

Maximizing High-Volume Evacuation (HVE) Performance Through Targeted Maintenance



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While

many practices assume their vacuum systems operate at peak capacity because they are “running,” gradual performance decline often goes unnoticed.

This case study evaluates how a four-operator dental practice struggling with poor chairside suction performance successfully increased airflow velocity by 19.7% without replacing their central vacuum hardware. By transitioning from traditional cleaning with a bucket to advanced line cleaning with an atomizer and structured maintenance protocols, the practice moved from marginal clinical efficacy to robust aerosol control.

INTRODUCTION & THE CHALLENGE

Guidelines establish specific Standard Cubic Feet per Minute (SCFM) metrics required for effective aerosol mitigation:

- U.S. Baseline: Minimum 7.1 SCFM per user for effective aerosol control.
- European Recommendations: High-performance benchmark of 10.6 SCFM.

A four-operator practice noted a palpable drop in chairside suction power during aerosol-generating procedures. Initial baseline testing using a specialized flowmeter device revealed an isolated reading of 7.6 SCFM. However, dental practices do not operate in a vacuum of



a single operator. When a second, adjacent operator was activated, the airflow in the primary room plummeted below 5.0 SCFM—falling dangerously short of safe aerosol mitigation standards.

DIAGNOSTIC FINDINGS

A comprehensive systems evaluation conducted in partnership with an Air Techniques representative revealed three primary systemic bottlenecks:

1. **Ineffective Line Flushing Methods:** The practice utilized a traditional “bucket method” once per week to flush lines. This method merely pulls liquid through the bottom of the tubing rather than cleaning the entire circumference. Additionally, manually plunging valves creates “water slugs” that can overwhelm line capacity and cause premature wear on vacuum gears.
2. **Over Time:** The use of improper cleaning solutions and methods caused build-up in the lines leading to inadequate suction.
3. **Severe Mechanical Blockages:** Both the individual chairside solids traps and the central vacuum system main trap were severely clogged with bio-burden and particulate matter, restricting airflow.

METHODOLOGY & INTERVENTION

The practice implemented a multi-tiered remediation strategy focusing on fluid dynamics, chemical compliance, and scheduled maintenance.

Baseline Flow: 7.6 SCFM



Phase 1: Daily Atomized Cleaning (CleanStream)



3-Month Flow: 8.7 SCFM



Phase 2: Tubing Replacement (\$300 Investment)



Final Flow: 9.1 SCFM



1. Transition to Cleaning Lines with an Atomizer

The practice replaced the bucket method with the CleanStream Vortex Dispenser and CleanStream Evacuation System Cleaner.

- The Vortex Principle: Rather than pulling solid liquid, an atomizer draws in a high-velocity mixture of air and solution. This creates a powerful vortex that continuously scrubs the entire internal diameter of the tubing walls.
- Formulation Compliance: The system utilizes a non-foaming, neutral pH line cleaner to protect internal vacuum components.

2. Rigorous Trap Maintenance Protocol

A strict calendar-based schedule was introduced to manage the initial surge of dislodged, legacy bio-burden:

- Chairside Solids Traps: Scheduled for replacement every Monday.



- Central Vacuum Main Trap: Scheduled for replacement on the 15th of every month.

