

RASWIN Module HRNi Collaborative projects

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Video demonstration

How to do Risk Assessment with RASWin?

General Information Module

1_HRNi_sar - RASWin

File Edit View User Help

Standard Modules

You're running RASWin Professional license. View HRN Scoring

Project data:

Project name: Training Machine

Project description: Training Project HRNi

Company name: Solidsafe Project type: Machinery

Person responsible: Jaume Gracia Date: 07/09/2017

PLr calculation by: EN/ISO 12100 & ISO 13849

Minimum Project Category: 3 Minimum Project PLr: d

Validation method: Step by step

PL Module to use: PL Graphic

Logo Image [SOLIDSsafe]

Last imported Safety Automation Builder project:

Machine data:

Manufacturer:

Machine description:

Model:

Serial number:

Manufacture date: septembre , 2017

1. Fill the project data information
2. Fulfill the machine data information

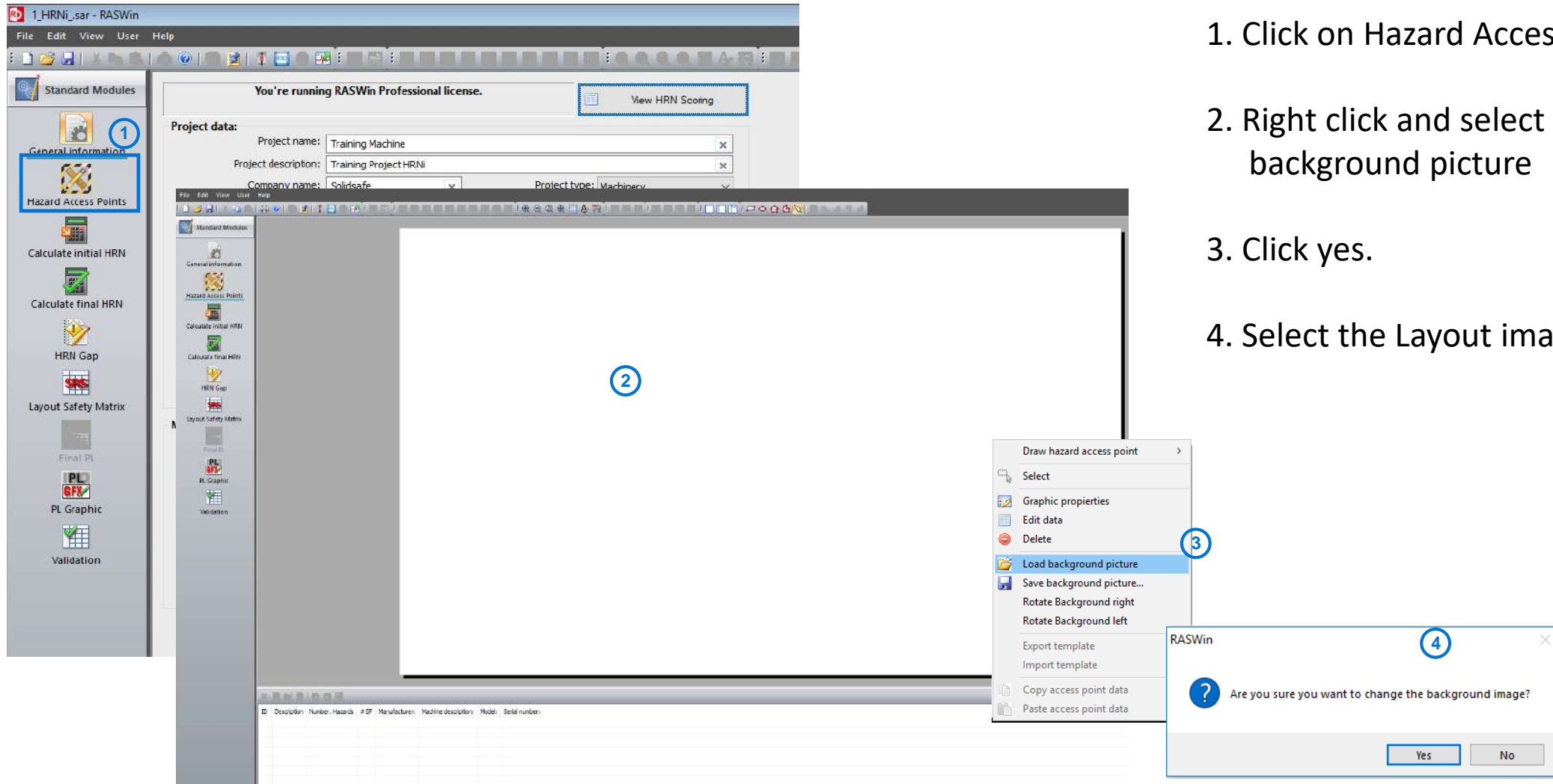
Step 0: Fulfill general information module

How to do Risk Assessment with RASWin?

