PYROBAN®

HOW TO CHOOSE CONTROL SYSTEMS FOR ATEX ENGINES, AND WHY.

WHITE PAPER

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How to choose control systems for ATEX engines, and why.

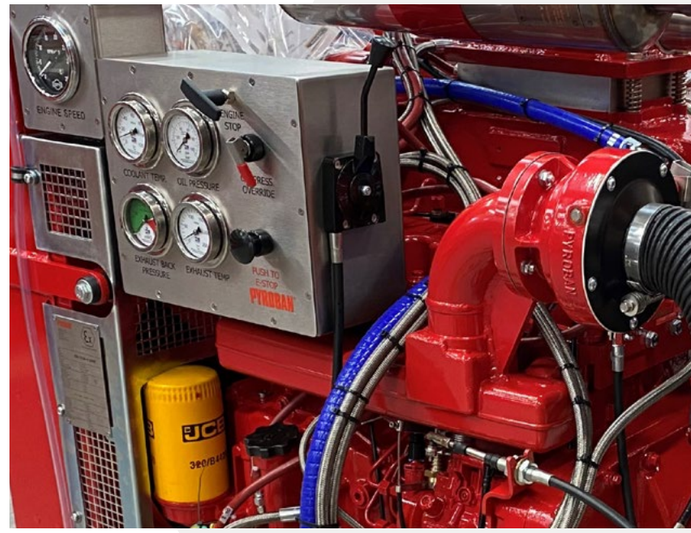
All explosion protected engines today will typically have one of three types of control system. This white paper explains the differences and shows what is possible when specifying a diesel engine to power your well service equipment in hazardous areas.

While most pre-built ATEX* engines (i.e Pyroban HazPaks) and Pyroban kits have some form of control system as part of the standard scope, most customers chose to upgrade the control system to suit specific project requirements.

To determine what's needed, engine size, type and the application are the key considerations.

This document looks at the three main options for engine packagers.

- Mechanical hydraulic / pneumatically actuated
- Passive - with multi inputs
- Active - with multi inputs

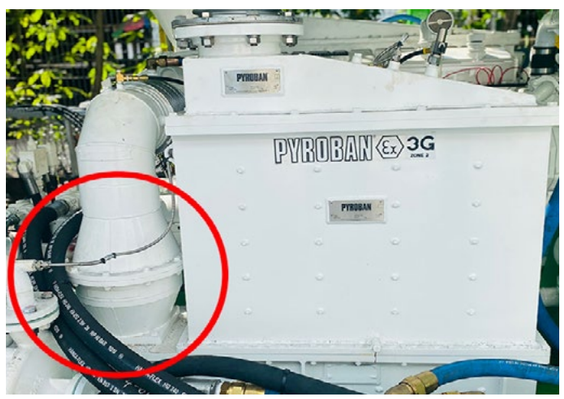


*ATEX 2014/34/EU (also known as ATEX 114) is a European Directive that relates to equipment and protective systems intended for use in potentially explosive atmospheres.

OPTION 1

MECHANICAL HYDRAULIC / PNEUMATICALLY ACTUATED SAFETY SHUTDOWN SYSTEM AND ENGINE CONTROL PANEL

A collection of fully mechanical devices will provide automatic engine shutdown on overspeed, high exhaust temperature, high coolant temperature and low oil pressure. This setup is suitable for mechanical engines and requires no electrical power.



One of two Cat® 3406 engines with "Pyroban kits" featuring a standard hydraulic engine control system and Ever Clear™ in Singapore. The engines power two 180k nitrogen pumps in ATEX Zone 2 hazardous areas offshore.

Take control of maintenance

To take better control of an explosion protected engine, maximise uptime and avoid the daily cleaning of exhaust flame arrestors, a standard control system can be used in conjunction with Pyroban's Ever Clear™ flame arrestors.

