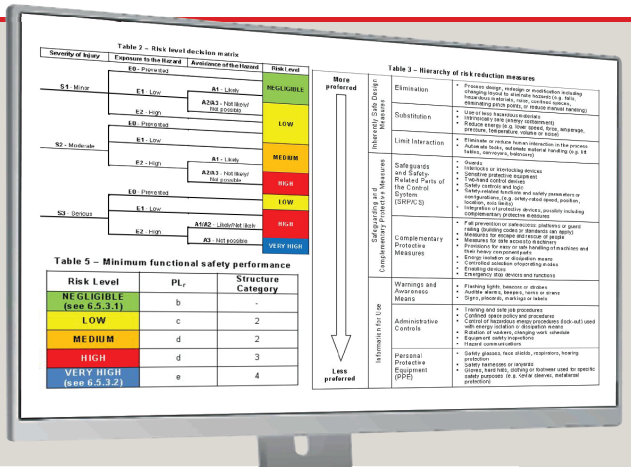
ENHANCING ROBOT AND MACHINE SAFETY



ENSURING SAFE INTERACTION BETWEEN INDUSTRIAL ROBOTS AND THEIR OPERATORS IS AN ESSENTIAL PART OF A HIGH-FUNCTIONING INTEGRATED SYSTEM.

At Shell-O-Matic, we work with the ANSI/RIA R15.06 (Industrial Robot and Robot Systems Safety Requirements), ISO 10218 (Safety requirements for industrial robots) and ISO 12100/ ISO 13849 (Safety of Machinery) guidelines to provide the comprehensive safety solutions specific to our customers' needs.

Three-step process:

- Generating a risk assessment matrix of your machinery, as required by the relevant standards
- Analyzing all interactions between humans and machines
- Providing risk-reduction strategies

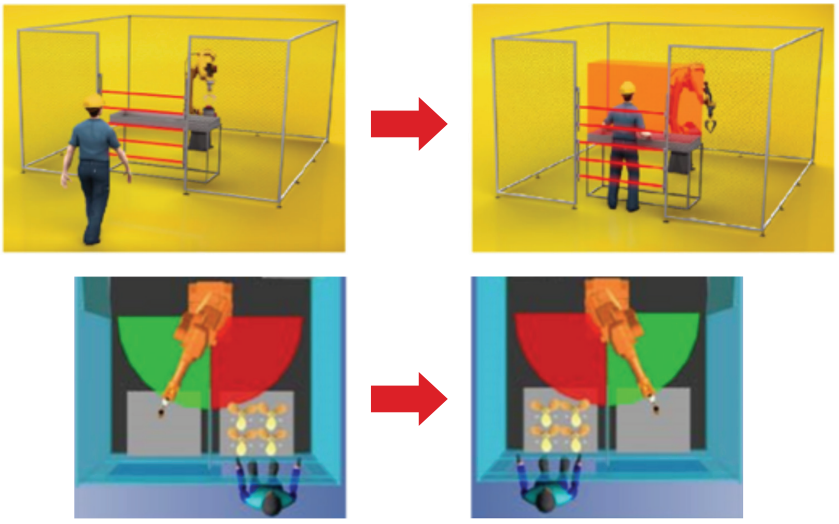
DYNAMIC CONTROL OF ROBOT WORKING ENVELOP

Controlling the robot's working envelop (its reach) is the first step to creating a dynamic and safe collaboration between the robot and an operator.

Robot manufacturers offer software options to dynamically control the robot working envelop as a function of system status.

No restriction on robot working envelop

Dynamic restriction of envelop



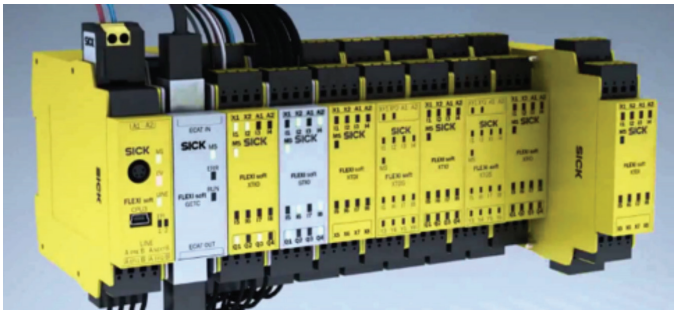
Dynamic Robot Working Envelop Control

PROGRAMMABLE SAFETY CONTROLLER

An optional part of the Shell-O-Matic Supervisory system, the programmable safety controller allows for more complex safety logic.

Advantages of the programmable safety controller:

- Manage the various safety devices and functions required with a robotic cell
- Scalable
- Reprogrammable, so it can evolve the logic or system with changing customer needs
- Communicates at the machine network level
  - Share safety system status
  - Adjust PLC control logic
  - Display appropriate messages on the HMI screen



SAFETY DEVICES

Shell-O-Matic can create a custom safety system tailored to customer needs. The system can be connected to various safety devices, including:

- Light curtains
- E-stop buttons
- Two-hand controls
- Area scanner
- Safety mats

This system allows Shell-O-Matic to deliver not only a new state-of-the-art safety system, but also to retrofit or upgrade existing robotic cell safety systems.