DIVIDELLA
KÖRBER SOLUTIONS

PROFITABLE PACKAGING
& MODULAR THINKING
FOR INDUSTRY 4.0

In this article, Christoph Hammer, Chief Executive Officer, Dividella, discusses the financial reasoning behind the selection of packaging equipment, taking into account real current and potential future requirements (paying particular attention to Industry 4.0 concepts), and highlighting the advantages of taking a modular approach, such as the solutions offered by Dividella and its sister companies.

Marketing and financial departments analyse and calculate, depending on market conditions and potential in a given country, basic indicators which are later introduced into their company's development strategy and further investments in production. Naturally, packaging is a key consideration when devising a production investment scheme.

Before defining a process and selecting equipment, it is important from the start to select the packaging material itself. It must be determined:

- in which form the packaged product will be most reliably protected
- what is most convenient and physically available for use by the end-user
- whether there will be a guaranteed indicator of initial opening
- if the protection from children is in accordance with GMP standards

- whether the package will be ecologically and easily developed
- if the information on the package itself about the product and its usage conditions will be adequate
- if it is cost-effective, which depends upon several other factors such as complexity, quality and quantity.

However, everyone knows that acquiring new equipment is connected with a serious investment and it must always be justified. An important parameter in deciding about purchasing new packaging equipment is the existing or estimated volume of production. If discussing volumes from 100,000 to one million packages per year it makes sense to talk about the advisability of using manual labour, whereas for volumes of more than one million packages per year, then it is clearly reasonable to talk about the semi-automation of the packaging line.

The principle of the semi-automatic line of work lies in the creation and sealing of packages occurring automatically, whilst product insertion is done by hand. Switching to a semi-automatic system allows small investments to guarantee the replication of quality, increased quantity, decreased staffing expenses and increased production efficiency.

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Mr Christoph Hammer
Chief Executive Officer
T: +41 81 750 3366
E: info@dividella.ch

Dividella AG
Werdenstrasse 76
9472 Grabs
Switzerland

www.dividella.ch

A most important factor regarding Dividella's packaging machines is that they are based on a modular platform. This modularity makes Dividella's platform seamlessly scalable and customisable to an individual production line's needs (Figure 1).

MODULARITY

Modular design has always been a core characteristic of Dividella's NeoTOP cartoners and top-loading machinery, enhancing service life, upgradeability and flexibility to minimise the total cost of ownership (TCO). Similarly, an integrated range of complementary packaging modules allows clients to adopt more space- and cost-effective solutions to reduce the total cost of package (TCP).

It's no coincidence that Dividella is itself part of a modular ecosystem of related skills and competences within the Medipak Systems group, each highly expert in their respective core areas and able to collaborate to provide complementary modules of innovation and specialised capability. Each of these modules is becoming increasingly relevant to questions of how the pharma industry can generate sustainable competitive advantages within the Industry 4.0 concept, which leverages the very latest information and communications thinking to generate innovation and progress.

A modular approach to Industry 4.0 allows Dividella to offer cutting-edge solutions in smart packaging, smart devices, condition monitoring and predictive analytics, plug and produce Internet of Things (IoT) functionalities and enterprise manufacturing intelligence (EMI).

The Modular Philosophy

A module is a self-contained unit or item, performing a defined task or purpose, which can be linked with other modules to form a larger system. The modular approach has three key advantages:

- Easy to configure to an exact purpose
- Easy to upgrade and expand
- Easy to analyse, allowing for quick identification of bottlenecks and areas for further investment.

However, modularity is not without challenges, i.e. interconnection, interoperability and compatibility. For modularity to work to best effect, it is vital that each module connects properly with neighbouring modules, that each module forms its own discrete "centre of excellence" without needlessly duplicating the functions of others and that each module can match the capabilities of the system.

Modularity in Top-Loading

Modular design and construction allows Dividella's NeoTOP family of TOPLoader machines to form a continuous upgrade path from manual packaging of small lots, up to 100,000 units per year, to fully automated high speed production of more than 24 million packages annually.

The NeoTOP machine family ranges from NeoTOPx, designed for semi-automated packaging of small batches of blisters, ampoules, vials, syringes, injectors and similar products, through to the NeoTOP 804 and 1604, designed for fully automated, high-speed production of very large lots. Across the range, there is consistent sharing of specialised modules that add specific capabilities, such as tailored in-feeding.

Modularity in Packaging

Dividella's TOPLoading packaging solutions for pharmaceutical products follow a similarly modular philosophy, emphasising a component-based approach to design, assembly and regulatory compliance. These features include provision of flat blanks for cartons and partitions allowing printing on all sides, 100% mono-material packaging, safe automated erecting of packs and a safer loading process, enabling 100% verification after loading.

