EXECUTIVE SUMMARY

EHS Today MachineDesign NED NEW EQUIPMENT DIGEST

Retrofitting Legacy Machinery for Safety: Navigating Risks & Regulatory Challenges

Presenter:
Devin Murray, tec.nicum Services Manager, Schmersal USA

OCTOBER 22, 2025

KEY TAKEAWAYS

- Retrofitting for safety is crucial to make legacy machines compliant with current standards.
- Best practices inform a realistic and effective roadmap for retrofitting.

in partnership with

SCHMERSAL
THE DNA OF SAFETY

Retrofitting Legacy Machinery for Safety: Navigating Risks & Regulatory Challenges

OVERVIEW

Many industrial facilities still rely on legacy machinery that predates modern safety standards, creating significant risk for operators and liability for organizations. Retrofitting these machines can improve performance, extend machine life, and improve safety without compromising productivity. But without proper attention to safety integration, retrofits can inadvertently create new hazards or violate compliance requirements. Risk assessments guided by OSHA and ISO/ANSI standards are critical to a safe, successful retrofit.

Schmersal is a safety industry leader with 80 years of experience in the design and manufacture of machine safety products focused on protecting machinery operators and maintenance personnel from recognized hazards—without compromising productivity.

CONTEXT

Devin Murray explained the importance of upgrading legacy machines for safety and offered best practices and guidance for safety retrofitting.

KEY TAKEAWAYS

Retrofitting for safety is crucial to make legacy machines compliant with current standards.

Upgrading legacy machines to be compliant with current safety standards is a crucial part of establishing a safe working environment. The OSHA General Duty Clause mandates a workplace free from recognized hazards—work environments that do not meet this requirement introduce potential liability.

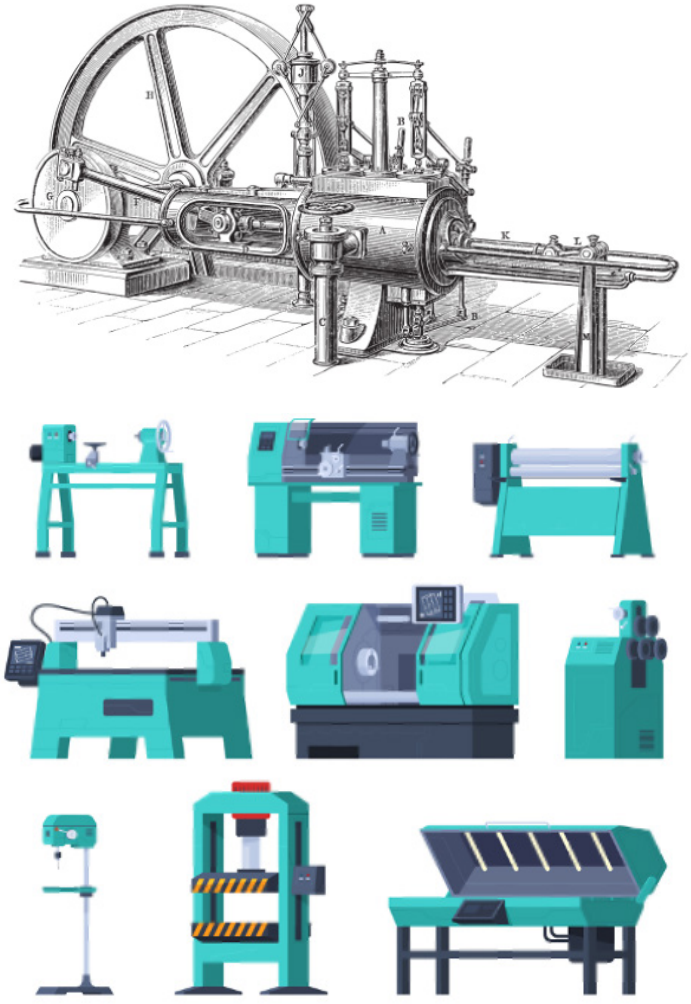
Legacy machines on plant floors tend to be older machines or technology with outdated systems; however, not all are recognizable as legacy machines simply by appearance. While the appearance of equipment built 50 years ago might make it easy to identify machines as legacy, equipment built within the past 20 years looks more modern, making its legacy status difficult to discern. Even machines built within the past five years might already be considered legacy if they don't comply with current safety standards.

