Experts in fire protection

MachineToolProtect
Compact fire protection for machine tools

SPECIAL SOLUTIONS

MACHINETOOLPROTECT

Damage caused by fire to machine tools

In many production areas, workpieces are manufactured by automatic machine tools. This includes turning, grinding, honing or drilling machines. These machines consist as a rule of a work area, hydraulics room, tool magazine, transport area for the material input and output, and exhaust systems. If a fire starts, this can quickly spread to other production areas. Long interruptions to business and high costs are often the result.

Increasing quality requirements and processing speeds increase the fire risk from machine tools. In particular, machine components that are rotating too quickly, a tool break or jammed workpieces can lead to an unwanted generation of heat. Furthermore, overloaded or damaged components such as drive motors, failure of the exhaust system or media transportation may be the cause of a fire. Fires can spread quickly in production areas via connected extraction equipment. If flammable cooling agent lubricants are used for the cooling process, a deflagration may result from the spray. If for example a metal cut is too strong due to defective machine control, the workpiece will become so hot that it will ignite the coolant lubricants or the aerosol mist. Furthermore, there is also the danger of a metal fire when processing light metals or their alloys.

The requirement for dependable fire protection of machine tools is a solution that takes into account all safety-related matters. MachineToolProtect combines fire alarm technology with extinguishing technology tailored to the application into an integrated and compact solution. The MachineToolProtect system can be designed as a conventional fire extinguishing system. In particular, for machine tools with low risk of material and environmental damage, the design has proved itself as a stand alone extinguishing system.

From the operator's point of view a solution is required which can detect emerging fires in good time and fight them in a targeted manner. Beyond this, a protection design is desirable that enables coordinated fire protection for production areas that merge into one another and at the same time is suitable for the protection of individual machine tools. Peripheral areas such as switch cabinets and oil processing should also be included in the fire protection scheme.

Minimax has the corresponding compact solution: MachineToolProtect.

Compact extinguishing system
MachineToolProtect can be installed and used as a compact extinguishing system immediately next to a machine tool. MachineToolProtect can be quickly connected via standardized connections to a cable and pipe network. The high degree of prefabrication and the quick and simple installation make the compact extinguishing system an economic and effective alternative to conventional systems.

Extinguishing agents
MachineToolProtect is designed for the use of various extinguishing agents. In practice gas extinguishing systems using argon and CO_2 as extinguishing agents, and water mist suppression systems, have proven their worth for the fire protection of smaller machine tools.

Detection and signal transmission
Detection is carried out in all system versions by UniVario flame, spark or heat detectors. All types of detectors identify fires in good time and thus make rapid action possible. They transmit their signals to an extinguishing control panel, which alerts persons at risk and the fire department as well as reliably providing the competent authorities with all relevant information.