Hazard Access Points Module

Step 1: Load background picture

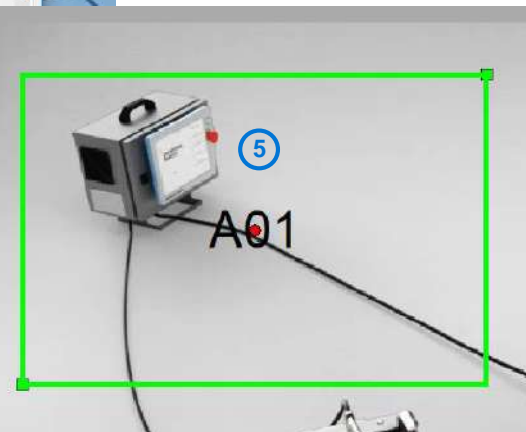
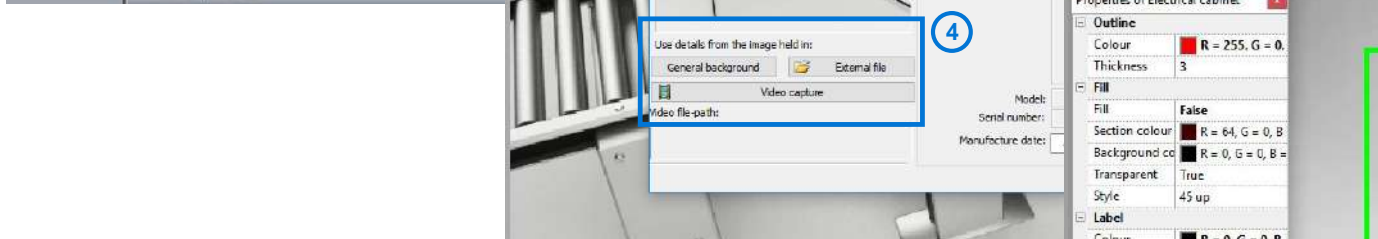
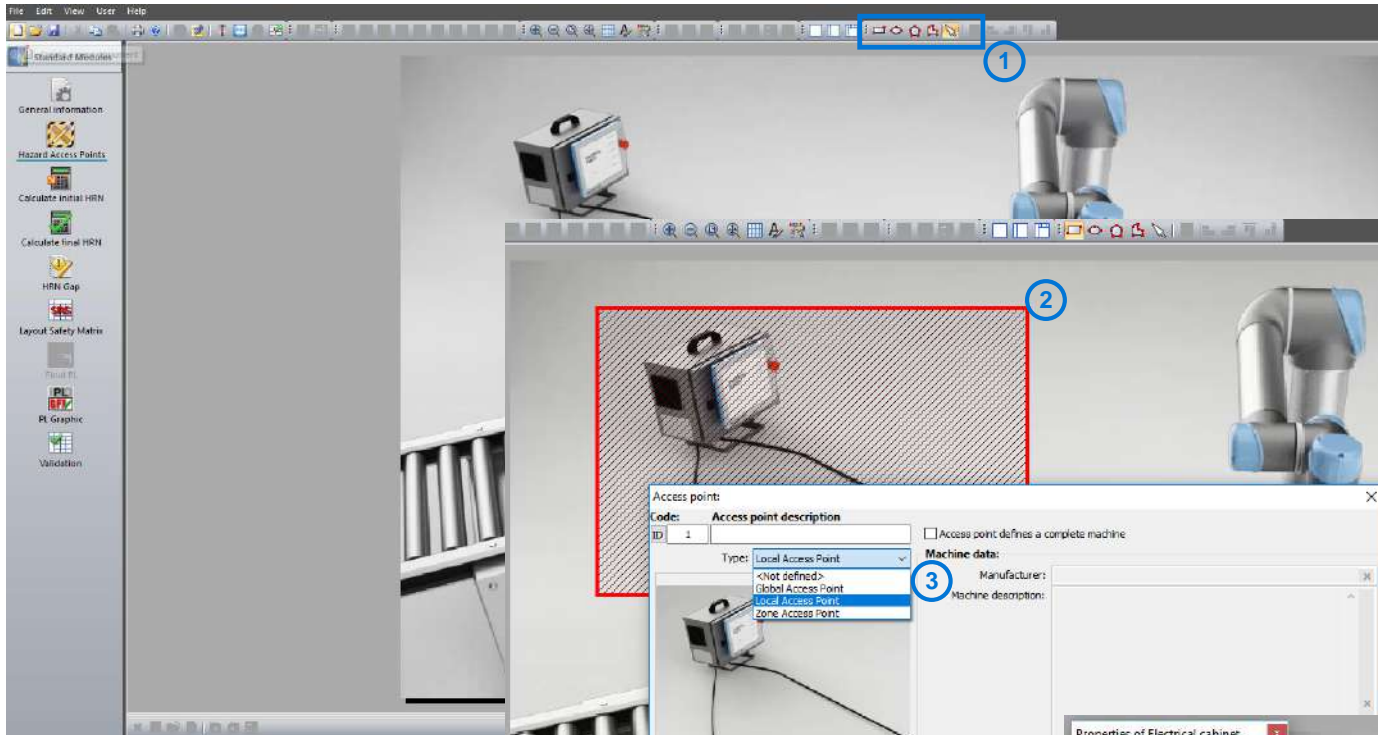
1. Click on Hazard Access Points
2. Right click and select "Load background picture"
3. Click yes.
4. Select the Layout image



How to do Risk Assessment with RASWin?

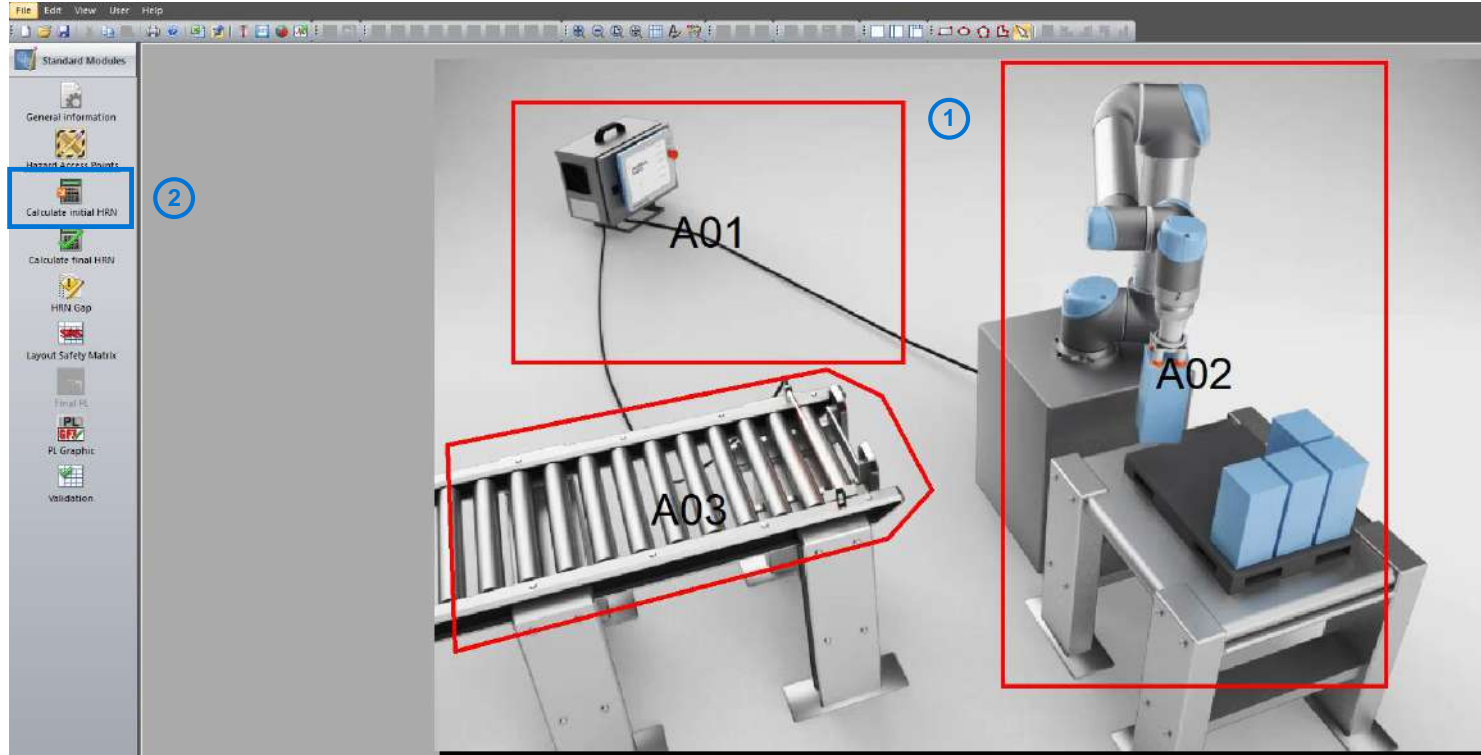
Hazard Access Points Module

Step 2: Create Access Points



How to do Risk Assessment with RASWin?

