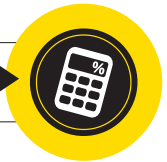




Optimizing costs means strategic purchasing

High performance and quality at low running costs are essential keys to success in internal warehouse logistics. This also applies to manual pallet storage systems with medium to high turnover levels. Companies with intelligent purchasing management therefore take the expected operating costs and the level of initial investment into consideration.

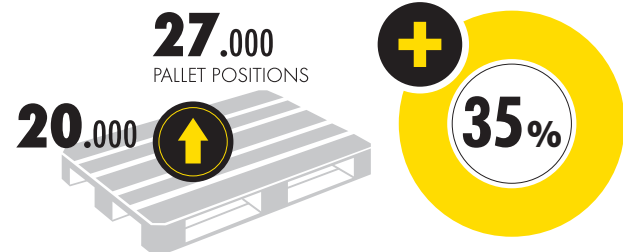
DO THE MATH!



Matthias Schmitt,
Head of the Procter & Gamble distribution center
in Crailsheim, Germany

"We can process orders much more efficiently,
with significantly reduced transit channels and much faster
with our flow storage solution."

Increase in capacity



Procter & Gamble: One step ahead with Interroll Dynamic Storage systems.
P&G modernized its international distribution center in Crailsheim, Germany in 2012 during ongoing operations. Interroll Dynamic Storage modules enabling an increase in capacity of around 35 percent with the same space (from 20,000 to 27,000 pallet spaces) are the centerpiece of the new system.



Inspired by efficiency

Established in 1959 Interroll has grown to become the world's leading supplier of key products for intralogistics. Whether boxes, pallets or soft goods are to be handled, no other supplier has such a comprehensive range of products on offer.

That is why system integrators, OEMs and operators select Interroll as their partner for their internal logistics business. Worldwide.

The Interroll global network ensures quick delivery and superior service for every local customer.

We inspire our customers and provide opportunities for them to increase efficiency.

Interroll.com

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How flow storage systems reduce the operating costs of pallet storage systems in the long term

Industry Fact Sheet
November 2013



The ways flow storage systems boost companies' competitiveness

Higher performance, lower costs

Intelligent flow storage systems for pallets (also known as Dynamic Storage) offer a multitude of advantages – in comparison to radio shuttle systems or conventional technologies – in the area of internal warehouse logistics with high **turnover levels**. A **diverse product range** can be handled faster and with lower personnel costs with dynamic storage systems. In addition, the use of gravity avoids power costs for electric motors that move pallets in the racking with radio shuttle systems. These are just some of the factors that significantly reduce **ongoing operating costs**.

Retrofit: Higher capacity without building a new system

The compact design of a modern flow storage system also reduces space requirements by up to **50 percent** compared to conventional solutions. Upgrades and increases in capacity – even in day-to-day operations – are therefore possible in most cases without any **investment in new systems**. The cost advantage of flow storage systems increases with the turnover rate and number of pallet positions required. The initial investments are amortized through savings in day-to-day operations, usually after **less than two years**. A further advantage is the long-term reliability offered by the robust mechanical design of the flow storage systems.



Reduction
Space
requirements



Reduction
Transit
channels



Coca-Cola can efficiently handle high throughput volumes for sales promotions and seasonal peak demand thanks to the maximum availability of the Interroll Dynamic Storage modules.





How modern flow storage systems work



Interroll Dynamic Storage solutions ("Pallet/Carton Flow systems")

are characterized by their lane structures. The individual lanes are equipped with non-powered rollers. The movement of the loading units (e.g., pallets) from entry into the lane through to the unloading position is generated by **gravity**. The loading units "flow" through the lane over slightly declined roller conveyors. Therefore, there is no need to lift and handle the pallets using mobile shuttles powered by electric motors.

