

Integrated Electronic Systems

By

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Introduction

When purchasing a new or replacement press control or monitoring system for a power press, often times a person approaches the problem with blinders. For example, implementing an in-plant sensor program requires the selection of an electronic monitor or die protection unit. The implementation of a sensor program requires that much attention be paid to sensor choice and sensor mounting, in addition to the sensor monitoring electronics. With concentration directed to the sensor program, it is easy to overlook the fact that the sensor program is only one part of the press production system. However, the same reasons that call for the implementation of a sensor program necessitate the implementation of an integrated press production system. Decreases in production costs, better quality, and reduction of downtime are some of the reasons, which can be used to justify the implementation of a sensor program. These same reasons can be used to justify the integration of the press production system. Integration of the press production system should be considered.

An integrated press production system is one that brings together components of the press production cell. These components include the press control and its subsystems, process instrumentation and monitoring, and automation if any is present. A central control gathers information from and sends information to the various systems components. The operator interface to the central control is via a single operator terminal.

Just as the central control supplies a gateway for data exchange between the operator and the various system components, central control can supply a gateway between a plant wide network and the various system components. This network allows for monitoring of production system's activities and press performance.

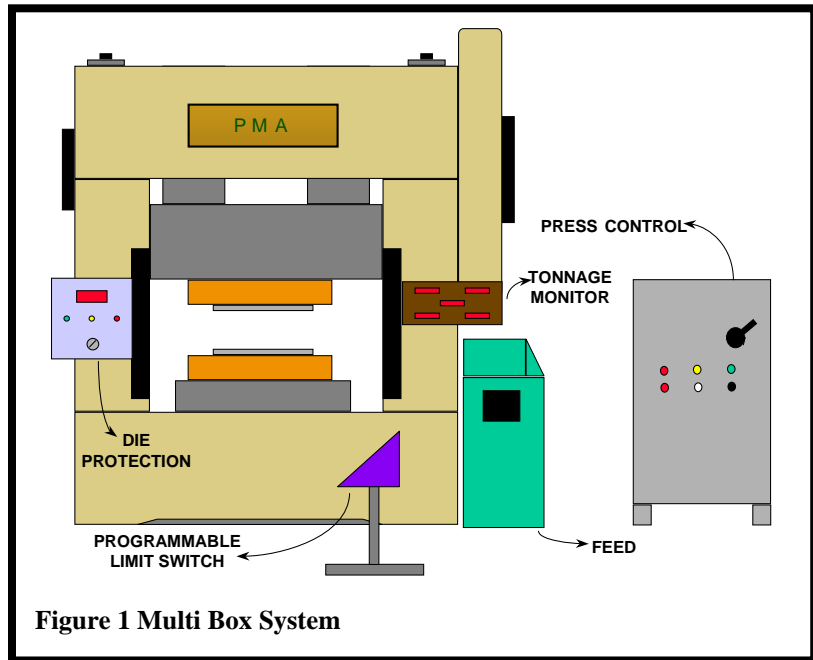
Integrated press production systems should not be limited to automatic running operations only. As will be illustrated below, many of the benefits gained from an integrated production system, with the exception of those, which directly relate to automation, apply equally to automated and manual press operations.

History of Press Production Systems

Prior to the late 1980's, press production systems consisted of a series of black boxes. One box was dedicated to the clutch/brake control. Another box was dedicated to die protection monitoring. Still another box was dedicated to the tonnage monitor. The connections between the devices were limited to a few hardwired connections, such as stop signals and timing signals. These multi-box systems were not the result of improper planning on the part of management, but upon the fact that they were the only ones available. Most of the equipment suppliers at that

time were those who started in the industry as dedicated suppliers of one black box or the other. Some companies specialized in tonnage monitoring while others specialized in die protection. As the suppliers broadened their market, they did so by adding another black box to their product line. These boxes served dedicated functions with little communication between them. In addition, the functionality of these boxes was limited by the technology available. For example, during that time period many of the microprocessors available for use in industrial control and monitoring equipment were slow, had limit features, and were expensive as compared to the microprocessors which are available today.

The result was a multi-box system shown in Figure 1. It was not uncommon for each of these devices to be manufactured by a different company, and their operating protocols and display techniques be different. The operator was presented with the task of having to learn to operate and monitor several different devices. A die change would require the operator to travel from device to device, in order to enter the parameters necessary to run and monitor the die correctly. Fault conditions would sometimes result in several devices displaying errors. In such cases, it would be difficult for an operator to be able to determine the true cause of the fault.



Still, the cause of other stop conditions could remain a mystery to the operator. For example, a relay clutch/brake control would be able to monitor the clutch supply air pressure switch. For intermittent low supply pressure conditions the clutch/brake control would stop the press, because of the low supply pressure. If the operator did not look at the low air pressure fault indicator before the supply pressure returned to normal, he would have no information as to the cause of the stop.

Several factors have driven the stamping industry to use more sophisticated and integrated control and monitoring equipment. The advances in electronics have given the suppliers better parts to incorporate into their products. For example, a microprocessor in older vintage tonnage monitor would be able to monitor four channels of data and drive a few digital displays. Today's microprocessors can monitor eight channels of data and transmit information for graphical display of the tonnage waveform. The loss of competent personnel has forced the stamping industry to look for equipment which will bring inexperienced operators to competence more quickly. Competitive pressures have forced the industry to increase quality, reduce downtime, and reduce labor content. An integrated press production system offers the metal stamper a means to respond to the demands of competitive pressures.