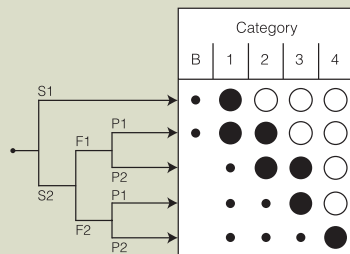


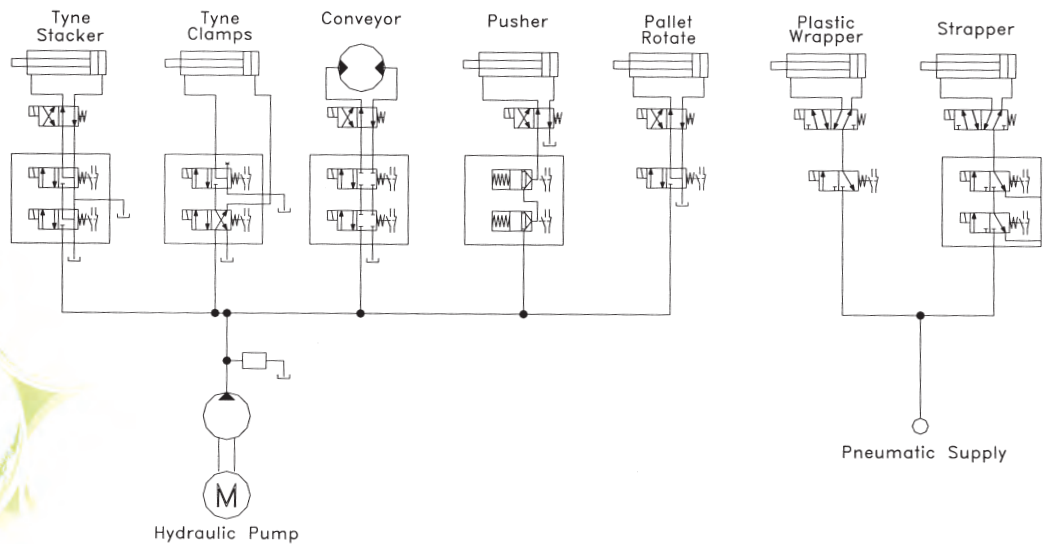
Machinery safety control fluid power — Part 5



LEGEND:

- S** Severity of Injury
 - S1, Slight (normally reversible) injury.
 - S2, Serious (normally irreversible) injury, including death.
 - F** Frequency of exposure and / or exposure time to the hazard
 - F1, Seldom to quite often and / or the exposure time is short.
 - F2, Frequent to continuous and / or the exposure time is long.
 - P** Possibility of avoiding the hazard
 - P1, Possible under specific conditions.
 - P2, Scarcely possible.
- Preferred
 Possible categories which require additional measures
 Over dimensioned

This article is the fifth of a six-part series providing an overview of requirements, principles, applications and technology for pneumatic and hydraulic safety systems of machinery. In the last issue we overviewed the application of part 1502 (validation) of the new AS4024.1 Safety of machinery. Our fifth topic deals with the practical application of appropriate control methods of the safety-related parts of control systems, which have been identified in the hazard identification/risk assessment.



Brick stacker and palletiser hazard identification/risk assessment

Tyne Stacker:	S2	F2	P2	Category 4	Monitored Dual Block and Bleed Hydraulic
Tyne Clamps:	S2	F2	P2	Category 4	Maintain System Pressure on Clamps (Over Centre Clamp)
Conveyor:	S2	F2	P1	Category 3	Monitored Dual Block and Block Hydraulic
Pusher:	S2	F1	P2	Category 3	Monitored Dual Cartridge Valves
Pallet Rotate:	S2	F1	P1	Category 2	Monitored Single Block and Bleed Hydraulic
Plastic Wrapper:	S2	F1	P1	Category 2	Monitored Single Block and Bleed Pneumatic
Strapper:	S2	F2	P2	Category 4	Monitored Dual Block and Bleed Pneumatic

Hydraulic and pneumatic circuits.

systems and

Prior to commencement of design of a safety-related control system, the hazard identification/risk assessment would have highlighted the safety-related parts of control system that need to be addressed within the design criteria. The application reviewed will be a brick stacker and palletiser.

As described in part 1 of this series the risk matrix is the essential tool for the designer. The assessment will in most circumstances only identify the level of risk and therefore determine a risk category. The designer's responsibility is to apply the correct product for the application including identification of known hazards such as load holding. For example, the application of a block and bleed system

would not be appropriate for runaway loads or horizontal load holding applications such as a conveyor, in which case a block and block valve system would be more appropriate in light load circumstances. Vertical load holding applications should incorporate the existing technology of pilot-operated check valves, counter balance valves, etc and not monitored spool valves due to spool leakage and potential failures between the valve and cylinder.

Brief definition of risk categories

Risk category B & 1 — do not require the application of monitored fluid power valving.

Risk category 2 — a single fault in the control system may lead to the loss of the safety function but the fault must be detected. A single monitored valve fulfils these requirements.

Risk category 3 — no single fault may lead to the loss of the safety function but multiple faults may lead to the loss of the safety function. Dual series ported monitored valves fulfil these requirements.

Risk category 4 — no single or multiple failures may lead to the loss of the safety function. Dual series ported monitored valve fulfils these requirements.

Risk categories 3 and 4 do not discriminate and require dual monitored valves.

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