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SAFETY BRIEF

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On Classification Of Safeguard Devices *(Part I)*

by Ralph L. Barnett [1] and Peter Barroso Jr. [2]

The field of safety research is still in its infancy. As yet no universally applicable safety principles have been formulated.

Recognizing this state of ignorance, scientists, and even legislators, set safeguarding standards for individual machines and specific processes. They do not claim to be defining universal safety truths.

The courts, on the other hand, produce general rules which they apply to all machines thereafter. Since no *valid* general rules exist, the legal system is producing irrational tenets at odds with other intellectual disciplines.

Engineers cannot change the law but we can provide guidelines to help the courts make more reasonable decisions. The first step is to stop looking at safety devices as a homogeneous lump. Safety devices differ in the amount of safety they provide and the amount of harm they can do.

We are studying a number of classification systems that make it possible to evaluate the efficacy of safeguarding devices. This first article presents one system which breaks down safety devices into mutually exclusive and jointly exhaustive catagories.

Intrinsic Classification of Safeguarding Systems

Type I - Devices that always improve safety. Generally, transmission guards are of this type.

Type II - Devices that sometimes improve safety and at other times leave the system unaffected. An example may be an awareness barrier.

Type III - Devices that always leave the system unaffected. Adding redundancy to a fail-safe system provides an example of this type.

Type IV - Devices that sometimes improve the safety and sometimes increase the danger of the protected system. The interlocked guard is usually of this type.

Type V - Devices that sometimes improve the safety, sometimes increase the danger and sometimes leave the system unaffected. The seat belt is a classic example in this category.

Type VI - Devices that sometimes increase the danger of the protected system and sometimes leave it unaffected. An example would be an emergency stop button mounted on a slitting line recoiler unit which invites an operator into an area where he should never be while the machine is running.

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No Charge

Type VII - Devices that always increase the danger of the system to be protected. A "Man Cage" for a mobile crane is an example of a system which legitimizes an unsafe use admonished by every crane manufacturer.

From a purely safety point of view—ignoring things such as function, practicability and cost—this classification permits a clear delineation of professional responsibility. Dealing with the most obvious problems first, we would focus on categories VI and VII where devices are placed on a machine that create a danger to public safety without any redeeming or offsetting characteristics. The code of ethics of every engineering society would consider the inclusion of such devices unethical and not in concert with the professional obligation to protect the public.

Type III safety devices, devices which do nothing, must also be rejected. One of the most important objectives of engineering is to minimize cost. It follows that non-functional devices should be excluded from all engineering works. Furthermore, it is unethical to mislead the public and increase cost when no value is delivered.

Certainly the most provocative devices fall into categories IV and V. Here, the devices themselves create danger. Has an engineer or a manufacturer in our society the right to forseeably cause harm to individuals for any reason not dictated by the society's value system? For example, can an engineer unilaterally force drivers to wear seat belts in order to save 100,000 lives, knowing that 10,000 people, who would otherwise be unharmed, will be killed by drowning, fire and lower abdominal injuries because they were wearing their seat belts? One cannot find an answer to this question in technology. We must look to the society's value system for guidance. It should be noted that the particular problem of seat belts was firmly dealt with by the public who demanded the removal of the interlock which prevented the starting of their vehicles when the seat belts were not used and the continuous buzzer which sounded during the non-use of the belts. The position of many safety organizations relative to type IV and V safety devices can be understood in the outcroppings of their codes and standards that prohibit the use of guards which themselves present a hazard.

Clearly, type I and II devices, which increase safety without collateral disadvantages, cannot be excluded from engineering systems on the basis of safety alone. Indeed, there are compelling humanitarian, ethical and legal reasons to incorporate such devices when they are feasible, compatible and economically practicable.

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What Is A Defect?

Attorneys usually ply their trade in only one state. Engineers, on the other hand, can anticipate that their handiwork will find its way into all 50 states. It is, therefore, necessary to acquaint every engineer with the definition of "defect" used in each state.

