

IDEAL-PAK

Filling & Packaging Line Solutions

www.ideal-pak.com

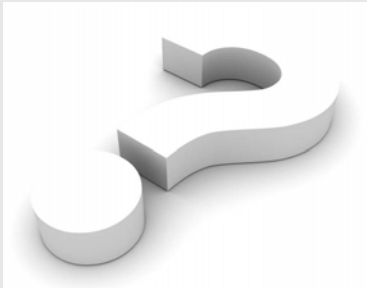


Increase Throughput and Productivity with Ideal-Pak DFS[®] Direct Fill System

The Ideal-Pak DFS[®] Direct Fill System is a proven liquid filling solution that delivers faster fill rates, greater accuracy and reduced costs for industrial applications in a broad range of liquid viscosities.

Current economic trends in the paints, coatings, lubricants, chemicals, food, and beverage industries require maximum efficiency and increased return on investment on a company's capital expense in liquid filling equipment. The technological innovation built into the Ideal-Pak DFS system delivers best in class performance for a wide range of liquid filling applications within specified viscosity ranges and attributes.

Introduction and Executive Summary



“Legacy liquid filling equipment and outdated pressurized fill carts require lengthy batch changeover times due to messy clean-ups and excessive spilling of valuable product.”

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DFS[®]
DIRECT FILL SYSTEM[®]

The Need to Maximize Efficiency in the Liquid Filling Industry

The liquid filling industry is in an economic environment where the current trend is to maximize productivity, increase ROI, and make the most of capital investments. Whether to invest in a liquid filling system that incorporates the latest in modular and expandable features, or to retrofit a legacy system to extend valuable capital equipment investments, the search for increased productivity requires an understanding of the systems with the latest in liquid filling technology.

As this white paper demonstrates, the Ideal-Pak DFS[®] Direct Fill System is a liquid filling solution that can increase throughput, improve accuracy and reduce costs in liquid filling environments that handle products with low to medium viscosities.

The Ideal-Pak DFS is not only the best option for expanding the capabilities of a new Ideal-Pak liquid filling machine, but can also be used to retrofit and upgrade a legacy liquid filling machine, including those of other manufacturers. Furthermore, the DFS system enables basic lean manufacturing and sustainable principles in liquid filling environments.

How to Recognize the Need for Improved Performance in a Liquid Filling Machine

What are the ill-effects of an outdated and poorly performing liquid filling machine or fill cart system? Old liquid filling equipment is subject to limited fill run times that cause slow fill rates. Legacy liquid filling machines or pressurized fill carts can be high maintenance and a drag on production, requiring lengthy batch changeover times due to difficult and messy clean-ups, while excessive spilling wastes valuable product and erodes profitability. Short of replacement, there has not been a viable and economical upgrade path to expand the capabilities of existing liquid filling machines until the introduction of the Ideal-Pak DFS[®] Direct Fill System[®].

Liquid filling technology has progressed in stages from manual hand filling to funnel filling to hose filling to nozzle filling to pressurized drum and now the Direct Fill System. Alternative fill cart systems place product in a pressurized vessel. The disadvantages of pressurized fill cart systems include increasing the likelihood of leaking, splatters, problem clean-ups and product loss. Volumetric fill cart systems fill by volume and can be less accurate.

