Rethinking Airport Grease Management

AcornVac
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Portland International Airport (PDX), owned and operated by the Port of Portland (Port), had a systemic grease problem across its food concessions. Dozens of dispersed tenants relied on aging gravity lines and tenant-maintained interceptors that routinely clogged and overflowed, jeopardizing both operations and code compliance across the concourses.

To solve the problem without tearing up FAA-compliant tarmac or shoehorning interceptors into already congested utility corridors, the Port partnered with PAE Consulting Engineers (PAE) to evaluate alternatives. Together, they ultimately implemented a vacuum-based grease waste system that could pull FOG long distances—horizontally and vertically—from widely scattered concessions back to centralized separation equipment.

By having PAE and AcornVac, Inc. co-engineer larger-capacity accumulators, stainless-steel vacuum mains with sawtooth slopes, and redundancy into a phased rollout, the team delivered a system that has run for more than a decade with clean pipes, minimal overflows, and lower lifecycle costs. That same adaptable backbone is now being extended across newly renovated terminals as the airport continues to reuse and expand the vacuum plumbing system.

Project background

PDX's journey with vacuum plumbing began more than 13 years ago with Terminal Grease Separation phase 1 (TGS 1). This was an initial installation serving a pre-security concession area, undertaken by the Port as the airport's owner and operator.

To comply with newly updated grease waste regulations, every food service tenant needed to improve their capture and management of fats, oils, and grease. However, the Port's existing approach, which used hydromechanical interceptors located inside individual tenant spaces, had resulted in inconsistent maintenance, frequent clogging, and grease bypass into the main drainage lines.

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Recurring blockages in the gravity system disrupted concession operations, increased the risk of code violations and environmental incidents, and drove up emergency repair costs. All pointing to the fact that tenant-managed point solutions were no longer tenable in a 24/7 airport environment.

Building on the success of TGS 1, the Port and PAE later planned Terminal Grease Separation phase 2 (TGS 2) to extend vacuum plumbing across multiple concourses—a move that would turn vacuum transport and centralized separation into the primary strategy for grease management at PDX. Eric Walczyk, a senior associate at PAE, served as the Port's lead technical authority for both phases, guiding the transition from traditional gravity systems to vacuum plumbing and coordinating design decisions with operations and maintenance staff.

Technical Challenge

The first vacuum setup for the TGS1 project worked well, but upgrading Portland International Airport's grease waste system across the facility encountered significant technical challenges. The FAA-compliant tarmac prioritized safety and durability, making subsurface modifications difficult. Installing multiple conventional below-grade grease interceptors would have required extensive demolition and reconstruction of the tarmac at a very high cost, given the complexity and scale of the work.

Beyond the physical barriers, the airport's deplaning level was already densely packed with existing utilities, leaving limited ceiling space for new piping or equipment. Any new system would need to be carefully routed to avoid interference with these utilities, as well as to navigate around critical infrastructure such as baggage conveyors, which require precise clearances to maintain operational safety and efficiency.

Compounding these challenges was the airport's decentralized food service operations. Tenant contractors, responsible for installing and maintaining plumbing in their leased spaces, operated largely outside the Port of Portland's direct control. This arrangement raised concerns about the long-term integrity and consistency of any new system, as variations in contractor expertise and attention to detail could lead to vulnerabilities or maintenance issues in the future.

Finally, the airport's status as a significant transportation hub imposed strict operational requirements. Any solution would need to be installed and maintained with minimal disruption to daily airport activities, as 24/7 operations left little room for extended shutdowns or construction-related interruptions. Collectively, these factors made the implementation of traditional grease management systems not only prohibitively expensive but also logistically impractical, necessitating a fundamentally different approach to meet both regulatory and operational needs.

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AcornVac System Overview

PAE developed a vacuum plumbing strategy that used AcornVac's vacuum plumbing system to move grease waste long distances from scattered concessions back to centralized separation equipment without disturbing the FAA-compliant tarmac.

