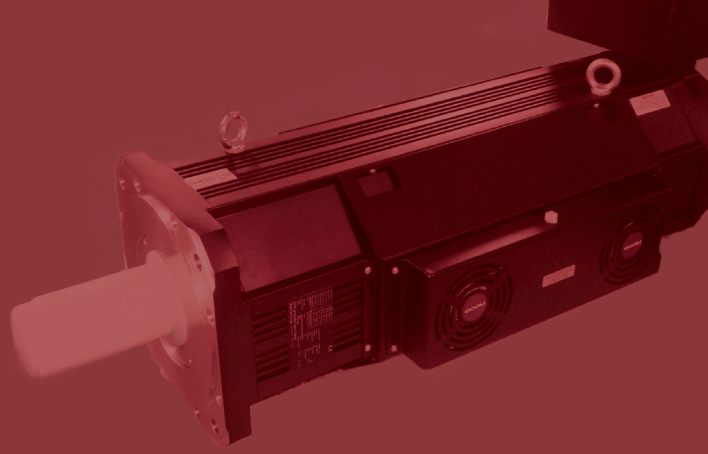


THE MOOG HIGH TORQUE SOLUTION INCREASES PRODUCTIVITY FOR CHIN FONG MACHINE INDUSTRIAL CO., LTD.



Power Press Applications

Press machinery alters the shape of work pieces, most often made from ferrous metal, by the application of pressure, and it is used widely in the metal forming industry for the production of automotive and home appliance parts. Depending on the way in which the work piece requires forming, shaping or cutting, press machines carry out a range of different functions such as the deep drawing, shearing, hot and cold forging and forming of precision parts. Traditional press applications are either hydraulically operated via a hydraulic actuator, or mechanically by way of an induction motor and a flywheel.

The advent of new materials such as ultra-high tensile strength stainless steel (UHTSS) with a tensile strength that exceeds 1450 MPa, has made the precision press slider profile and force control progressively more important, while the pressing industry itself demands ever-greater energy efficiency and productivity. These are among the reasons press machine manufacturers like Chin Fong Machine Industrial have moved away from traditional press machinery to servo presses driven by servo motors. In short, servo presses offer advanced motion control and energy management capability, and are able to control both the position and speed of the pressing machine's cam shaft.

Chin Fong Industrial

Chin Fong are one of Taiwan's leading manufacturers of metal press machinery, with production facilities in China and Taiwan, offices in North America and Southeast Asia and a network of sales representatives and distributors across the world. Founded in 1948, Chin Fong's major customers include Sumitomo Heavy Industries, Ford, Toyota, Honda, Mazda, Mitsubishi Motors, Yamaha, among many others. The company manufactures various types of press applications including servo, generic stamping, high-speed precision, transfer, forging and link motion presses.

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The Moog / Chin Fong Collaboration

Chin Fong's formal collaboration with Moog began in the early 2000s, at which point the company were among the first application manufacturers in Taiwan to design a servo press prototype. In 2016, in collaboration with Moog and their servo press partners Danfoss Drives, Chin Fong built a number of servo press machines of up to 600-tons, and by 2017 had decided to improve their competitiveness in this sector by achieving faster machine design times, quicker commissioning and greater operational reliability for the lower tonnage, compact machine market. Subsequently, the company again chose to collaborate closely with Moog to develop and build a best in class, compact servo press machine for its US subsidiary company Stamtech, located in Manchester, Tennessee.

The Moog / Chin Fong team began focusing their efforts on developing a smaller sized servo press machine of up to 500-tons, given that market opportunities for large servo press machines were limited. Subsequently, the company hoped that successful development of its 160-ton iLS1-160 servo press would eventually allow them to penetrate additional, larger size machinery markets.



iLS1-160 Servo Press, © Chin Fong Machine Industrial Co., Ltd.

Testing and Commissioning

Between 2018 and 2019, a team of engineers from Moog and Chin Fong developed Moog's Integrated High Torque Solution for use with the ILS1-160. The system consists of:

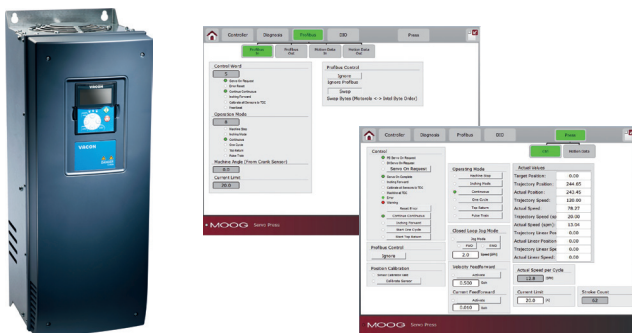
- A Moog MD Series JSF7-245 Servo Motor (30 kW)
- A Danfoss NXP Servo Drive
- Moog MSD motion controller with advanced software for press machines: Moog Servo Press Suite, MSPS
- A Danfoss input power supply system
- An energy management system based on capacitor modules
- The option to combine with Moog's hydraulic or electrohydrostatic die cushion.



Moog MD Series JSF7-245 Servo Motor (30kW)

Initially, Chin Fong provided Moog with the ILS1-160's mechanical & electrical specifications, which included:

- Press force
- Rate tonnage point (RTP)
- Press energy
- Required speed for various motion types
- Electrical data including permissible machine power and input power



Danfoss NXP Servo Drive, Moog Servo Press Suite

The Chin Fong / Moog team then made use of the Moog Servo Press Simulation Suite (MSPSS), a Matlab Simulink based simulation tool that permits deep analysis of servo press systems, to size, configure and select the optimum components for specific motion and load profiles. The Suite allowed the team to assess gear ratio, motor size, customized windings, the Servo Drive and power supply architecture, and they were thus able to optimize the overall servo press system architecture.

The resulting dynamic simulation allowed the team to carry out real time testing and monitoring of the servo presses' components, and ultimately assess which criteria would generate the greatest flexibility, system compactness and value for the customer. The results of the simulation generated data on the thermal load of the motor and components, the required grid power, grid feedback power and the energy flow of the system, along with the system's motor performance.

Improved Commissioning Times and Performance

The simulation testing proved very successful, and the reduced machine tuning time meant that the team could test different motion profiles and undertake any additional fine-tuning quickly. As a result, the entire commissioning process for the ILS1-160 took just five days and, aside from speeding up machine design time, generated a number of advantages for Chin Fong. The capability to highly configure and control the press slider profile resulted in better net shaping and finer accuracy, a reduction in the necessary parts production time due to better-controlled edge forming and an increase in mold/die life that stemmed from a reduction in impact. Ultimately, Moog's High Torque Solution helped to reduce material wastage, lowered machine operational costs and extended the lifetime of the machine. Chin Fong achieved the flexibility that they had looked for, with one of the new ILS1-160's capable of replacing several conventional press machines.

'Moog has been an excellent partner for Chin Fong as we continue to develop our technology for the global servo press market,' notes company Vice President Bruce Tsai. 'Moog has made timely and well thought out proposals for new types of machine design, and this has helped us achieve the critical balance between machine cost and performance, ultimately allowing us to remain competitive in this market. Moog's global support and after sales service is, for us, one of the great advantages of our collaboration.'

For further information visit moog.com/industrial

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Moog's High Torque Solution Increases Productivity for Chin Fong Machine Industrial Co., Ltd.

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