In addition to the safety hazards posed by legacy technology, new hazards can be introduced if equipment modifications are made (e.g., retrofitting machines to accommodate new process automation) without corresponding safety upgrades.

Upgrading equipment for any reason first requires a risk assessment to identify associated hazards and ensure relevant safety upgrades are made. (Implementing partial safety upgrades without a risk assessment does not fully address hazards and can introduce a false sense of security.)

Several KPIs can be used to identify which machines need to be retrofitted. Leading indicators include audit scores and near-miss reports. Lagging indicators include accident reports and machine downtime due to safety faults.

Figure 1: Legacy machines come in different forms



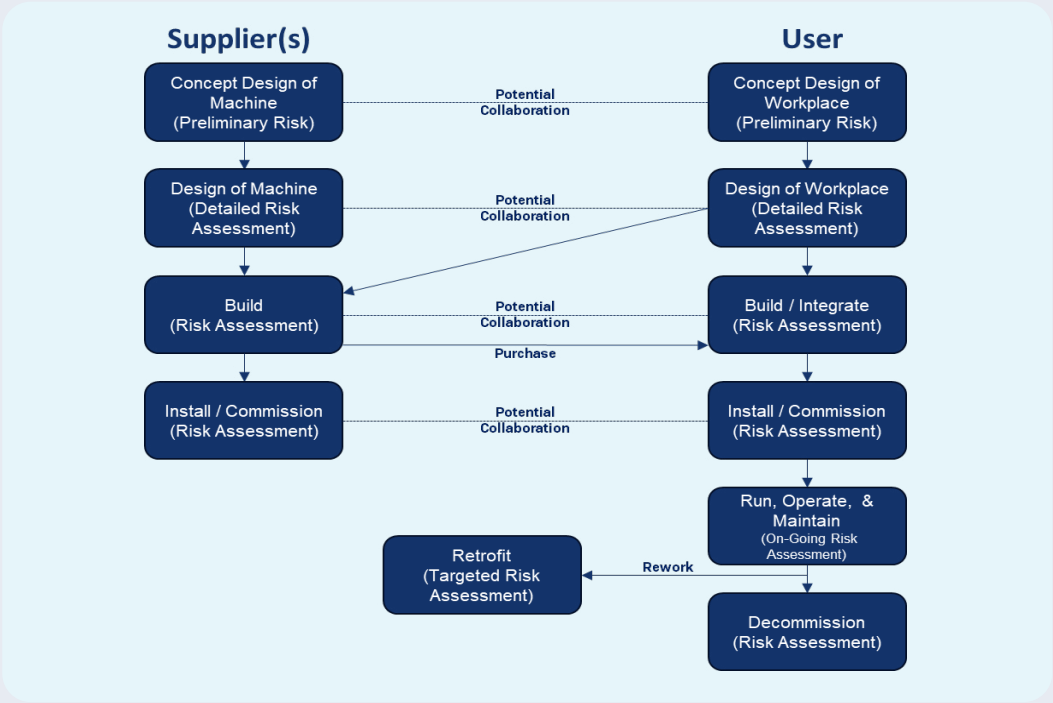
Common questions when retrofitting machinery

Q: Who is responsible for ensuring the machine is safe?

The OSHA General Duty Clause places the legal requirement for providing employees with a place of employment free from recognized hazards on the end user (employer), not the OEM.

ANSI B11.0 provides a risk assessment process for machine safety, including responsibilities for suppliers and end users with potential collaboration points. As with the OSHA General Duty Clause, ANSI B11.0 makes the **end user responsible for ensuring the machine is safe** by conducting additional ongoing risk assessments and retrofits.

Figure 2: ANSI 11.0 highlights the risk assessment process for the users and suppliers



Q: Can my machine be classified as "grandfathered" for complying with previous standards?

When trying to safeguard a machine, use current industrial consensus standards (e.g., ANSI, ISO). Although these are voluntary standards, they provide the most useful guidance for achieving compliance with the legally required OSHA code of federal regulations and the General Duty Clause.

Thus, to understand whether a machine can be grandfathered in for safety, it is crucial to determine:

- Does the obsolete standard address all recognized hazards and provide an acceptable means of safeguarding as required by OSHA?
- Is the obsolete standard incorporated by reference (under CFR1910.6)?

The answer to both questions must be "yes" to justify a "grandfathered" classification.

Q: If consensus standards are voluntary, can I use obsoleted standards during upgrades?