The team configured larger AcornVac accumulators to provide sufficient usable volume for multiple airport food tenants, allowing each concession to discharge by gravity into a nearby tank while vacuum transport occurred behind the scenes. PAE specified stainless-steel vacuum mains in place of cast iron to reduce weight and improve corrosion resistance in a FOG- and chemical-rich environment, and laid out runs that could lift and carry waste both vertically and horizontally to a central collection point.

To maintain performance while threading new mains through congested utility zones and around baggage systems, the design incorporated saw-tooth slope adjustments, dual extraction valves, overflow protection, and secured strainers to meet PDX's reliability and maintenance requirements in a 24/7 terminal.

Implementation Process

The AcornVac system was deployed through a collaborative, phased process that began with early engagement between PAE, the Port of Portland, and AcornVac's regional team. "We were fortunate to have Tom Puhl of Braley Grey involved from the start," said Laura Marshall, AcornVac president. "His insight helped connect PAE's engineers with the right tools and concepts to meet the Port's demanding specifications."

Key personnel from the Port were also invited to tour the AcornVac manufacturing facility in Chino. "Once they saw the quality and the engineering up close, they were much more comfortable moving forward," said Walczyk.

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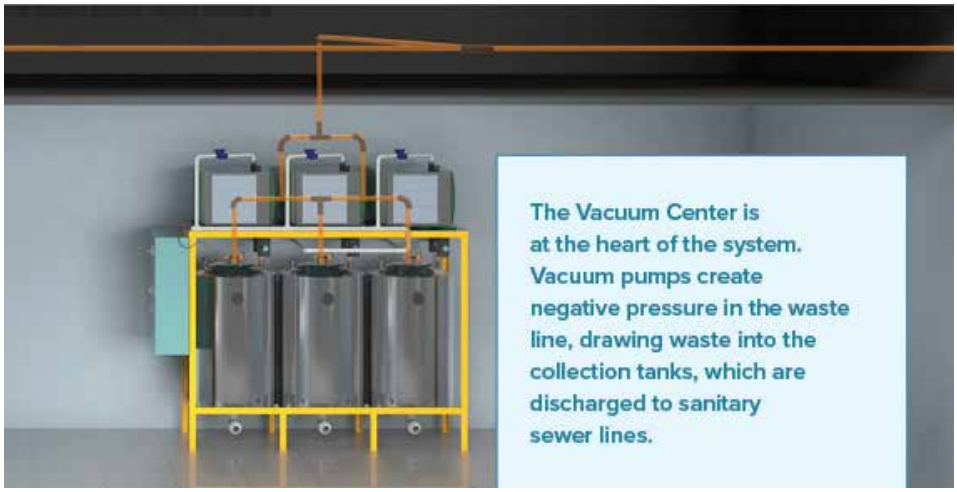
As the program expanded into TGS 2, PAE and AcornVac focused on contractor education, providing targeted training on stainless-steel assembly, slope transitions, and other vacuum-specific details so field crews could execute the design reliably. To maintain quality and ensure adherence to specifications, multiple inspection points were established throughout the installation, including checks at 35% and 80% completion, as well as a final inspection before commissioning.

“The port was very risk-averse, so we had to take a ‘belt and suspenders’ approach. We built in redundancy everywhere—dual extraction valves, overflow protection—so that even if something failed, airport operations wouldn’t miss a beat,” explained Walczyk.

Through this structured and collaborative process, the AcornVac system was seamlessly integrated into the airport’s infrastructure, setting a new standard for grease waste management in complex public facilities.



Operational Benefits

The AcornVac system delivered a range of operational benefits for Portland International Airport. Custom modifications were implemented to ensure both reliability and ease of maintenance.

Based on the initial installation thirteen years ago, airport staff knew the system's reliability was exceptional. "After thirteen years with the vacuum system, we've had very few overflows, and inspections show the pipes are still clean. That's a huge win for maintenance," said Walczyk, which confirms that the vacuum transport and centralized separation approach effectively prevents the accumulation of fats, oils, and grease.