This approach offers a variety of advantages for pharma companies and their customers, influencing the complete production and logistical process, having a positive effect on both TCO and TCP. It also allows Dividella to incorporate innovative concepts like the folding "wing" format, extended fifth panel flap, integrated partitioning, external tamper-evident wafer seals, use of 100% recyclable material and space-saving designs that minimise footprint and logistics costs.

In turn these deliver further cost-saving benefits that include:

- Cold-chain storage and distribution improvements
- In-package damage reduction
- Packing/processing efficiency
- Cost-saving mono-materials.

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Figure 1: Modularity and scaleability is built into every aspect of Dividella's packaging and cartoning products and services.

Pharma 4.0 Modularity

Dividella is working in tandem with its fellow Medipak Systems group companies to find solutions to the question of how the pharma industry can generate sustainable competitive advantages with the aid of Industry 4.0 concepts. These solutions include:

Smart Packaging: Smart packaging takes product personalisation and security to a new level, envisaging packs that communicate with the patient and with the machines in the production process. Using digitally encoded data within the package can revolutionise information and service options for providers and end-users, such as:

- digital/audio patient information leaflets
- digital tamper-proof protection
- digital health management
- intake reminders
- automatic repeat orders
- individualised product tailoring during production.

Smart Devices: Smart control devices provide the right information at the right time and place, enabling operators or production managers to more easily operate and monitor a machine or system. By means of the mobile, "extended" human machine interface (HMI), the operator gains significant freedom of movement and can thus perform tasks more efficiently, resulting in higher quality and hugely simplified changeover, setup or maintenance.

Condition Monitoring & Predictive Analytics: Condition monitoring and predictive analytics can reduce downtime and optimise deployment of personnel and resources by collecting data in real-time whilst interpreting it more meaningfully to detect critical incidents before they occur and schedule preventative maintenance.

Plug & Produce: Plug & produce lays the basis for IoT functionalities by using standardised interfaces to allow vertical integration between MES, automation and control systems. Like connecting an electronic device via a USB interface, it should be possible in the future to link a line, system or machine to the network simply and straightforwardly.

Enterprise Manufacturing Intelligence: EMI can improve product quality (process stability) and productivity (process efficiency) by translating production data into usable information for decision making. By analysing these data the customer can, in turn, improve process stability and efficiency, which naturally feeds back into increased product quality and productivity. Production can be supervised in virtually real-time and can be continuously verified.

FLEXIBLE, SCALABLE PACKAGING SOLUTIONS

The modular and readily scalable nature of Dividella's packing equipment means that our customers can begin at an extremely simple level, possibly even starting without a machine and just receiving an identical carton pre-erected by Rondo, our sister company. The next level is a module that erects the carton automatically, and product loading is done manually. Companies can then scale this up to a fully automated machine, depending on various factors such as production volumes and product lifecycle. Dividella also has a manual product inserting module, because with very small lots it's sometimes not worthwhile to fully automate the process. The main steps in the pharmaceutical product packaging process are summarised in Figure 2.

If the pharmaceutical production plans are sufficiently ambitious and the expected production volume is in the range of three to five million packages per year, then it is impossible to avoid automated packaging lines. Such production volumes are difficult to ensure merely with staff packagers, and the human factor will bring the replication of quality into doubt. The employment expense will also be considerable.

Let's examine, as an example, the pharmaceutical market in India. Even under the conditions of quite low salaries (on average, a worker in a pharmaceutical manufacturing company earns €1200 (£1050) per year), production modernisation and the replacement of manual labour by machine labour results in positive economic performance, and investments in quality European equipment pay for themselves in five to seven years (based purely on the replacement of manual labour and decreased TCP). If we shift focus to Europe the economic benefits are even greater, due to factors such as the higher cost of staff, with packaging lines breaking even within one to five years.

With volumes from five to 24 million pharmaceutical packages per year, production may only be done by fully automatic, high-speed packaging lines. The return on investment for such equipment will, in the long run, lead to covering the production volume, decreasing the cost of the packaging materials and, of course, decreasing the expenditures on staff, which, depending on the country, allows for savings from hundreds of thousands to millions of Euros per year.

CONCLUSION

It can be seen that when assessing options for packaging pharmaceutical products there are several questions which must be thoroughly considered. Dividella's modular, scalable solutions to these questions provide companies with flexible, cost-effective answers to the important questions. Dividella can help product and delivery device manufacturers make decisions on this subject in a competent, well-informed and reasonable manner.

Figure 2: Main steps in the pharmaceutical packaging process.

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FLEXIBLE PACKAGING FOR SCALABLE PRODUCTION

Best combination of maximum format flexibility for small to mid size lots

- Manual or Flexible Feeding
- Latest technology for small to large batches
- New functions allow innovative pack styles
- 100% momomaterial packaging for sustainabilty
- Very fast format line clearance and change over
- Large format range
- Highest OEE possible

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