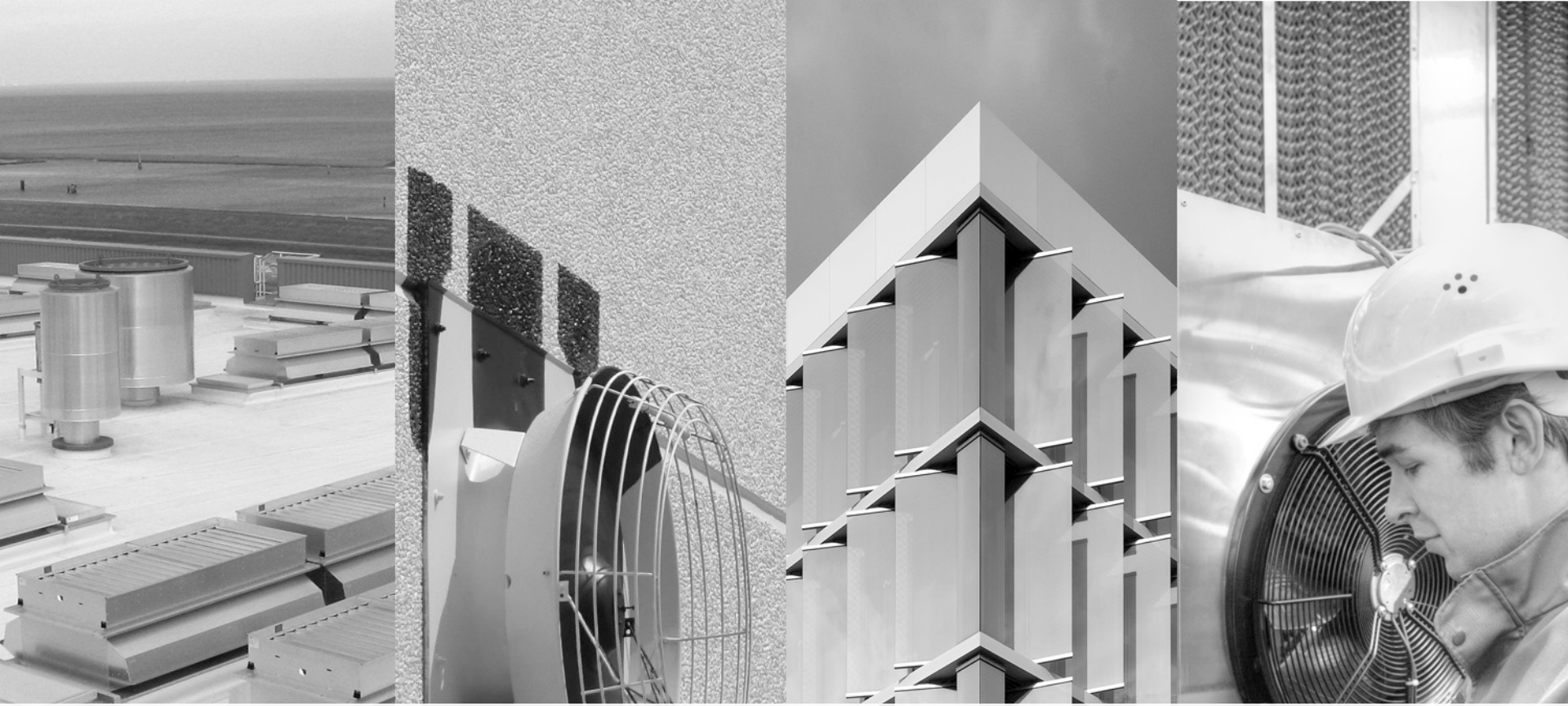

Colt International Ltd

Anatomy of a control system for life safety smoke control

CPD Technical Seminar 2018

CPD Accreditation

Colt International Limited

CIBSE CPD

Certification

of CPD course provision

This is to certify that

Colt International Ltd

has been registered as a CPD Course Provider by
The Chartered Institution of Building Services Engineers (CIBSE)

Accredited from 1st June 2017 to 31st May 2019

Andrew Rowe
CPD Panel Chair
CIBSE

Grace Potthurst
Membership Development Coordinator
CIBSE

The Chartered Institution of
Building Services Engineers
222 Balham High Road
London SW12 9BS
T: 020 8675 5211
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www.cibse.org

CIBSE CPD

Colt have a number of CPD accredited topics including:

- Car park ventilation
- The general principles of smoke control
- Pressurisation
- Smoke shafts
- Overheating common corridors
- Smoke and fire curtains
- Louvre
- Evaporative cooling

A brief history of Colt

Colt International Limited

Founded in

1931

2016 UK turnover

£30 million

2016 Group turnover

£160 million

Manufacturing facilities in

UK, Holland & Germany

Accreditations and Memberships

Colt International Limited

Accreditations

- Achilles
- Altius Gateway
- CHAS
- Construction Line
- Safe Contractor
- Worksafe Contractor
- RoSPA

