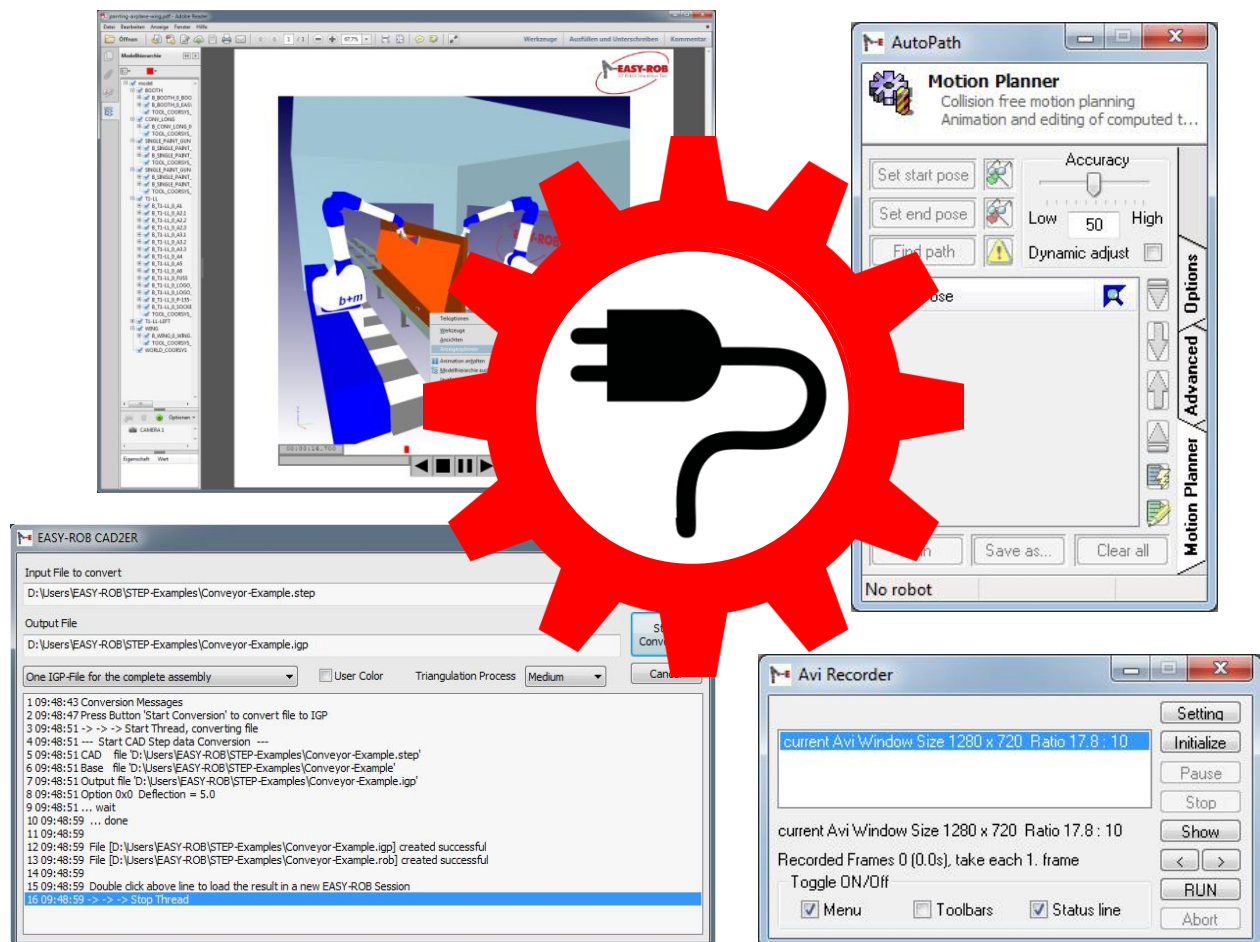


Operation References

Special Functions & Plugins

EASY-ROB™ V8.0



November 2019

Version 3.2

EASY-ROB™

Table of contents

| | |
|---|----|
| Table of contents | 3 |
| PlugIn DLLs | 4 |
| AVI - Recorder | 4 |
| VRML Export with Animation | 6 |
| Path planning with AutoPath™ | 7 |
| CAD Import..... | 13 |
| Import VRML with Animation | 13 |
| CAD2ER - Converting STEP- and VRML II 97-files to IGP | 16 |
| CAD Export..... | 17 |
| CAD-file Export | 17 |
| Project Manager | 19 |
| Administrate Projects | 19 |
| History Diagram..... | 21 |
| Visual analyses of the simulation..... | 21 |
| ERC Command Searcher..... | 23 |
| Search ERC Commands | 23 |
| 3D-PDF-Export | 24 |
| Saving simulation process in 3D-PDF document | 24 |
| Space Mouse..... | 28 |
| Space Mouse Connection..... | 28 |
| Appendix..... | 29 |
| Inverse / forward Kinematics ID's | 29 |
| Contact | 32 |
| Notes | 33 |

PlugIn Dlls

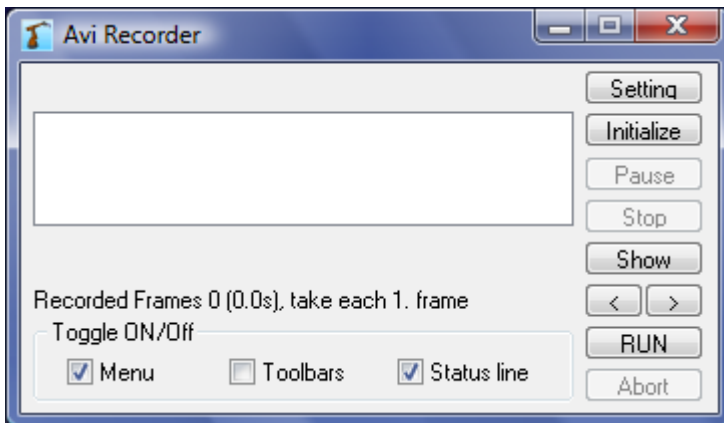
AVI - Recorder

In the current version of EASY-ROB™ you can directly create AVI video files. There's no external software needed for video capturing.

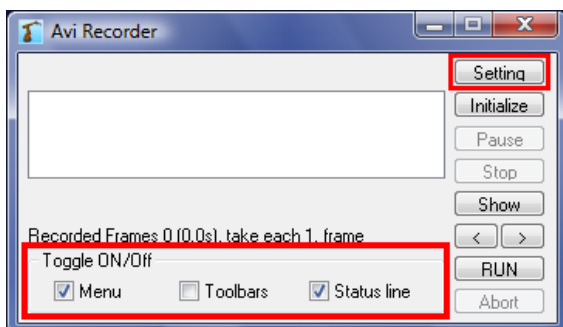
1. Load the cell (*.cel)
2. Open the panel either by using the menu
View | EASY-ROB PlugIn Dlls | AVI Recorder or use the button:



