

Biofilm

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The Hidden Challenge of Biofilm in Endoscope Reprocessing

Visual inspection is commonly used as a quick assessment following manual cleaning. If no visible soil remains, the device may be considered ready for the next reprocessing step, such as automated washing, high level disinfection or automated endoscope reprocessing. However, visible cleanliness does not confirm the absence of residual contamination within complex device structures.¹

Increasingly, healthcare professionals recognize that **biofilm** - structured communities of microorganisms embedded in a protective matrix - may persist on medical devices even when no visible contamination is observed. Understanding this **hidden challenge** is an important step toward improving cleaning effectiveness.²

Limitations of visual inspection¹

- ✓ Confirms absence of visible soil or debris
- ✗ Does not confirm absence of residual microorganisms
- ✗ Does not confirm absence of biofilm
- ✗ Does not reflect cleaning effectiveness within internal channels

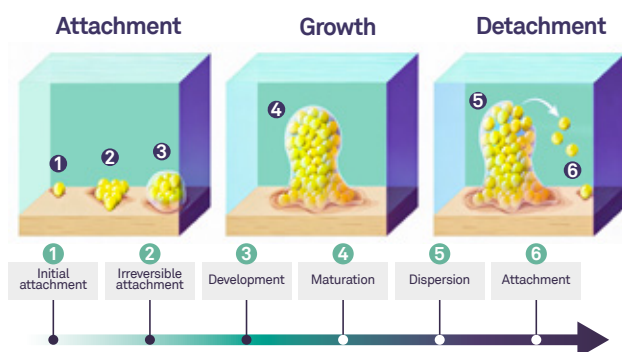
What is biofilm?

Biofilm is a **structured community of microorganisms attached to a surface and embedded in a protective matrix**. This structure can make contamination more difficult to remove from medical devices.²

The biofilm matrix:²

- anchors microorganisms to surfaces
- protects microorganisms from environmental stress
- may increase resistance to removal compared with planktonic (free-floating) microorganisms

Formation of Biofilm



In endoscopes, biofilm can form:³

- inside narrow channels (lumens)
- on internal surfaces with repeated exposure to moisture and organic material
- in areas where mechanical access is limited



Flexible endoscopes present unique reprocessing challenges due to their complex design, narrow channels, and limited accessibility of internal surfaces, which may contribute to biofilm formation and persistence.⁴

ASP Advanced Sterilization Products

Not all contamination is the same

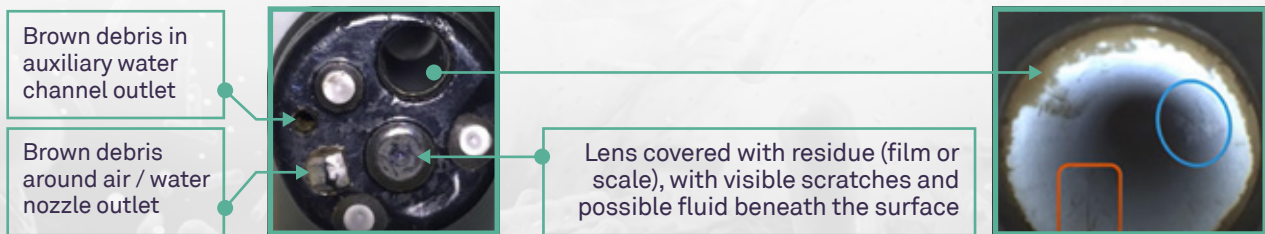
Type	What it is	Key characteristics
Visible soil	Blood, tissue, or other organic residues visible on the device ⁷	Visually detectable following use
Bioburden	Viable microorganisms present on a device prior to cleaning, disinfection, or sterilization ⁵	Includes both free and surface-associated microorganisms
Biofilm	Surface-attached microorganisms within a protective matrix ²	Protected by a matrix → more difficult to remove once established

Biofilm behaves differently and requires a tailored cleaning approach.²



Residual contamination inside a colonoscope⁶

Borescope inspection can help identify residual contamination and cleaning challenges within internal endoscope channels.



Effective cleaning goes beyond visible cleanliness⁸

What this means for your cleaning process

To effectively address biofilm, cleaning should:

- include defined parameters such as contact time, temperature, and flow rate⁷
- support mechanical action within internal channels, not only external device surfaces
- be designed to remove both visible and non-visible contamination⁷
- follow a standardized process intended to support reproducible cleaning outcomes and minimize user-dependent variation⁸

CIDEZYME BIOCLEAN™ Enzymatic Detergent can support these requirements.⁹

For more information, please visit asp.com or contact your ASP Sales Representative.



References:

1. Ofstead CL, Wetzler HP, Eiland JE, Heymann OL, Held SB, Shaw MJ. Assessing residual contamination and damage inside flexible endoscopes over time. *American Journal of Infection Control*. 2017;45(11):1209–1215. 2. Donlan RM. Biofilms and device-associated infections. *Emerging Infectious Diseases*. 2001;7(2):277–281. 3. Primo MG, Costa DM, Guadagnin SV, Azevedo AS, Alfa MJ, Vickery K, Leão-Vasconcelos LSN, Tipple AF. Biofilm accumulation in new flexible gastrointestinal endoscope channels in clinical use. *Open Forum Infectious Diseases*. 2020;7(Suppl 1):S578. 4. Luo Y, Yang Q, Li B, Yao Y. Establishment of a quality control circle to reduce biofilm formation in flexible endoscopes by improvement of qualified cleaning rate. *Journal of International Medical Research*. 2020;48(9):1–14. 5. Centers for Disease Control and Prevention (CDC). Bioburden on Medical Devices. CDC Infection Prevention and Control Resources. 6. Ofstead CL. Residual contamination: Soil, bioburden, and biofilm. Educational video resource. 7. Galvan K. Cleaning, Disinfection and Sterilization. 8. Azizi J, Gavette M, Kulkarni K, Drosneck MA. Efficacy of cleaning. *Biomedical Instrumentation & Technology*. 2020. 9. CIDEZYME BIOCLEAN™ Enzymatic Detergent Instructions for Use.