

The intention of these articles is to inspire thought, not provide a solution. All safety design should be conducted by a professional engineer.

## Wintek's Stop Time Meter

Wintek uses a stop time meter to help determine safe distances of light curtains for presses and other machinery. This self-contained, portable electronic stop time meter is capable of measuring stop times from 1 to 9999 milliseconds.

The operation of the meter is quite simple. The position/velocity transducer is equipped with magnets. In the case of a press, the P/V transducer is placed on the bolster or flat die section and the cable magnet on the ram or upper die section directly above the transducer. The set control start point (which is usually the mid-stroke position of the upper die) is entered into the stop time meter. An autoflag is used to break the light curtain.

The press cycle is initiated and when the press reaches mid-stroke, the P/V transducer sends a signal to the autoflag to break the light curtain. The meter measures the time from when the light curtain is broken to when the press comes to a stop (actually a velocity of about 0.17 inches per second).



Wintek performs at least ten of these tests to obtain an accurate stop time. The data is used to calculate the safe distance of light curtains. The measurement process is quick, and allows us to physically measure the stop time of your machine rather than estimating it using combined delay times of all of relays and valves in your system. ⚡

## NEW LOCKOUT STANDARD

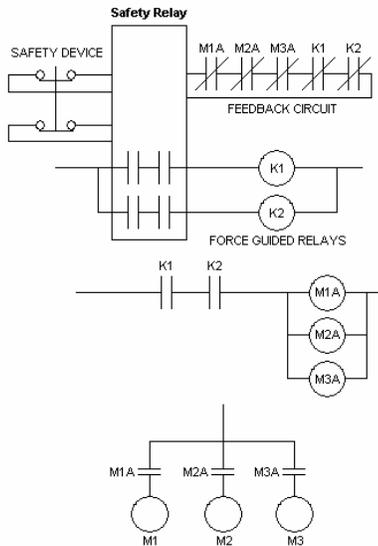
The new CSA Z460 Control of Hazardous Energy standard is due to be released in early 2005. A draft copy was been made available for public review; here is a preview of what it'll look like. (Note that this article may or may not be consistent with the final version of the standard.)

Designer – The standard explicitly defines what the manufacturers (and those performing modifications) are to provide. Location, identification, and capability of lockouts are all discussed in detail. Manufacturers will be responsible for providing a manual with lockout procedures, including special instructions for clearing of jams and any other specialized task.

Continued on Page 3.

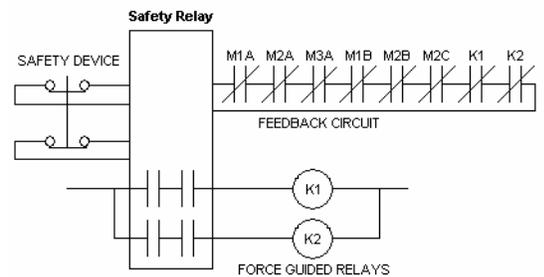
## CONTROL RELIABILITY: A Statistical Analysis

This article will analyze three “typical” safety circuits to determine probabilities of accidents occurring.



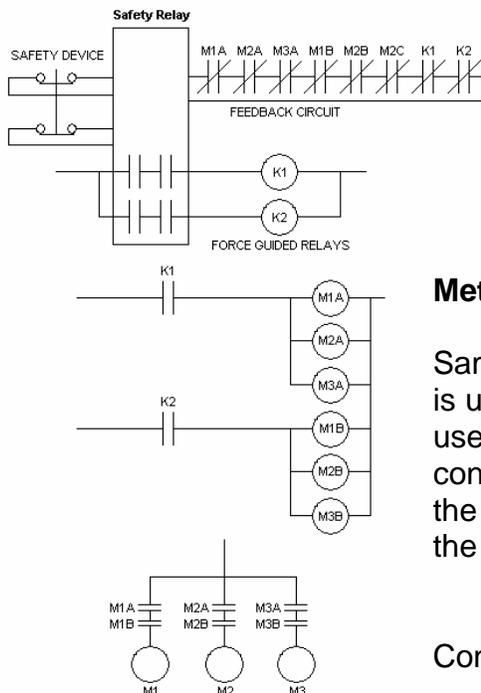
### Method A

Uses control reliable safety and expansion relays. However, only a single contactor (W/ feedback) is used to interrupt each motor. Hence, a failure of any of the contactors would result in a hazardous situation.