HRNi Module



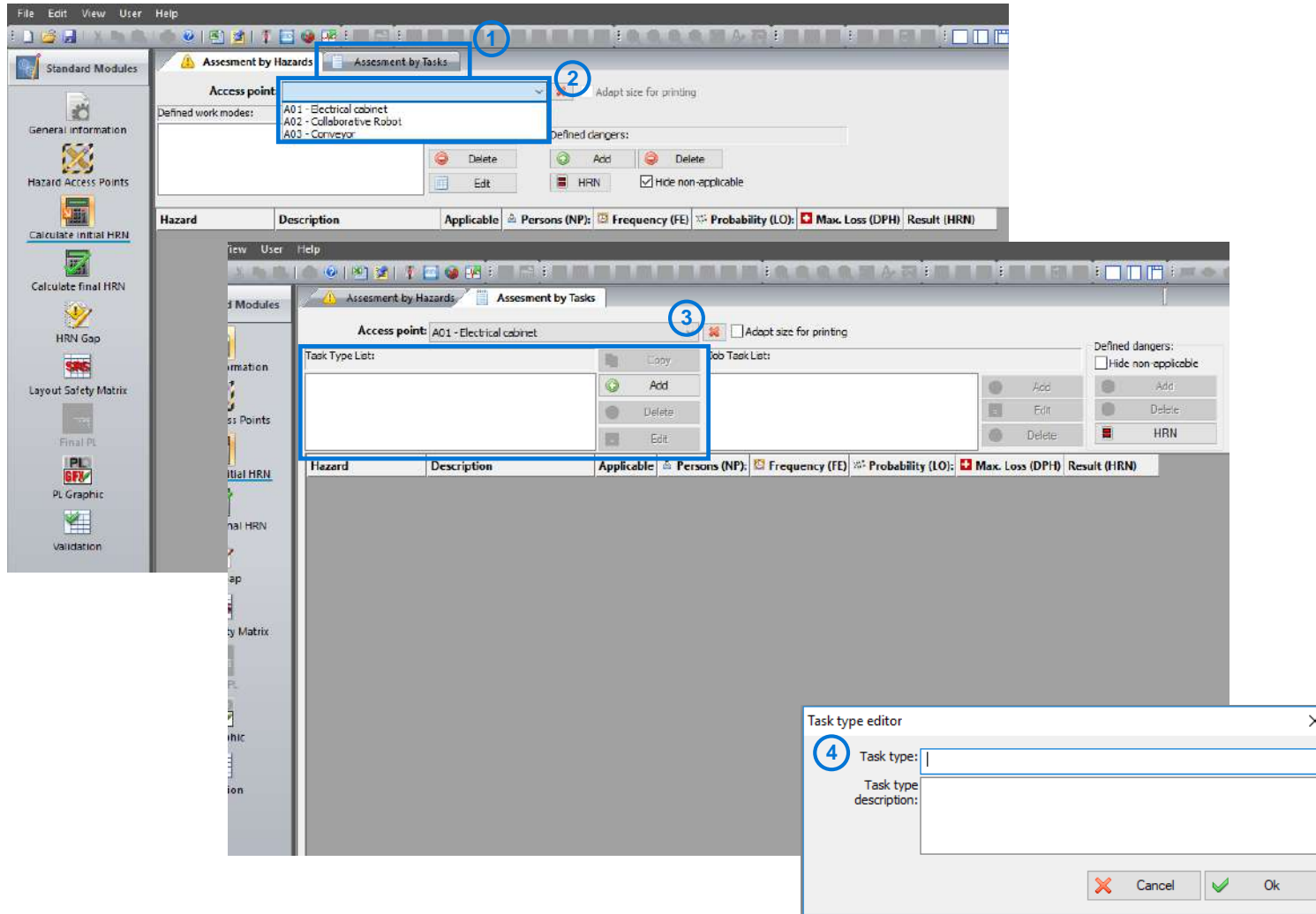
1. Create all access points of the layout.

2. Click on HRNi Module

Step 3: Open HRNi Module

How to do Risk Assessment with RASWin?

HRNi Module

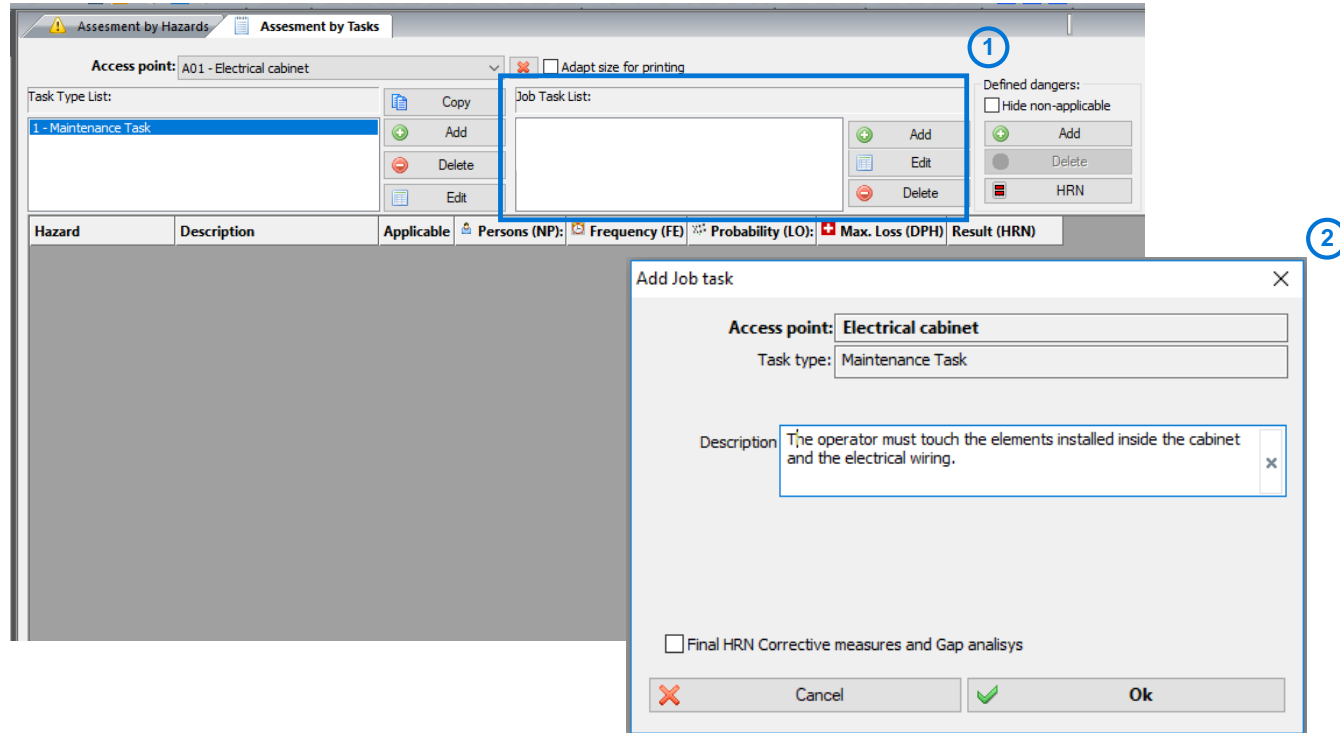


1. Select “Assessment by tasks” tag.
2. Select the Access Point.
3. Add a Task type list.
4. Add a description of the task

Step 4: Create a Tasks list

How to do Risk Assessment with RASWin?