Alternative: Push the "F6" Button

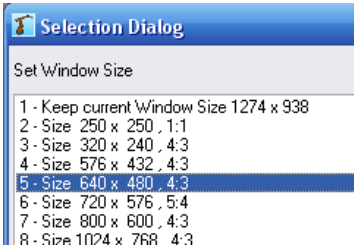
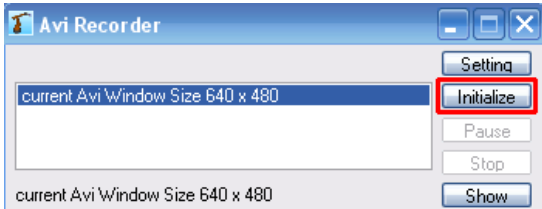
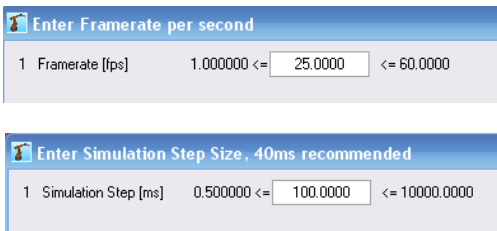

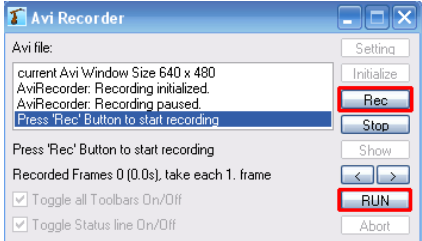
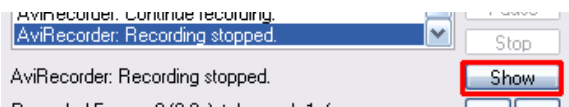


| | | | |
|---|--------------------------------------|---|--------------------------|
|  | Select window-size |  | Show Recording |
|  | Select a path where to save the file |  | Select: Number of frames |
|  | Pause Recording |  | Start Simulation |
|  | Stop Recording |  | Abort Simulation |



First you have to select if you want to capture the recording with or without the toolbar and status line.

AVI Recorder

| | |
|---|---|
|  | <p>With a click on “Setting” you can select a window size</p> |
|  | <p>With a click on „Initialize“ you can set the name of the file and a place where to save it</p> |
|  | <p>After that you can set the Framerate (fps) and the Simulation-Stepsize (ms)</p> |
|  | <p>Selecting the compressing factor is the last step before you can start a recording.</p> |
|  | <p>With a click on „Rec“ you can start the recording</p> <p>A click on “RUN” starts the simulation.</p> |
|  | <p>After the recording you can show the recorded AVI by using the „Show“ button</p> |

EASY-ROB™

PlugIn Dlls

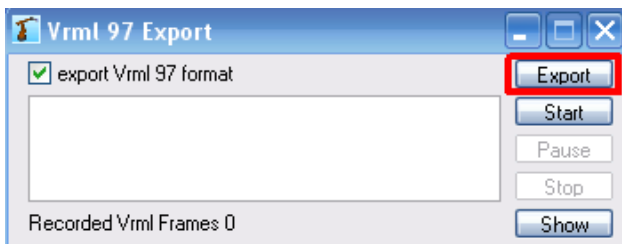
Operation References

VRML Export with Animation

If you want to exchange the work cell (static) or the result of the simulation (with animation) you can use the VRML 97 Export to store the whole work cell including the animations sequence into a file with extension (*.wrl).

1. Load the work cell „three_robots.cel“
2. Open the panel by menu:
View | EASY-ROB PlugIn Dlls | VRML 97 Export
Alternative: Push the “F7”-Button

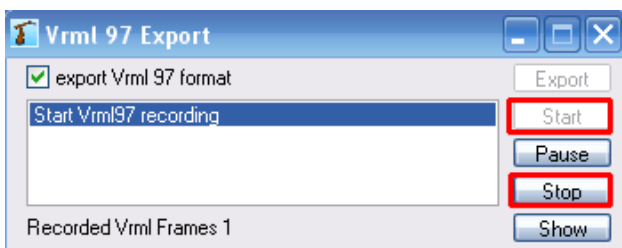
Export static:



To export a static workcell click on „Export“ and save the VRML-file.

To see the workcell in the explorer just click „Show“.

Export dynamic:



To export a workcell including the animation click on „Start“ to record and start the simulation. At the end of the simulation Stop the recording with „Stop“ and save the VRML-file.

To see the animation in the explorer just click „Show“

Remark: Prerequisite for an animation is a loaded and running program.

EASY-ROB™

PlugIn Dlls

Operation References

Path planning with AutoPath™

To engineer a workpiece into the fixture or to move around an interfering geometry is a time-consuming task.

The EASY-ROB™ option **AutoPath™** will support the user to plan and create collision free paths.

The example below will show the capability and the functionality of AutoPath™.

1.
Load the workcell

AutoPath_Example_01.cel

with the button *Load from Library*
from the directory:

../EASY-ROB / ApplicationLib /



Start Device Manager
Shortcut: „Ctrl+Shift+O“

Annotation:

The example demonstrates a typical initial situation and the result of a collision free path planning done by AutoPath™.

The workpiece has to go through the frame and has to be placed on the other side of the frame.

The first cycle shows the shortest way from start to the target – of course including collision.

The path in the second cycle was planed by AutoPath™ and is collision free. While planning a path, AutoPath™ is taken the axis limits of the robot into consideration.

An additional geometry on the way through the frame requires a further optimization of the path.


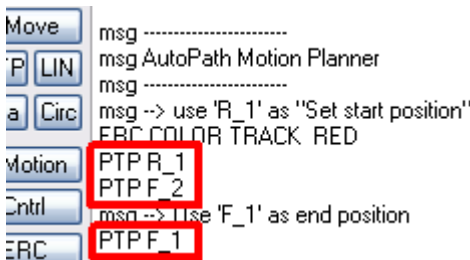
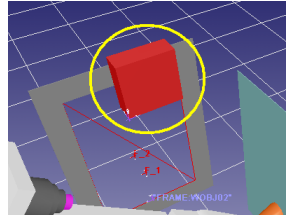
In the last cycle the workpiece is moving along the optimized path.

2.
Start the simulation with the button
Run Program

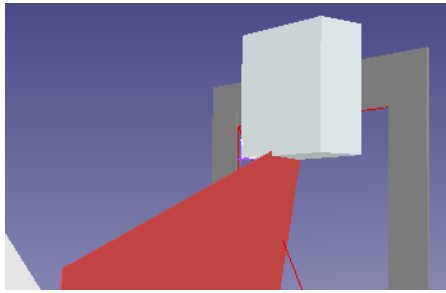
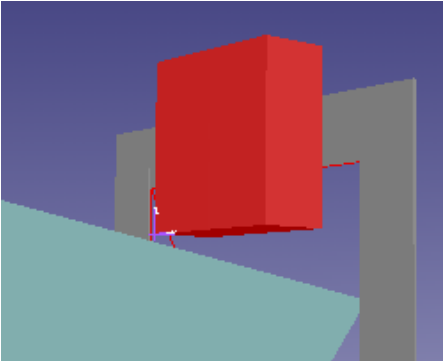


