Robot Safety Distance

How-to guide: what the workbook does, how to use it and what every number means. mfgcalcs.com

Robot Safety Distance

Check every light curtain, scanner and safety mat around your robot cells against the ISO 13855 form of the minimum safety distance, and see the longest robot stop each installed distance allows.

For: Machine safety engineers, robot integrators, maintenance and EHS teams positioning or auditing safeguards around robot cells.

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Quick start

1. On Setup, type the site name, list your robots with their measured stopping time, and the device types you use.
2. On Safeguards, give each light curtain, scanner or mat a row: robot, approach speed K, device and controller response, intrusion allowance C, margin and the installed distance.
3. Fix anything the Check column names.
4. Open the Dashboard: safeguards closer than required, the clearance of each, and what makes up each required distance.

What is in the workbook

Start Here	Read this first: what the workbook does and how to use it.
Setup	Site name, the robots with their measured stopping time, and the safeguard device types.
Safeguards	One row per light curtain, scanner or mat: stopping time, allowance and installed distance in; required distance and clearance out.
Dashboard	Required against installed distance for every safeguard, the clearance, and what makes up each required distance.
Method	How every number is calculated, with assumptions, limits and sources.
Verify	Self-check: the workbook's formulas recomputed on fixed inputs against an independent reference.

What each number means

Quantity	How it is calculated	Units
Stopping time T	(Device response + controller response + robot stopping time) / 1,000.	s
Reaction travel	Approach speed K x stopping time T.	mm
Base distance	Reaction travel + intrusion allowance C.	mm
Required distance	Base distance x margin.	mm

Quantity	How it is calculated	Units
Margin added	Required distance - base distance.	mm
Clearance	Installed distance - required distance.	mm
Status	Within limits when the clearance is zero or more; Out of limits otherwise.	-
Robot stop limit	(Installed distance / margin - C) / K x 1,000 - device response - controller response.	ms

Assumptions, limitations, sources and the self-check (the Verify sheet, which recomputes the workbook's formulas on fixed test inputs) are in the workbook. The last page shows the Dashboard with the example data for Ashcombe Automation, a fictional business.

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Engineering estimates for planning and improvement work. Verify the results against your own process, data and standards before you rely on them.

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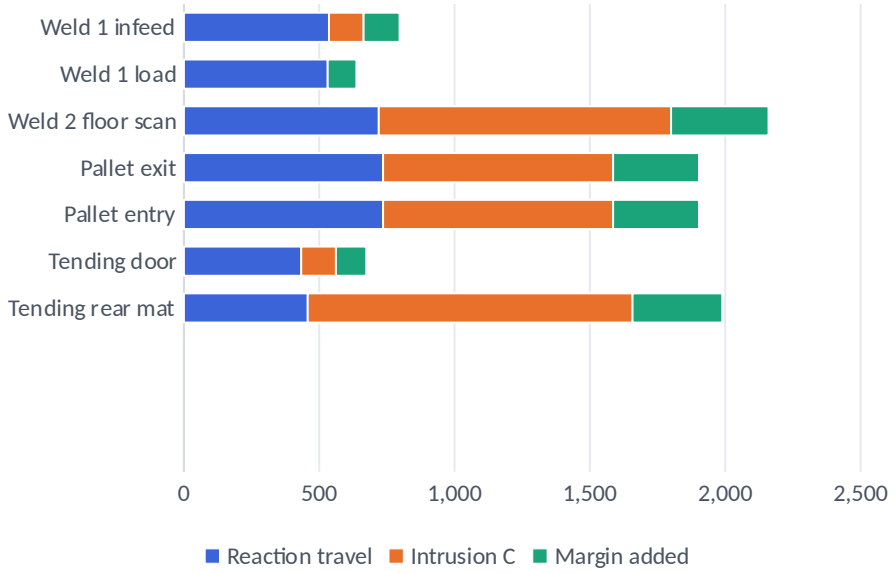
Required against installed distance for every safeguard, the clearance, and what makes up each required distance.

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Ashcombe Automation, robot hall (example): 7 safeguards on 4 robots, 1 closer than required.

SAFEGUARDS	CLOSER THAN REQUIRED	SMALLEST CLEARANCE (MM)	LONGEST STOPPING TIME T (S)
7	**1**	**-103.2**	**0.460**
Rows on Safeguards	Status Out of limits	Negative = too close	Device + controller + robot

What makes up each required distance (mm)



Installed against required distance (mm)