The Ideal-Pak DFS® Direct Fill System Advantage

Technical Overview

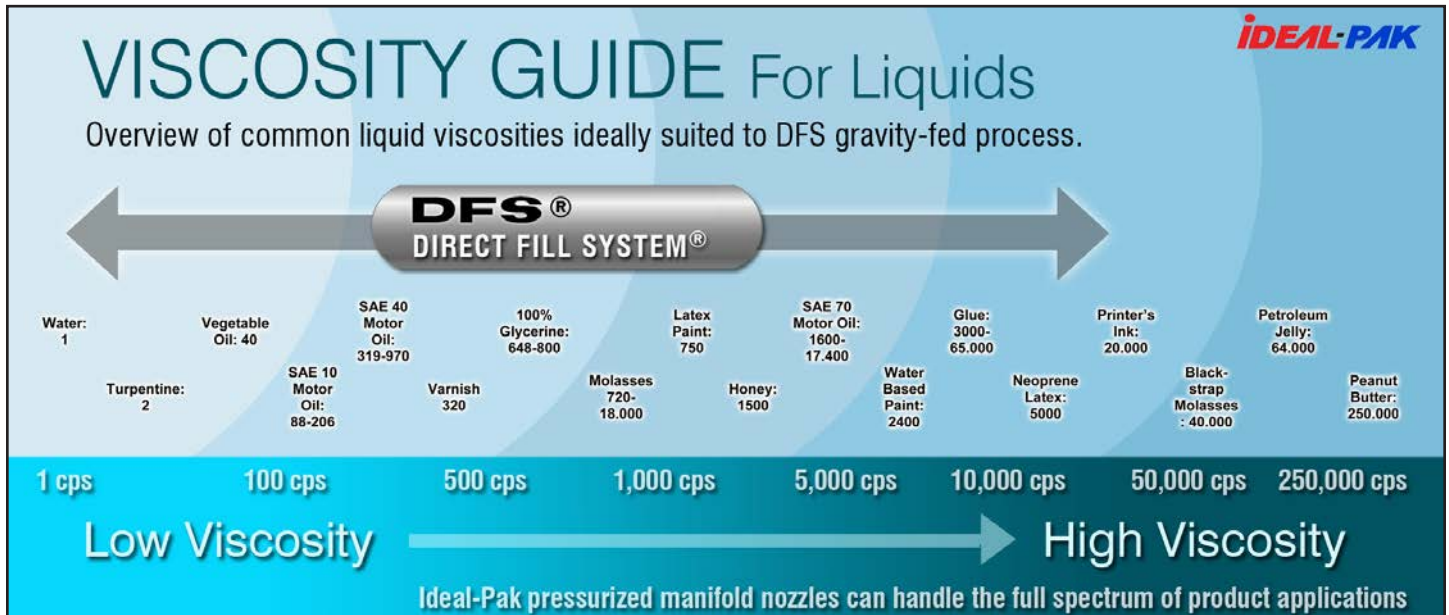
Viscosity is a measure of a liquid's ability to resist flow. Easy flowing thin liquids have low viscosity, while thick liquids have high viscosity. For Ideal-Pak Automatic Electronic Net Weight and some Semi-Automatic Electronic Net Weight Liquid Filling Machines, a product's viscosity determines the best choice of nozzle configuration.

DFS Gravity-Fed System

The Ideal-Pak Direct Fill System achieves faster fill rates and greater accuracy because it utilizes a gravity-fed process that is best for water-thin liquid viscosities to liquids that are semi-viscous. Gravity head pressure allows the DFS to go beyond conventional volumetric or pressurized systems in this viscosity range. Gravity head pressure also eliminates splattering, delivers more uniform batch yields, and reduces clean up time.

Viscosity Guide For Liquids

The chart below is a general overview of common liquid and their relative range of viscosities from thin to thick as measured in Centipoise (cps). For viscosities in the range of water-thin products to inks and solvents, for example, the Ideal-Pak DFS Direct Fill System is the gravity-fed fill cart that is simple, reliable and *pays back benefits every time it's used.*



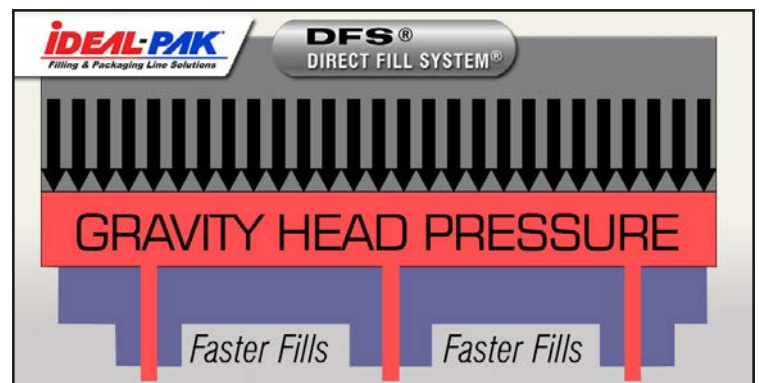
Approximate Viscosity In Centipoise (Centipoise: Water is the standard at 1 cps.)