If there is an updated standard over obsoleted standards—especially one that applies to a particular machine type—an OSHA letter of interpretation **allows OSHA to justify that the most recent standard defines recognized hazards** and requires associated remediation practices. In upgrading machines to comply with updated safety control measures, the latest standards must be used.

Several standards can be used to reach compliance with OSHA legal requirements of a safe machine:

- Type A Standards (General-Basic Safety), including ISO 12100:2010 and ANSI B11.0:2023
- Type B1 (Aspects of Safety), including ISO 13849-1:2023
- Type B2 (Device Requirements for Safety), including ISO 13850:2015 and NFPA 79:2024
- Type C (Machine Specific), including ISO 10218:2025 and ANSI/A3 R15.06:2025

> "For a machine built in-house or a custom-built machine, chances are there will not be a Type C standard associated with it. That's when you rely on Type A basic standards . . . at the end of the day, a risk assessment will always be required."
>
> – *Devin Murray, Schmersal USA*

Q: What is the difference between Categories and Performance Levels for a safety circuit?

"Category" and "Performance Level," defined by ISO13849, both describe the reliability of safety circuits: **Category describes the physical wiring of the safety circuit while Performance Levels specify the ability of a safety circuit to perform under foreseeable conditions and avoid dangerous failures of the safety system. Categories are one parameter used to determine a safety system's Performance Level.**

The appropriate Performance Level will depend on the hazards and associated safety requirements identified through a risk assessment with which the machine needs to comply.

Best practices inform a realistic and effective roadmap for retrofitting.

In addition to improving safety and compliance, retrofitting helps companies save costs and extend machine life. Schmersal recommends following several industry-proven best practices when retrofitting a legacy machine for safety.

- **Develop a plan and a timeline** to implement a proper solution. A realistic timeline will consider machine availability to determine when the machine can be brought offline and will identify the number of machines being upgraded.
- **Involve all relevant stakeholders.** Health and Safety representatives who are aware of safety requirements, including the most recent standards, should be included. Typically, a retrofit will also require input from engineers and operators who understand the machine's usage, and supervisors and management who can help drive a culture of safety from the top down.
- **Design and integrate the right solution for the machine**. Retrofits must achieve a balance between safety and productivity—one cannot be sacrificed for the other. A safety solution should ideally integrate seamlessly into the current system; however, newer technology, such as electronic guard interlocks, safety light curtains, and programmable safety controllers, may not interact well with legacy controls.

It is crucial to understand how safety controls will be designed and integrated, and to establish methods to evaluate progress (e.g., set up design reviews and milestones).

- **Verify and validate.** A post-risk assessment validates that the solution is correct for the system and ensures no new hazards were introduced—the safety measures should reduce risk.

When developing a roadmap for safety upgrades to legacy machines, companies can optimize the process by setting priorities based on risk assessment, addressing the greatest risk soonest and considering lower risks that might be easily resolved with little capital and labor investment.

After the retrofit is complete, it is crucial to continue to update and maintain machine documents (e.g., schematics, SOPs, MOCs) and train personnel on the new controls and procedures.

Note: Not having schematics is a hazard, yet is a common problem. In some cases, machine schematics may have been lost or misplaced, in which case OEMs may be able to provide a copy of the schematics. If the schematics cannot be obtained and/or past non-OEM machine modifications may not have been properly captured, it will likely be necessary to reverse engineer the setup to recreate schematics.

> "This is not one-and-done. Make sure you audit and continually improve. Schedule periodic safety audits, whether annually or [when] doing any major changes. Investigate near misses for lessons learned."
>
> – *Devin Murray, Schmersal USA*

Figure 3: Set retrofit priorities based on greatest risk

Risk	Negligible	Very Low	Low	Significant	High	Very High	Extreme	Unacceptable
HRN	0-1	1-5	5-10	10-50	50-100	100-500	500-1000	1000+

ADDITIONAL INFORMATION

To learn more, visit Schmersal

BIOGRAPHY

Devin Murray
tec.nicum Services Manager
Schmersal

Devin Murray is the tec.nicum Services Manager at Schmersal, with over 15 years of experience in machine safety. A TÜV-certified Functional Safety Engineer and Functional Safety Trainer, he has developed training programs, conducted risk assessments, and authored whitepapers on machine safety. Devin holds a BSEE and MBA from Alfred University.