Shortcut: „Ctrl+R“

Introduction of the AutoPath™ example

| | |
|---|---|
| Commentary of the single steps of the program: | |
| 3. Open the <i>Teach Window</i> by mouse click on the button <i>Open Program Teach Window</i> to see the current program |  |
| 4. After the declaration of the variables and the settings for the collision detection the robot will move by PTP-commands (line 26) from the start position to the target position. |  <pre> Move msg ----- LIN msg AutoPath Motion Planner a Circ msg --> use 'R_1' as "Set start position" Motion PTP R_1 PTP F_2 Ctrl msg --> Use 'F_1' as end position ERC PTP F_1 </pre> |
| 5. The second cycle was planed by AutoPath™. The collision free positions are placed for a better overview into a sub function (fct ComputedMotion(), line 59). The base for path planning is a collision free start and target position (2 tagpoints). The calculated collision free positions in between will be stored as axis values (including start and target position) The determined positions for the move forward can be used in reverse order for the way back. | <pre> call ComputedMotion() fct ComputedMotion() CONFIG 5 PTP_AX 0.001987 14.918705 24.145096 -0.723742 -65.057760 -1.044701 PTP_AX 11.358115 6.773610 34.196621 -61.874079 -53.128671 -23.215272 PTP_AX 37.312795 10.036447 18.948508 -56.884667 -38.187299 -7.011792 PTP_AX 46.571021 16.165010 7.437025 -41.405253 -54.501604 26.808908 PTP_AX 39.803718 40.294771 12.634212 -43.407540 -90.668994 27.589344 WAIT 2.0000 ! go back PTP_AX 46.571021 16.165010 7.437025 -41.405253 -54.501604 26.808908 PTP_AX 37.312795 10.036447 18.948508 -56.884667 -38.187299 -7.011792 PTP_AX 11.358115 6.773610 34.196621 -61.874079 -53.128671 -23.215272 PTP_AX 0.001987 14.918705 24.145096 -0.723742 -65.057760 -1.044701 endfct </pre> |
| 6. After the second cycle geometry will be set to visible. (line 48) | <pre> ----- ! Plan another Path with Disturbance ----- ERC CURRENT_DEVICE SET DISTURBANCE ERC DISPLAY_CROBOT ON ERC CURRENT_DEVICE UNSET </pre>  |

Introduction of the AutoPath™ example

| | |
|---|---|
| <p>7. The path is not collision free anymore and requires a further optimization.</p> | <p>call <code>ComputedMotion()</code></p>  |
| <p>8. By using AutoPath™ the path was optimized and stored in the function „call <code>ComputedMotion_with_Disturbance()</code>“.</p> | <p>call <code>ComputedMotion_with_Disturbance()</code></p>  |

EASY-ROB™

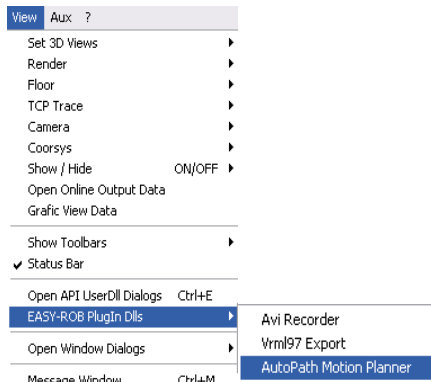
PlugIn Dlls

Operation References

Path planning with AutoPath™ – Dialog and Operation

1. Start the AutoPath™ dialog from the menu

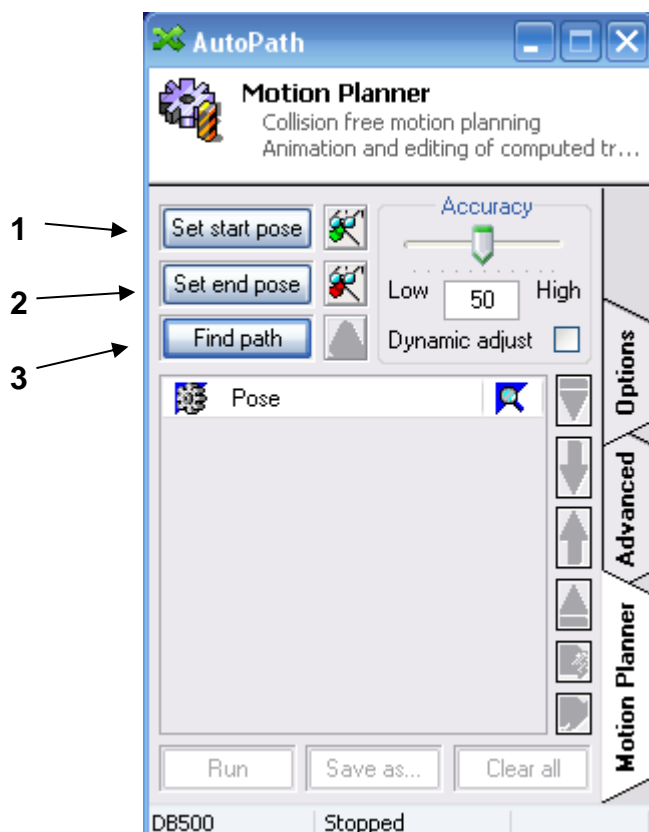
View | EASY-ROB PlugIn Dlls | AutoPath Motion Planner




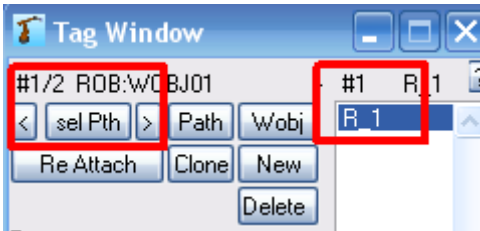
2. The dialog AutoPath™ and the most important elements:

1. Set start pose
(to set the collision free start position, without exceeding the axis limits of the robot)
2. Set end pose
(to set the collision free end position, without exceeding the axis limits of the robot)
3. Find path
(search a collision free path from start to the target position)

The calculation can take several minutes – depending on the complexity of the situation and the computer performance.

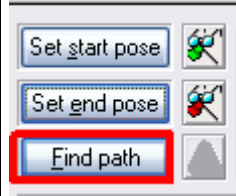


AutoPath™ Dialog and Operation

| | |
|--|--|
| <p>3. Open the <i>Tag Window</i> by double click on the button <i>Sel Tag</i></p> <p>(workcell <i>AutoPath_Example_01.cel</i>)</p> |  |
| <p>4. Select with „sel Pth“ the path „Rob“ and move the robot to tagpoint R_1 (double click the tagpoint in the list of the TagWindow)</p> |  |
| <p>5. Click the button „Set start pose“ in the motion planner to set the tagpoint R_1 as start position.</p> |  |
| <p>6. Select with „sel Pth“ the path „Frame“ and move the robot to tagpoint F_1 (double click the tagpoint in the list of the TagWindow)</p> |  |
| <p>7. Click the button „Set end pose“ in the motion planner to set the tagpoint F_1 as end position.</p> |  |

AutoPath™ Dialog and Operation

8.
Leave all settings to default and click „Find path“ in the AutoPath™ dialog to calculate a collision free path.

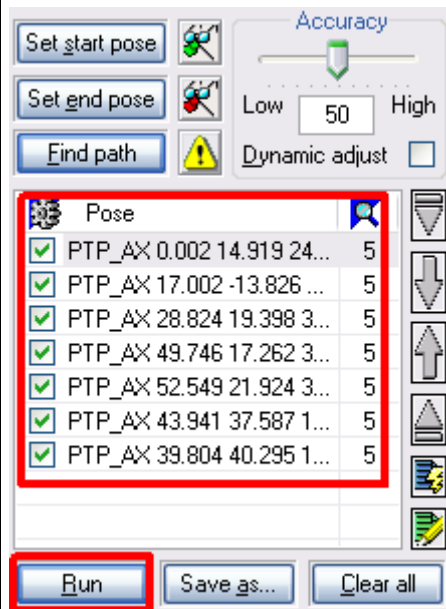


Important Note:

The process to calculate a collision free path can take up to several minutes – please don't lose the patience and don't start any other EASY-ROB™ functions while the calculation.