For products with thicker viscosities such as adhesives and heavy oils, the same systems would utilize the pressurized manifold with precision Ideal-Pak nozzles.

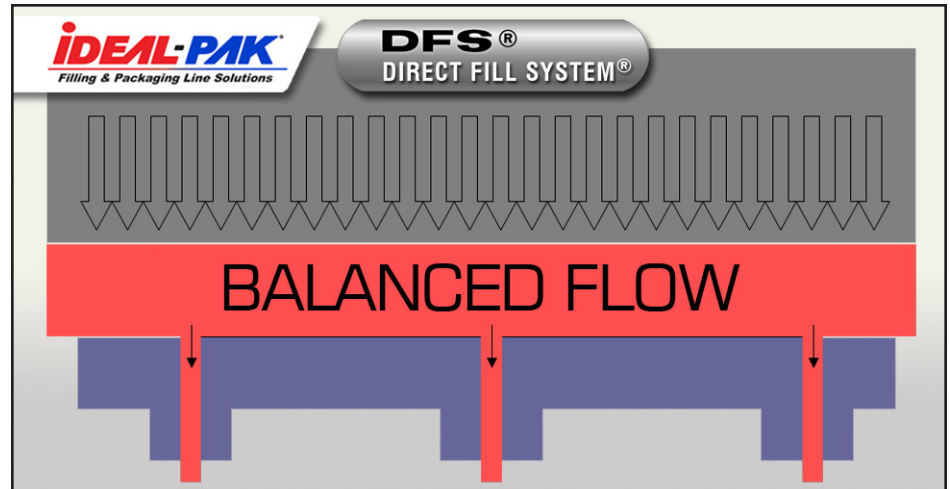
DFS® DIRECT FILL SYSTEM BENEFITS

DFS® BENEFIT 1 – FASTER FILL RATES

The DFS Gravity Head Pressure operation delivers more uniform filling for greater throughput.



DFS Balanced Flow delivers faster fill rates (up to 35%)



“Laminar flow, sometimes known as streamline flow, occurs when a fluid flows in parallel layers, with no disruption between the layers. In nonscientific terms laminar flow is “smooth”, while turbulent flow is “rough.””

DFS® BENEFIT 2 – GREATER ACCURACY

A balanced flow allows greater control of nozzle cut-off during the filling cycle.

DFS® BENEFIT 3 – BATCH YIELDS THAT ARE LARGER AND MORE CONSISTENT

Altogether, the DFS System combination of Gravity Head Pressure and Balanced flow delivers more uniform yields.

DFS® BENEFIT 4 – REDUCED CLEANUP AND CHANGEOVER TIME

- Superior Gravity Head Pressure process eliminates splattering & reduces cleanup time.
- All surfaces are easily accessible for easy clean-up.
- Fewer wetted parts allows 50% reduction in cleanup and change over time.
- No seals to leak
- Optional Spray Ball Cleaning system

