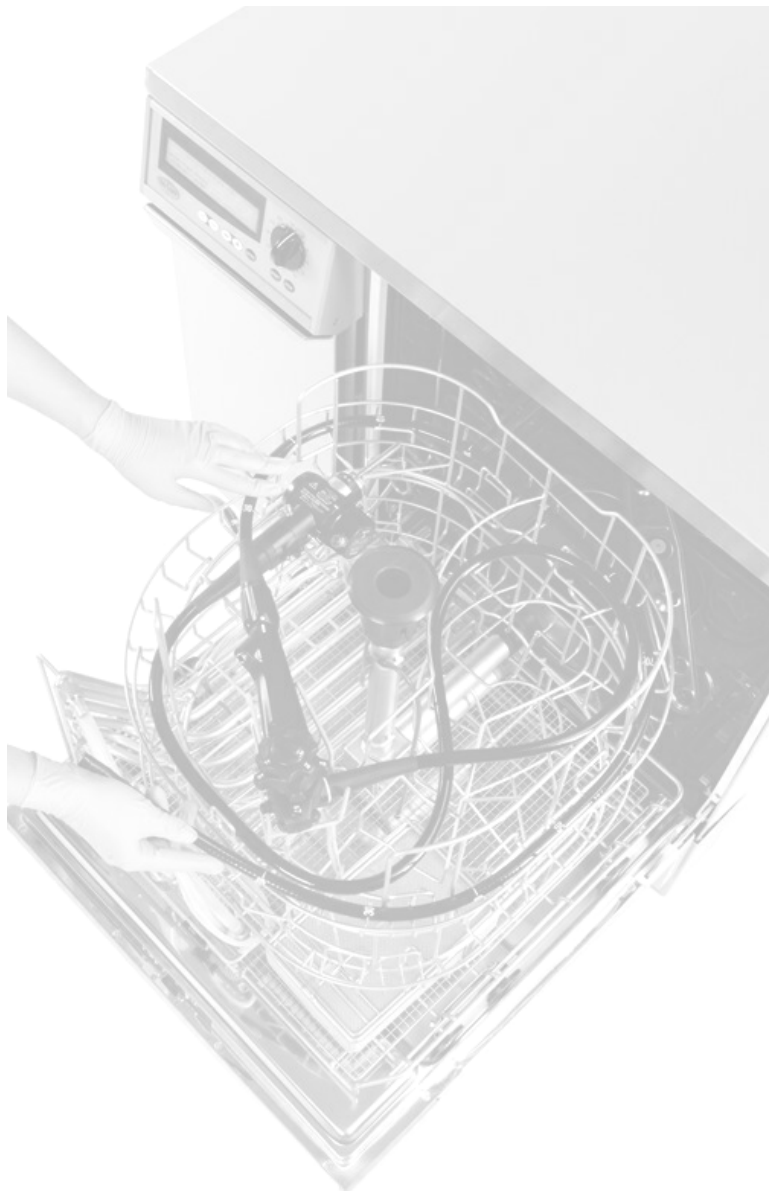
Flow Rate through Air/Water Channel



Flow Rate through Thin Channel



Results



	Channel Diameter	Flow Rate
Biopsy Channel	3.2 mm	800 ml/min
Air/Water Channel	2.4 mm	480 ml/min
Thin Channel	0.65 mm	7.5 ml/min

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Summary



- Die Nutzung von Simulationstools kann den Aufwand an laborbasierten Verifikationstests reduzieren
- Das Desinfektionsergebnis ist stark abhängig von der Benetzungsdauer der chemischen Substanzen und dem Kanalvolumenstrom („Flottengeschwindigkeit“), dies kann gut über Systemsimulation nachgestellt werden
- Während der Produktlebensdauer werden künftig Simulationsumgebungen bei der Optimierung der Systeme genutzt



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Thank you for your attention !

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