9.
After the search the collision free path will be displayed as single positions.

Move along the positions by clicking on “Run”.



CAD Import

Import VRML with Animation

All common 3D-CAD systems such as Catia, ProEngineer, Solid Works, Solid Edge, etc are able to export VRML 1.0 and VRML 2.0.

EASY-ROB™ can import VRML files and save them as IGP-Files (*.igp). The Import does not include kinematics or animations in the VRML-file.

Additionally to the *.igp-file the importer will create automatically a *.rob-file.

Even when the files from different systems are all VRML-files, with regard to the inner structure (number of objects and number of polygons) they are all different.

Solid Edge, UGS e.g. is using „Shapes“ to set colors and objects.

EASY-ROB™ is taking this into consideration while import by using a presetting and the functionality to „merge“ the polygons.

The „merger“ will reduce the number of objects and will increase the number of polygons per object.

And even when the file that the merger is creating will be bigger as the „not-merged“ file, you will have a better performance .

In the „VRML-Examples“-folder you will find examples from different systems with some remarks about the presetting.

TIP: Always use the „**Merger**“, so you will have a better performance while rendering.

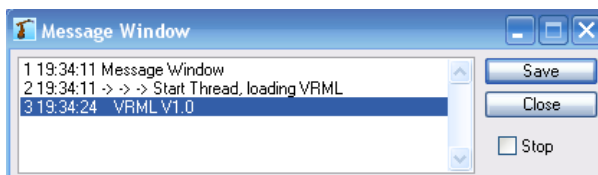
VRML files are ASCII-files. You can open and read them in every editor.

Most times you will find additional information in the header of the file.

TIP: Before the import always save your work and start a new session of EASY-ROB.

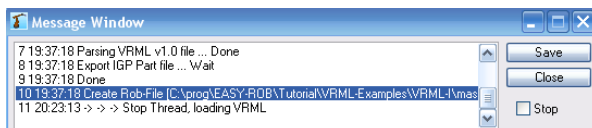
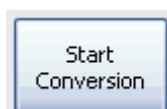
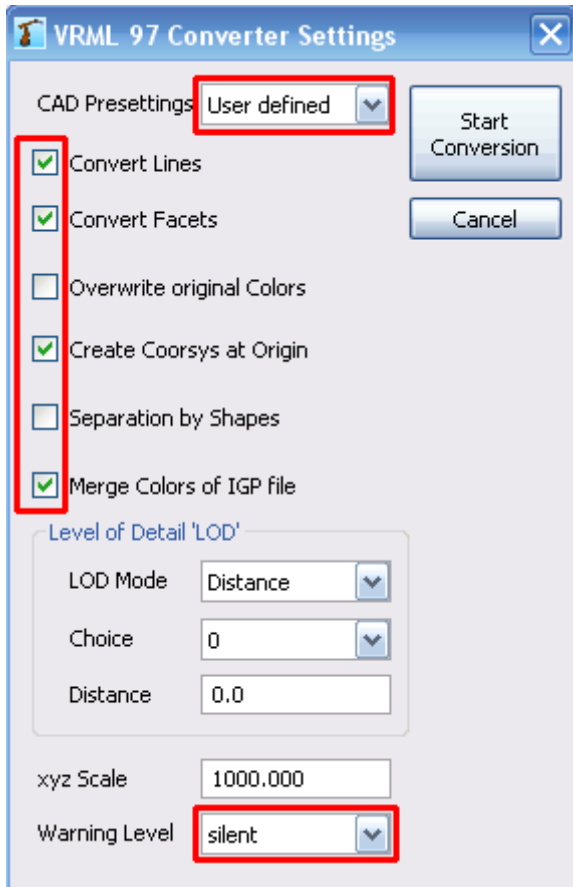
To load a VRML file you can either

1. select the file by menu File | Load | Import / Convert | Convert VRML1.0 /2.0 into CAD Preview or
2. use „Drag’n Drop“ from Explorer



Beside the Message Window you will get the dialog for the Converter Settings

CAD Import - VRML



By the CAD Presetting you can configure the exporting system.

This is important because depending on the export system EASY-ROB has to use different options for the import

TIP:

Always use the presetting.
Changing the presetting can cause bad system performance.

With the Warning level you decide how much information you will get while the import.

Silent = Standard messages
Warning = only warnings
Verbose = detailed

With Start Conversion
you can start the converter

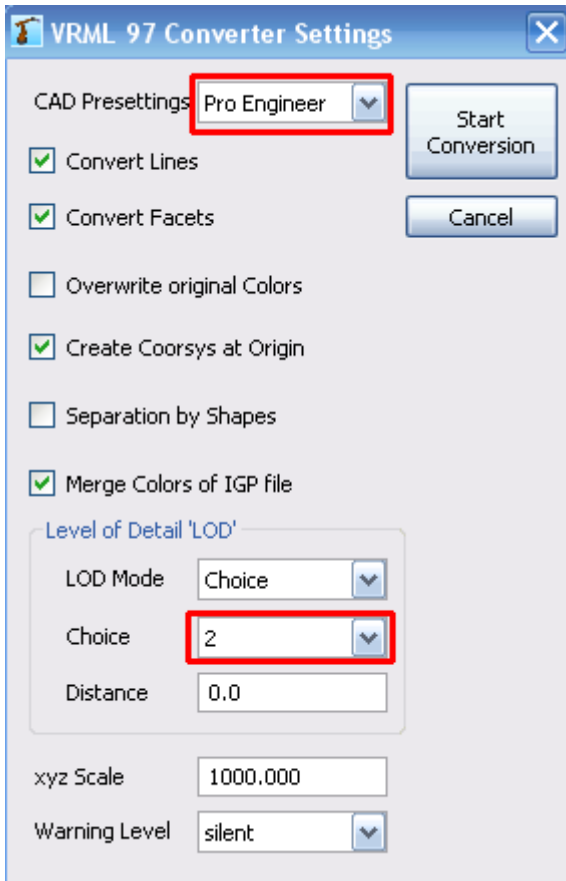
In the Message Window you can follow all messages and by using the „Save“-button you can store the protocol of the import

TIP:

Double click onto a line with bracket will open the file in the editor
Double click onto any other line will delete the whole Message Windows

CAD Import- VRML

EXTRA for the import from Pro Engineer



While reading parts from Pro Engineer you are able to reduce the data by using the LOD (Level of Detail)

By using this option you can reduce the data-volume and increase the system performance.

