

Manifold plate – the pinnacle

Whenever sheet metal has to be punched, bent or cut in a continuous production, tools are often moving at 1,200 strokes per minute and more. Nitrogen cylinders excel when demands are high and the space is small: compact, with definable force curves, long lifetimes and great efficiency. But when things get even smaller and faster, and there is a need for even greater durability, then the time for manifold plates has come.

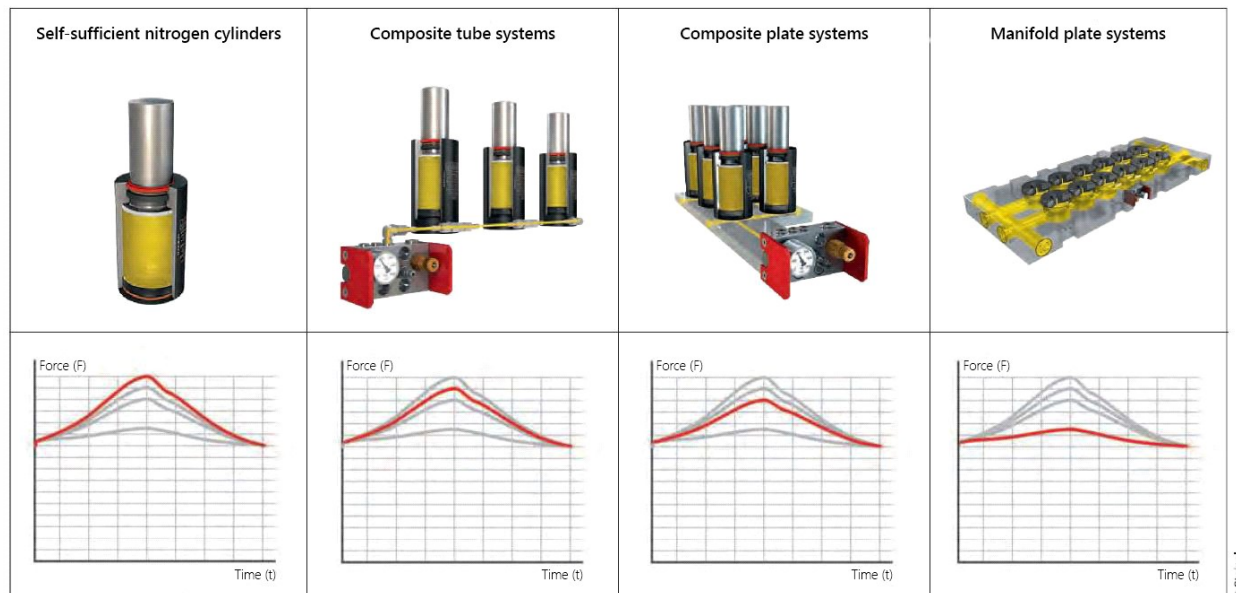
When they have to be punched, cut or formed, thin materials and small strips require correspondingly small tools. When it comes to spring elements, every millimetre counts. In addition, a consistent production quality requires uniform blank holder forces. Nitrogen cylinders meet these requirements. Instead of metal or plastic, it is compressed nitrogen that provides the required force. In case of comparable strokes, they require less installation space than mechanical spring elements and supply more consistent force progressions. Innovative sealing materials, a lifetime lubrication and a two-point-mounted piston ensure a long lifetime. That makes millions of strokes possible. Depending on the application, the nitrogen-filled cylinders are used individually or as a composite system. For most installation situations and applications, Steinel supplies springs from stock. When deviating specifications are needed, the standard parts specialist will produce them according to customer specifications at its location in Schwenningen.

Through tubes, multiple nitrogen cylinders can be combined to form a composite plate. A control panel notifies users of the system pressure. The always-balanced force ratio in the composite system prevents one-sided loads in the tool, and the nitrogen volume, which can be increased easily, leads to a pressure increase that is a little more flat. This leads to longer lifetimes and greater process reliability. In addition, the system pressure can be adapted during the production process, and an external nitrogen buffer can be connected to reduce the force increase.

Composite plate systems offer the same advantages – but they are even more robust and compact. They connect nitrogen cylinders and the control panel via boreholes in the composite plate. This increases the nitrogen volume and results in an even more gradual force increase. In order to make the right forces available at the right place, composite plate systems can have multiple pressure cycles.

Steinel manifold plates consist of a metal plate with volume boreholes as integrated nitrogen buffers, space-saving manifold cylinders and control panels. The control, filling and pressure regulation either take place directly at the plate in the tool or, if it is not accessible, via a control panel that is offset and connected through a tube line. The manifold plate systems, which always feature a tool-specific design, are well-suited for especially stringent requirements and complex production tasks. It is also possible to integrate multiple pressure cycles into manifold plates.