The Supreme Court justices in each state were contacted in a futile attempt to obtain these definitions. An appeal to our clients, however, has produced the case decisions in each state which best describe the criteria engineers must exhibit in their product designs.

Each issue of this newsletter will contain the case decisions from several states. We appeal to our readership to update our collection.

Special thanks to those of you who have already contributed. The eagerness of the legal community to participate in this intellectual endeavor has far surpassed that of the technical community and is a constant source of inspiration and delight.

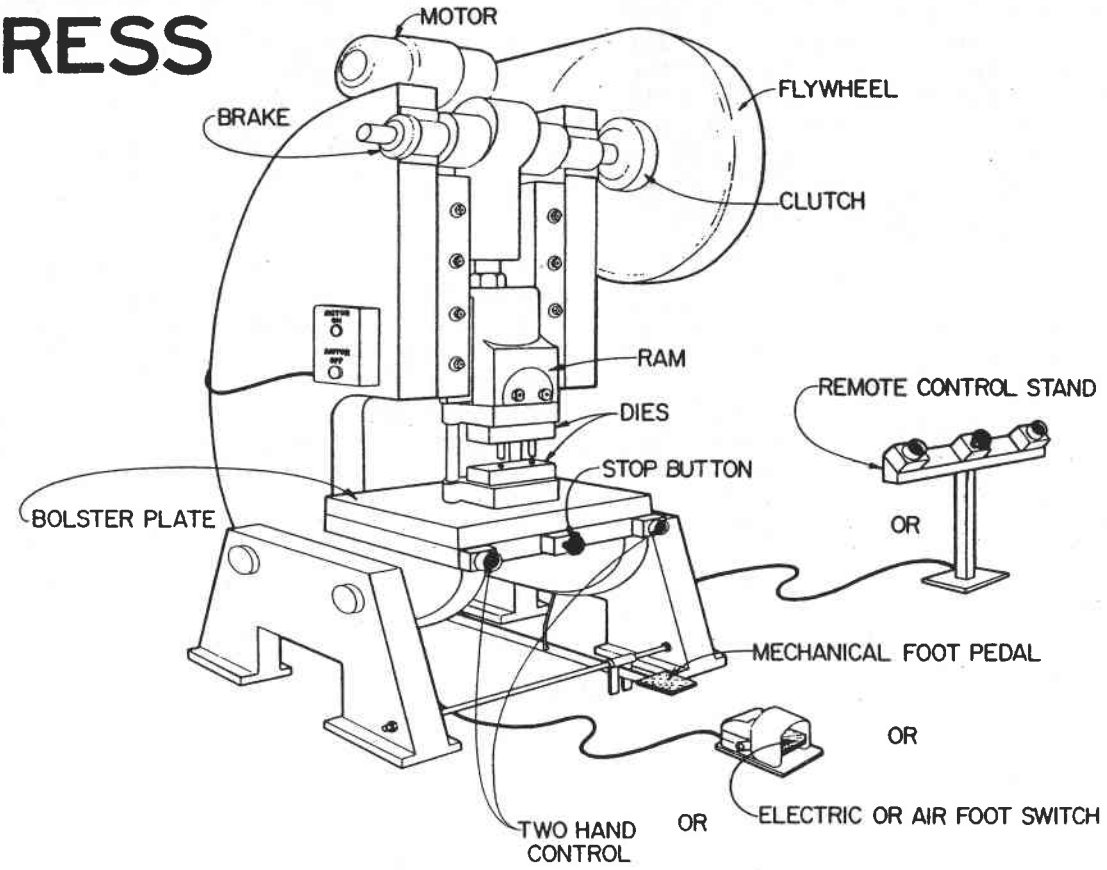
Alabama

Casrell v. Altec Industries, Inc. 335 So. 2d. 128 (1976)
In this case, the defendent, Altec, asked what is a "defect," and by inference, what is "unreasonably dangerous." The Supreme Court of Alabama held that the terms are synonymous, that is, defective means unreasonably dangerous and has no independent significance. Their answer is as follows:

> "a defect is that which renders a product unreasonably dangerous, i.e., not fit for its intended purpose. Whether a product is unreasonably dangerous is for the trier of fact to determine as in a traditional negligence case.
>
> The product either is or is not unreasonably dangerous to a person who should be expected to use or to be exposed to it. If it is, it makes no difference whether it is dangerous by design or defect. The important factor is whether it is safe or dangerous when the product is used as it was intended to be used. However, danger may be obviated by an adequate warning.
>
> Defective is interpreted to mean that the product does not meet the reasonable expectations of an ordinary consumer as to its safety. Defective condition applies when, at the time the product leaves the seller's hands, it is in a condition not contemplated by the ultimate consumer."

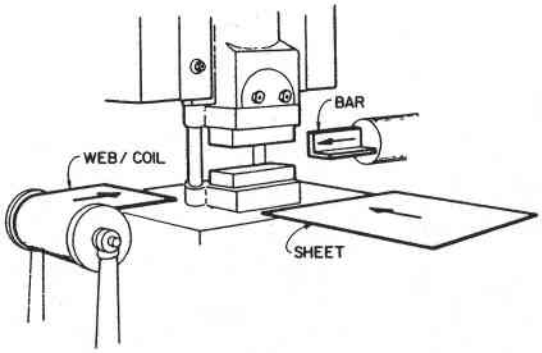
Continued pg. 4, col. 1

PUNCH PRESS



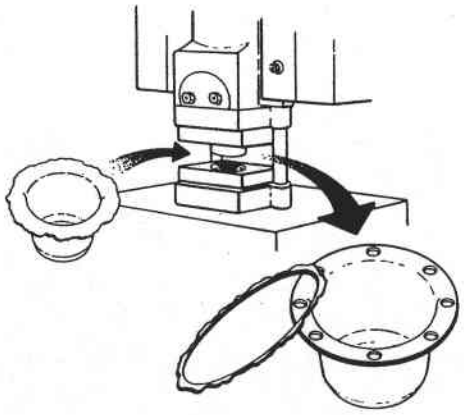
PRIMARY OPERATIONS

FIRST OPERATION ON VIRGIN STOCK



SECONDARY OPERATIONS

FURTHER OPERATION ON PREWORKED PART



Graphics by Mary A. Misiewicz

Punch Press is one of a series of safety posters available from our graphics division. The posters depict the areas where each of the classical safety devices is inapplicable and the circumstances where it is unsafe.

Alaska

Caterpillar Tractor Co. v. Beck, 593 P.2d. 871 (1979). In this case, the driver of a front-end loader was killed when the loader rolled over an embankment. The plaintiff contended that the manufacturer's failure to equip the machine with a protective safety shield constituted a design defect in the loader, and because of that defect the driver suffered fatal injuries. The Supreme Court of Alaska, following the guidelines set by the California case of **Barker v. Lull Engineering Co., Inc.,** 573 P.2d. 454, held that a product is defectively designed if:

> "(1) the plaintiff proves that the product failed to perform as safely as an ordinary consumer would expect when used in an intended or reasonably foreseeable manner, or
>
> (2) the plaintiff proves that the product's design proximately caused injury and the defendent fails to prove, in light of the relevant factors, that on balance the benefits of the challenged design outweigh the risk of danger inherent in such design"

Relevant factors for test (2) to be considered and compared include, but are not limited to, the following:

"(a) the gravity of the danger posed by the challenged design
(b) the likelihood that such danger would occur
(c) the mechanical feasibility of a safer alternative design
(d) the financial cost of an improved design
(e) the adverse consequences to the product and to the consumer that would result from an alternative design."

In this case, the court has also adopted the doctrine of comparative negligence in the allocation of damages. This doctrine will reduce the injured party's damages by comparing "in percentage terms the injured party's own fault which contributed to his injuries with the fault of the manufacturer" providing that the injured party "voluntarily and unreasonably assumed" a known risk of injury **because of the alleged design defect.** The defense of contributory negligence "depends on providing the user's actual awareness of the product's defect and his voluntary and unreasonable encounter of the risk known to him."

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