EASY-ROB™

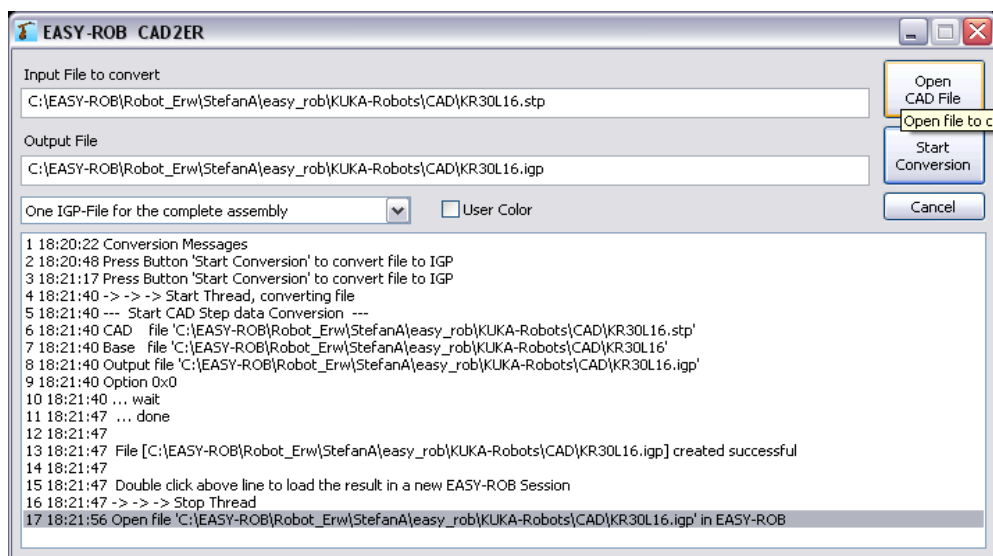
CAD Import

Operation References

CAD2ER - Converting STEP- and VRML II 97-files to IGP



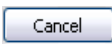
EASY-ROB™ - CAD2ER allows to convert STEP- and VRML II,97 files to IGP. You can find the application as standalone program in subfolder `./cad2er/` of the EASY-ROB™ -Application. Loaded Rob- und IGP- files will be loaded in a new EASY-ROB™ Session.

Start CAD2ER with the shortcut „Ctrl+Shift+C“ or by Menu: Load > Start CAD2ER Converter



CAD2ER was developed in collaboration with *machineering* GmbH & Co. KG (www.machineering.de).

Handling

- Select the file you want to convert by clicking on .
- Change the name of the file into „Output File“
- Place a checkmark on „User Color“ to configure the colour.
- Click on  the begin the conversion of the file.
- Double-click on the generated file-name in „[]“ brackets to open the file in a new EASY-ROB-session.
- Quit CAD2ER by clicking on .

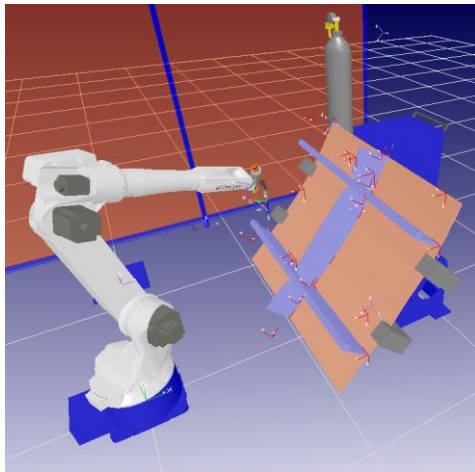
TIP: Native CAD-files, like CATIA V4/V5 or Pro/Engineer can be converted to STEP by using the software „3D-Tool“.

CAD Export

CAD-file Export

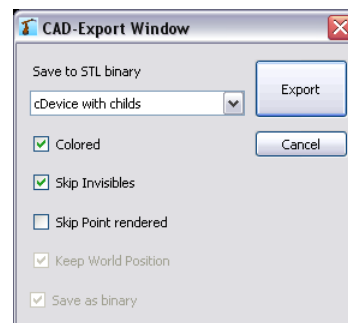
Single robots or devices or even the complete workcells can be exported as binary STL-files. STL binary is a neutral format and can be imported in all common CAD-Systems. Furthermore the results of the planer can be analyzed by the user.

Optional: the exported STL-file can also include colours, though it is not supported by every CAD-system.

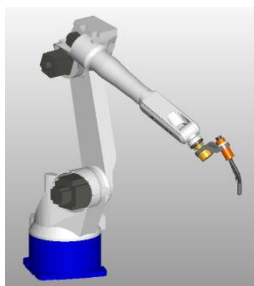


Workcell: arcweld_L_01.cel

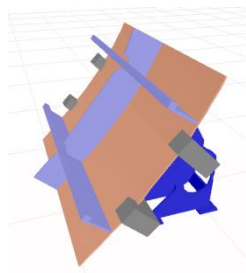
To export a robot select a robot by click on Menu: File > Save > Export > STL binary, to open the **CAD Export Window**



Selecting „cDevice with childs“ exports the robot with the Welding-Torch as coloured STL-file e.g.. „cDeviceChilds_stl“.

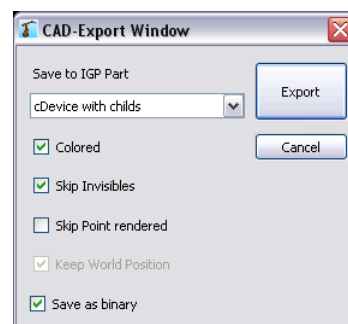


Robot as STL binary file

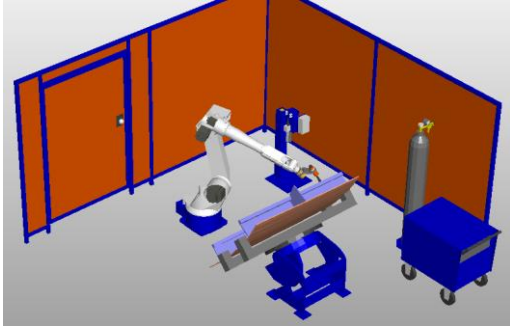


Rotary table als IGP binary file

To export the rotary tabel „POSITIONER_01“ with the component „WORKPIECE_02 „ to a **IGP binary**-file, the rotary table has to be selected first.



CAD-file Export



Workcell as VRML II,97 file

IGP binary-file decreases file-size to nearly 50%.
Import will happen 20% more faster. All
geometries will be saved in world-coordinates.

