MECHANICAL IGNITION SOURCES: A POTENTIAL INDUSTRY BLIND SPOT

WOODCOCK & WILSON

INDUSTRIAL FAN SPECIALISTS

Hazardous Area Fan Specialists

INTRODUCTION: THE ELECTRICAL BIAS IN EX SAFETY

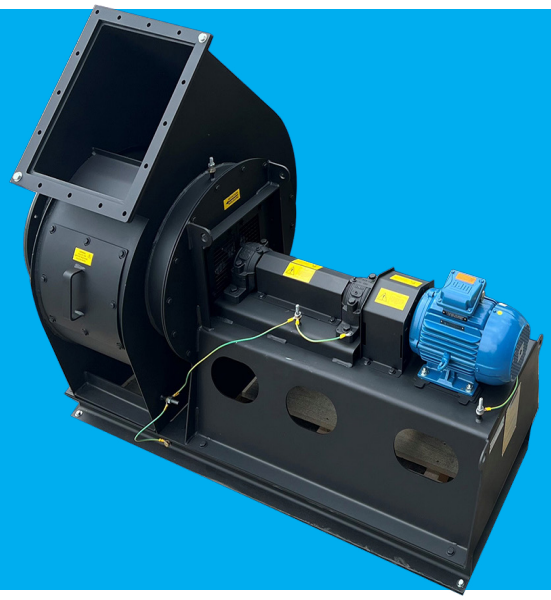
Discussions around explosion protection and hazardous area equipment often focus heavily on electrical ignition sources. Electrical apparatus is highly visible, well defined in standards, and widely understood as a potential cause of ignition. However, this focus can unintentionally obscure an equally important reality: non-electrical equipment is capable of generating ignition sources that are just as credible and, in some cases, more severe.

Independent bodies such as DNV/CSA (Sira) have consistently highlighted that effective ignition prevention must address all potential ignition sources, not only those associated with electrical equipment. In mechanical equipment such as industrial fans, compressors, gearboxes, and rotating machinery, ignition risks can arise from friction, hot surfaces, static electricity, or mechanical failure. Ignoring these risks undermines the fundamental objective of explosion protection.

UNDERSTANDING NON-ELECTRICAL IGNITION SOURCES

Non-electrical ignition sources are well recognised within international standards and guidance. These include external hot surfaces, mechanical sparks, frictional heating, electrostatic discharge, compression effects, shock waves, and exothermic reactions. Unlike electrical faults, which may be intermittent or externally visible, mechanical ignition sources can develop progressively through wear, contamination, misalignment, or changes in operating conditions.

Standards such as ISO 80079-36 and ISO 80079-37 provide a structured framework for identifying and assessing these risks. The intention is not to treat non-electrical equipment as inherently dangerous, but to ensure that potential ignition mechanisms are identified, assessed, and controlled through design, material selection, operating limits, and where necessary, independent validation.



COMPLIANCE VERSUS IGNITION PREVENTION

A critical distinction highlighted by all certification bodies is the difference between regulatory or scheme compliance and genuine ignition prevention. Compliance with a directive, scheme, or statutory marking requirement does not automatically mean that equipment cannot act as an ignition source.

Certification schemes define how technical requirements are demonstrated and documented. Ignition prevention, however, remains an engineering challenge that depends on how equipment behaves under normal operation, foreseeable faults, and abnormal conditions. This distinction is particularly important for non-electrical equipment, where ignition risks are often application-specific and influenced by mechanical design choices rather than discrete protection concepts.

In practice, compliance should be viewed as a minimum framework, not as a substitute for technical understanding of ignition risk.

ASSEMBLIES MATTER: THE CASE OF INDUSTRIAL FANS

Industrial fans provide a clear example of why a holistic approach to ignition prevention is essential. A fan is an assembly comprising electrical components, rotating mechanical parts, bearings, shafts, impellers, casings, coatings, and interfaces with the process environment.

While electric motors may be certified to the IEC 60079 series, the mechanical fan assembly introduces additional ignition risks that fall outside purely electrical considerations. These risks include friction between rotating components, particle ingress leading to mechanical sparking, surface temperature rise due to abnormal loading, and static electricity on non-conductive surfaces.

Under the IECEx system, assemblies require non-electrical components to be assessed or effectively certified as part of the assembly certification process. This reinforces the principle that ignition prevention must consider the complete equipment, not only selected components.