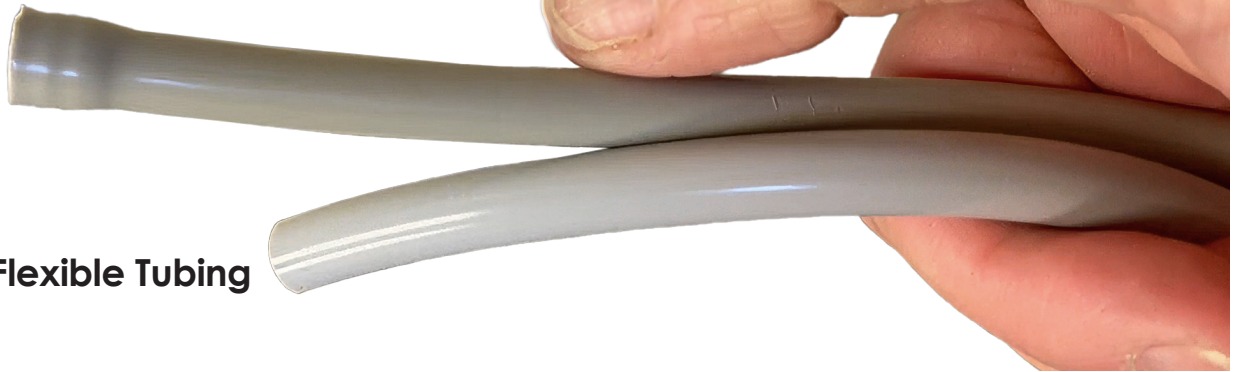


3. Low-Cost Infrastructure Refresh

Old, discolored internal suction tubing was identified as a source of permanent luminal narrowing due to years of

calcified buildup. The practice replaced all HVE and saliva ejector tubing across all four operatories with lightweight, ergonomic alternatives.

Old Stiff Tubing



New Flexible Tubing

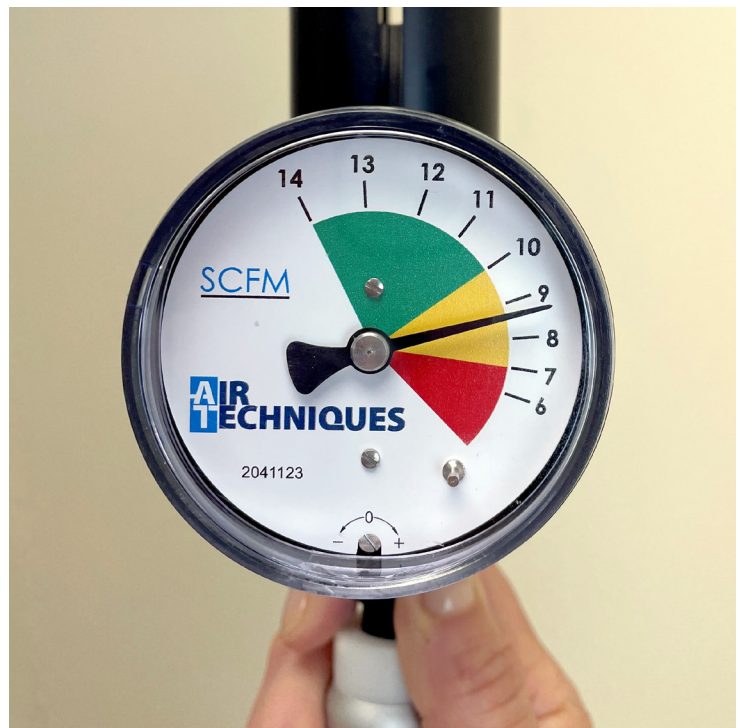
RESULTS & PERFORMANCE METRICS

Airflow performance was tracked across three distinct milestones using a calibrated chairside SCFM gauge:

Phase	System Status	Measured Airflow (SCFM)	Performance Increase
Baseline	Clogged traps, weekly bucket flushing	7.6 SCFM	Reference Point
Phase 1	3 Months of daily CleanStream atomization	8.7 SCFM	+14.5%
Phase 2	Chemical line cleaning + New physical tubing	9.1 SCFM	+19.7% total

CONCLUSION AND STRATEGIC RECOMMENDATION

The Takeaway: Regular, structured maintenance is important in order to make sure that your mechanical room equipment does not degrade over time. This study proves that atomized, neutral-pH chemical line cleaning is necessary to protect expensive mechanical infrastructure. Long-Term Action: The clinical team recommends standardizing the daily use of Air Techniques CleanStream Evacuation Suction Line Cleaner in all operatories.



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