EASY-ROB™ Project Manager

Operation References

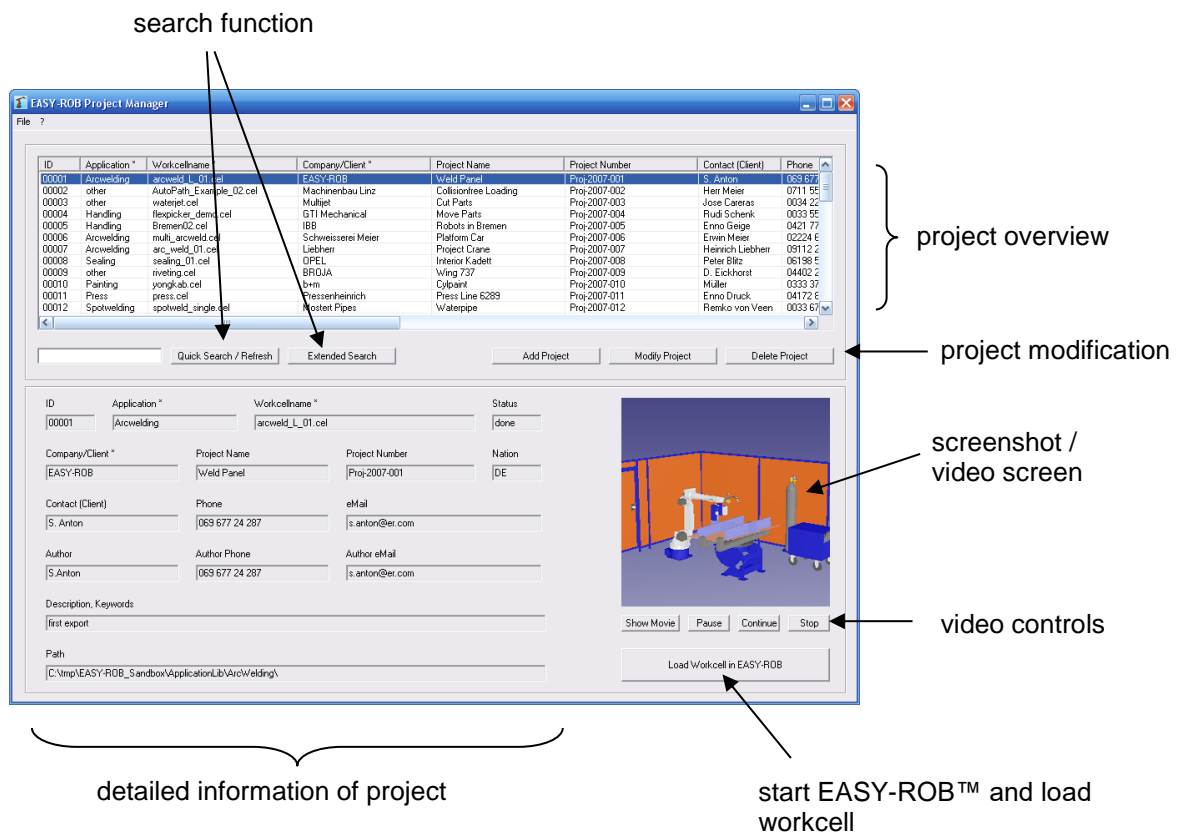
Administrate Projects

The Project Manager provides different functionalities to administrate EASY-ROB™ workcells and project related information. The search functions are supporting the user to find the desired data straight away. The project data can be stored either by using the input mask in the Project Manager or by the Visual File Interface out of EASY-ROB™ (see chapter „Visual File Interface“)

Further on the Project Manager is able to run and show videos of the workcells and is able to load the workcell straight into the EASY-ROB™.

Start the Project Manager by double click onto the executable „/EASY-ROB/easyrob-project-manager.exe“ or from EASY-ROB™ by shortcut „Ctrl+Shift+P“ . Or use the menu :File Menu: Load -> Start Project Manager.

search function



project overview

project modification






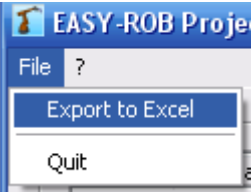
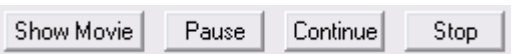

screenshot / video screen

video controls

detailed information of project

start EASY-ROB™ and load workcell

Project Manager

| | |
|---|--|
|  | Add a new projects |
|  | Modify an existing projects |
|  | Delete a projects |
|  | <p>Quick Search</p> <p>Options for Quick Search:</p> <ul style="list-style-type: none"> - Enter a complete word - Enter a part of a word - Enter numbers <p>Tip: Using an empty field and „Refresh“ will show all items of the database.</p> |
|  | Extended Search with filter |
|  | Export all projects into an EXCEL file |
|  | <p>Controls for the video</p> <p>(if the buttons are disabled there is no video)</p> |
|  | <p>Start EASY-ROB™ and load the selected workcell</p> <p>(if the button is disabled there is now workcell)</p> |

EASY-ROB™

History Diagram

Operation References

Visual analyses of the simulation

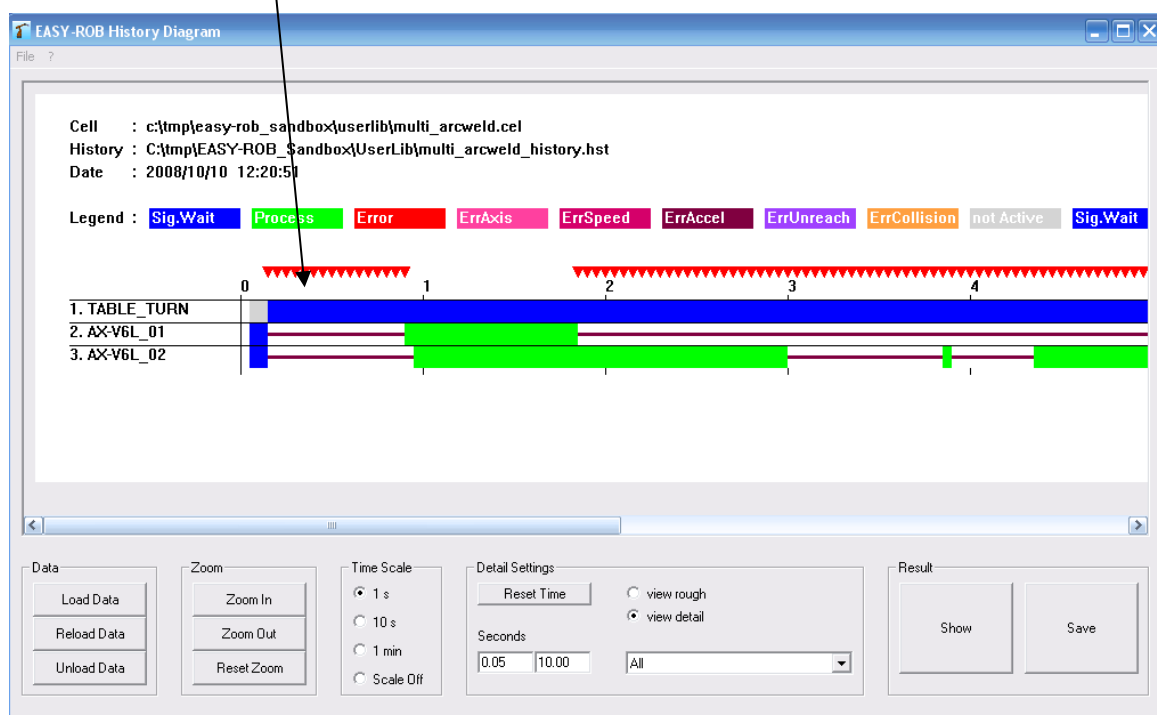
The functionality „History Diagram“ enables the user to analyze the simulation visual by a graphic.

History Diagram can record the state of every device into the workcell. The state like e.g. „waiting for signal“ or an „axis limit exceeding“ will be stored while every simulation step and be displayed and analyzed in a diagram.

Because all possible states will be shown in different colors, an occurring error can be identified immediately.

Start the History Diagram by double click onto the executable „/EASY-ROB/easyrob-history-diagram.exe“ or from EASY-ROB™ by shortcut „Ctrl+Shift+H“. To start from the menu use “File Menu: Load -> Start History Diagram.”