HRNi Module



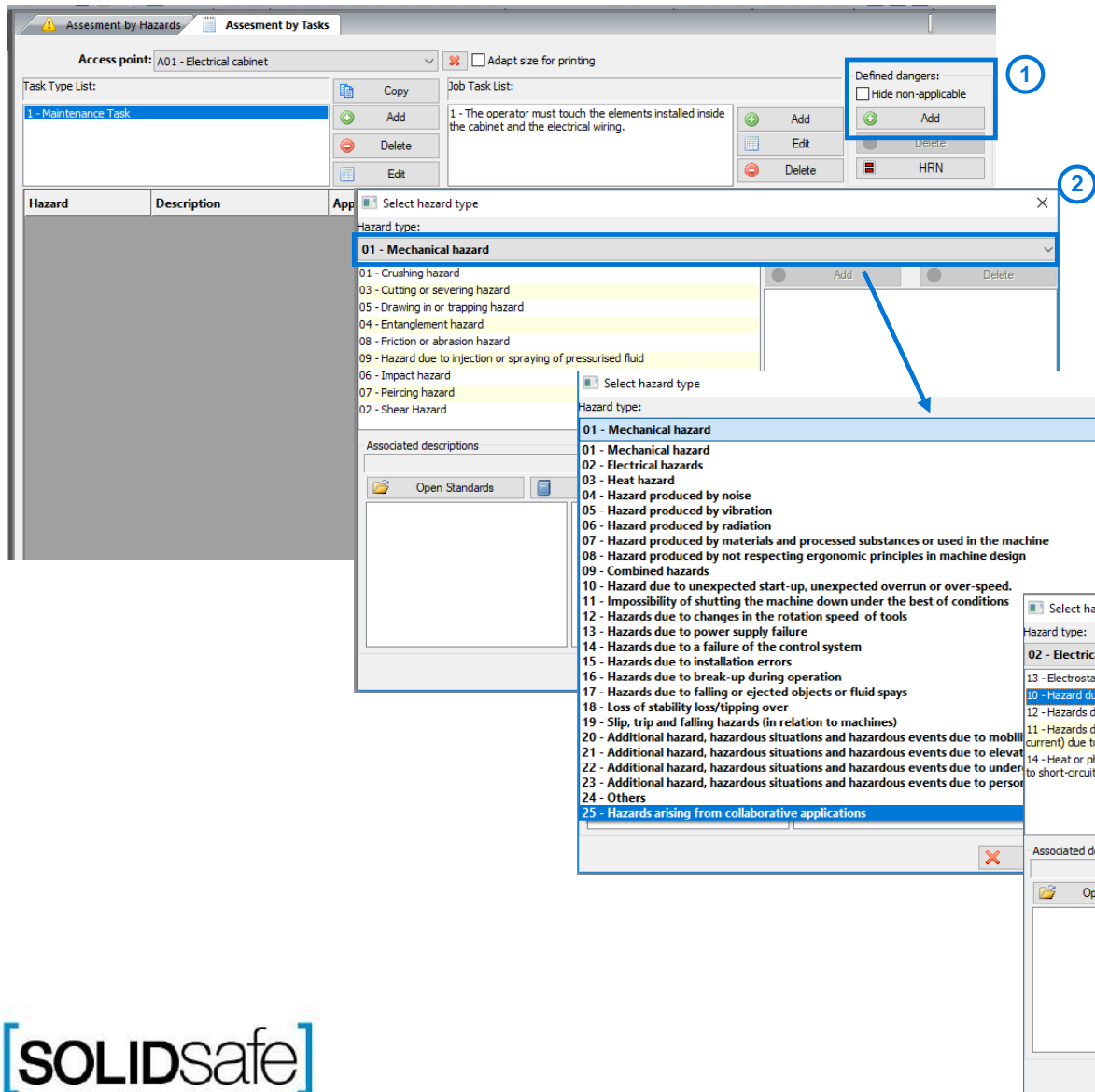
1. Add a jobs list, with the operators jobs in this task.

2. Add a description of each job.

Step 5: Create a job list for each task

How to do Risk Assessment with RASWin?

HRNi Module

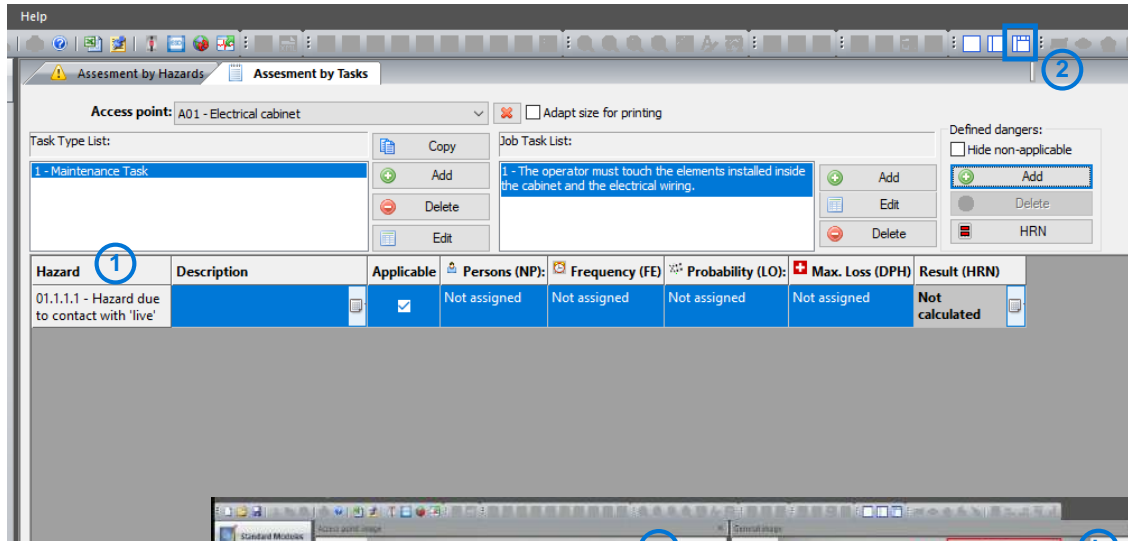


1. Add a new hazard.
2. Select the type of the hazard.
3. Add a description of each job.
4. Add a detail picture (Optional).

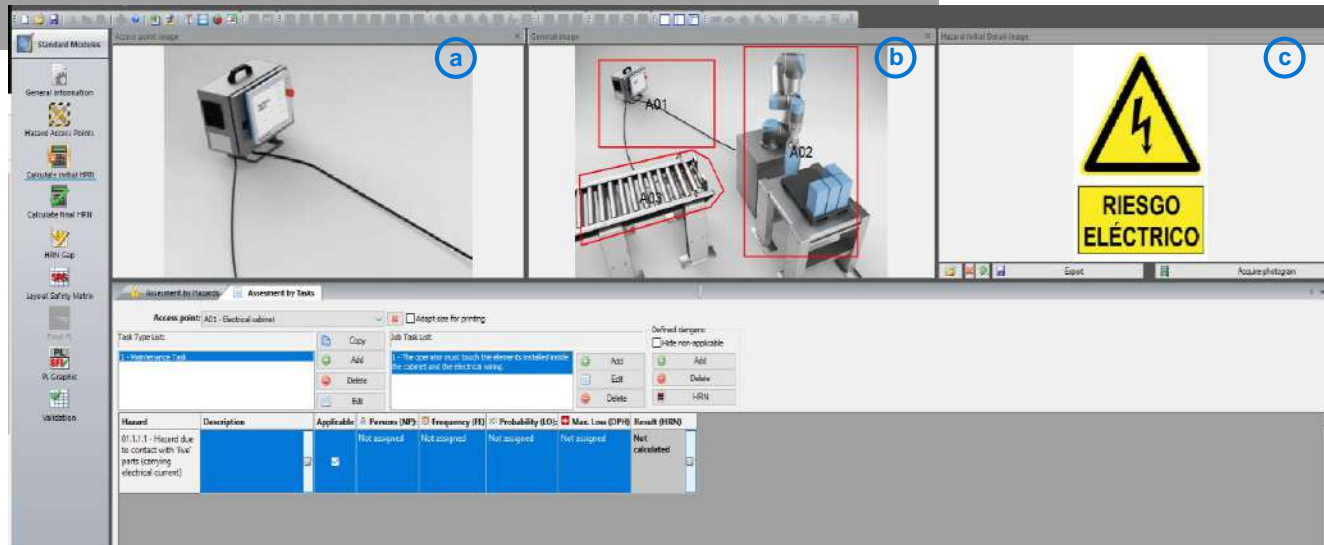
Step 6: Create a Electrical hazard

How to do Risk Assessment with RASWin?

