AIDA TECH
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Volume Six

Servo Driven Mechanical Presses

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For many years mechanical press users have realized that having the ability to adjust the operating speed and stroke length and altering the slide motion would enhance their operations by improving part quality and increasing the productivity of their presses and tooling. However, because the mechanical press drive is based on a very rigid design platform, the ability to adjust speed and stroke length and the modification of the slide motion, while possible, significantly increased the cost of the machine. Also, the addition of automation to the press was made more complex when variables were added to the press system.

Despite the difficulty of machine design and the additional cost, adjustable features became available on mechanical presses. Over time speed adjustment has become the norm on most new machines, while modified slide motions and stroke length adjustment have remained less common. Link and knuckle drive systems provide modified slide motions on a growing number of mechanical presses while stroke length adjustment has been limited primarily to high speed (200 spm and above) presses.

Servo-press Development

Nearly 10 years ago (1993), Aida began development of a mechanical press drive system that would incorporate the very desirable adjustability at a cost that would make it attractive in the market place. The result of that development effort was the introduction of the first servo driven mechanical press (SEE FIGURE # 1) approximately 6 years ago (1997).

The first and second generations of our servo technology utilized high speed, low torque servo motors that were developed for the plastic injection molding industry. Although these motors were fine for embossing or blanking, their limited torque/energy capability severely

Figure #1

restricted their use in forming applications. This obvious limitation made these servo-motors impractical for use in normal presswork. Another problem with the high RPM, low torque motors is that they are not available for higher tonnage presses without tying multiple motors together with complex drive systems to convert the high RPM drive into a controllable, vertical slide motion. These complex drive systems add a great deal of cost and are difficult to maintain (SEE FIGURE #2 & #3). And finally, these drive systems consume a great deal of power so the cost of operation is excessive. As a result, Aida offered simple servo driven presses of up to 110 tons capacity targeted at special, high precision stamping applications. This was not meant to be a “mainstream” product and therefore, was not offered to the general metal forming market.

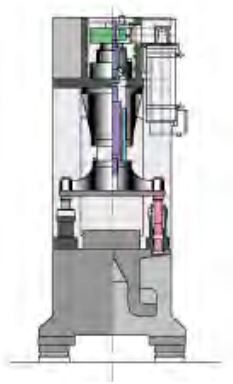

Figure #2

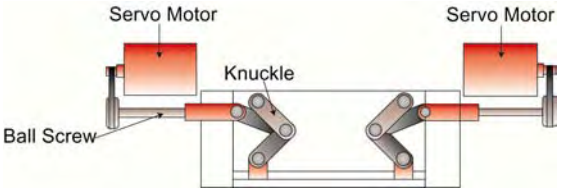

Figure #3

Four years ago (1999), because of the limitations of the high RPM drives and the fragility of ballscrews, Aida decided to take a totally different, radical path in the development of a servo driven press with enormous flexibility and durability for the general presswork market. This 4-year project has culminated in our newest product, Aida's ServoPro Technology.

Is Servo Forming™ With ServoPro ™ Technology Right for Your Operation?

To determine if a stamping operation is a candidate for this significant new technology, five questions need to be answered either "yes" or "no".

1) Would the ability to adjust the stroke length and operating speed to optimize a variety of jobs prove beneficial? (FIGURE #4)

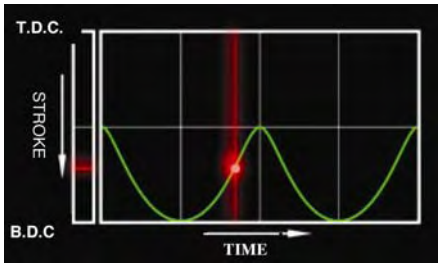

Figure #4

2) Would the ability to program slide motion improve part quality and increase productivity? (FIGURE #5)

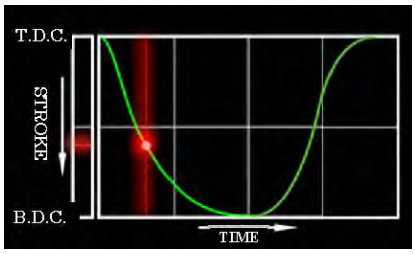

Figure #5

3) Are there jobs that would benefit from having the slide dwell during the working part of the stroke? (FIGURE #6)