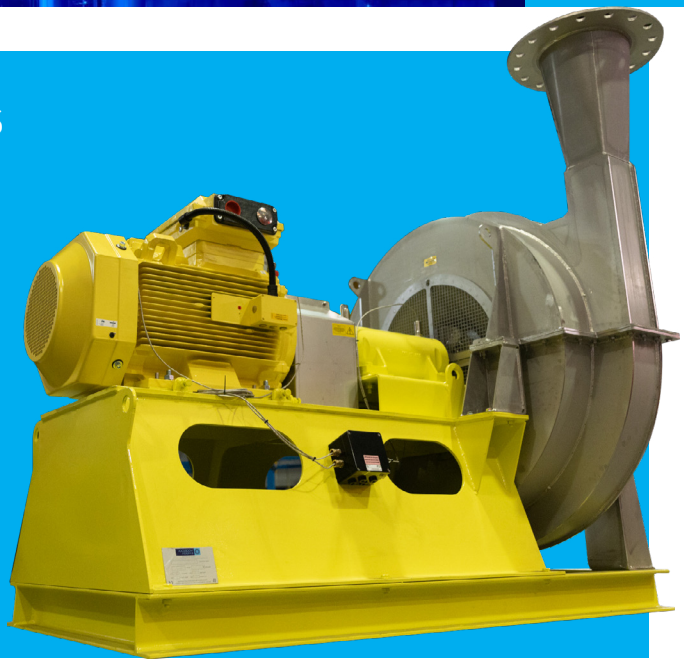
MECHANICAL IGNITION SOURCES: A POTENTIAL INDUSTRY BLIND SPOT

NON-ELECTRICAL ASSESSMENT AS AN ENGINEERING DISCIPLINE

Effective non-electrical ignition prevention relies on disciplined engineering practice. This includes systematic ignition risk identification, assessment of normal and fault conditions, validation against applicable standards, and documentation of limitations and assumptions.

Key considerations include material selection, avoidance of light metals where appropriate, control of surface temperatures, management of clearances, treatment of coatings and finishes, and mitigation of static electricity. Where ignition risks are controlled through design features or operational limits, these must be clearly defined and communicated to ensure they remain effective throughout the equipment's life.

This process is not simply an extension of electrical certification, but a distinct technical discipline in its own right.



A MANUFACTURER'S PERSPECTIVE: BEYOND MINIMUM COMPLIANCE

From a manufacturer's perspective, managing non-electrical ignition risk means moving beyond a purely declarative approach to compliance. It requires conservative design decisions, investment in testing and validation, and a willingness to apply independent certification routes where the application demands a higher level of assurance.

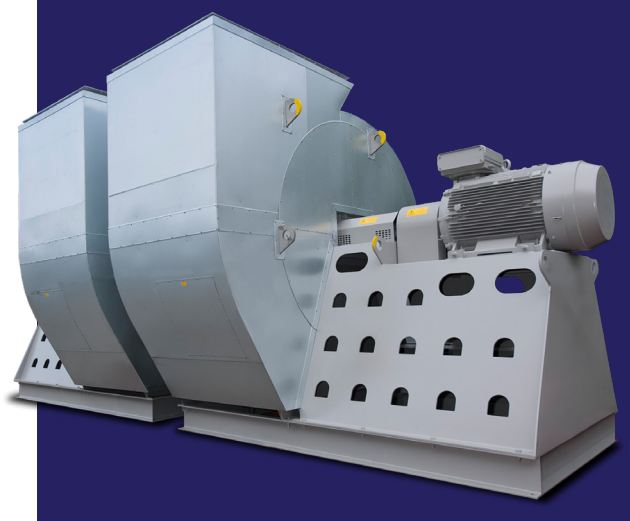
At Woodcock & Wilson, this philosophy has led to the application of independent certification for complete fan assemblies where specified, including the assessment of mechanical elements alongside electrical components. The objective is not certification for its own sake, but confidence that ignition risks have been properly understood, controlled, and verified.

This approach reflects an understanding that hazardous-area equipment is ultimately judged by how it performs in service, not solely by the markings on its nameplate.

RAISING AWARENESS WITHOUT RAISING ALARM

The intention of highlighting non-electrical ignition risks is not to undermine existing regulatory frameworks or create unnecessary alarm. International standards already recognise these risks, and robust tools exist to manage them effectively.

What is often missing is awareness. Specifiers, engineers, and end users may reasonably assume that compliance markings imply a comprehensive assessment of all ignition sources. Improving understanding of certification scope and the role of non-electrical assessment supports more informed decision-making and better alignment between risk, application, and assurance level.



CONCLUSION: IGNITION PREVENTION IS A SYSTEM RESPONSIBILITY

Ignition prevention in hazardous areas does not stop at the motor terminal box. It extends across the entire equipment assembly and its interaction with the operating environment. Electrical and non-electrical risks must be considered together if the intent of explosion protection is to be achieved.

By combining sound engineering practice, appropriate use of international standards, transparent certification scope, and independent verification where necessary, manufacturers and users can move beyond minimum compliance towards genuinely safer outcomes.

In explosive atmospheres, safety is not a label. It is the result of informed engineering decisions made across the whole system.

Hazardous Area Fan Specialists