Graphic of the simulation



Data
handling


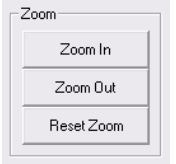
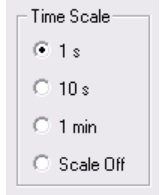

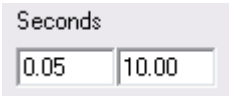
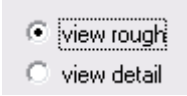

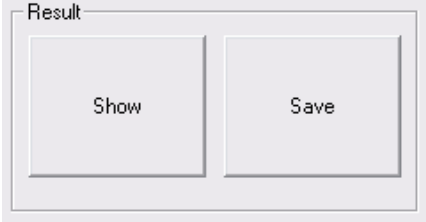
Zoom
function

Time
scale

Detail settings

Show,
Save data

History Diagram

| | |
|---|---|
|  | <p>Load, reload and unload history file</p> |
|  | <p>Zoom in and out the view and reset to start conditions</p> <p>(zoom is only related to the lenght of the diagram, not to hight)</p> |
|  | <p>Show time scale</p> <ul style="list-style-type: none"> - every second - 10 seconds - every minute - switch scale off |
|  | <p>Reset time to start conditions</p> |
|  | <p>Start and end time of the displayed area</p> |
|  | <p>Rough display :all errors in one color detailed display: every error in its own color</p> |
|  | <p>Selection of the displayed Device (all or one Device)</p> |
|  | <p>Show: Show the diagram (with the selected settings)</p> <p>Save: Save the diagram as JPG-picture in the same directory of the history file</p> |

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ERC Command Searcher

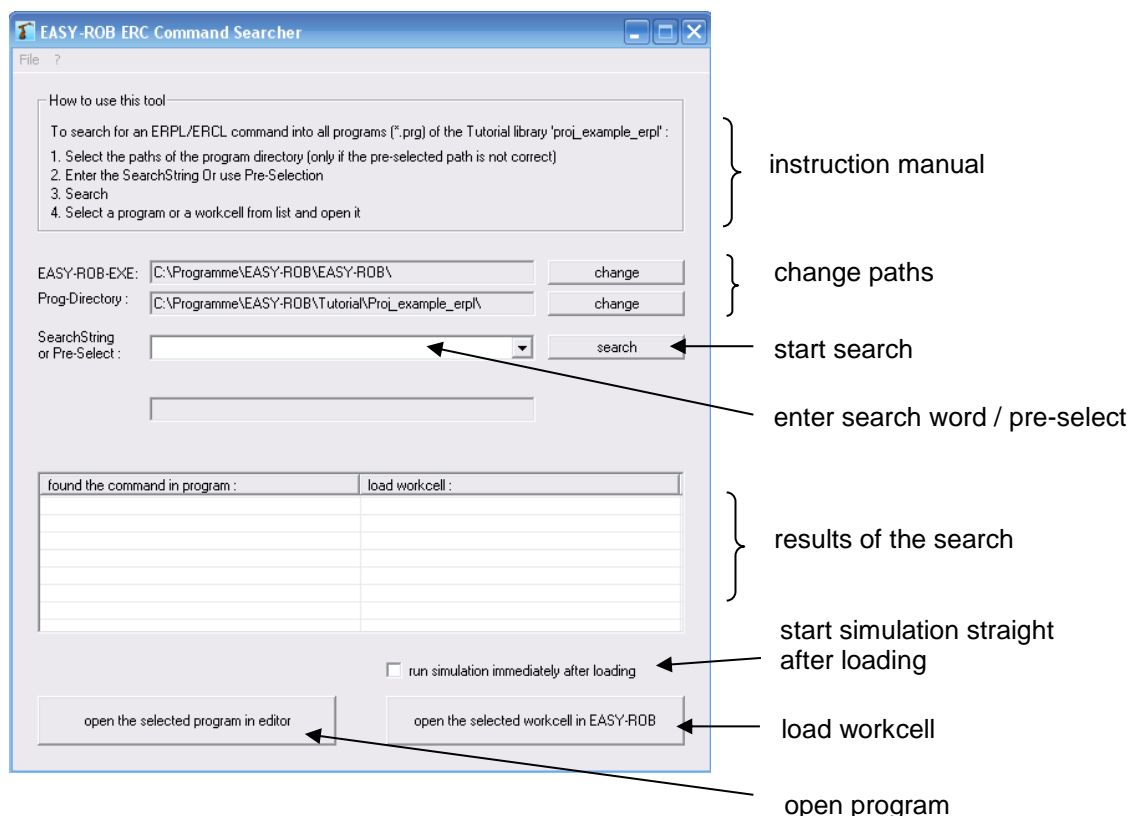
Operation References

Search ERC Commands

The example library contains for each ERPL-/ERCL- command a workcell with program.
The ERC Command Searcher will support the user to search for a specific ERC commands in the example library "Proj_example_erpl", which is normally installed in the directory:
".\EASY-ROB\Tutorial\Proj_example_erpl"

The library contains many short example programs with different ERC commands to give an impression how the commands are working

Start the ERC Command Searcher by double click onto the executable „/EASY-ROB/ easyrob-erc-command-searcher.exe“ or from EASY-ROB™ by shortcut „Ctrl+Shift+S“. From the menu use „File Menu: Load -> Start ERC Searcher“.



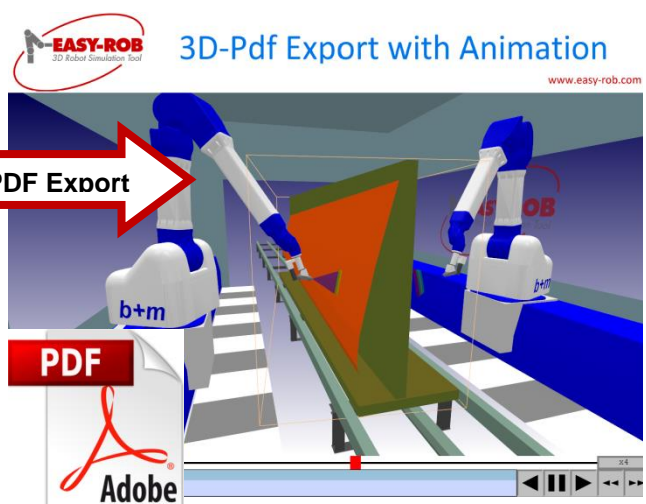
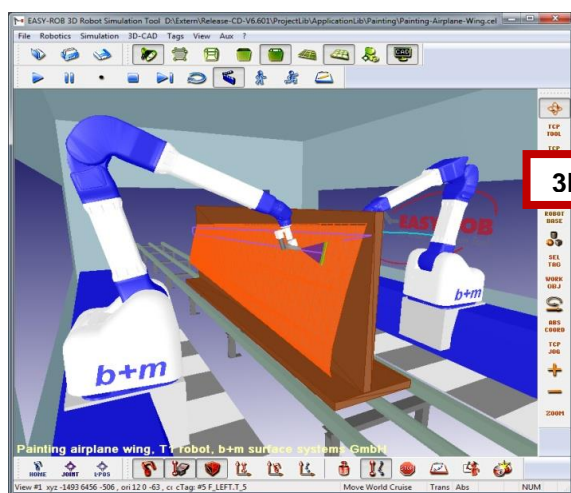
EASY-ROB™

3D-PDF-Export

Operation References

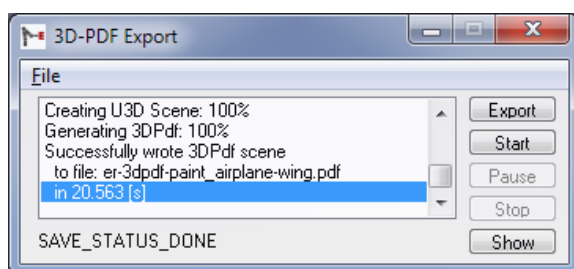
Saving simulation process in 3D-PDF document

The new EASY-ROB™ 3D-PDF Export option allows to save entire simulation process of a work cell in one 3D-PDF document. Afterwards it can be opened, using the free Adobe® Reader XI and the whole simulation can be started.