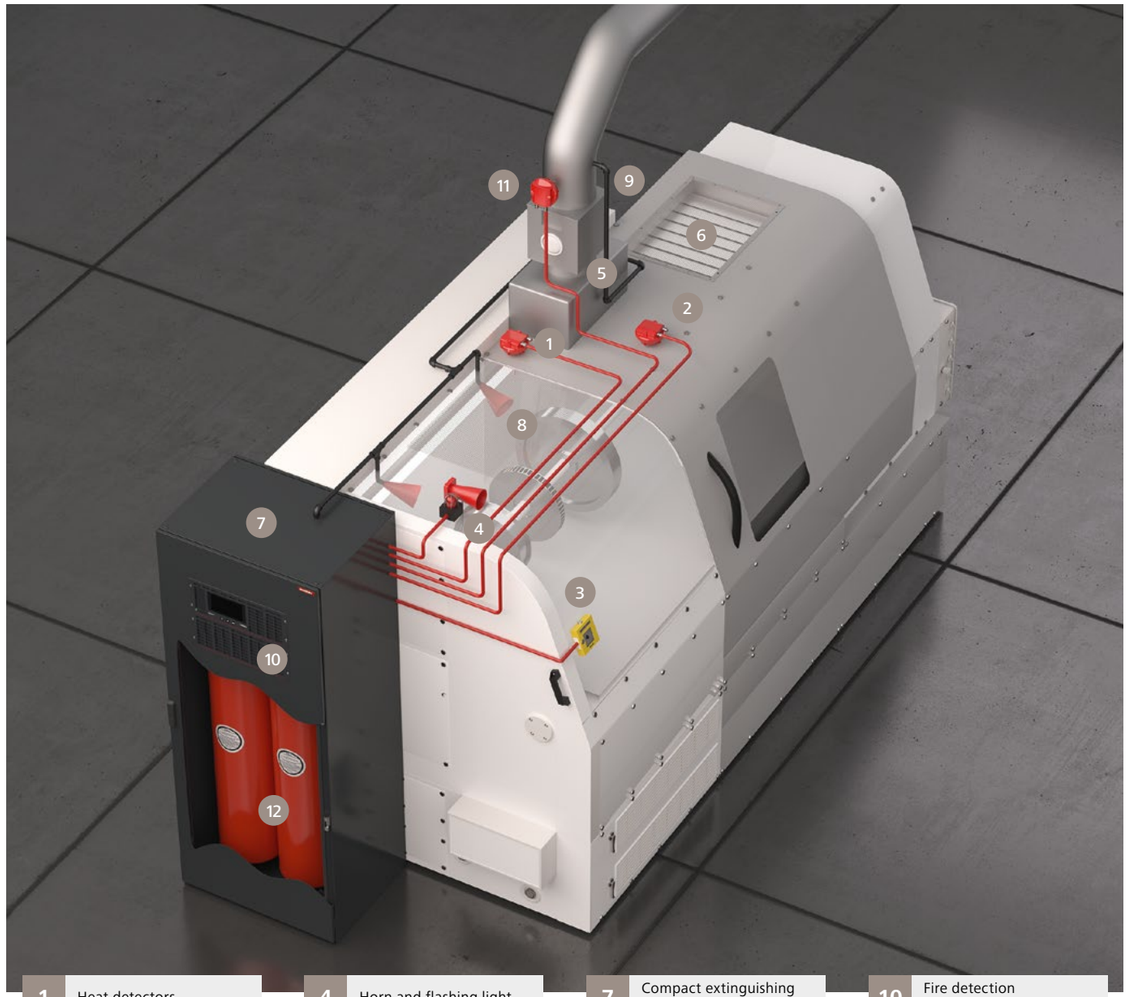
Compatibility
Interface problems are avoided thanks to the compatibility of all electrical and mechanical system components. Consequently the coordination of the technologies used by MachineToolProtect simultaneously enables comprehensive and therefore dependable protection for machine tools and their periphery.

Proven systems with performance level d
All MachineToolProtect versions meet the relevant safety regulations of the Employers' Liability Insurance Association and allow expert acceptance, meeting the specific requirements of the machinery directive as a safety component. DIN EN 13849-1 Performance Levels (PL) up to d are reached for safety functions.

MachineToolProtect is based on nationally and internationally certified systems (VdS and FM) and approved components.

Design and function

MachineToolProtect – system versions for every requirement
To avoid longer operational outages from fire damage to machine tools, rapid fire detection and targeted extinguishing are crucial. This ensures that fires already in progress are rapidly detected and extinguished – even with the complex geometry of a machine tool or adjacent production lines.



1	Heat detectors	4	Horn and flashing light	7	Compact extinguishing system	10	Fire detection control panel
2	Flame detectors	5	Exhaust air-/ fire damper	8	ObjectProtect nozzle	11	Spark detector
3	Manual release	6	Explosion relief	9	Nozzle built into exhaust air channel	12	Extinguishing agent supply

Gas extinguishing equipment

MachineToolProtect with gas extinguishing equipment
Oxygen-displacing extinguishing gases are always the right choice if a residue-free extinguishing and consequently very rapid reactivation of the machine tool are to be achieved. The extinguishing gas is supplied in high-pressure steel cylinders in the vicinity of the machine tool. The extinguishing agent is fed via nozzles which are installed in the processing area of the machine. Since the extinguishing agent is only used in the machine, generally outside the machine there is no concentration that could be hazardous to people. In work spaces which can be entered, safety features in the machine door locking ensure the necessary life safety.

For risks in light metal working the extremely inert noble gas argon is the only optimally usable extinguishing agent.