As a direct replacement for the traditional "plate type" flame arrestors, Ever Clear puts a stop to the 8-hour cleaning routine which would normally have to take place to unclog the build up of soot. Cleaning solvent waste is eliminated along with manual handling associated with the cleaning routine.

Only suitable for turbo diesel engines above 100bhp, Ever Clear also prevents "dummys" from being used, helping to ensure ongoing safety.

OPTION 2

PCS2™ - ENGINE CONTROL SYSTEM FOR ELECTRONIC ENGINES

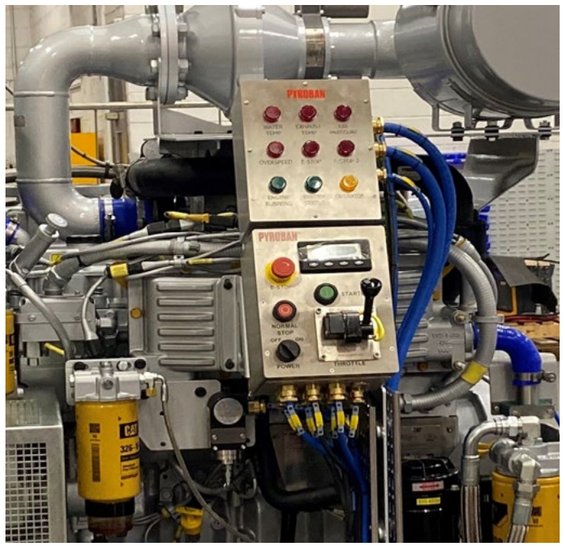
For more advanced electronic engines, control systems are available that can be configured to monitor a variety of sources.

For example, Pyroban PCS 2 is an adaptable safety shutdown system that offers:

- Two temperature inputs
- One pressure input
- One speed input
- Two emergency stop inputs.

These inputs enable PCS2 to protect against engine overspeed, over temperature, loss of oil pressure and provide the emergency stop facility.

Depending on the activation method and potential explosion risk, fuel shut-off or air and fuel shut-off will occur through activation of air inlet and fuel shut-off valves on the engine. The air shut-off valve can be actuated pneumatically or electrically.



The project above was for a major NOC in South America and features a Pyroban C9 engine from the HazPak 350 range of pre-built, fully certified ATEX powerpacks.

The PCS2 ATEX engine control system includes a flameproof enclosure containing the electronic circuit boards and cabling glands for the input switches and shut-off valves (red ex d enclosure seen above). The control circuitry receives inputs from the switches and sensors and controls the fuel and air shut-off valves accordingly.

A separate LED indicator panel shows the sensor and system status such as engine overspeed, over temperature, loss of oil pressure and more. The image above also shows the stop/start control and emergency stop facility.

PCS2 has "Zone 2" and "Zone 1" ATEX / UKEX / IECEx approval and allows explosion protected diesel engines and power systems to be safely operated in a Zone 2 certified hazardous area.

Like the standard hydraulic control system, PCS2 can also be used with Ever Clear long life exhaust flame arrestors.

OPTION 3

EX-SCS™ - ALL IN ONE SAFETY AND ENGINE CONTROL SYSTEM WITH GAS DETECTION

The control system with the most features and benefits includes Pyroban's Ex-SCS™ engine control system which helps operators take an active approach to the overall safety system and combines ATEX safety shutdown with diesel engine control and monitoring.

"...A safety shut-down is triggered on detection of a flammable gas...

A key difference is that there is no need for any exhaust flame arrestors as it features gas detection. The control system can also include lots of other inputs making it easy to incorporate additional driven equipment controls such as pumps, generators, transmissions, or the well head platform's DCS (distributed control system).

