Container Geometry Analysis

Comprehensive Analysis Report

Generated: November 18, 2025 at 23:48:13

Input File: simulated_container_eppi_50uL.csv

Analysis Duration: 0.00 seconds

Software Version: 3.11.3 (Temp Directory Fix)

Status: ■ SUCCESS

■ Executive Summary

Metric	Value	Unit
Total Container Height	39.50	mm
Total Container Volume	1.735	ml
Calculated Volume	1.733	ml
Volume Accuracy	99.90	%
Segments Detected	3	
Data Points Analyzed	79	
Profile Points Generated	62	
Processing Time	0.00	seconds
STL Mesh Generated	■■ Yes (Check Mesh)	

Quality Assessment:

Volume Preservation: 99.903% (Error: 0.097%)
Status: ■ Excellent
Average Fit Error: 0.121%
Maximum Fit Error: 0.236%
Mesh Quality: STL exported with closed bottom at z=0

■■ Job Execution Details

Processing Steps:

Step	Duration (s)	Status
Data Loading	0.005	■
Area Computation	0.002	■
Segmentation & Fitting	0.014	■
Profile Generation	0.001	■
STL Export	0.013	■

Generated Output Files:

Filename	Type	Size (KB)
simulated_container_eppi_50uL_model_20251118_234813.stl	STL	288.36

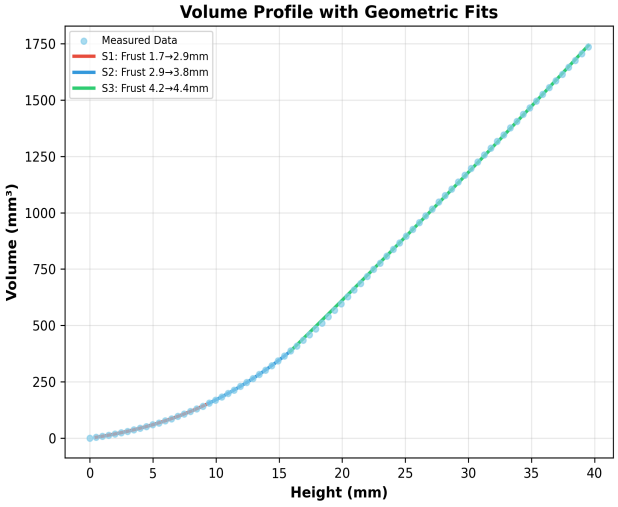
■ Statistical Analysis

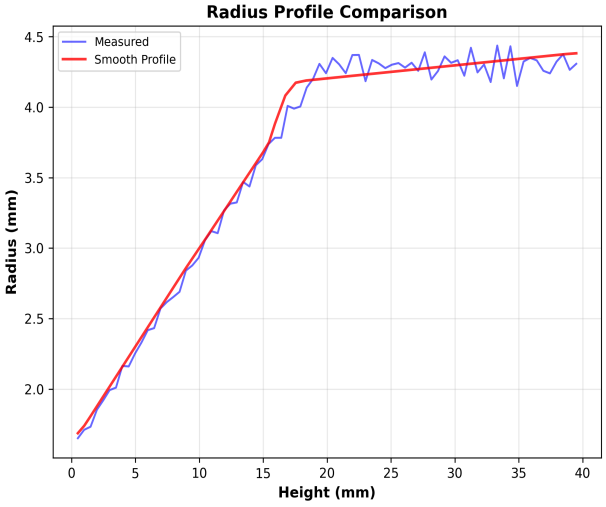
Statistic	Value	Unit
Height Statistics		
Minimum Height	0.00	mm
Maximum Height	39.50	mm
Height Range	39.50	mm
Volume Statistics		
Minimum Volume	0.000	ml
Maximum Volume	1.735	ml
Volume Range	1.735	ml
Cross-Section Statistics		
Mean Area	43.67	mm²
Std Deviation	17.89	mm²
Minimum Area	8.57	mm²
Maximum Area	61.84	mm²
Mean Radius	3.73	mm