In contrast to carbon dioxide and nitrogen, it can be used effectively with combustible metals. For this application Minimax offers solutions tailored to the particular case, and these have proved themselves in practice.

1	Heat detectors	4	Horn and flashing light	7	Independent extinguishing agent supply unit	10	Spark detector
2	Flame detectors	5	Exhaust air-/ fire damper	8	Fire detection control panel		
3	Manual release	6	Explosion relief	9	Minifog fine spray nozzle		

Design and function
Minifog ProCon water mist technology

MachineToolProtect with
Minifog ProCon water mist technology

Minifog ProCon water-based extinguishing systems are based on low pressure and are a particularly efficient alternative for MachineToolProtect compact extinguishing systems. The extinguishing water is finely sprayed via Minifog ProCon impulse nozzles so these systems manage with little extinguishing water. The water supply and pipe network can accordingly be made small. If no existing water supply can be used, alternatively a water supply is possible via a supply tank with automatic additional feed and pump system.

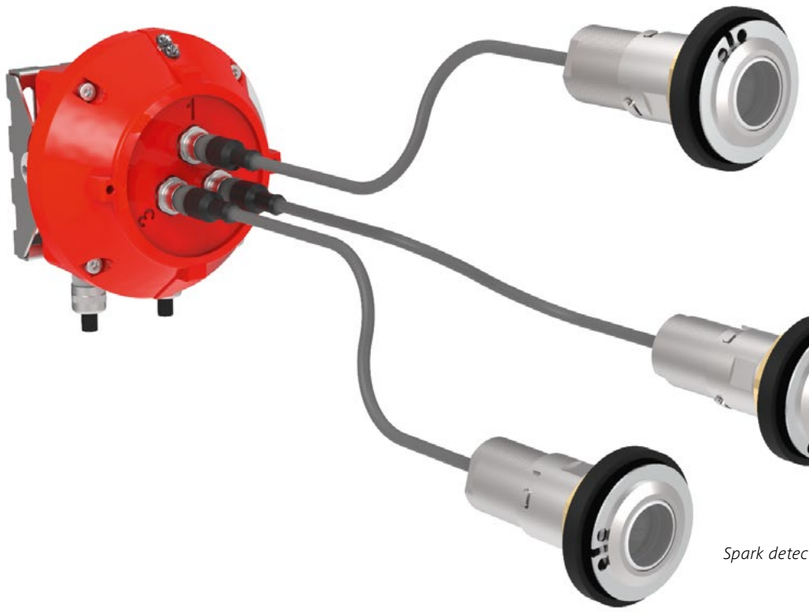
The particularly small drops cause an enlargement of the total surface of the extinguishing water and lead to an increase in the contact surface for heat transfer. This significantly improves the cooling capacity of the water. In addition large amounts of steam are immediately created by the very sudden vaporization of the small water droplets in the area of the flame, which hinder the supply of oxygen to the fire. The extinguishing principle, which works by means of cooling- and smothering effect, allows particularly effective fire-fighting with reduced use of extinguishing water.

Fire detection

Fire detection
Fires are detected within the internal areas of a machine tool by means of intelligent UniVario flame detectors. Depending on the requirement and choice of product, these respond to infrared or UV radiation and are fitted with an integrated flushing and visual monitoring of optics. Due to their robustness and reliability they are ideal for use on machine tools. As a supplement and/or alternative, detection may be carried out using UniVario heat detectors.

Fire detection and suppression control
Fire control is taken over by the extinguishing control panel. If detectors detect a release by fire, they send a signal to the extinguishing control panel. Which then activates the extinguishing process, simultaneous activating the audible and visual alarms. For additional safety a push button detector for manual activation is installed, for example, on the control panel.

The extinguishing system can also be operated at the fire detection and extinguishing control panel and so allows unified and user-friendly operation. In order to ensure permanent access to operation and data, the fire detection control unit should be positioned in a permanently manned position. If this cannot be implemented, there is an option of forwarding main signals to mobile end devices.



UV flame detector

IR flame detector

Spark detector

Fire detection and suppression control

Clunid FMZ6000 fire detection and suppression control panel

A solution for every area

Prerequisite for successful extinguishing is the integration of the work equipment control and power down which also prevents damage to the machinery from uncontrolled switch-off.