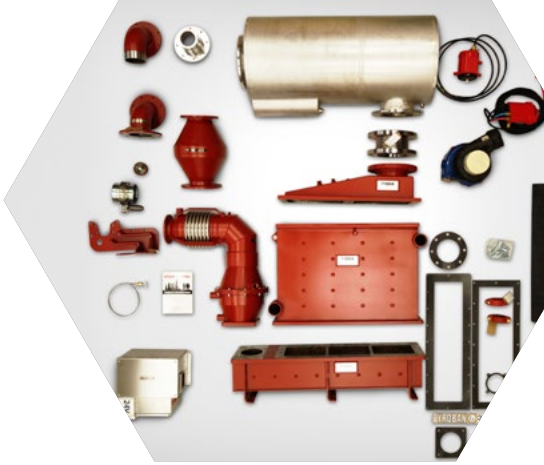
For example, the Ex-SCS application on two Cat® C18 diesel powerpacks in Egypt (in picture on left) includes driven equipment parameters such as seal pressure, gearbox and pump vibration, gearbox oil temperature and pressure, diesel day tank level, suction and discharge pressure.

Ex-SCS features infrared gas detection and is a 100% stand-alone safety control system for ATEX 2014/34/EU compliance. A safety shutdown is triggered on detection of a flammable gas in the engine air inlet or in the atmosphere, diesel engine over speed, high exhaust gas and coolant temperatures, low oil pressure or on manual emergency stop activation, for example.

A colour 15" touchscreen HMI displays the current safety status and the diesel engine control and monitoring screens can also be integrated. For example, equipment controls or sensors can all be fed into Ex-SCS. Viewable under direct sunlight the resistive touch screen can be operated with gloves on. It's ideal where there are few restrictions on control panel size and permits a clearer layout.

No exhaust flame arrestors are needed (Plate-type or Ever Clear) reducing maintenance costs and giving operators the assurance of ongoing safety through the life of equipment. It means there is no reliance on an exhaust flame arrestor being fitted when in operation – which can sometimes be dangerously swapped out for a "dummy". Manual handling issues also disappear.

All three types of control system are available for ATEX engine packages (HazPaks) and Pyroban kits for engine brands such as Caterpillar, Cummins, JCB, Volvo, DDC, MTU, Perkins and more. All Pyroban Kits and HazPak packages are designed and manufactured to be robust and reliable in harsh operating conditions and corrosive environments found in the oil and gas industry



Typical explosion proof kit from Pyroban featuring Ever Clear

“By eliminating the need for plate type exhaust flame arrestors, operators reduce downtime and improve productivity straight away.

Manual handling and environmental compliance issues also disappear because you have removed the need to regularly change the heavy flame arrestors and clean with solvents, offshore. The dangers of “Dummy” arrestors are also avoided.”

Lewis Cleary, Ex Power Systems, Pyroban Ltd

EVER CLEAR™

Ever Clear™ exhaust flame arrestors developed by Pyroban are a direct replacement for the plate type flame arrestors found in Pyroban explosion protected diesel engines.

Costing as little as half the annual cleaning costs of a plate type exhaust flame arrestor, they are suitable for new, or existing, Pyroban protected turbo diesel engines above 100bhp. Tested in accordance with EN1834-1:2000 and suitable for T3, IIA & IIB gas groups.

Ex SCS™

Pyroban’s Ex SCS™ is an active approach combining flame arrestor elimination, safety shutdown and diesel engine control and monitoring into one flexible package. It features infrared gas detection and is a 100% stand-alone safety control system for ATEX 2014/34/EU compliance.

PYROBAN®

PIONEER® SAFETY GROUP

ABOUT PYROBAN

Pyroban provides explosion protection solutions for materials handling equipment and diesel engines and is a founding member of the Pioneer Safety Group. For over 50 years Pyroban has been at the forefront of the industry developing products to protect your people, your site and equipment when operating in hazardous areas.

QUALITY

Additional to the ISO9001:2015 quality standard certification, each Pioneer Safety Group company attains the required level of 3rd party certification for the business markets it serves including ATEX, IECEx and UKEX.

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