PPQ still required by clients

ISO 9001: 2015

ISO 14001: 2015

Memberships

BSRIA

CIBSE PATRONS

ASFP
www.asfp.org.uk

CIBSE CPD

FETA

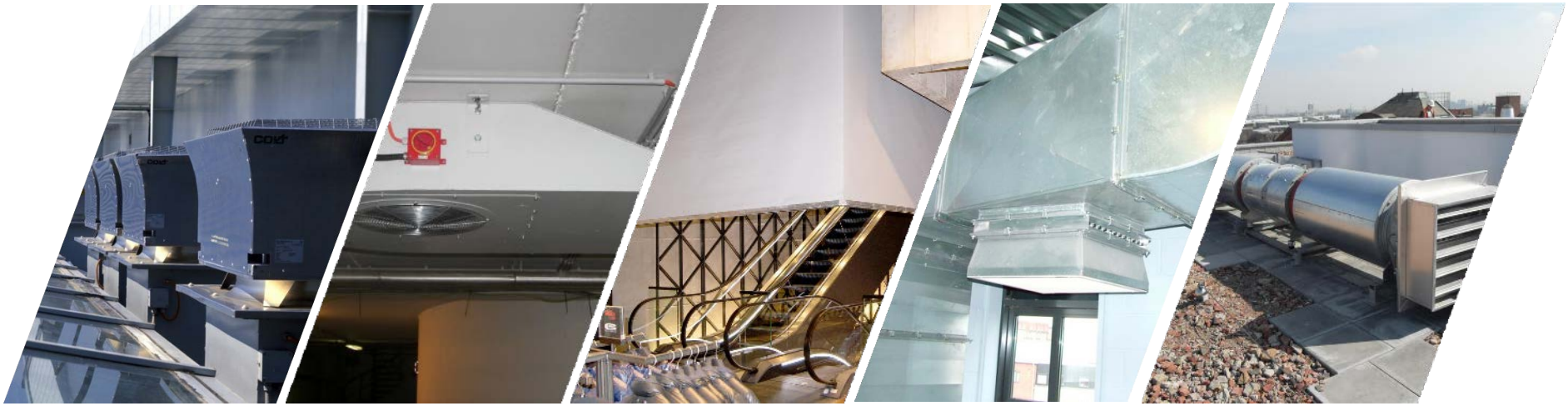
Smoke Control

Climate Control

Louvre & Shading

Service

Smoke Control



SHEVS
Smoke and Heat
Exhaust Systems

Car Park
Ventilation

Smoke
Containment

Pressurisation
Systems

Smoke Shaft
Systems

Climate control

Natural Ventilation

Hybrid Ventilation

Mechanical Ventilation

Evaporative Cooling

Louvre

Screening | Ventilation & Rain Defence | Shading | Acoustic

Service

24 hour call out

Nationwide Coverage

Spare Parts

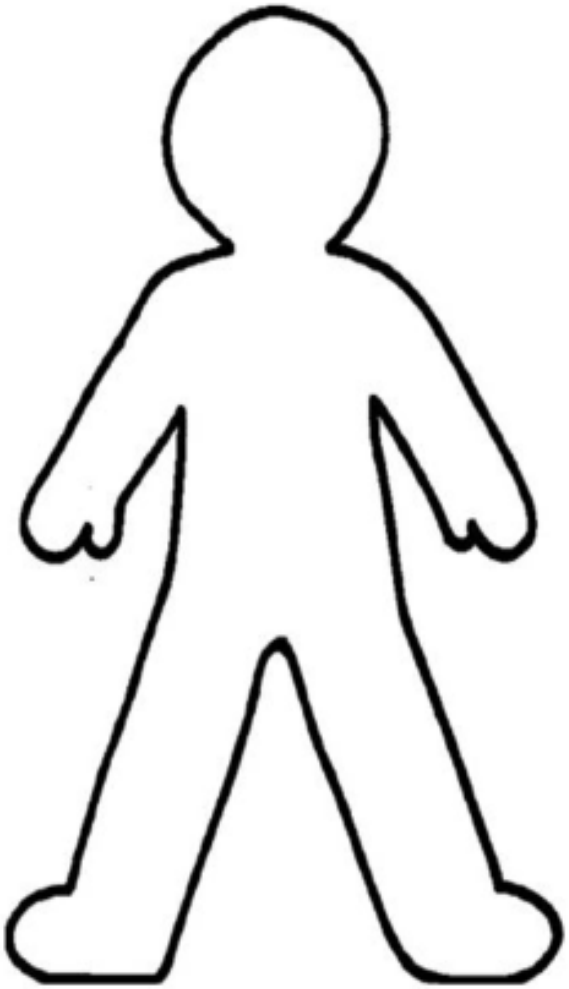
Surveys

Controls should be Application Specific – fire alarm systems are not always appropriate as life safety control systems

Should be designed with resilience, backup and reliability

Not BMS, BAS or HVAC/process control systems

- Open/Closed Protocol?
- Only operate on first activation (subsequent signals are locked out)
- Key enabled Firefighters override



Anatomy

- Brains – decision making control panel
- Eyes/ears – Sensors and detectors
- Muscles – Equipment and devices
- Central nervous system – cable network
- Cardiovascular System – Power supplies

Minimise single points of failure

Protect critical functions

Provide early warning and contingency planning

Defined failure modes

Decision making system

- Provides main user interface.
- Controls the whole system.
- Displays the status of the system.
- Allows the system to be overridden.
- Makes decisions based on a programmed cause and effect.

Control Panel

Display

Sensors and detectors

- Smoke Detectors
- Heat Detectors
- Manual Call Points
- Override Switches
- Pressure Sensors
- Temperature Sensors

Interfaces with other systems

- Fire Alarm/Detection.
- Sprinklers.
- Building Management System (BMS).
- Day-to-day systems/AHUs.
- Volt Free Contacts for critical item (Fire Alarm Interfaces).
- Non-critical items can be ‘high level’ (Modbus/BACNet etc.)

Eyes / Ears – Sensors and Detectors

Anatomy of a control system for life safety smoke control 2018

SD

SD

SD

SD

FOS

Fire Alarm

Control Panel

Display

Power Switching Panels – Motor Control Panels

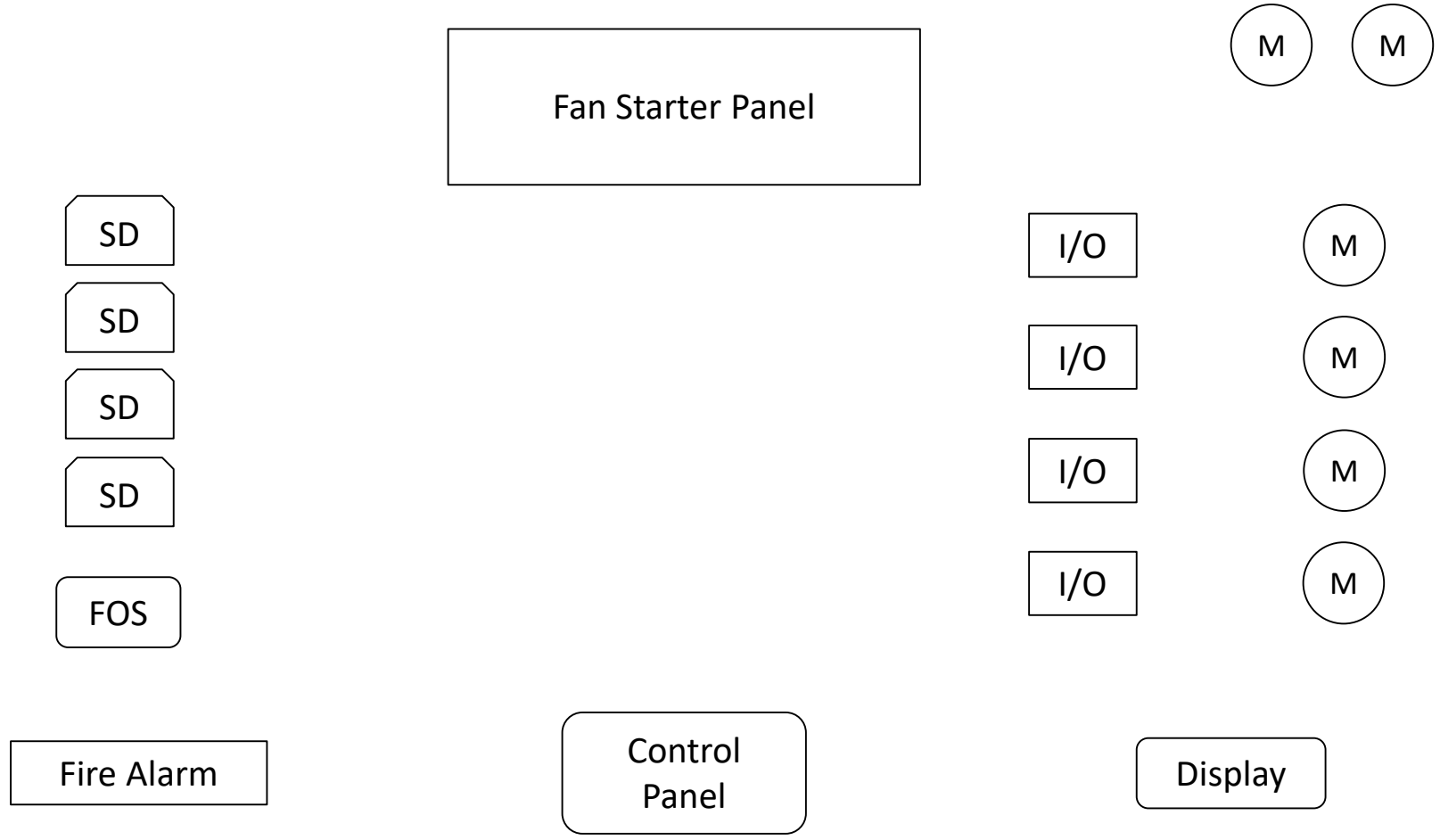
- Used for switching high powered 3 phase fans.
- No specific standard on construction.
- External panels available.
- Form 2 as standard.
- Form 4 is possible, but not required and often expensive.