Work equipment power down and control
In addition to the machinery, in the event of a fire MachineToolProtect can switch off the medium feed, exhaust air and sealing air in a set sequence. Generally butterfly valves and compressed air solenoid valves are closed first and the machine is powered down in a controlled manner via the extinguishing control panel and the machine's PLC.

Exhaust air and exhaust air butterfly valve
In addition upon activation of the extinguishing system the exhaust system must be powered off. For machinery with connections to central exhaust systems, a butterfly valve must be installed into the machine exhaust to protect the exhaust system against fire spreading into it.

Locking and blocking
An automatic locking mechanism for the machine controls is required so that the activation for the extinguishing system is interrupted by a safety locking switch when the housing doors or inspection flap are opened.

This way no activation can occur with the door opened and the machine cannot start operating. In addition, an automatic disablement of the extinguishing system as per the Employers' Liability Insurance Association directive is provided which prevents danger to persons from accidental activation of the extinguishing system. Minimax has a patented system solution for this which meets all requirements of safety level d.

Explosion relief
Pressure relief devices in the machinery housing limit the pressure at a very early stage of a deflagration and/or explosion process to a safe level. In the event of a deflagration they release an opening through which the pressure and the flames can escape. This prevents doors from being blown open, windows being blown out or the housing being damaged. Suitable flame barriers prevent a flame impingement from the escape opening to adjacent tracks or areas.

CPS 1230 Cabinet Protection Systems

One-stop all-round protection

CPS 1230 Cabinet protection systems
Switch cabinets are located in the immediate vicinity of machine tools and accommodate electronic and electrical components in the smallest of spaces.

CPS 1230 extinguishing systems protect such cabinets when a fire starts in their interior due to short circuit, overload, overheating or component failure. In the event of fire CPS 1230 extinguishing systems protect not only the cabinets themselves but also protect the fire from spreading to machine tools in their environment.

Spark suppression system
Protecting the exhaust cleaning system
In the extraction and transport devices of wood-working machines, sparks or pockets of embers must be quickly detected and extinguished. Spark suppression systems detect potential sources of ignition and in a flash generate a water spray curtain via an extinguishing unit in order to extinguish sparks or glowing particles. They are thus always the ideal solution if there is a high risk that sparks and pockets of embers end up unnoticed in other areas and cause a fire there. Spark detection occurs via UniVario YMX5000 monitored spark detectors that react to the infrared radiation of passing potential sources of ignition. The detector continuously monitors its electronics for functioning and its optics for obstructed visibility. Faults are automatically transferred to the control panel. If increased operating temperatures are to be expected in certain areas, monitored spark detectors with infrared cables for thermal isolation will be used.

Minimax is a pioneer in the development of spark suppression systems and offers spark suppression systems with VdS approval and also with FM system approval. Its protection strategy has been successfully tried and tested in thousands of applications worldwide.

All-Round Protection
MachineToolProtect combines fire detection-, water mist or gas extinguishing technology and spark suppression technology into an integrated solution. Minimax offers fire protection that is individually coordinated to the various protection zones.

Advantages at a glance

- MachineToolProtect is the right solution for both woodworking and metal working machines
- Highest level of life safety - the safety functions meet Performance Levels up to d
- MachineToolProtect is based on nationally and internationally certified systems and components
- Integrated and cross-process solution for machines and filter systems
- Operation even under tough environmental conditions
- Central extinguishing agent supply usable for single and multi-zone systems
- Briefest downtimes thanks to extremely rapid fire detection and protection of investments

MachineToolProtect gas extinguishing technology:

- Suitable for materials such as metals, light metals, alloys and machinery with combustible cooling lubricants (CLs)
- Extinguishing medium optimally matched to the particular material
- Highest level of life safety thanks to reliable equipment and controls
- Rapid fire fighting without extinguishing agent residues – no damage to electrical and electronic equipment
- Control of residual risks such as metal chip fires possible
- Rapid reactivation of the machine after successful extinguishing

MachineToolProtect water mist extinguishing technology:

- Suitable for materials such as wood, plastic and metals and machinery with combustible cooling lubricants (CLs)
- No hazard to persons
- Self-sufficient water supply, easily refillable
- Connection to local water supply possible
- Low expenditure for water supply and pipe network installation
- Ideal for retrofits

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