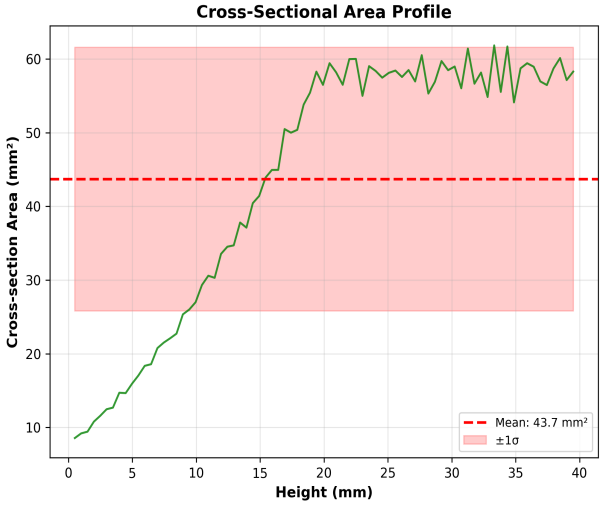
■ Geometric Segment Analysis

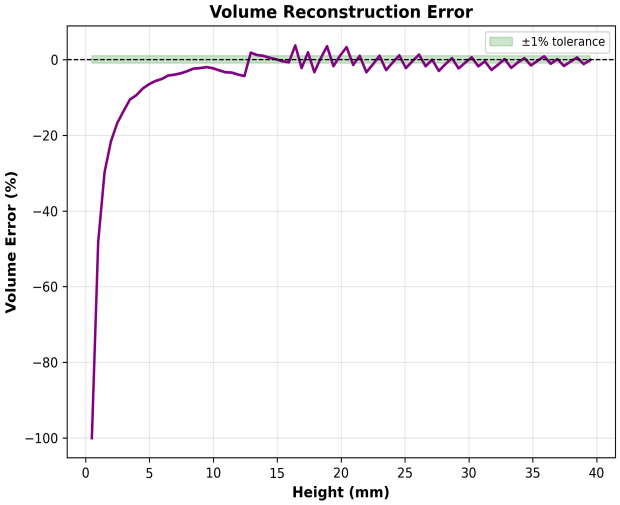
ID	Type	Height Range (mm)	Parameters	Volume (ml)	Fit Error (%)
1	Frustum	0.5 - 9.5	r■=1.67 → r■=2.93 mm	0.151	0.072
2	Frustum	9.5 - 15.9	r■=2.92 → r■=3.81 mm	0.232	0.054
3	Frustum	15.9 - 39.5	r■=4.17 → r■=4.38 mm	1.348	0.236

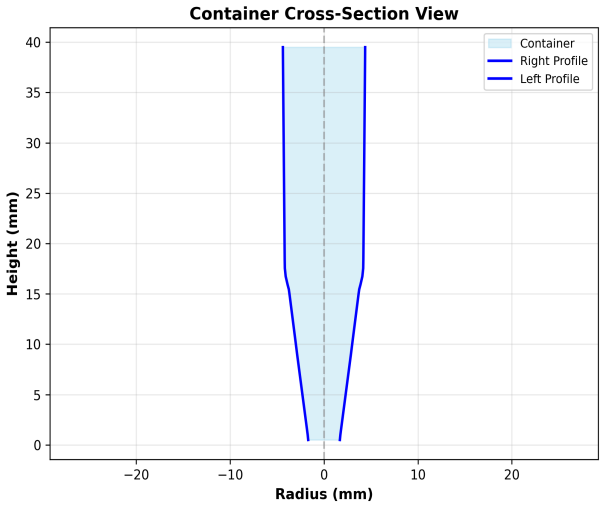
■ Analysis Visualizations









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ANALYSIS SUMMARY

Data Quality:
- Total Points: 79
- Valid Points: 78
- Height Range: 0.0 - 39.5 mm
- Volume Range: 0.000 - 1.735 ml

Geometric Analysis:
- Segments Detected: 3
- Cylinder Segments: 0
- Frustum Segments: 3

Profile Quality:
- Profile Points: 62
- Mean Radius: 3.47 mm
- Radius Std Dev: 0.89 mm
- Volume Accuracy: 95.67%

Cross-Section Stats:
- Mean Area: 43.7 mm²
- Area Std Dev: 17.9 mm²
- Coefficient of Variation: 41.0%
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■■ Processing Configuration

Segmentation Parameters:
• Minimum Points per Segment: 12
• Savitzky-Golay Window: 9
• Percentile Threshold: 80
• Variance Threshold: 0.15

Geometric Fitting:
• Maximum Function Evaluations: 4000
• Fit Bounds Multiplier: 0.5 - 3.0
• Minimum Differential Volume: 0.01 mm^3

Profile Generation:
• Transition Buffer: 2.5 mm
• Hermite Tension: 0.6
• Smooth Transitions: Hermite cubic spline (C^1 continuity)

STL Export:
• Angular Resolution: 48 faces/ring
• Mesh Type: Watertight with bottom cap (ALWAYS CLOSED AT z=0)
• Vertices: 3025
• Faces: 5904
• Bottom Cap: ■ Closed with center fan triangulation at z=0

Report generated by Container Geometry Analyzer v3.11.7_FINAL
Analysis completed in 0.00 seconds