Input/Output (I/O) Devices

- Usually connect to an addressable network.
- Take power & comms signals.
- Control devices/motors.
- Multiple I/Os per network.
- Usually relatively small & located ‘in the field’.

The Muscles – Equipment and devices

Anatomy of a control system for life safety smoke control 2018



Cable Network

Comms and power networks must be protected. Should be installed with metal clips to maintain installation in a fire.

Fire rated cabling to Category 3 of BS 8519 for Life Safety Systems.

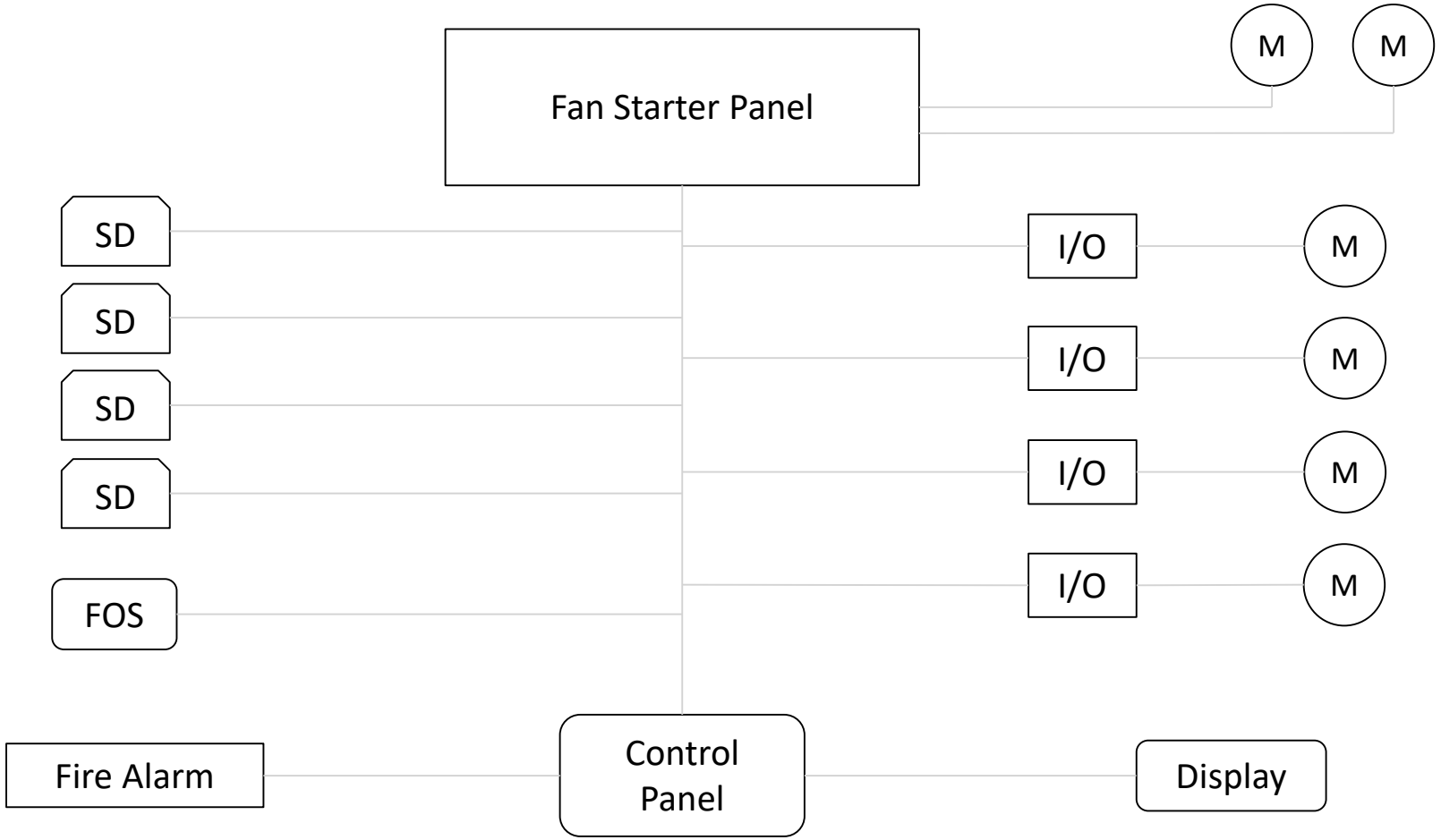
Tested under fire conditions for:

- Heat
- Water jet
- Impact

3 Phase Power Cables should be classed as F120
Comms/230Vac/24Vdc Cables should be PH120 +

Central Nervous System - Cables

Anatomy of a control system for life safety smoke control 2018



Power Supplies

BS 8519

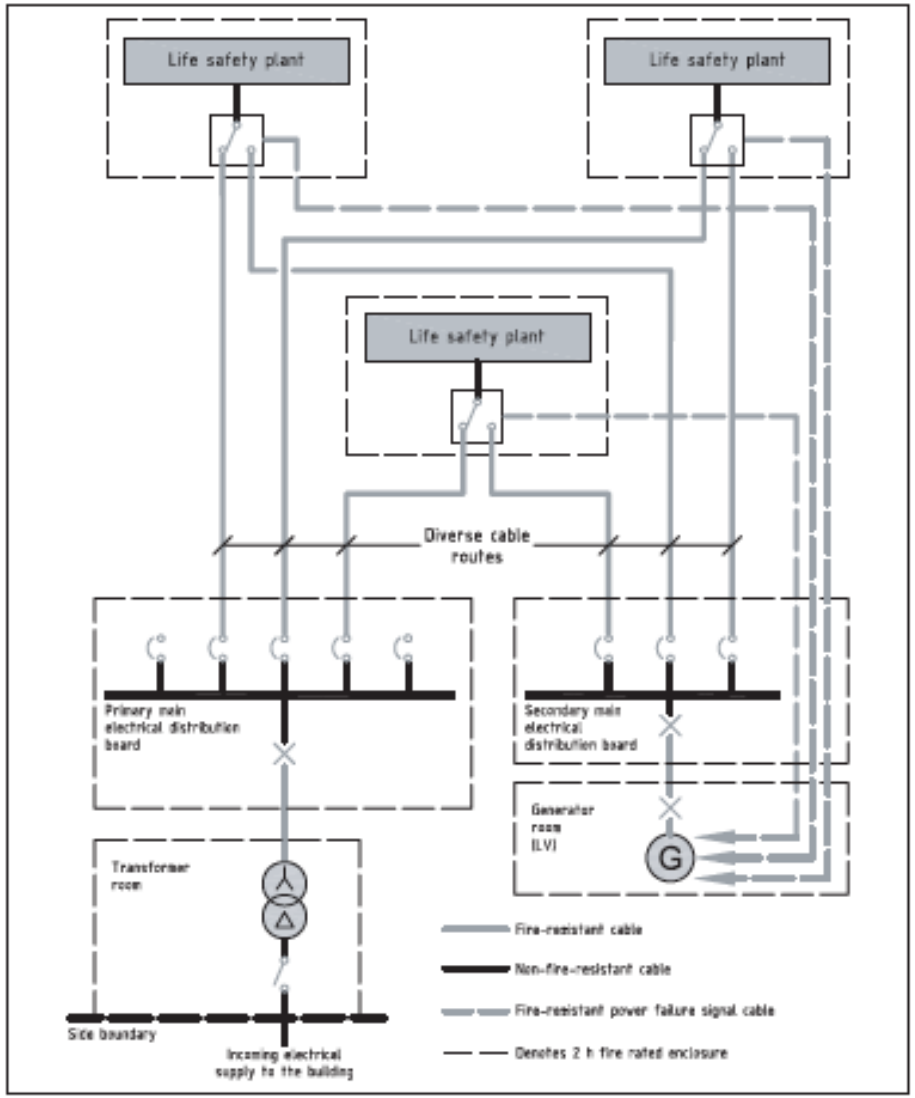
Primary and Secondary sources

Automatic Transfer Switch (ATS)

