HOW SERVO TECHNOLOGY BENEFITS MODERN AUTOMOTIVE INDUSTRY

Shieh Yih Machinery Industry Company, Ltd (SEYI) explains the advantages of servo technology and the benefits it offers to the automotive sector.

The global automotive industry is under a paradigm shift from fuel vehicles to alternative and pure electric options. EV-volumes.com sales data revealed that the global total electric vehicles (EV) sales for 2022 was 10.5 million units across battery electric vehicles (BEV) and plug-in hybrid vehicles (PHEV) — more than 55 percent of growth rate compared with 2021. The global EV share in light vehicle sales is 13 percent for 2022 and this number will continue to grow significantly for the next few years.

Electrification and lightweight design for automobiles to achieve carbon emission reduction target as well as safety guarantee have become a main focus for auto original equipment manufacturer (OEMs). The use of high-tensile steel and new composite materials such as ultra-high strength steel, carbon fibre, aluminum and other metal alloys for door beams, roof rails, body pillars and bumpers can be seen more often in the industry. However, metal stampers grapple with materials' form complexity.

SEYI's 4-point 1600ton servo press installed at a Tier 1 auto part supplier's USA site.

SEYI servo motors for small, medium and large tonnage presses.

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Marrying Mechanical And Hydraulic

Mechanical presses may be good at production efficiency, but when stamping these tough materials, springback effect or cracks occur occasionally. Hydraulic presses are able to produce good quality parts but efficiency is a concern. Servo presses have a powerful combination of high productivity of a mechanical press and the formability of hydraulic presses. This important feature significantly shows how servo presses can benefit today's automotive industry. Although servo technology and its advantages are gradually being recognised by metal formers today due to its versatility and controllability, choosing a suitable servo press may take some time. These lightweight materials are difficult to form and the programmable slide profile can be adjusted to deal with different forming conditions.

Servo Motor Is Key

The heart of a servo press is the servo motor. Different from commercial servo motors, SEYI's inhouse motors are specifically designed for stamping press applications. It offers the precise control of slide movement as well as forming speed. Commercially available high-speed motors require speed reducers. This leads to complicated designs and high energy losses. In contrast, SEYI adopts a direct-drive design for its servo presses without flywheels and a deceleration mechanic. Thus, better accuracy and energy efficiency can be achieved. Additionally, the motor with low speed, high-torque characteristics is helpful for better formability. With an optimised motion control, servo presses can eliminate spring-backs or cracks which results in a much lower tool wear rate. The slide can move down and up quickly but slow down when touching the material, to ensure the overall production rate as well as product quality.