HRNi Module



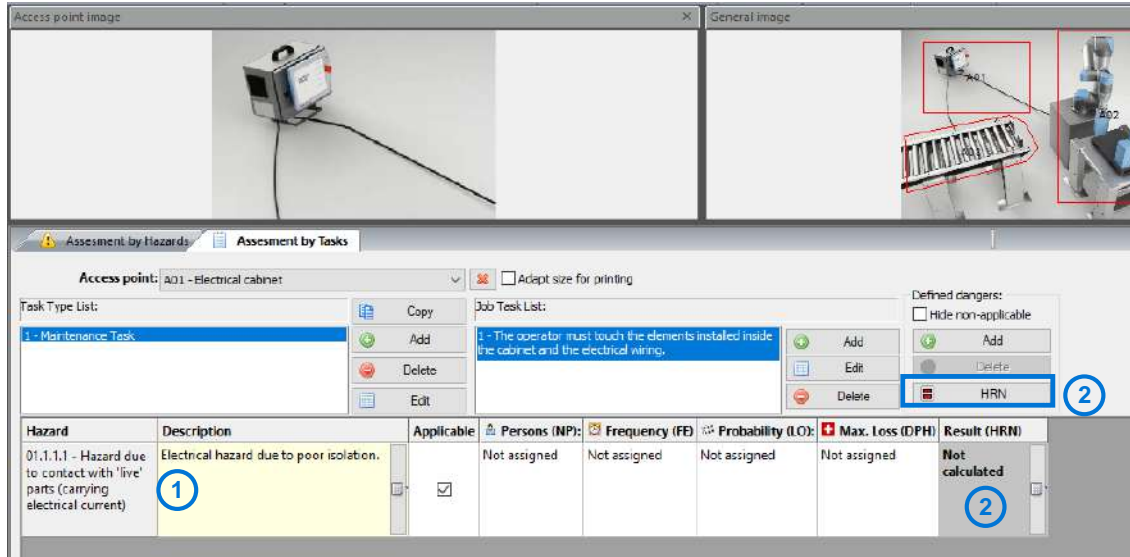
1. The hazard has been created.
2. Click on collage icon, to see the detail image of the hazard.
3. Three images will appear.
 - a) Access point image
 - b) General layout image
 - c) Hazard detail image



Step 7: See a detail image of the hazard

How to do Risk Assessment with RASWin?

HRNi Module



1. Write a description of the hazard.
2. Click on "Result HRN" on Hazard row or in "HRN" button.
3. The Initial HRN parameter popup will appear.

HRN calculation : Electrical hazard due to poor isolation. ③

Enter initial HRN parameters

Persons (NP):

Frequency (FE):

Probability (LO):

Max. Loss (DPH):

Result (HRN):

How to do Risk Assessment with RASWin?

HRNi Module

The image shows four overlapping screenshots of the RASWin HRNi module, illustrating the steps to calculate the HRNi value. Each screenshot is titled "HRN calculation : Electrical hazard due to poor isolation." and contains a "Cancel" button.

Step 1: Select the number of persons that will be doing the task at same time. The "Persons (NP)" dropdown is set to "1".

Step 2: Select the frequency of operator exposure to hazard. The "Frequency (FE)" dropdown is set to "Annual 0.50".

Step 3: Select the probability of occurrence. The "Probability (LO)" dropdown is set to "Little/low possibility, under extreme circumstances 0.03".

Step 4: Select the maximum operator loss in case of hazard. The "Max. Loss (DPH)" dropdown is set to "Scratch, bruise 0.10".

The "Result (HRN)" field displays the calculated value: "Scratch, bruise 0.10".

1. Select the number of persons that will be doing the task at same time.
2. Select the frequency of operator exposure to hazard.
3. Select the probability of occurrence.
4. Select the maximum operator loss in case of hazard.

Step 9: Calculate the HRNi value of the hazard

How to do Risk Assessment with RASWin?

HRNi Module

The screenshot displays the RASWin HRNi Module interface. At the top, there are two image windows: 'Access point image' showing a close-up of an electrical cabinet, and 'General image' showing a wider view of the cabinet with red boxes highlighting specific areas. Below these images, the 'Assessment by Tasks' tab is active. It shows a dropdown menu for 'Access point' set to 'A01 - Electrical cabinet'. There are sections for 'Task Type List' and 'Job Task List', both containing a single task: '1 - Maintenance Task'. A table at the bottom lists hazards. The first hazard is '01.1.1.1 - Hazard due to contact with 'live' parts (carrying electrical current)', described as 'Electrical hazard due to poor isolation'. It is marked as 'Applicable' with a checkmark. The table also shows 'Persons (NP)' as '1-2 Persons, 1.00', 'Frequency (FD)' as 'Daily, 2.50', 'Probability (LO)' as 'Probable, Not surprising, 8.00', and 'Max. Loss (DPH)' as 'Fatality, 15.00'. The 'Result (HRN)' is '300.00 - High', indicated by a red box with a blue circle containing the number 1.

Hazard	Description	Applicable	Persons (NP)	Frequency (FD)	Probability (LO)	Max. Loss (DPH)	Result (HRN)
01.1.1.1 - Hazard due to contact with 'live' parts (carrying electrical current)	Electrical hazard due to poor isolation.	<input checked="" type="checkbox"/>	1-2 Persons, 1.00	Daily, 2.50	Probable, Not surprising, 8.00	Fatality, 15.00	300.00 - High

