Boosting Efficiency and Hygiene in Liquid Glucose Barrel Unloading with Fristam FDS Twin Screw Pump

A Few Highlights of the Case Study

A major food industry customer was having trouble discharging liquid glucose (LG) from 200 Liter drums. It was a laborious, insanitary, and inefficient manual handling operation, prone to inducing production delays and quality problems. Its viscosity ranged from 90,000 cP to 120,000 cP at 52°C, so the operation was slow and manpower-intensive.

To overcome these hurdles, the customer adopted the Fristam FDS 2-1 Twin Screw Pump, specially designed for hygienic applications and optimized for viscous product handling. With modifications, including a customised low-pitch screw, the solution enabled 200 kg barrels to be unloaded within 8–10 minutes. This resulted in an 80% increase in production efficiency, significant reductions in manpower, and ensured hygienic operations, setting a new benchmark for barrel unloading applications.

Where the Problems Began?

The client was manually extracting liquid glucose from 200 Liter barrels for syrup production. It was a labor-intensive, inefficient process, and a hygiene hazard—the key in food production. Areas of primary concern were:

- **Constraints in Manual Handling:** It was time- and labour- intensive to recover LG manually.
- **Low Productivity:** Slow unloading, limited batch production, and bottlenecks.
- **Hygienic Concerns:** Labour-intensive steps introduced contamination opportunities, a problem for in-house QC as well as for the end-use customer.
- **Problems Caused by Viscosity:** Because of LG's high viscosity, non-mechanical unloadage was unreliable and inconsistent.

Our customer needed a strong, hygienic, and efficient pump system to pump viscous liquid glucose and strictly adhere to food industry standards.

Research & Insights

Fristam's technical experts carried out a stringent site investigation in preparation for estimating the client's current processes and challenges.

Important Steps in the Analysis:

1. Process Study: Close observation of manual unloading and requirements for flow.

2. On-Site Tests: Preliminary testing was carried out with an FDS 2-3 Twin Screw Pump. These showed unloading challenges at ambient temperatures due to a very high viscosity.

3. Temperature Influence Testing: Testing showed warming barrels to 52°C lowered viscosity enough for pump-assisted unlading.

4. Client Team Consultation: Collaboration with the client's R&D and production teams confirmed the critical need for a hygienic solution and low handling time.

Key Insight: A customised pumping solution was needed; one where efficiency, hygienic design, and high-viscosity capability were in balance.

Finding the Right Solution

After inspection and testing, Fristam developed the FDS 2-1 Twin Screw Pump with a specially engineered screw having a reduced pitch size. It ensured higher handling of hot and viscous LG.

Key Characteristics of the Proposed Solution:

- **Custom Screw Design:** Smaller pitch ensured smooth and consistent transfer of viscous liquid.
- **High Efficiency:** Unloaded 200 kg barrels in just 8–10 minutes at 52°C.
- **Hygienic Design:** Totally CIP/SIP-compatible, in accordance with high food industry hygiene requirements.
- **Flexibility:** The Capability of pumping, cleaning, and allowing for product transfer in one solution.
- **Time-Saving:** Radically reduced physical labour, allowing staff to focus on higher-value tasks.

Implementation Process

Implementation was carried out collaboratively and systematically:

1. On-Site Product Trials: LG was heated to 52°C, and multiple trials with the customised screw design were conducted.

2. Installation of Pumps: Two FDS 2-1 pumps were installed by the customer to meet their production requirements.

3. Testing & Validation: Pumps were validated for efficiency in unloading, adherence to hygiene, and time to unload. Both cleared the internal QC inspections successfully.

4. Training & Handover: Fristam's experts trained operators for smooth operation of the pump and for best use.

Challenges Encountered & Solutions:

Challenge 1: Excessive viscosity at room temperatures.

Solution: Pre-heated barrels to 52°C, lowered viscosity, and allowed easy pumping.

Challenge 2: Hesitation from the client to transition from manual handling.

Solution: Demonstration trials of unloading in 8–10 minutes assisted in getting confidence.

Measurable Impact & Outcomes

Installation of the Fristam FDS 2-1 Twin Screw Pump brought measurable benefits:

Parameter	Before (Manual Handling)	After (Fristam FDS Pump)
Unloading Time	>25 minutes per barrel	8–10 minutes per barrel
Production Output	Limited by manual handling	Increased by **80%**

Hygiene Standards	At risk of contamination	Fully hygienic, CIP/SIP-ready
Manpower Required	High dependency	Significantly reduced
Downtime	Frequent delays	Minimal downtime

Key Results

- 80% improvement in production efficiency with shorter unloading time.
- Substantial labour savings, lowered operator reliance.
- Hygienic operations, meeting food industry safety standards.
- First-ever LG Barrel Unloading Pump installation in India, presenting newer possibilities for food, beverages, and dairy applications.
- Less maintenance downtime, ensuring continuous production flow.

Lessons Learned

1. Tailored Solutions Drive Results: Customizing screw pitch design was critical to overcoming viscosity challenges.

2. Demonstrations Generate Trust: On-site testing was needed to persuade the client and gain acceptance.

3. Heat & Pumping Balance: It was desirable to hold at 52°C to lower viscosity without impacting product integrity.

4. Continuous Engagement: Constant communication between Fristam engineers and the QC team of the client made implementation a success.

The Next Steps

With the success of the LG barrel unloading project, the client is enthusiastic to consider the same hygienic pumping applications for different use cases in food, beverages, and dairy areas. It is a case where Fristam can work on hygienic unloading solutions for use in various industries where viscous products are dealt with.

Conclusion

The installation of the Fristam FDS 2-1 Twin Screw Pump revolutionized the liquid glucose unloading system for the customer from a slow, laborious, and unhygienic practice to a fast, efficient, and fully hygienic system. Decreasing the time for unloading to 8–10 minutes, boosting the efficiency of production by 80%, and guaranteeing compliance with hygiene, Fristam offered a solution both for current challenges and a completely new industry standard.

This case study details why Fristam's customised hygienic pump solutions assist food producers in streamlining procedures, minimizing costs, and delivering repeatable quality - all with the highest possible product integrity.