High operational reliability and service life

Conveyor rollers, characterized by a particularly high service life and operational reliability, are used in Interroll Pallet Flow systems. The special design ensures excellent shock absorption. High-performance labyrinth seals protect the ball bearings from damp and dust. The Pallet Flow systems are tested at the Interroll test center in La Roche sur Yon, France. They need to demonstrate **over 50,000 cycles** that they can withstand chilled and deep freeze environments (0-5 degrees to -28 degrees Celsius respectively) and still provide smooth and even pallet movement. **FIFO** (First-In, First-Out) and **LIFO systems** (Last-In, First-Out) can be set up with Interroll Pallet Flow systems. These principles can be used for both pallet and carton handling (Carton Flow).

Suitable for all kinds of warehouses

FIFO systems are, above all, the first choice in the food and beverage industry as well as with toiletries. Pallets are always loaded and unloaded at opposite ends of the flow lane. Interroll FIFO lanes are equipped with a safety separator to smoothly remove the pallet with a forklift before releasing the next pallet into the unloading position. The separator is suitable for all common pallet weights and sizes (60 to 1,200 kg and 600 to 1,200 mm deep). Special **rollers with a brake function** limit the speed of pallets to a maximum of 0.3 meters per second regardless of their weight.

Pascal Collaud,
Logistics Manager of Pearlwater Mineralquellen AG
in Termen/Switzerland

"Our flow storage system is readily available – a prerequisite for success in the highly competitive beverage market. We must also be able to quickly handle very high throughput volumes for sales promotions and seasonal increases in sales."



An efficient and sustainable material flow:
COOP, the largest retail group in Switzerland, can transport up to 140 million liters of excellent fresh mineral water each year in Pearlwater's state-of-the-art mineral water plant in Termen, Switzerland. Extremely limited space and ambitious CO2 reduction targets were key requirements that could best be met with Interroll Dynamic Storage modules.

System comparison: Radio shuttle vs. Dynamic Storage system

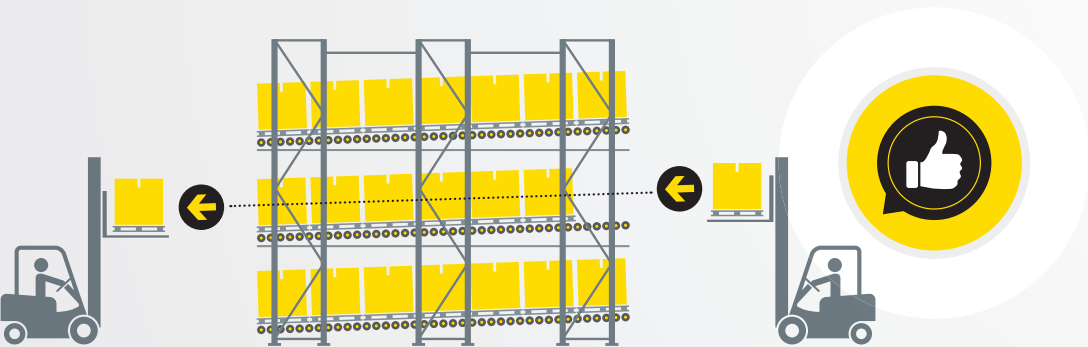
A comparison of areas of application	Radio Shuttle	Dynamic Storage system	Strengths and weaknesses of the various systems for manual pallet storage with medium to high turnover levels	Radio Shuttle	Dynamic Storage system
Storage and handling	✓	✓	Planning costs	☁	☀
Integrated picking		✓	Necessary safety certifications	☁	☀☀
Dispatch		✓	Process reliability	☀	☀☀
First-In, First-Out	✓	✓	Demand for operating personnel	☁	☀
Last-In, Last-Out	✓	✓	Risk management	☁	☀
Variable pallet sizes		✓	External energy requirements	☁☀	☀☀
			Flexibility	☀	☀☀
			Complexity	☁☀	☀

Source: INTRALENCO, 2013

Dynamic Storage system

Operating principle

Gravity saves energy costs: the pallets "flow" unaided through the lanes over slightly declined roller conveyors. A robust mechanical design ensures an extremely long service life.