1. The HRNi value has been calculated.

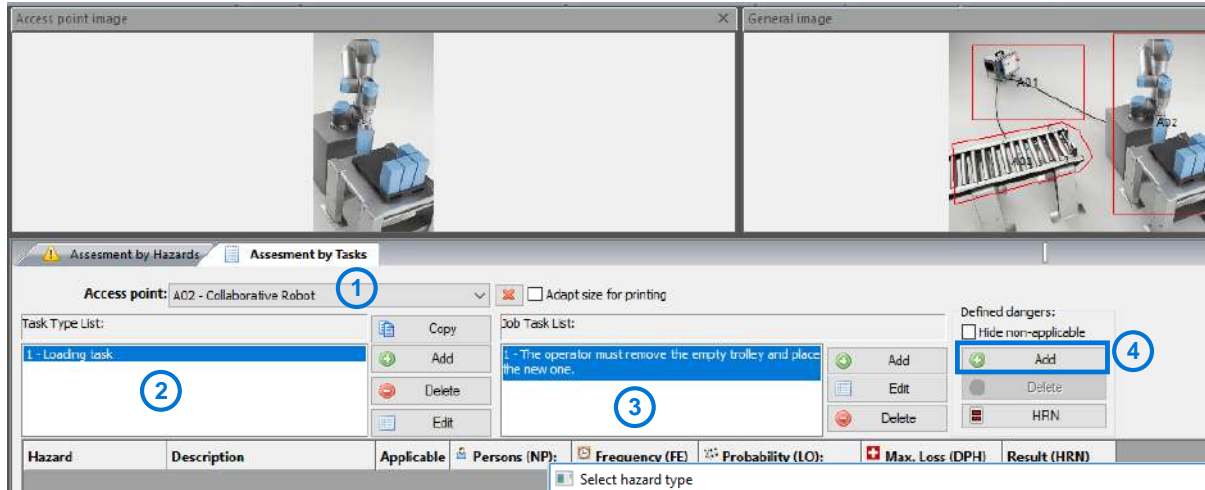
- a) Red: High risk. Must be reduced.
- b) Orange: Low but relevant. Should be reduced, if is not possible to reduce, it must be in Operator manual.
- c) Green: Negligible risk. No action should be taken.

2. Repeat the same procedure for each hazard.

Step 9: Calculate the HRNi value
of the hazard

How to do Risk Assessment with RASWin?

HRNi Module



1. Select the Collaborative Robot access point

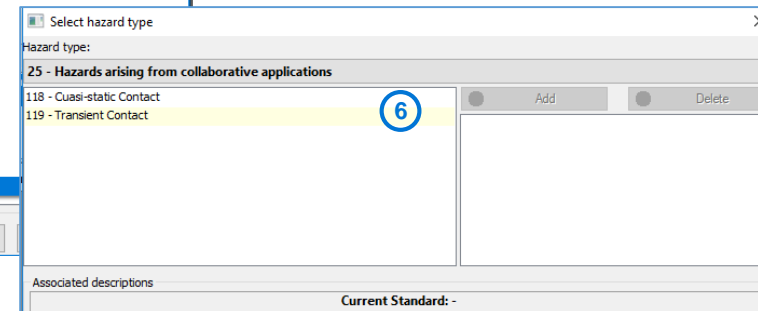
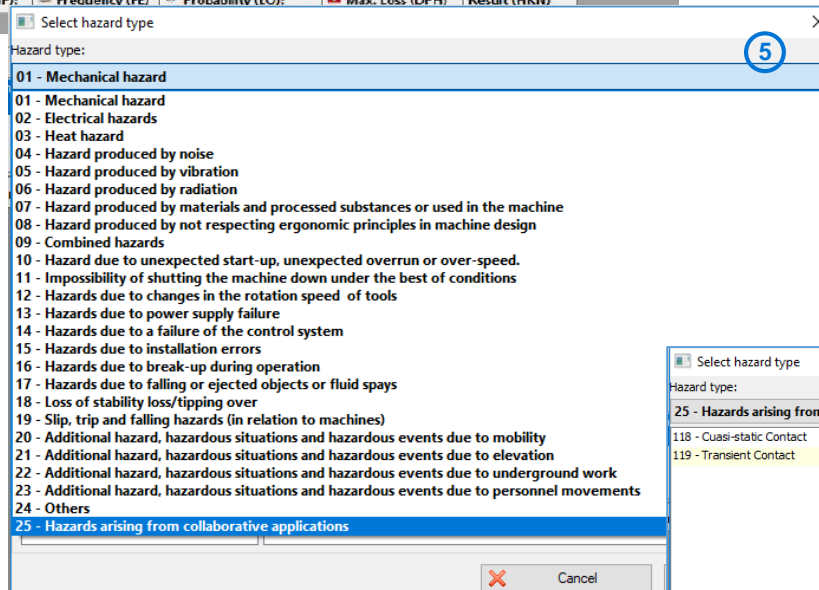
2. Create a task.

3. Create a job.

4. Add a new hazard

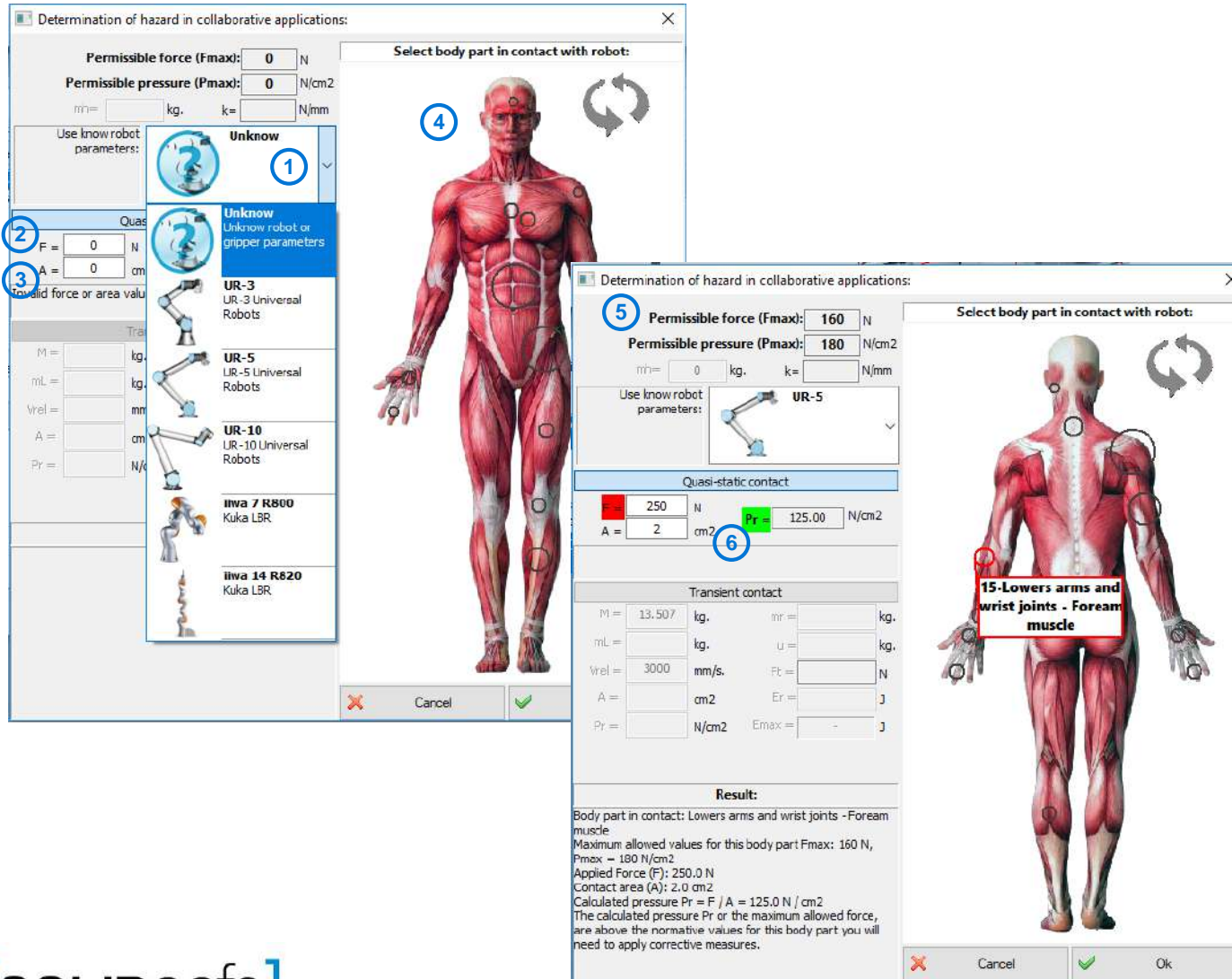
5. Select "Hazards arising from collaborative applications".