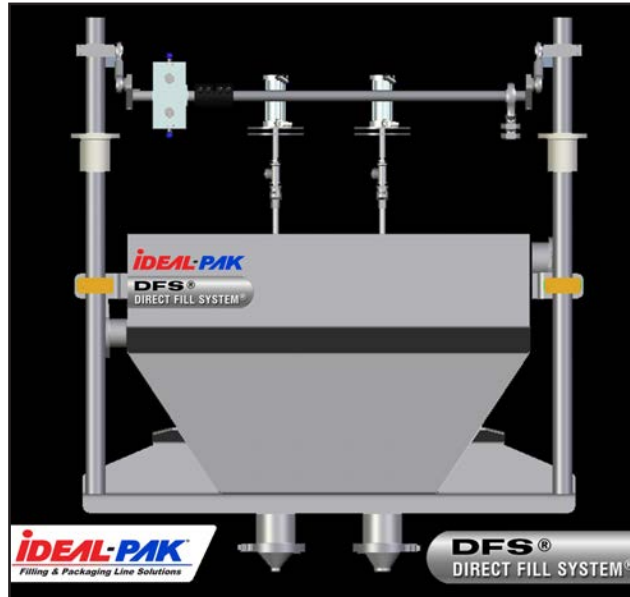


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DFS® BENEFIT 5 – SIGNIFICANT REDUCTION IN OPERATING COSTS

The Ideal-Pak DFS® Direct Fill System features a simple design that reduces maintenance requirements, including fewer serviceable parts and eliminates the need for surge tanks, hoses, valves and surge dampeners.

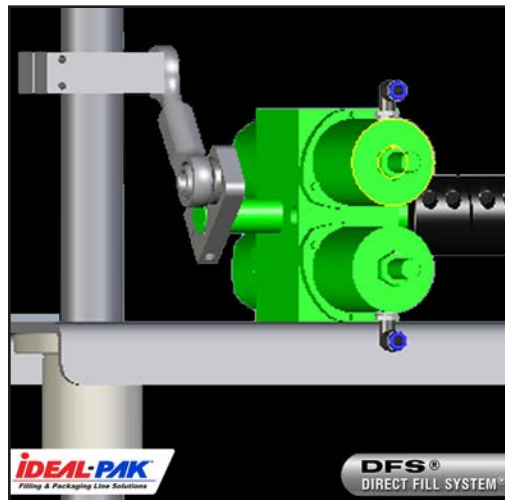


DFS® BENEFIT 6 – Minimal Product Residue Remains After Fill Cycle Eco-Friendly

- The DFS keeps product residue to a minimum
- Up to 50% Reduction in Creation of Hazardous Waste
- Up to 50% Reduction in Media required to Clean Machine

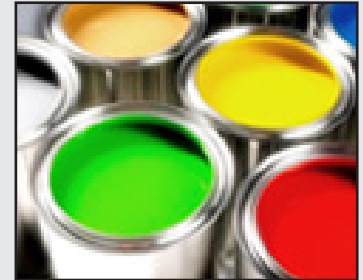
DFS® BENEFIT 7 – FLEXIBLE FOR MANY INDUSTRIAL APPLICATIONS

Convenient adjustment controls for fill rate and dribble rate make the DFS an ideal solution for a wide variety of industrial applications, including paints, coatings, chemicals, inks, lubricants.



IMPLEMENTATION

The Ideal-Pak DFS system is easy to integrate into your existing line, and can be added to any multi-head liquid filling machine. Available in 2-4-6 and 8 head configurations, the following case studies demonstrate the versatility of the DFS system and demonstrate the benefits achieved when the DFS is implemented.



*“DFS®
Direct Fill System
for Paints, Coatings,
Chemicals, Inks,
Lubricants,
and Many More
Industrial
Applications”*

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DFS®
DIRECT FILL SYSTEM®



INNOVATION

The Ideal-Pak DFS® Direct Fill System is the result of multiple advances & significant breakthroughs in the technology of liquid filling machines.

Ideal-Pak products may be covered by one or more of the following patents:

*Patent for Mobile & Flushable Container Filling Unit
#5,505,233*

Patent for Mobile Volume Flow Filling Unit #5,823,406

*Patent For Fluid Filling System With Fill Time Optimization
#6,148,877*

*Patent for Mobile Fluid Product Filling System With Fast Setup
#6,595,250*

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DFS Direct Fill System Case Studies in Ideal-Pak Liquid Filling Machines

The following case studies demonstrate how the Ideal-Pak DFS Direct Fill System has been integrated into liquid filling machines to deliver the following benefits: increased filling accuracy, reduced clean-up time, and increased automation for faster fill rates.