Diverse Routes

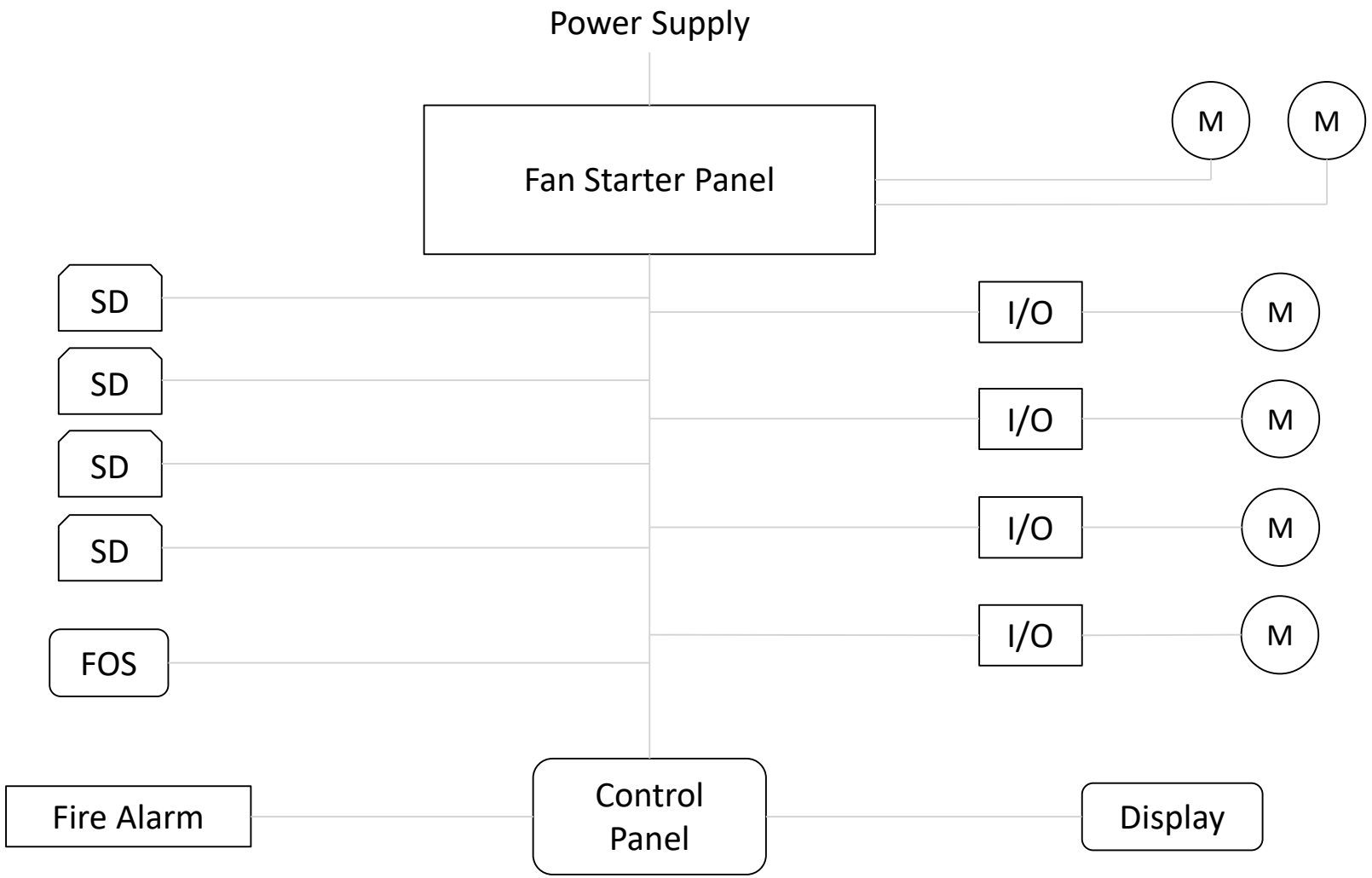
Fire rated enclosures

Battery back up Panels

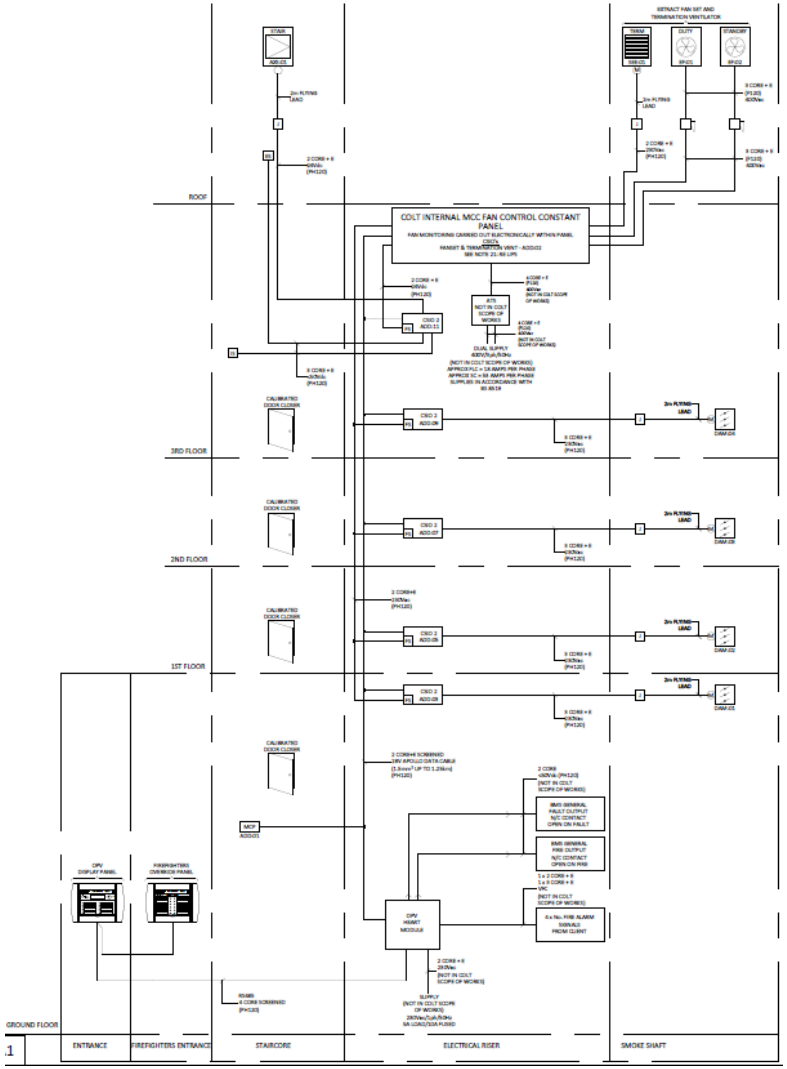


Cardiovascular system – Power Supply

Anatomy of a control system for life safety smoke control 2018



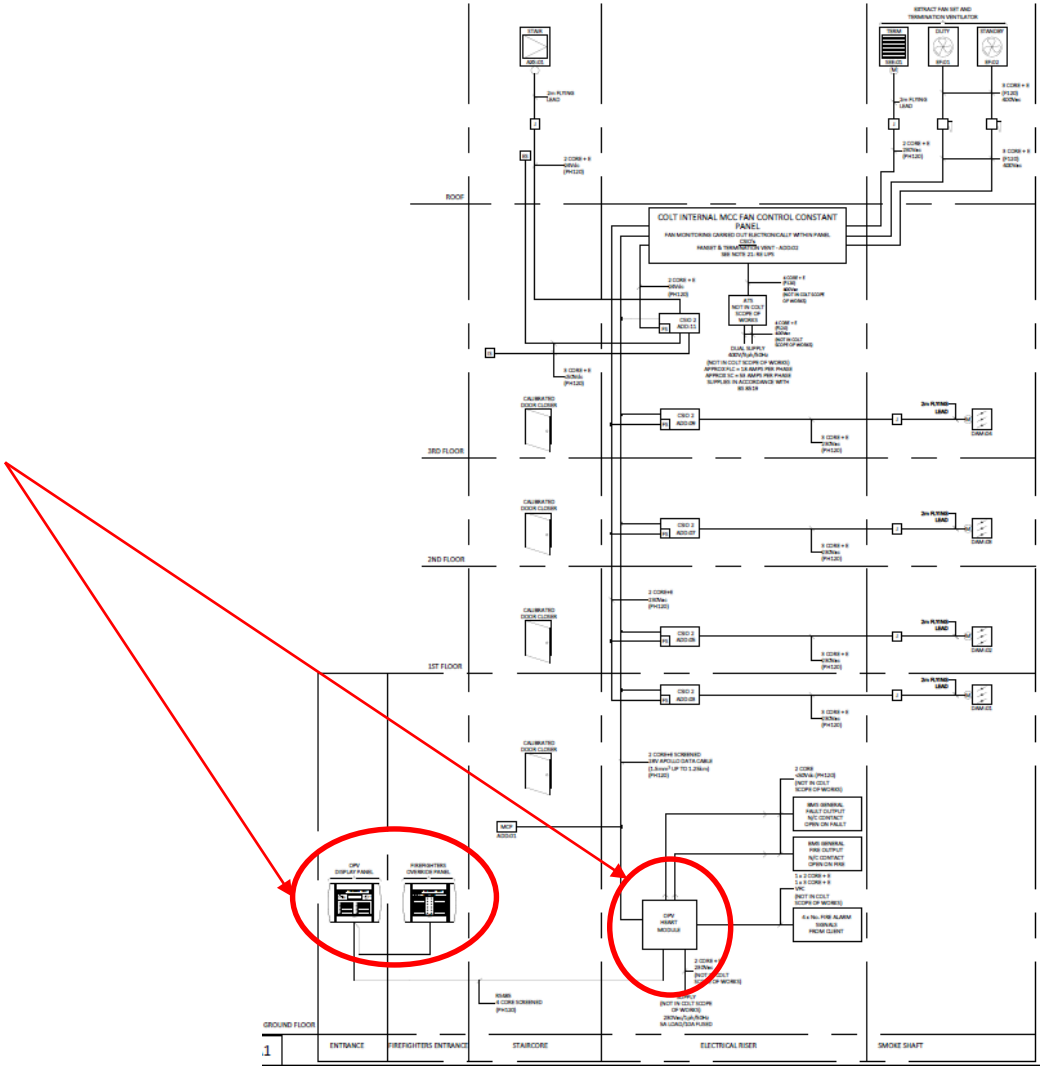
Typical Schematic



Example System

Anatomy of a control system for life safety smoke control 2018