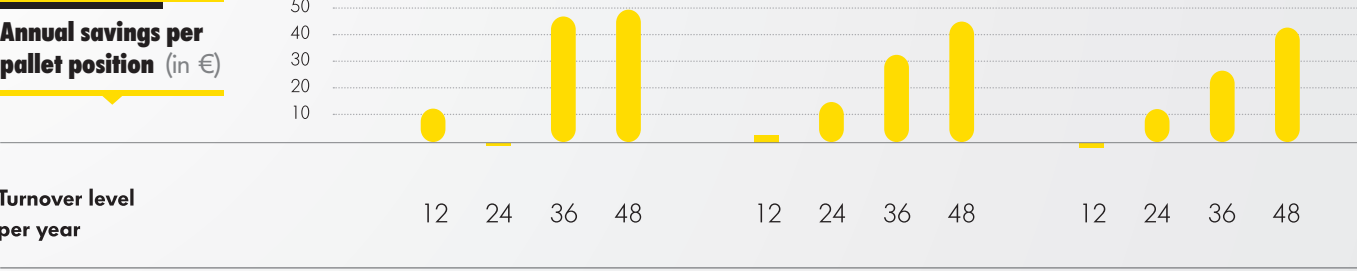
Radio shuttle storage system

Operating principle

Mobile shuttles powered by electric motors continuously lift and move the loading units to the desired position in the lane. An **electronic solution** takes care of the transport and controls (radio).



Cost comparison: Radio shuttle vs. Dynamic Storage system



Pallet positions

1.000

3.000

5.000

The calculations are based on a comprehensive estimate made by the consultancy firm INTRALENCO. The company, headquartered in Wühl, Germany, has many years of experience in the market of intralogistics. It offers complete manufacturer- and system-independent consulting services to small and medium-sized companies.

Calculation including hardware, installation, land use, energy costs, deployment of personnel, amortization; average market prices in each case. Source: INTRALENCO, 2013



The total costs are paramount



Intelligent and efficient storage solutions should be used especially with pallet storage systems that need to deal with **high turnover rates** and an **increasing range of products**. It is not just the initial investment that plays a role in the economic assessment. The costs arising in day-to-day operations play a far greater role. Scientific studies carried out by the Leibniz University of Hannover, Germany with the participation of Southeast University in Nanjing, China show that flow storage systems **reduce overall operating costs**.

High turnover figures require solutions with low throughput costs

With slow-moving goods it can make economic sense to use traditional bulk storage, pallet racks or mobile racking. However, radio shuttle and flow storage systems really come into their own with **fast-moving goods** – for example, in manual warehouses in the food or beverage sector. They not only require **much less space**, which has a positive impact on the lease and/or building costs, but appropriate systems also reduce **personnel requirements**. With a growing number of pallet spaces and an increasing turnover rate, the overall comparison of costs are clearly in favor of flow storage systems.

The hidden costs are crucial

Shuttle systems often can offer initial cost advantages for the necessary systems technology. But it is worth taking a closer look at **follow-up costs** in the evaluation: The higher operating costs of the radio shuttle solutions have a negative impact with increasing warehouse size, product range and flow of goods. For example, when you include higher personnel costs and the larger number of pallet trucks required in the overall calculation, this results in significantly lower costs per pallet space and year with flow storage systems (see graphics on the left).

It pays to do your math

An increasing product range in a warehouse with shuttle systems therefore has a clear disadvantage with the same warehouse size and identical pallet throughput as this requirement necessitates a **complicated, time-consuming and thus costly transfer of shuttles** to other storage lanes.

Flow storage solutions are therefore a particularly cost-effective choice in the long term for various warehouse sizes and turnover rates. They also ensure greater **long-term reliability** and **more flexibility** with short-term order peaks due to their performance and robustness.

Prof. Dr.-Ing. Lothar Schulze,
Gottfried Wilhelm Leibniz University
Hannover, Germany

"Flow storage systems fully meet the requirements for capacity and performance flexibility. They can grow with the business."