6. Select a Cuasi-static contact hazard.



How to do Risk Assessment with RASWin?

HRNi Module

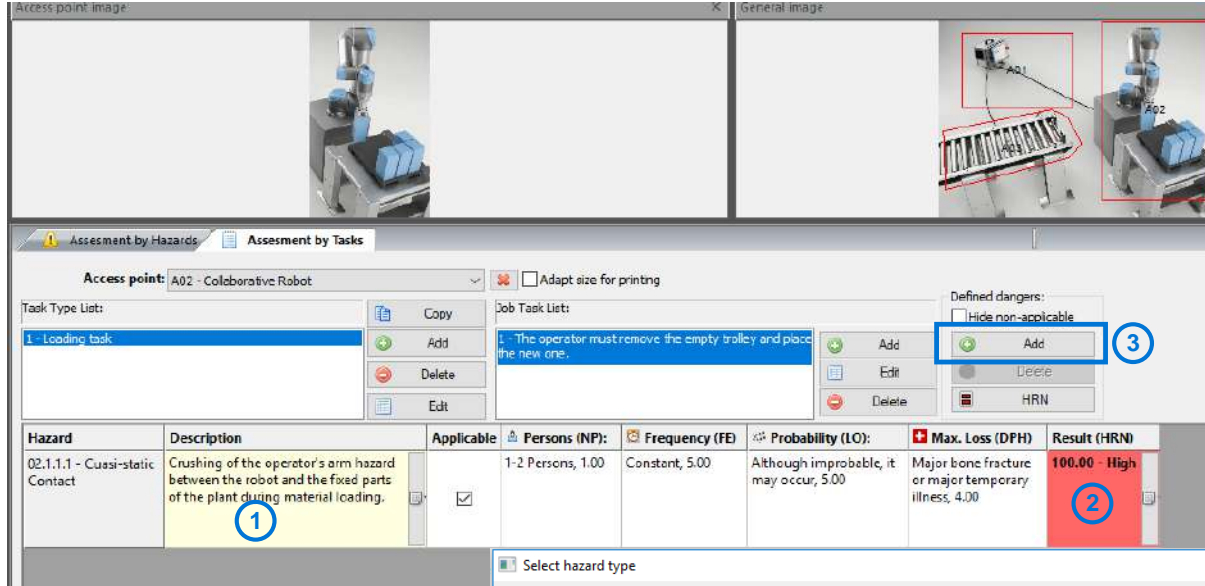


1. Select the Collaborative Robot from Raswin catalog, if it not appear use “Unknow”.
2. Using a Catalog Robot, the maximum force will be auto-filled. If other robot is used, enter the value manually.
3. Write the area of contact.
4. Selects the part of the body where the contact occurs.
5. The Standard's maximum values, will appear.
6. The contact values of Force and Pressure will be displayed.
If value is below maximum Standard's level, it will appear in green, if not, it will appear in red.
6. Click OK

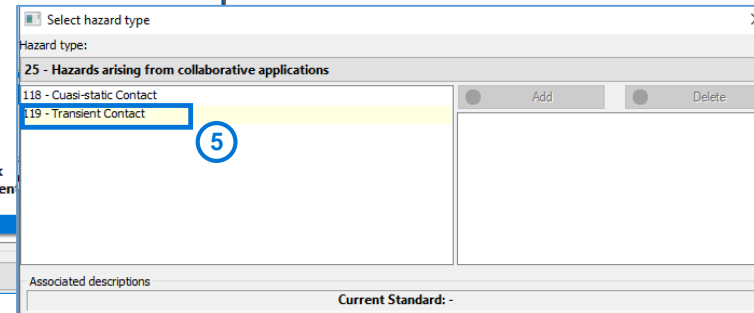
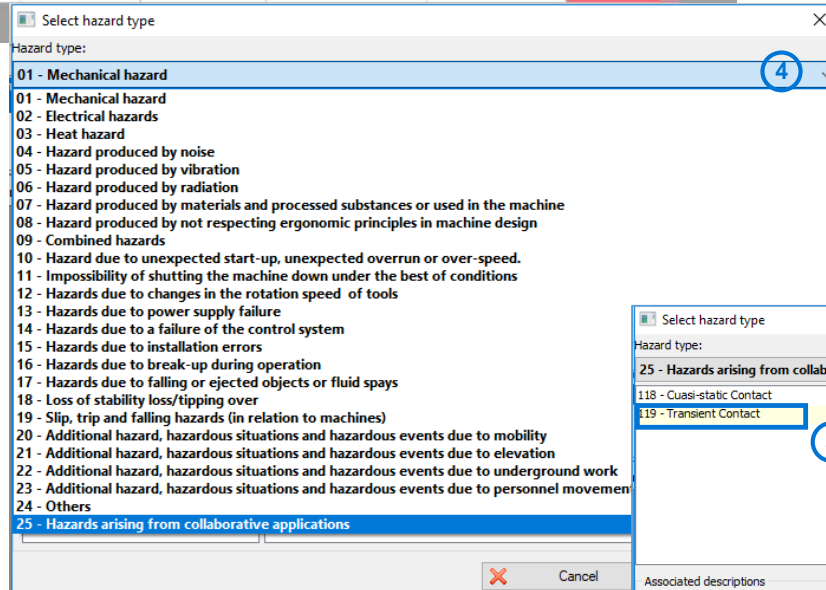
Step 11: fulfill the hazard specifications

How to do Risk Assessment with RASWin?

HRNi Module



1. Write a hazard description.
2. Calculate the HRNi value for this hazard.
3. Add a new hazard.
4. Select "Hazards arising from collaborative applications".
5. Select a Transient contact hazard.



How to do Risk Assessment with RASWin?

HRNi Module

The screenshot displays the RASWin HRNi Module interface for determining hazard in collaborative applications. The interface is divided into several sections:

- Left Sidebar:** Contains a list of robots and grippers. The selected robot is the **UR-5 Universal Robots**. Other options include UR-3, UR-10, iiwa 7 R800, and iiwa 14 R820.
- Top Section:** Displays input fields for **Permissible force (Fmax)** (0 N), **Permissible pressure (Pmax)** (0 N/cm²), **mh** (40 kg), and **k** (25 N/mm).
- Central Human Model:** A 3D model of a human figure with various body parts labeled. A red circle labeled **6** is on the head, and a red circle labeled **9** is on the chest.
- Main Window:** Shows the **Determination of hazard in collaborative applications** dialog. It includes a **Select body part in contact with robot** dropdown menu. The **Quasi-static contact** section shows **F = 250 N** and **A = 2 cm²**. The **Transient contact** section shows **M = 13.507 kg**, **mL = 2.5 kg**, **vrel = 3000 mm/s**, **A = 2 cm²**, **Ft = 1300.34 N**, **Er = 33.82 J**, **Fmax = 650.17 N/cm²**, and **Emax = 1.60 J**. The **Result** section states: **Body part in contact: Chest - Pectoral muscle**, **Maximum allowed values for this body part Fmax: 280 N**, **Pmax = 340 N/cm²**, **M = 13.51kg**, **mL = 2.50kg**, **mR = 9.25kg**, **u = 7.51kg**, **vRel = 3000mm/sec**, **k = 25N/mm**, **Contact area (A): 2.0 cm²**, **Applied Force (F): 1300.3 N**, **Calculated pressure Pr = F / A = 650.2 N / cm²**, **Calculated Energy Er: 33.8 J**. It concludes that **Either calculated pressure Pr, Er or Ft exceed the normative values for this body part. Corrective measures are required.**