A vacuum-based solution allowed maintenance personnel to service debris separators and other system components without disrupting concourse operations...

The system's adaptability has also proven valuable. As food service tenants and layouts have evolved, the AcornVac infrastructure has adapted to these changes with minimal disruption, simplifying the cleaning and maintenance process for airport staff.

The adoption of a vacuum-based solution allowed maintenance personnel to service debris separators and other system components without disrupting concourse operations above—a key capability in an airport setting, where minimizing downtime and avoiding interference with passenger flow are critical.

Financial Analysis

The financial impact of the vacuum system at Portland International Airport was substantial. By avoiding extensive tarmac demolition and reconstruction for multiple below-grade interceptors, the Port eliminated one of the largest potential project costs.

The AcornVac system also reduced the number of grease interceptors required and used lighter stainless steel piping in place of cast iron, lowering labor requirements and installation time.

In operation, the system's modularity and component reusability have added further value. "One of the biggest advantages was being able to reuse tanks and control panels from the first phase, TGS 1, in our current Terminal Expansion project, TCore. Even after more than a decade, those components were still going strong. That's real long-term value."

This combination of avoided civil work, leaner mechanical scope, and long-lived components helped the Port reduce both capital and ongoing maintenance costs while limiting revenue risk from unplanned outages.

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Environmental Impact

The AcornVac vacuum plumbing system also delivered clear environmental benefits for PDX. By improving grease capture and transport, the system prevents blockages and overflows that could send fats, oils, and grease into the municipal wastewater system or nearby waterways. Centralized separation, combined with the vacuum system's self-cleaning action and fewer emergency interventions, has made grease handling more predictable and controlled, supporting the Port of Portland's broader sustainability and resource-management goals.

Lessons Learned

The Portland International Airport's TGS 1/2, and TCore projects, all utilizing AcornVac, yielded several essential lessons that can guide similar infrastructure upgrades in complex environments:

Early stakeholder engagement is crucial: Demonstrations and facility tours played a vital role in fostering trust and understanding among Port officials, contractors, and maintenance staff.

Clear division of responsibilities enhances accountability: Assigning gravity piping installation to tenant contractors and vacuum system maintenance to Port staff clarified roles and reduced confusion, leading to better system integrity and more consistent upkeep.

Comprehensive training and quality control prevent issues: Providing thorough training for all installation teams and establishing multiple inspection points throughout the process helped maintain high standards and catch potential problems before they could impact operations.

System modularity and component reusability drive long-term value: Designing the system so that major components can be reused during expansions or upgrades maximizes return on investment and minimizes waste.

Redundancy and customization enhance reliability: Incorporating features such as dual extraction valves, overflow protection, and secured strainers addressed the airport's specific operational risks and ensured uninterrupted service in a 24/7 environment.

Vacuum technology offers distinct advantages: The vacuum-based solution proved not only more cost-effective but also easier to maintain and adapt as the airport's needs evolved, confirming its value over traditional gravity systems.

Procurement: The Port worked within the public procurement process to select the sole source vendor during the design phase, which provided additional quality control during design and a long-term commitment to the project and Port by Acorn. It could be a mistake to use an open, low-bid procurement for a specialty system like this, because no 2 vacuum systems are equal in terms of design, operation, and maintenance.

These lessons highlight the importance of collaboration, adaptability, and a focus on long-term operational excellence when introducing innovative infrastructure solutions in demanding public settings.

A vacuum system may not be the first tool engineers consider for grease control, but at PDX it turned out to be the only approach that could satisfy code, preserve critical infrastructure, and still give the owner long-term flexibility. By pairing AcornVac's hardware with PAE's system-level thinking, the Port turned a chronic maintenance liability into a piece of backbone infrastructure it can confidently design around for the next generation of terminal projects.

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