Steinel manifold plates can accommodate filling pressures of more than 150 bar, and they excel with a force increase factor that is 40 percent lower than that of self-sufficient nitrogen cylinders, as well as an even lifting force of all pressure cylinders of a pressure cycle. The very small pressure and force increase across the entire stroke range, as well as the constant maximum force, ensure an even production quality.



Typical force curves of the different nitrogen systems

Manifold plates - the solution for the most stringent requirements

The volume boreholes, which are designed for a maximum gas volume, make it possible. The high nitrogen volume ensures a flexible production process that is easy on the tool, as well as lower operating temperatures compared to other nitrogen systems. A pressure controller integrated into the panel can stop the press immediately in case of irregularities in order to avoid rejects or an increased tool wear. The result is an extremely long lifetime, which frequently allows Steinel manifold plates to achieve 10 million strokes. Because they feature so few sealing points, manifold plates can be assembled and maintained easily and their downtimes can be minimised.

Due to a high packing density, high-speed manifold plates generate maximum forces in minimal spaces. They play to their strengths whenever demanding materials have to be processed to become highly precise, series-produced punched parts. In hot forming, Steinel manifold plates can ensure the height adjustment of multiple tools operating in the plant.

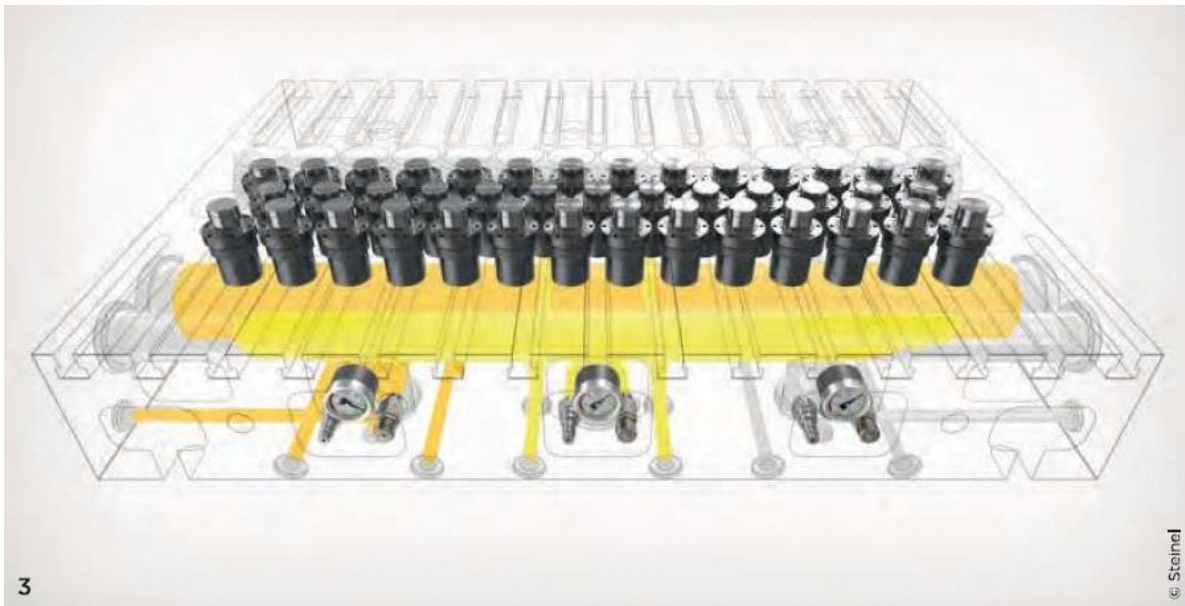
Manifold plates pose the ultimate challenge when it comes to their development and production – and only a few manufacturers can meet that challenge. The demands on materials and parts are tremendous, and the safety aspects require special processes and a high degree of specialised know-how. Steinel engineers custom-develop each manifold plate and adapt it to the respective tool. They also optimise it for the required force requirements while taking into account the development of heat in the production process. If the nitrogen volume exceeds one litre, the design has to comply with the stringent pressure equipment directive (PED).



1 Manifold plate as the tool upper part in a progressive stamping tool with a modular design.



2 Manifold plate with three pressure circuits that can be set independently of each other. One, two or three pressure circuits can be filled and the respective filling pressure can be adapted to the strip stock that has to be machined.



3
Interior of a manifold plate with three independent pressure circuits.



4
The different versions of manifold cylinders are screwed into the die plate in a manner that saves space.