### Method B

Uses control reliable safety and expansion relays. Each motor has two contactors interrupted by both safety expansion relays. All relays and contactors are monitored, establishing a completely control reliable circuit.



### Method C

Same as Method B, but with a subtle difference: K1 is used to interrupt all the “A” contactors, while K2 is used to interrupt all the “B” contactors. This is still control reliable, since the machine will still stop in the event of any single component failure. However, the odds of failure are greater than with Method B.

Continued on Page 3.

## CONTROL RELIABILITY *Cont. from Pg.2*

Assumptions / data:

- M1, M2, and M3 are large motors controlling hazardous motion.
- K1 and K2 are force guided relays with a 1 in 10,000,000 probability of failing.
- K1 and K2 are rated for interrupting 3 motor contactors, but not 6.
- M1A, M2A, M3A, M2A, M2B, M2C are standard contactors (ie, AB 100-C)
- The contactors have a 1 in 10,000,000 probability of failing.
- The safety relay is assumed to be control reliable, with a negligible probability of failure.
- This article does not take into account the operator's ability to avoid the hazard – M1, M2, and M3 directly constitute a hazard.

	Odds of Failure (per cycle)	Odds of Failure (per day) at 2 cycle/min, 24 hr/day	Odds of Failure (per day) with 50 machines
Method A (single channel)	1 in 3,333,333	1 in 1157	1 in 23
Method B (control reliable #1)	1 in 25,000,000,000,000	1 in 8,680,555,555	1 in 173,611,111
Method C (control reliable #2)	1 in 10,000,000,000,000	1 in 3,472,222,222	1 in 69,444,444

Summary:

The probabilities clearly demonstrate that having your entire circuit control reliable is necessary for high risk hazards. The numbers also show that although there are different methods of control reliability, the overall result is consistent: a system with an extremely low probability of failure, even when considering deployment over multiple machines and cycle. ⚡

## NEW LOCKOUT STANDARD *Cont. from Pg. 1*

User – The user will be responsible for ensuring all new, refurbished, and relocated equipment has lockout procedures, and is responsible for ensuring the procedures are followed. This section is quite comprehensive – the Z460 went to great lengths to address every situation, including equipment testing, “lockout tag removal when authorized person is absent”, outside contractors, etc.

Examples – Unfortunately, some facilities do not have any kind of lockout signage present. Safety staff from these facilities will benefit from the extensive use of examples throughout the standard.

If you would like to discuss the draft version of this standard, or would like to view an advance copy, feel free to contact us! ⚡

## LIGHT CURTAIN MOUNTING CONSIDERATIONS

It is common to see a light curtain sized and installed without careful consideration given to safe distances and potential reach around. A common misconception is that placing a light curtain in front of the hazard will protect the operator from the hazard.

For safety integrators which do not already have one, consider developing a checklist with (at least) the following items:

- 1) Safe Distance
- 2) Reach Around
- 3) Reach Under
- 4) Reach Over
- 5) Step Between
- 6) Manual Reset
- 7) Blanking
- 8) Muting
- 9) Light Curtain Category

The safe distance is defined as the shortest distance between any point in the sensing field to the nearest pinch point. When friction brakes are used, this proper safe mounting distance can be affected by stopping times, break wear, mechanical and electrical delays

in the control system. A safe distance calculation needs to be performed for every light curtain installation. At the design stage, this can be accomplished by gathering data from proposed components, and using a safe distance formula. Safe distances can also be determined using a stop time meter, which can allow the light curtain to be placed closer than the somewhat conservative calculations.

Some of the above items are occasionally overlooked, but items 2 through 4 do not attract the attention they deserve. The light curtain is ineffective if an operator can access the hazardous area by going over, under, or around the light curtain. Consult anthropometric tables in CSA Z432 for details on how to properly eliminate "reach" type hazards.

Items 5 through 8 may or may not apply, depending upon both the application and the risk assessment.

**WINTEK** wishes you and your families a safe and happy holiday season!

What do you call people who are afraid of Santa Claus?  
Claus-trophobic!

Visit **WINTEK** at [www.phsr.com](http://www.phsr.com) for more helpful hints and informative articles about PHSR's. You will also find links to various standards and other safety related downloads. We can also answer your specific questions regarding PHSR's in individual situations.

Our main website, [www.wintek-eng.com](http://www.wintek-eng.com), gives more detailed information regarding **WINTEK**'s services and various accomplishments.