1. Select the Collaborative Robot from Raswin catalog, if it not appear use "Unknow".
2. Using a Catalog Robot, the maximum force will be auto-filled. If other robot is used, enter the value manually.
3. Write the Payload (Gripper + part).
4. Using a Catalog Robot, the maximum Speed will be auto-filled. If other robot is used, enter the value manually.
5. Write the area of contact.
6. The Standard's maximum values, will appear.
7. The Standard's maximum values, will appear.
8. The contact values of force, pressure and energy will be displayed.
If value is below maximum Standard's level, it will appear in green, if not, it will appear in red.
9. Click OK

Step 13: Fulfill the hazard specifications

How to do Risk Assessment with RASWin?

HRNi Module

The screenshot displays the RASWin HRNi Module interface. On the left, a sidebar contains icons for 'Standard Modules', 'General information', 'Hazard Access Points', 'Calculate initial HRN', 'Calculate final HRN', 'HRN Gap', 'Layout Safety Matrix', 'Final PL', 'PL Graphic', and 'Validation'. The main window is divided into several sections. At the top, there are two image windows: 'Access point image' (containing a blue circle with the number 3) and 'General image' (containing two red rectangles with the number 3). Below these, there are two tabs: 'Assessment by Hazards' and 'Assessment by Tasks'. The 'Assessment by Tasks' tab is active, showing a 'Task Type List' with '1 - Loading task' selected. Below this, there is a 'Job Task List' with a single task: '1 - The operator must remove the empty trolley and place the new one.' To the right of the task list, there are buttons for 'Add', 'Edit', and 'Delete'. Below the task list, there is a table with the following data:

Hazard	Description	Applicable	Persons (NP)	Frequency (FE)	Probability (LO)	Max. Loss (DPH)	Result (HRN)
02.1.1.1 - Quasi-static Contact	Crushing of the operator's arm hazard between the robot and the fixed parts of the plant during material loading.	<input checked="" type="checkbox"/>	1-2 Persons, 1.00	Constant, 5.00	Although improbable, it may occur, 5.00	Major bone fracture or major temporary illness, 4.00	100.00 - High
02.1.1.2 - Transient Contact	Robot impact hazard on the operator's chest during loading task.	<input checked="" type="checkbox"/>	1-2 Persons, 1.00	Constant, 5.00	Probable, Not surprising 8.00	Major bone fracture or major temporary illness, 4.00	160.00 - High

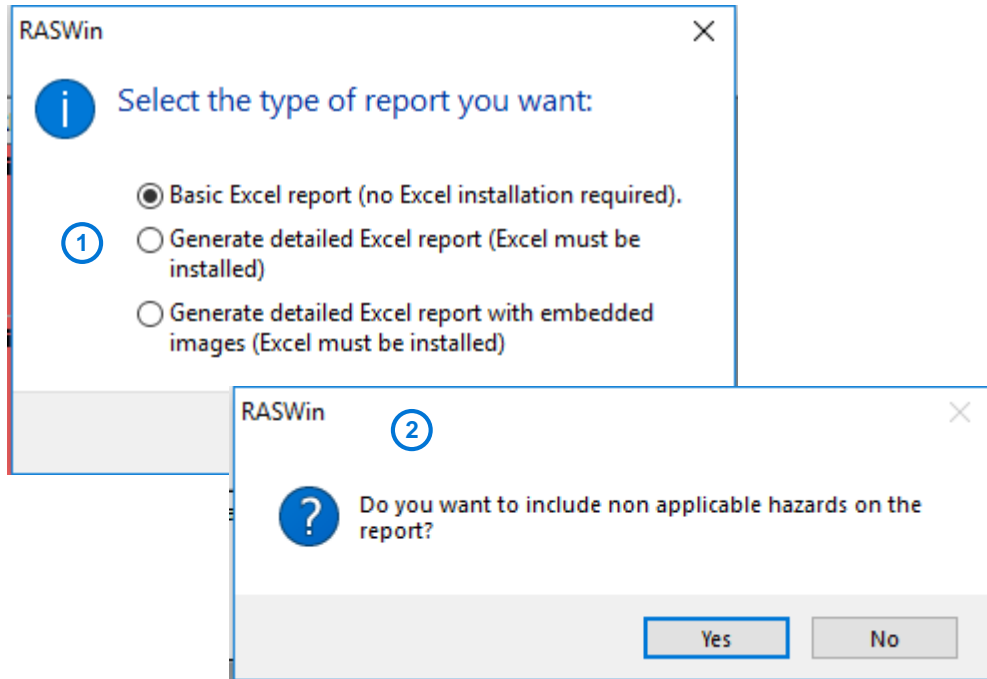
The table has a yellow background for the first row and a red background for the second row. A blue circle with the number 1 is located in the 'Description' column of the second row, and a blue circle with the number 2 is located in the 'Result (HRN)' column of the second row.

1. Write a hazard description.
2. Calculate the HRNi value for this hazard.
3. Add a new hazard.
4. Click on "Export generic hazard" to create an excel report.

Step 14: Export the HRNi to Excel

How to do Risk Assessment with RASWin?

HRNi Module



1. Select the detailed Excel report as type of report.

a) Basic Excel report: If Excel is not installed on your computer.

a) Detailed Excel report: Initial Risk Assessment report, in excel format, without images.

b) Detailed Excel report with embedded images: Initial Risk Assessment report, in excel format, with images.

2. Select “No”.

3. The excel report has been created.

3	Access point	Mode:	Task type:	Hazard:	Description	Number of exposed persons (NP):	Exposure frequency (FE):	Probability (LO):	Probable maximum loss (DPH):	Level	Result (HRN):
	A01 - Electrical cabinet	The operator must touch the elements installed inside the cabinet and the electrical wiring.	Maintenance Task	01.1 - Hazard due to contact with 'live' parts (carrying electrical current)	Electrical hazard due to poor isolation.	1-2 Persons, 1,00	Daily, 2,50	Probable , Not surprising, 8,00	Fatality, 15,00	High	300,00
	A02 - Collaborative Robot	The operator must remove the empty trolley and place the new one.	Loading task	02.1 - Cuasi-static Contact	Crushing of the operator's arm hazard between the robot and the fixed parts of the plant during material loading.	1-2 Persons, 1,00	Constant, 5,00	Although improbable, it may occur, 5,00	Major bone fracture or major temporary illness, 4,00	High	100,00
	A02 - Collaborative Robot	The operator must remove the empty trolley and place the new one.	Loading task	02.2 - Transient Contact	Robot impact hazard on the operator's chest during loading task.	1-2 Persons, 1,00	Constant, 5,00	Probable , Not surprising, 8,00	Major bone fracture or major temporary illness, 4,00	High	160,00