

# Machine Guarding Safety

Machine guarding is essential to protect workers from hazards posed by moving parts, flying debris, electrical components, and other risks associated with machinery used in NCC T&D operations. This includes equipment such as cable cutters, hydraulic presses, drills, and heavy machinery for substation construction, transmission line installation, and underground cable maintenance. NCC T&D's HSE management system mandates robust guarding protocols to prevent amputations, crush injuries, and fatalities.

## NCC T&D Project Leaders Key Responsibilities

Project Leaders must ensure:

- **Risk Assessment:**  
Identify all machinery requiring guards (e.g., rotating blades, pinch points, electrical panels).  
Classify hazards by type (mechanical, electrical, thermal).
- **Guard Selection & Installation:** Choose guards based on the hierarchy of controls:  
Fixed Guards: Permanent barriers (e.g., enclosures for gearboxes).  
Interlocked Guards: Shut off power when opened (e.g., access panels on cable jointing machines).  
Adjustable Guards: Customizable for varying operations (e.g., band saws).  
Safety Devices: Light curtains, two-hand controls, or emergency stop buttons.
- Ensure guards comply with NCC T&D engineering standards.
- **Training:**  
Train workers on guard purpose, inspection, and reporting defects.  
Certify operators for machinery with complex guarding systems.
- **Maintenance:**  
Schedule regular guard inspections and repairs.  
Lockout/tagout (LOTO) protocols during guard removal for maintenance.

## Types of Machine Guards

- **Fixed Guards**  
Permanently attached (e.g., shrouds on grinders, enclosures for conveyor belts).  
Require tools for removal.
- **Interlocked Guards**  
Automatically cut power when opened (e.g., access doors on transformers).  
Must prevent restarting until guard is closed.
- **Self-Adjusting Guards**  
Move with the workpiece (e.g., blade guards on circular saws).
- **Distance Guards**  
Position workers away from hazards (e.g., barriers around robotic arms).

## Worker Responsibilities

Workers must:

- **Inspect Guards Daily:** Check for damage, missing bolts, or tampering before use.
- **Never Bypass Guards:** Operate machinery only with guards in place.
- **Report Issues:** Flag loose guards, malfunctioning interlocks, or unguarded machinery.
- **Follow LOTO:** Isolate energy sources before removing guards for repairs.
- **Use PPE:** Wear gloves, safety glasses, and hearing protection as required.

## Common Hazards in NCC T&D Operations

- **Rotating Parts:**  
Cable spoolers, drill presses, or fan blades.  
Solution: Fixed guards with ventilation holes to prevent overheating.
- **Pinch Points:**  
Hydraulic presses, conveyor rollers.  
Solution: Two-hand controls or light curtains.
- **Electrical Hazards:**  
Exposed terminals in substation equipment.  
Solution: Insulated enclosures with warning labels.



- **Flying Debris:**  
Grinding, cutting, or chipping tasks.  
Solution: Transparent face shields and debris shields.

### **Machine Guarding Hierarchy of Controls**

- **Elimination:** Redesign tasks to remove the hazard (e.g., prefabricate components offsite).
- **Engineering:** Install guards or safety devices.
- **Administrative:** Train workers, post warning signs, and enforce safe distances.
- **PPE:** Use gloves, goggles, and aprons as a last line of defense.

### **Additional Considerations for NCC T&D Projects**

- **Electrical Work:**  
Insulate guards near live equipment to prevent arc flash.  
Use non-conductive materials (e.g., fiberglass) for guards in substations.
- **Harsh Environments:**  
Protect guards from sand, dust, and corrosion with weather-resistant coatings.  
Increase inspection frequency in extreme heat to detect warping or brittleness.
- **Client-Specific Needs:**  
Align guard designs with machinery used in SEC substations or Saudi Aramco facilities.
- **Remote Sites:**  
Equip mobile workshops with pre-fitted guards for portable machinery.
- **Maintenance Protocols:**  
Document guard removal/replacement in maintenance logs.  
Train supervisors to audit guard compliance during site walks.

### **Key Takeaways**

- **Guards Are Non-Negotiable:** Never operate unguarded machinery.
- **Inspect Relentlessly:** Daily checks by workers, weekly audits by supervisors.
- **Train Thoroughly:** Focus on “why” guards matter, not just “how” to use them.
- **Enforce LOTO:** Strict compliance during guard maintenance.
- **Learn from Near-Misses:** Investigate guard bypass attempts as critical warnings.

For guard specifications, training modules, or incident reporting, consult NCC T&D’s HSE Manual or contact the HSE Department.