Ideal-Pak DFS® Direct Fill System Case Study 1

Automatic 6 Head Net Weight Filling Machine with Two 3-Nozzle DFS® Modules (Model AE6-LNM)

Customer: Leading Chemical Manufacturer
Customer's Filling Application: Chemicals

Customer Requirements:

- Fill 1 and 2.5 Gallon Containers
- Accurate to within $\pm .05$ lb.
- Fill Rate of 19-24 CPM



- Two flush troughs to clean DFS Modules behind machine while still connected to the machine control

Customer's Improvement:

- Improved filling accuracy: standard deviation went from $\pm .034$ lb. to $\pm .016$ lb. with the new Ideal-Pak machine --- a 50% improvement
- Reduced clean-up time

Ideal-Pak DFS® Direct Fill System Case Study 2

Ideal-Pak Automatic 2 Head Net Weight Filling and Closing Machine with Lid Placer and DFS® Module (Model AE2-CAM)

Customer: Leading Paint & Coatings Supplier

Customer's Filling Application: Paint (Solvent Base)



“The Ideal-Pak DFS® Direct Fill System can be implemented into an existing filling machine to maximize efficiency and enhance your filling line’s performance.”

Customer Requirements:

- Fill 1 Gallon Metal and Plastic Containers
- Accurate to within $\pm .03$ lb
- Fill Rate of 10 - 16 CPM
- Fill 400 - 500 Gallon Batches of 60 Ku - 100 Ku Product

Customer's Improvement:

- Reduction in labor time and cost:
Automated filling process enables faster operator set up and clean up when compared with the customer's former semi-automatic volumetric filling machine.
- Operator productivity is improved as the container is automatically fed under the nozzle and lid is automatically placed.
- A constant level of product is maintained in the DFS® and Electronic Net Weight filling delivers greater accuracy.

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Ideal-Pak DFS® Direct Fill System Case Study 3

Ideal-Pak Automatic 2 Head Net Weight Filling and Closing Machine with a DFS® Module (Model AE2-CFM)

Customer's Filling Application: Chemicals (Epoxies)

Customer Requirements:

- Fill 2 and 5 Gallon Containers
- Accurate to within $\pm .1$ lb.
- Fill Rate of 8-12 CPM for 2 Gal and 6-10 CPM for 5 Gal
- Spray Ball Flush Assembly (DFS®) DFS® has Powered Height Adjustment, Filter Bag Connection, and Fume Vent Tube.



About Ideal-Pak

The Ideal-Pak® Product Line of Liquid Filling Machines and Packaging Equipment is manufactured and sold exclusively by Ideal® Manufacturing & Sales Corporation located in Madison, Wisconsin.

The Ideal-Pak product line includes fully automatic and semi-automatic filling systems that operate by Electronic Net Weight, Mechanical Weight or Volumetric technology.

Ideal-Pak high-performance liquid fillers are the result of more than sixty years of innovation and dedication to the packaging industry.

For more information about the Ideal-Pak DFS Direct Fill System and Ideal-Pak Filling & Packaging Line Solutions

**Call: 608-241-1118
Toll Free: 800-383-1128**

Visit: www.ideal-pak.com

Email: sales@ideal-pak.com

Customer's Improvement:

- 400% increase in filling line through-put - from 1 skid per hour to 4.17 skids per hour.
- Labor was reduced 65% per skid - from 3 man hours per skid to 1.04 man hours per skid.

The Ideal-Pak DFS® Direct Fill System is a Best-in-Class liquid filling solution:

- **Faster Fill Rates**
- **Greater Accuracy**
- **Batch Yields That Are Larger And More Consistent**
- **Reduced Cleanup And Changeover Time**
- **Significant Reduction In Operating Costs**
- **Environmentally Friendly**
- **Flexible For Many Industrial Filling Applications**



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