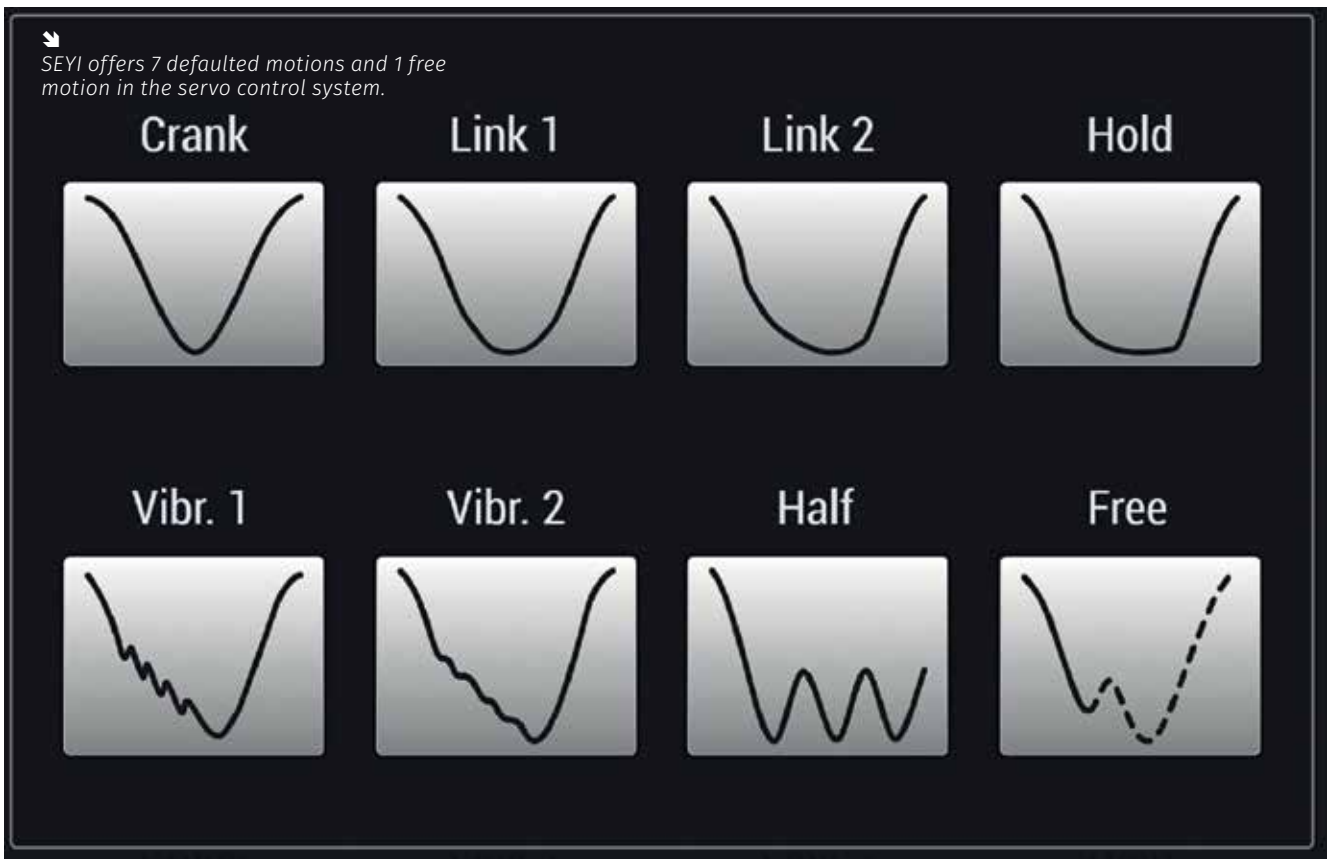
Another critical advantage of servo presses is the powerful energy-saving mechanism. Climate change is affecting the entire world, with extreme weather conditions becoming more frequent. Paris Agreement, signed by 195 countries, set the target that "Carbon Neutrality" by mid-21st century is essential in order to limit global warming. Since 2020, the commitment to carbon neutrality is recognised by various industries. Particularly, in the automotive industry, carbon neutrality has almost become one of the most important directions. How to effectively reduce carbon footprint to the lowest possible level during the entire production process has been a hot topic. For metal stampers, stamping machines are the main source of electrical power consumption when talking about the carbon footprint.

Based on energy-savings and environmentally friendly design concepts, SEYI adopts the direct-drive transmission design without flywheel for servo presses and this can reduce energy consumption considerably. In

terms of power management system, by using the power unit, power leveling can prevent the peak instantaneous current occurs. Energy can be regenerated by servo motor while the slide movement is decelerating and returned to the high-capacity capacitor banks for energy storage and then electrical power can be recycled for use. Compared to a traditional press, SEYI's servo press can save two-thirds of power, resulting in energy cost-savings as well as carbon footprint for customers. The following is an interesting example to demonstrate the effect: imagine all the 20,000 presses in Taiwan (200 tonnes on average) converted to servo presses, the carbon emission saved will be equivalent to 47 New York Central Parks!

As mentioned earlier, SEYI's servo press motion is freely programmable. The slide of the press can run at any position, different speeds, and the parameters of different slide motions can be easily programmed via the user-friendly HMI interface. SEYI offers 7 defaulted motions and 1 free motion in the servo control system. The most frequently used is "Half Motion." By shortening the stamping stroke, since unnecessary press movement can be eliminated, the throughput can be doubled, increasingly enhancing the production efficiency. "Link Motion" can help reduce reverse tonnage and extend tool life due to better formability. "Vibration Motion" is ideal for deep drawing with less stamping stages but still achieve higher quality and accuracy. This versatility offers customers the utility of several different presses all in one.

Lastly, the electrical control of SEYI servo presses is compatible with different types of communication protocols for a press line integration. Common software functions, such as tonnage and process monitoring, are already pre-installed in SEYI's servo control system. Meanwhile, under the current Industry 4.0 trend, SEYI has also developed its Smart Stamping Solution with the foundation of smart machinery, to help customers further actualise smart production and smart management based on their needs. Machine status and production status with sensor implementation can be monitored and tracked in real time basis. By information visualisation, the system can assist customers modify their production planning or parameters anytime when the system pings alerts, enhancing the efficiency of the whole production site. For more information, please visit www.seyi.com.



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