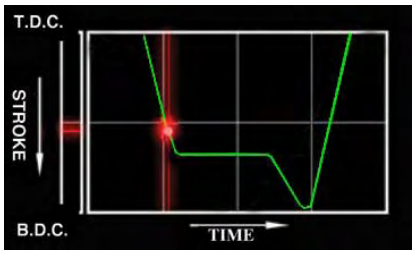

Figure #6

4) Is there a benefit to be derived from optimizing the relationship between the press stroke and the cycling of automation to increase output? (FIGURE #7)

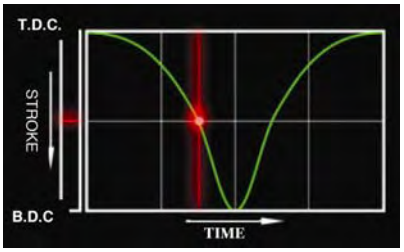

Figure #7

5) Are there jobs that use high strength steels or exotic materials, have in-die tapping or assembly operations that would benefit from a programmable slide motion? (FIGURE #8)

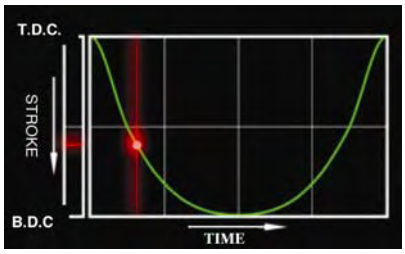

Figure #8

If the answer is "yes" to one or more of these questions, then that stamping operation is a candidate for Servoforming with the AIDA ServoPro™ technology. The truth is that nearly every stamping operation would realize huge benefits from the application Servoforming technology.

Why Aida's ServoPro™ Technology?

What makes the AIDA ServoPro™ different is the large, high-torque, low RPM servo-motors that have been developed for capacities of up to 300 tons per drive motor, with an increase to even larger capacities in the near future (SEE FIGURE #9).

Figure #9

These low RPM, high torque motors are designed specifically for use in general presswork, including forming. Power consumption has been significantly reduced to the point where it is comparable to a standard mechanical press drive in most applications. A direct drive is achieved by attaching the servo-motors directly to the press drive shaft (SEE FIGURE #10) replacing the flywheel, clutch and main motor found on all mechanical presses.

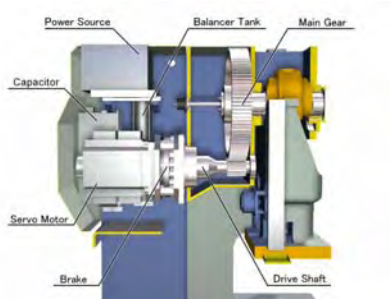

Figure #10

With this "direct drive" stroke lengths, rating points above the bottom of the stroke and torque and energy remain the same as the standard mechanical press drive, characteristics which the drives illustrated in figures #2 & #3 cannot achieve.

The AIDA ServoPro™ technology uses the same basic press structures that are found in our standard gap and straight-side presses. The low deflection characteristics and small over-all clearances that make Aida presses function so well are still there, only the flywheel, clutch and main motor have been replaced with the high capacity ServoPro-motor.

Figure #11

As ServoPro moves into larger capacity straight-side presses multiple servo-motors will be used and will be tied together in the drive system (SEE FIGURE #11) rather than function independently as shown in figure #3. This will ensure that the slide will remain as parallel to the bolster as possible during stamping operations that have high off-center loads.

Conclusion

As competition in the stamping industry continues to get progressively more intense, the companies that will survive and prosper are those that embrace new technologies and use them to continually improve the quality of the parts that are being made, the productivity of their manufacturing equipment, the life of dies and the flexibility of manufacturing cells. Servoforming is a technology that offers stamping producers the opportunity to improve in all of these areas. Aida's ServoPro technology has skipped a few steps in the evolution of traditional stamping presses and stampers are about to reap the benefits. In fact, Aida is going to define Servoforming.