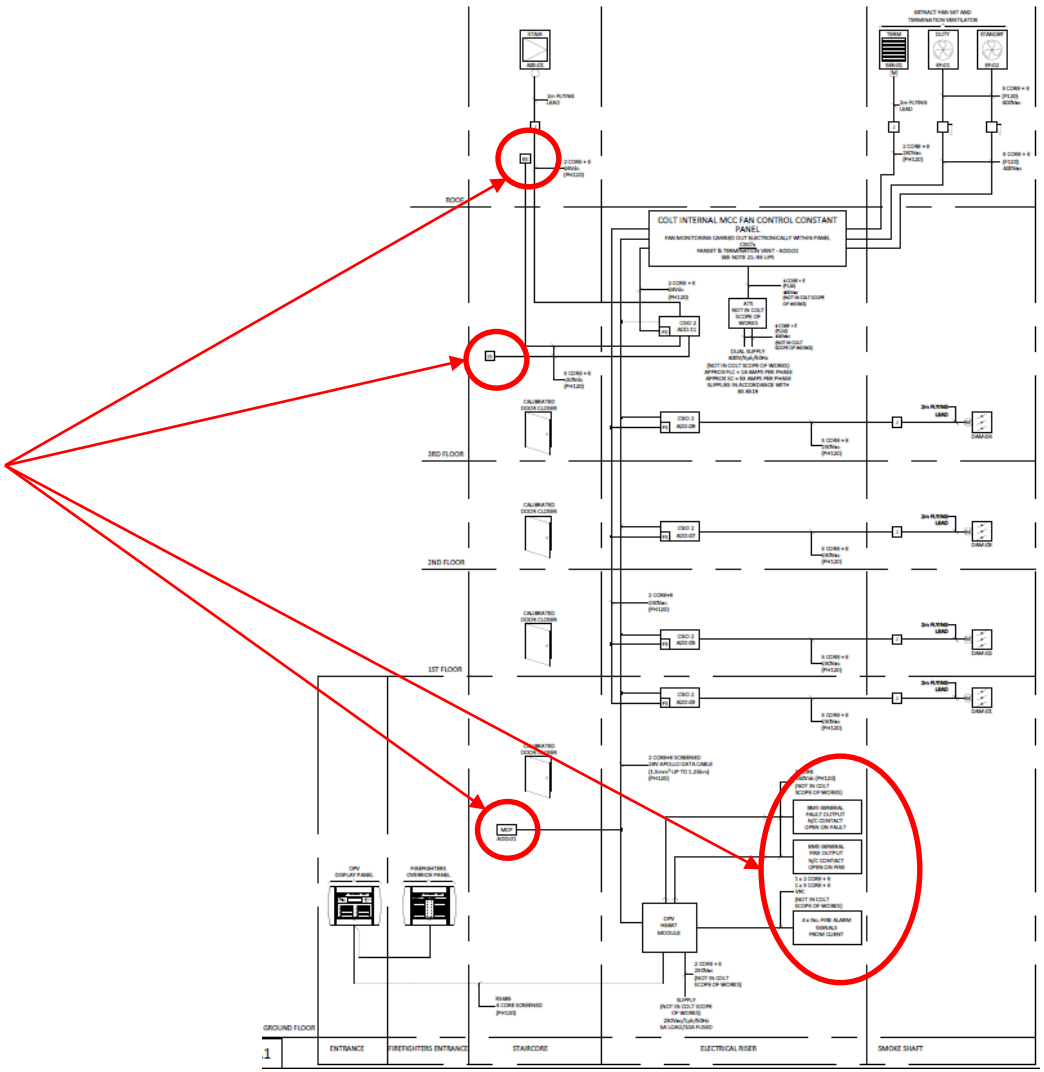
Brains



Example System

Anatomy of a control system for life safety smoke control 2018

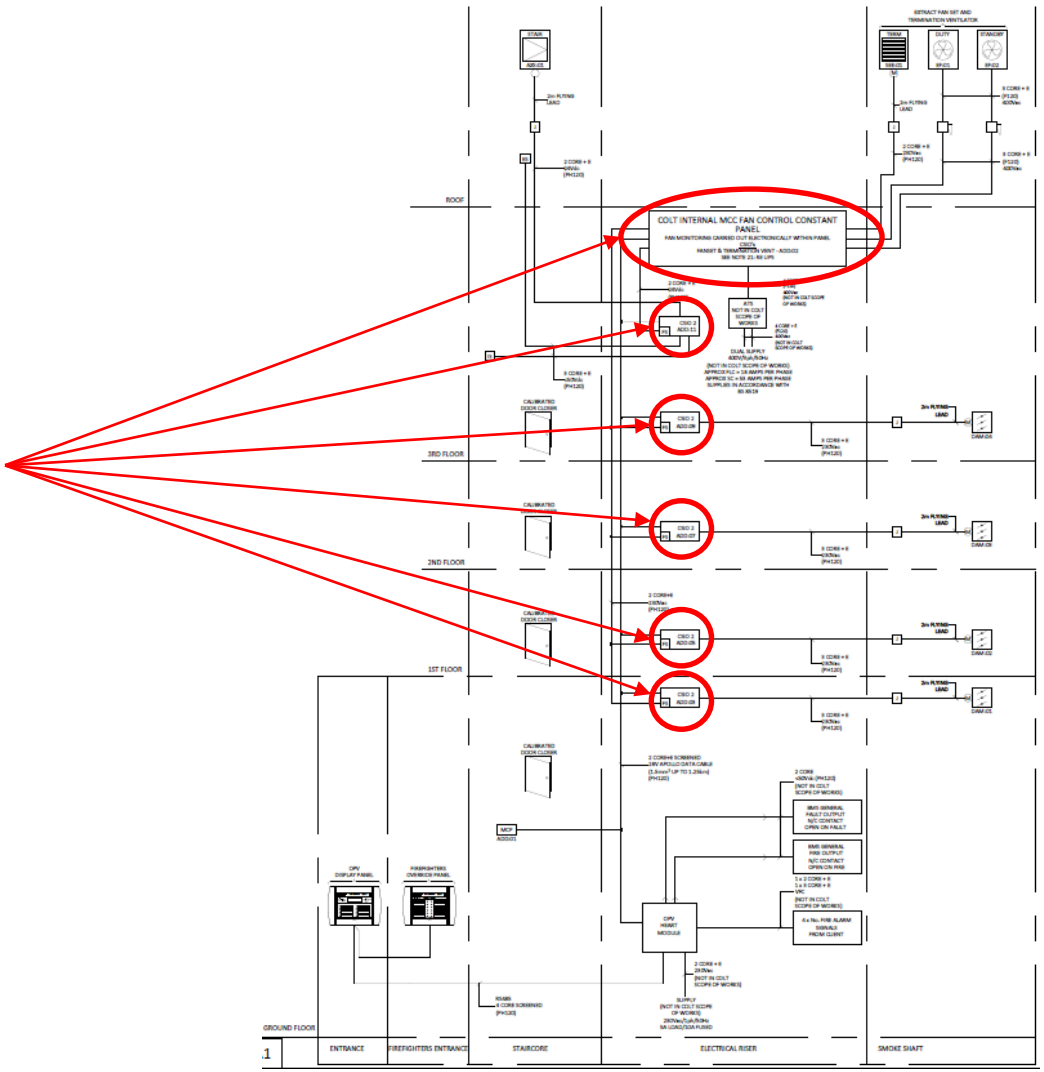
Eyes/Ears



Example System

Anatomy of a control system for life safety smoke control 2018

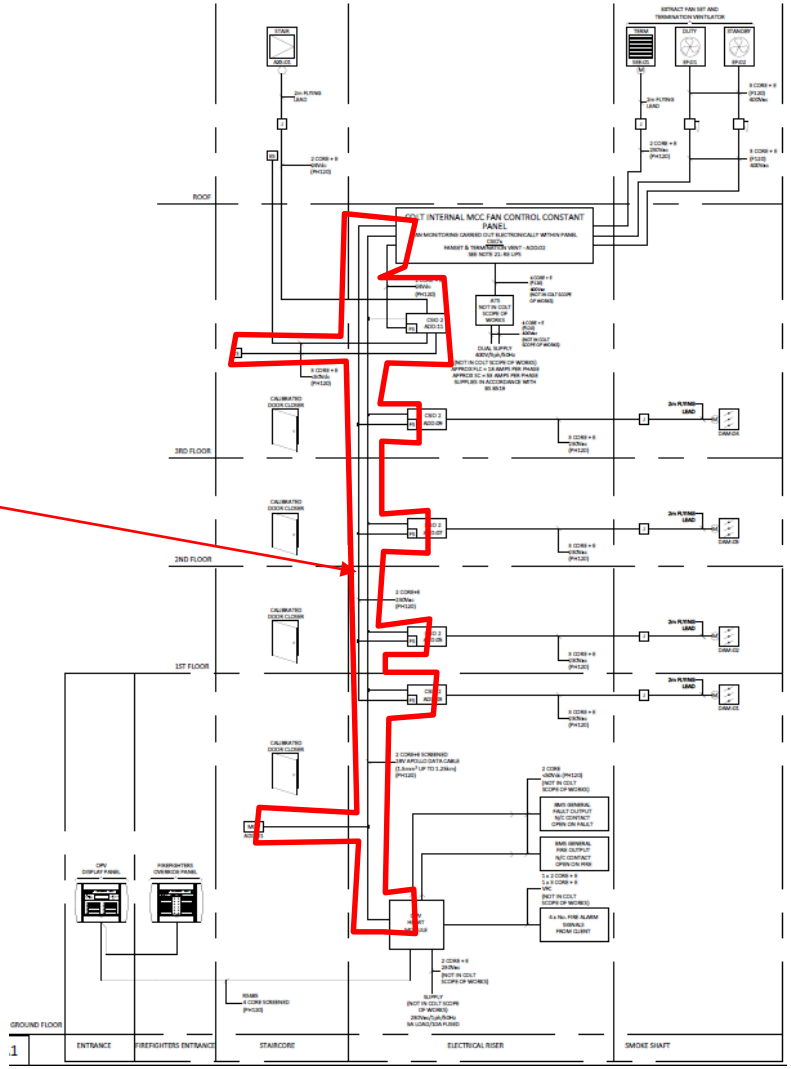
Muscles



Example System

Anatomy of a control system for life safety smoke control 2018

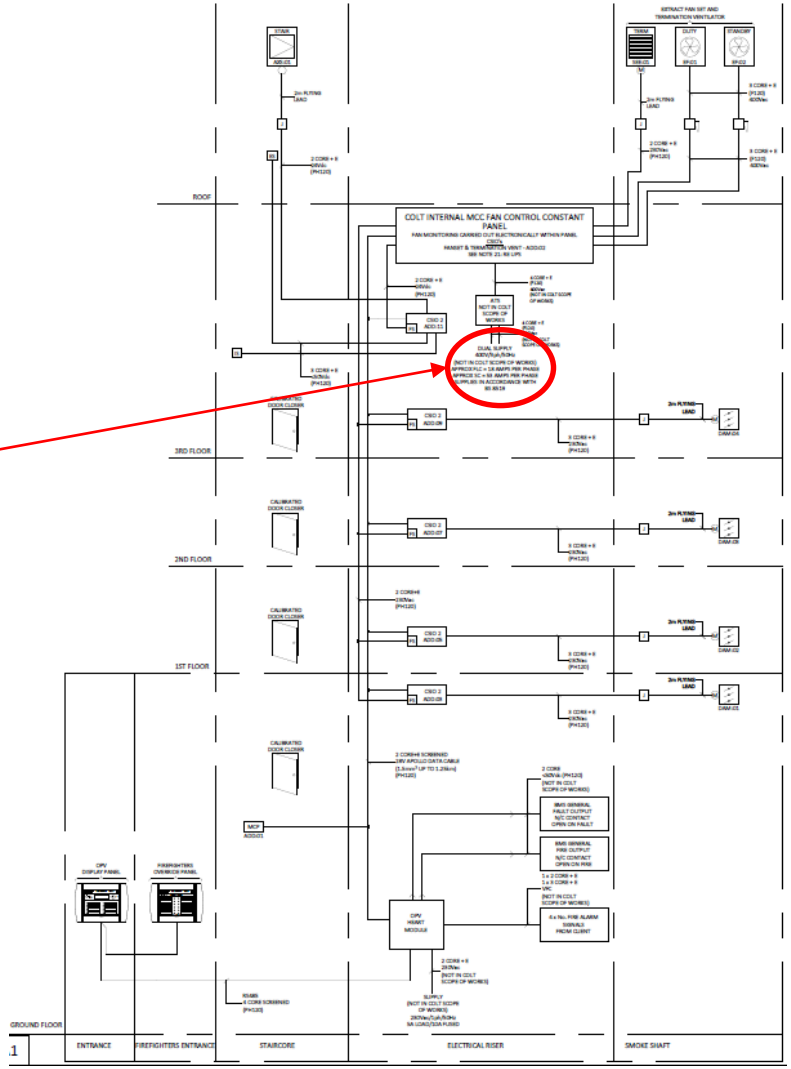
Nervous System



Example System

Anatomy of a control system for life safety smoke control 2018

Cardiovascular System



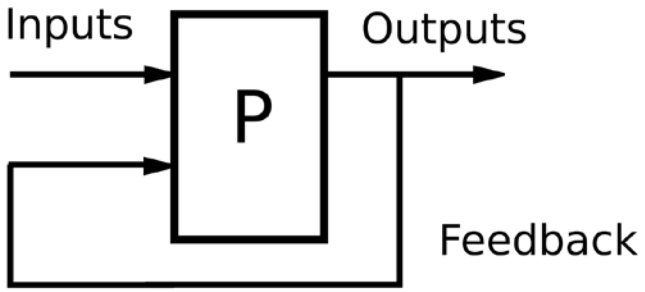
Cause & Effect

- Control logic for the system.
- Defines what happens under specific scenarios (smoke detector activation, switch activation etc.).
- Usually presented as a simple matrix.
- Allows project specific software to be programmed.

