

3.1 Machine Risk Assessments

Machinery owned by Rowan University in academic and research departments must undergo machine guarding risk assessments to evaluate the hazards posed by the operation of the machine. These assessments will evaluate the level of unmitigated risk to the operator and make recommendations on corrective actions to take to decrease risk. Risk assessments must be performed initially for all machines, at the time a new machine is purchased, and when significant changes are made to the way a machine is operated. Risk assessments must be documented, with records retained until that machine is disposed of, sold, or otherwise permanently removed from service. Corrective actions will include the implementation or selection of engineering controls, awareness devices, administrative controls, and personal protective equipment.

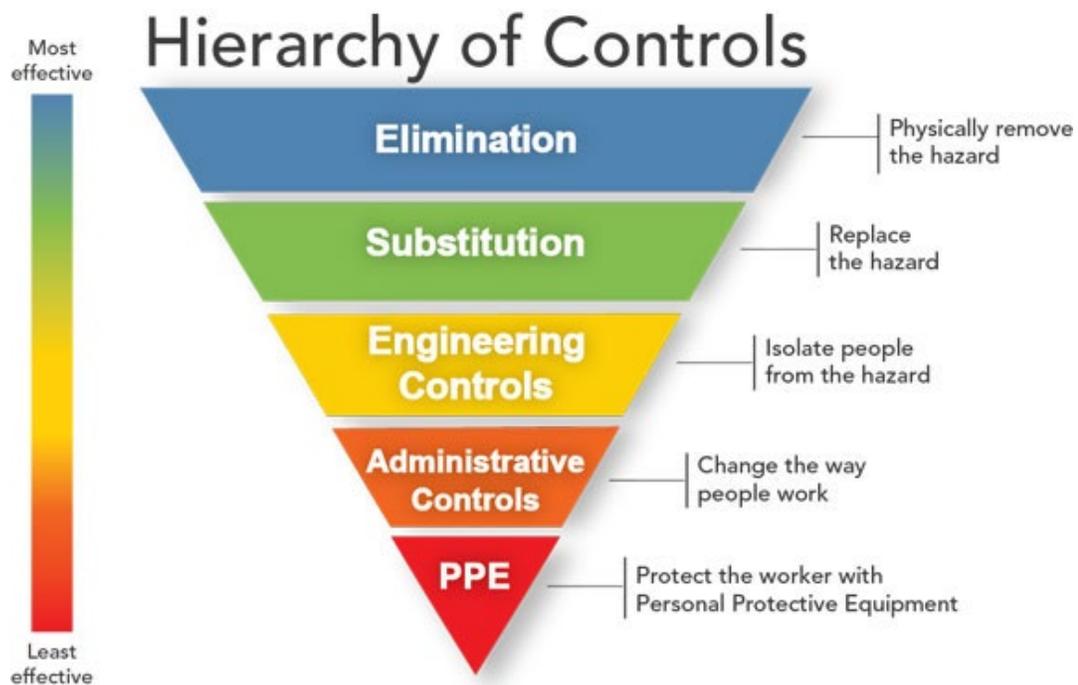
Because of the amount of technical knowledge and resources necessary for conducting risk assessments, it is strongly recommended that machine owners seek the expertise of a company specializing in the field of machine safety. Such companies can provide complete safeguarding solutions that include conducting the risk assessments, developing guarding systems, installation of guarding systems, and documenting all methodology utilized. Conducting risk assessments is a process requiring multiple steps to properly complete. It can be both time and labor intensive to properly complete machine risk assessments.

In the United States, the preferred method for conducting machine guarding risk assessments is detailed in ANSI B11.0 *Safety of Machinery*. The objective of this standard is to eliminate injuries from machinery by establishing requirements for the design, construction, modification, installation, operation, and maintenance of machinery. **Appendix C** contains a flowchart from ANSI B11.0 outlining the following steps of the assessment process:

1. The first step in conducting a risk assessment is to prepare for and establish the scope of the assessment. A team of affected personnel including machine operators, maintenance personnel, and EHS professionals should be identified and assembled for the assessment.
2. Information gathering is the next step in the risk assessment process. Relevant information pertaining to the machine type, how it is utilized, the frequency of use, previous near-misses or incidents, etc. needs to be collected. All foreseeable tasks and their associated hazards for a given machine need to be identified and recorded. Affected personnel who operate or interact with the machine need to be identified. It is highly important to get the involvement of personnel who are routinely involved in the operation of a machine. Without their input and approval, the implementation of effective guarding solutions is likely to be very difficult to

accomplish. This is because guarding solutions need to be developed with the specific operation of the machine in mind. A guard that gets in the way of operation or decreases productivity is very likely to eventually be bypassed, disabled, or removed.

3. The third step in the process is to determine the initial level of risk involved in the operation of a machine. The level of risk involved is determined based on an evaluation of the task(s) and the associated hazards identified during machine operation. The actual level of risk is then calculated, and takes into account the existing safeguarding measures in place (if any). If it is determined that the risk is already at a reasonable level, no further action is required to address that particular hazard.
4. In the fourth step of the risk assessment process, safeguarding measures are evaluated and implemented which will decrease the level of risk posed by machine operation. The hierarchy of controls applies directly to the practice of machine guarding. See **Appendix D** for a detailed overview of the Hierarchy of Controls.



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All guards must be installed to the specifications called for by the applicable regulations and/or standards. It is important to have guarding devices installed by qualified individuals who are familiar with machine guarding requirements. This ensures that not only are the correct safeguards selected, they are installed on the machine in a manner which is conducive to their proper use.

5. After control measures have been installed or implemented, the next step in the process is to conduct a follow-up risk assessment in order to determine residual risk. The machine is re-evaluated with the newly implemented safeguards in operation. The new level of risk is then compared to the initial level of risk. The risk level of the machine in this step should be significantly lower than the previously calculated risk level that was determined before the new safeguarding was implemented.
6. The sixth step in the risk assessment process is to make a decision to accept the existing amount of residual risk or to take further steps to reduce it. While achieving zero risk is typically not possible in all situations, the goal is to reduce the level of risk as much as is feasible. If the level of risk is determined to be acceptable at this point, no further guarding measures need to be installed on the machine. The decision to accept a risk is influenced by multiple factors including the culture, technological and economic feasibility of installing additional risk reduction features, the degree of protection achieved through the use of additional risk reduction measures, and the regulatory requirements or industry best practices.
7. After all risk reduction measures have been implemented, their effectiveness needs to be evaluated. This step ensures that the guarding installed on the machine actually is functioning to mitigate the machine hazards. The validation process should include testing the operation of safety devices and electronics, reviewing training, checking for the presence of warning labels, and a review of overall machine operation.
8. The final step in the risk assessment process involves completing or updating all documentation associated with the guarding process. The safeguarding device(s) installed on the machine need to be evaluated for compliance with the applicable regulations and standards. Standard operating procedures (SOPs) and training materials need to be updated to reflect the addition of the safeguarding device(s) installed on the machine. After affected employees complete the required training reflecting the new safeguarding measures, an equipment sign-off should be completed to verify the changes and document the training. Records of the risk assessment need to be maintained until that machine is disposed of, sold, or otherwise permanently removed from operation by the University.