Application definition
Filler machines are most commonly used in the pharmaceutical, cosmetics and the food and beverage industries to dispense and package liquid or paste-like products. A conveyor belt first positions the container to be filled using servo drives. During this process, the filling machine bridge moves synchronously with the conveyor belt. Filling occurs using a "time/pressure method", which keeps the material at a constant pressure while the filling valve is opened for a specific length of time. This process enables delivery of a precise amount of product, which is pumped into filling tubes with piston pumps. Filling machines must achieve the highest standards of precision and throughput.

Explanation of the process
Let’s use bottle filling as an example. Generally speaking, bottles are guided one-by-one through a distribution screw onto a conveyor belt and via a lead-in star to the filler. After the filling cycle, they reach the capping machine via the lead-in star, and are finally moved to the transport line via the lead-out star.

It is essential that the bottles are filled as quickly as possible and then capped immediately. In order to be able to react more flexibly and quickly to the market requirements, such as varying bottle types, different seasonal demand or other current trends, the industry counts on single drives for each module and on coupling via relevant software modules. Different systems and different technologies for filling may be used.

 Principally, these may be divided into three categories: filling by level sensing, the use of volumetric flow meters, and by weight. Of these three systems, the level sensing system is predominantly used in the food and beverage industry. The fill level is determined by the length of the tube that enters the bottle, during the filling stage.
Application challenge | Siemens answer
---|---
Trouble-free volume filling of the product via flow meter with precision is of utmost importance. | Flow meter sends analog value to the SIMATIC S7 PLC, which processes the value and controls the opening of the dose, providing higher processing speeds and fail-safe results.
Filling temperature and pressure during filling play an important role to the product quality and performance. | Built-in PID controller SINAMICS G and S family, along with SIMOTION D ensure that bottle positioning is precise.
Conveyor system should be able to position bottle precisely. | PC627 WinAC, SIMATIC ET 200S (F-CPU), along with SINAMICS S120 drives, SIMOTION D motion controller and SIMOTICS 1FK7/1LA7 motors provide the solution which is PROFIBUS/Ethernet/PROFINET-based, making it completely flexible and customer-oriented.
Modular design for filler machine needs to be compatible with the rest of the machine and overall data communication has to be seamless. | OPL software toolbox from Siemens can create Weihenstephaner Standard (WS) compatible data for SIMOTION and SIMATIC controllers, hence reducing the integration cost with in a beverage production line.
Open automation structures based upon international standards, as well as consistent and uniform modules are also very important. | Using the OPL software toolbox, PLC Open and OMAC standards, the machine maintains its uniformity and consistency with other international standards.

Siemens vs. competition
- Siemens offers the most comprehensive variety of motors for the industry.
- The SINAMICS G and S families offer an excellent range of drives to suit every kind of application in the packaging industry.
- SINAMICS S120M presents a drive and motor solution in a single, modular package. With its IP67 rating, it is best-in-class.
- SINAMICS drives can communicate with a wide range of PLCs made by other automation manufacturers via EtherNet/IP and PROFINET.
- SIMOTION D offers the most sophisticated solution wherever there is a need for high-level, coordinated motion control.
- Easy Project of the OPL software toolbox can read in data generated in accordance with Weihenstephaner Standard (WS) and implement it in SIMATIC S7 PLC and SIMOTION motion control projects.