Apollo Addressable Network														
						Relay	OP: 00	OP: 00	OP: 00	OP: 00	OP: 00	-	OP: 00
						Address	ADD: 03	ADD: 04	ADD: 05	ADD: 06	ADD: 02	ADD: 02	ADD: 07
						Location	Smoke Shaft	Smoke Shaft	Smoke Shaft	Smoke Shaft	Smoke Shaft	Smoke Shaft	Stairwell
						Floor Level	Ground Floor	1st Floor	2nd Floor	3rd Floor	Roof Level	Roof Level	Roof Level
						Equipment	Smoke Damper (COL-DAM-L-01-001)	Smoke Damper (COL-DAM-L-02-001)	Smoke Damper (COL-DAM-L-03-001)	Smoke Damper (COL-DAM-L-04-001)	Smoke Extract Fans (COL-SF-L-RF-001&002)	Seefire Vent (COL-SEE-L-RF-001)	AXS 140 01
Operation	Floor Level	Location	Address	Terminal	Priority								
Default Condition	All	All	N/A	N/A	0		Close	Close	Close	Close	Off	Close	Close
Manual Call Point	Ground Floor	Corridor	ADD: 01	-	5		X	X	X	X	X	X	Open
Fire Alarm Signal Required Volume Flow Rate (m^3/s)							3.00	3.00	3.00	3.00	X	X	X
Fire Alarm Signal	Ground Floor	Corridor	Heart	-	5		Open	X	X	X	DOL	Open	Open
Fire Alarm Signal	1st Floor	Corridor	Heart	-	5		X	Open	X	X	DOL	Open	Open
Fire Alarm Signal	2nd Floor	Corridor	Heart	-	5		X	X	Open	X	DOL	Open	Open
Fire Alarm Signal	3rd Floor	Corridor	Heart	-	5		X	X	X	Open	DOL	Open	Open
OPV FOP Required Volume Flow Rate (m^3/s)							3.00	3.00	3.00	3.00	X	X	X
OPV FOP Button - Open	Ground Floor	Corridor	Disp. 1	BU: 01	6		Open	X	X	X	DOL	Open	Open
OPV FOP Button - Auto							Auto	X	X	X	Auto	Auto	Auto
OPV FOP Button - Close							Close	X	X	X	Off	Close	Close
OPV FOP Button - Open	1st Floor	Corridor	Disp. 1	BU: 02	6		X	Open	X	X	DOL	Open	Open
OPV FOP Button - Auto							X	Auto	X	X	Auto	Auto	Auto
OPV FOP Button - Close							X	Close	X	X	Off	Close	Close
OPV FOP Button - Open	1st Floor	Corridor	Disp. 1	BU: 03	6		X	X	Open	X	DOL	Open	Open
OPV FOP Button - Auto							X	X	Auto	X	Auto	Auto	Auto
OPV FOP Button - Close							X	X	Close	X	Off	Close	Close
OPV FOP Button - Open	3rd Floor	Corridor	Disp. 1	BU: 04	6		X	X	X	Open	DOL	Open	Open
OPV FOP Button - Auto							X	X	X	Auto	Auto	Auto	Auto
OPV FOP Button - Close							X	X	X	Close	Off	Close	Close

Testing and maintenance

- Smoke control is a life safety system, covered by the RRO. Testing and maintenance is covered by BS 9999:2017 Annex I
- Regular testing – weekly
- Three monthly full test
- Annual inspection and maintenance by a competent person

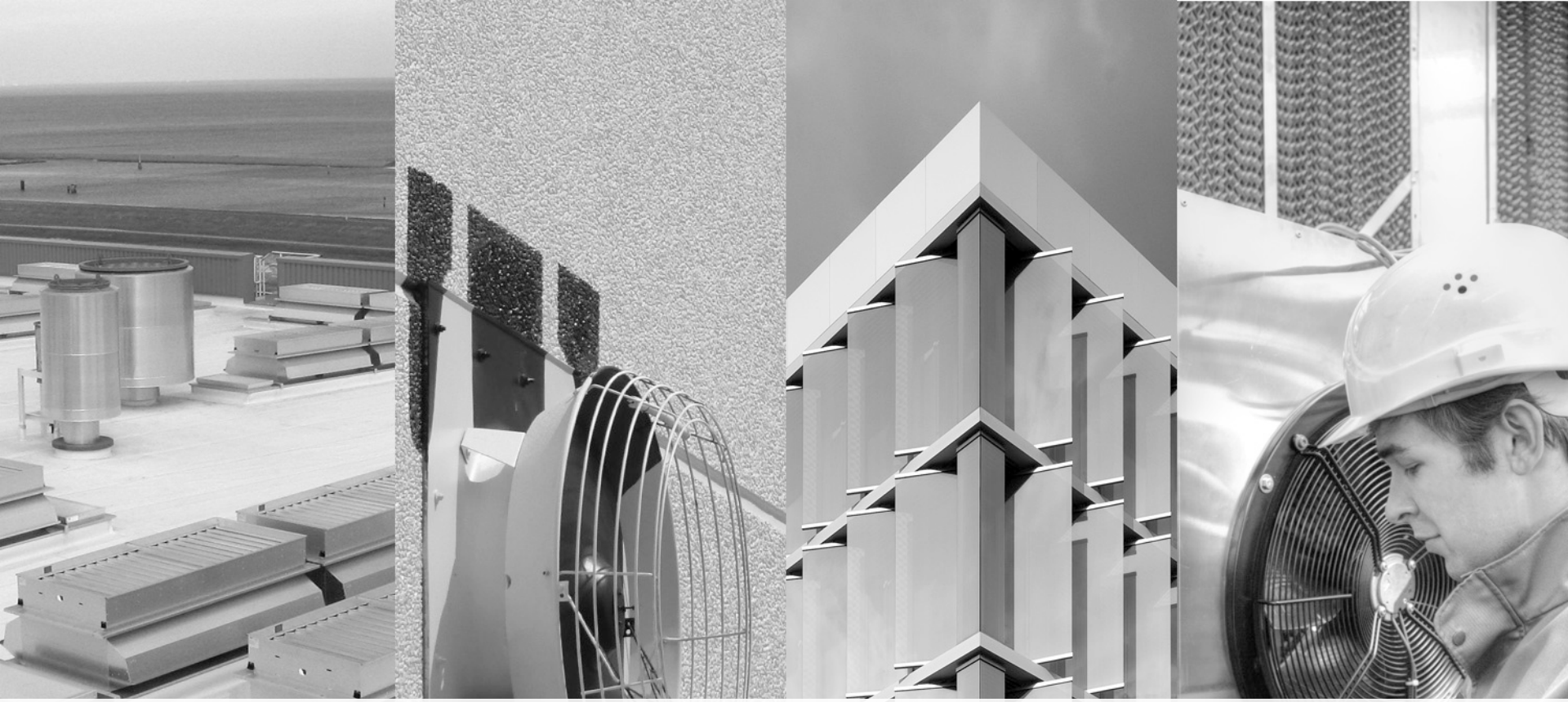


Things to Consider

- Avoid single points of failure.
- Feedback from equipment.
- Failsafe modes.
- Ease of use.

Summary

- A well designed control system is a lot like the human body:
  - Decision Making System (Brain).
  - Sensors & Detectors (Eyes/Ears).
  - Equipment & Devices (Muscles).
  - Cable Network (Nervous System).
  - Power Supplies (Cardiovascular System).
- All are required for a functioning system.



Q&A Session…