To ensure a proper operation, we recommend using at least version XI (11.0.10) of Adobe® Reader.

The 3D-PDF Export can be found under **View > EASY-ROB PlugIn DLLs > 3D-PDF Export**.



3D-PDF Export dialogue

- Open the 3D-PDF Export dialogue
- Click on Start to begin recording.
- Start the simulation. The simulation run will be recorded. The number of recorded frames will be displayed.
- Click on Stop to finish the recording. You will be asked to enter the destination directory and the name of the 3D-PDF document.
- The 3D-PDF document will be created.

The Adobe® Reader allows to rotate and zoom the recorded scene.

3D-PDF-Export

Use the navigation bar to start, pause or stop the recorded simulation process. Fast forward and rewind (x1/64 – x64x speed) are also possible. The displayed time shows you the real process time.



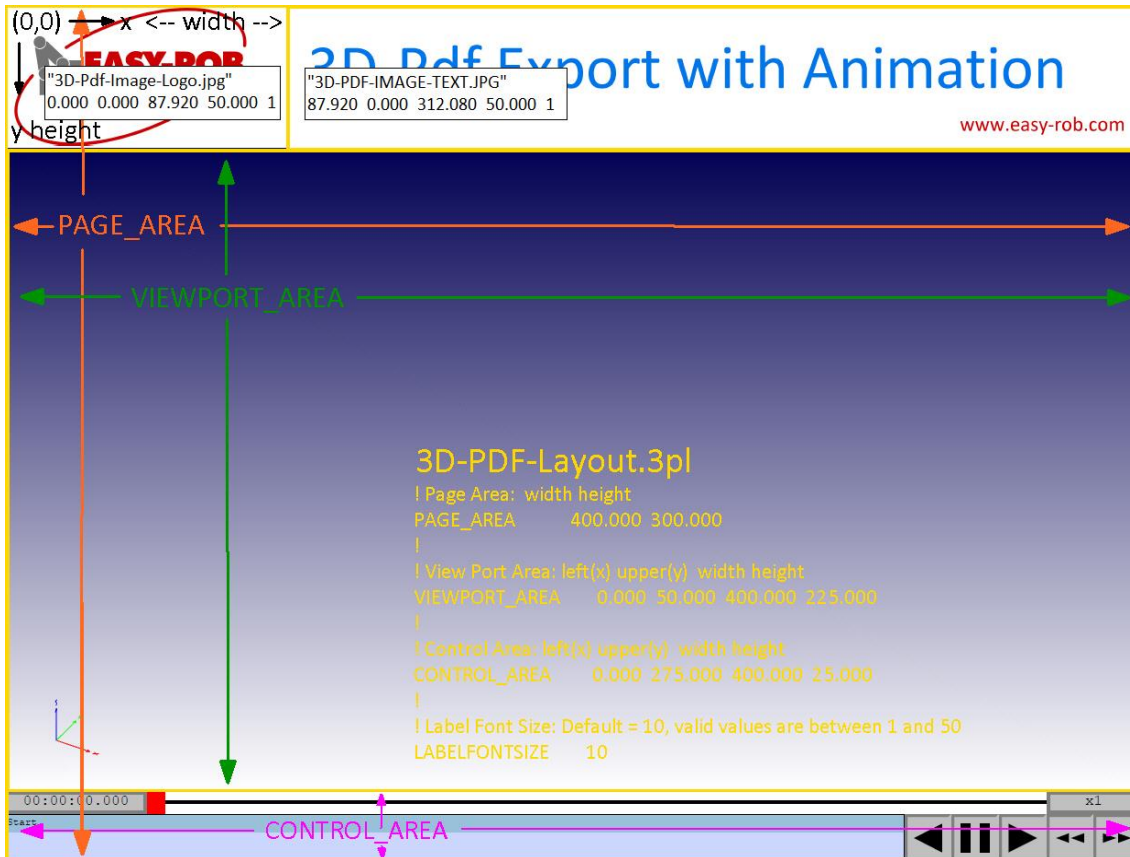
The 3D-PDF Export functionality can alternatively be controlled via ERCL commands. The user then has the following ERCL commands. Find more detailed information in document "EASY-ROB-ShortKeys_ENG.pdf"

```
ERC_3D_PDF_EXPORT SCREENSHOT [filename]
ERC_3D_PDF_EXPORT ON / OFF [filename]
ERC_3D_PDF_EXPORT SET_FILE filename
ERC_3D_PDF_EXPORT SET_LABEL labelname
ERC_3D_PDF_EXPORT SET_PASSWORD passwordname
ERC_3D_PDF_EXPORT PAUSE
ERC_3D_PDF_EXPORT DEACTIVATE
```

Additional ERCL- commands allow to load a layout from a 3D-PDF Layout file ".3pl" or to determine the layout dynamically while running a program.

```
! -----
! Date: 2016/09/14 Time: 10:43
! 3D-PDF Version v7004
! 3D-PDF Layout File "3D-PDF-Layout.3pl"
! -----
!
! (0,0)--> x <-- width -->
! |         |
! v         height
! y         |
!
! Important Notes:
! - Viewport-, Control-Area and all Images should be inside the Page-Area
! - Images cannot be on top of the ViewPort- or the Control-Area,
!   but can be used as background, if their size is less or equal to the Page-Area.
! - The number of possible loaded images is limited by 12
! - The "image path" and "image file" must be saved within quotes
! -----
!
! Page Area: width height
PAGE_AREA          400.000  300.000
!
! View Port Area: left(x) upper(y) width height
VIEWPORT_AREA      0.000  50.000  400.000  225.000
!
! Control Area: left(x) upper(y) width height
CONTROL_AREA       0.000  275.000  400.000  25.000
!
! Label Font Size: Default = 10, valid values are between 1 and 50
LABELFONTSIZE      10
!
! Path where the images stored
! If no path is defined, the current working directory is valid
IMAGE_PATH         ""
!
! Images specifications for 3 images
! Parameter 1: "Image file name"
```

```
! Parameter 2-5: left(x) upper(y) width height
! Parameter 6:  Scaling is one of ISO_Stretch = 0 or ISO_CenterFit = 1
ADD_IMAGE      "3D-Pdf-Image-Logo.jpg"  0.000  0.000  87.920  50.000  1
ADD_IMAGE      "3D-PDF-IMAGE-TEXT.JPG"  87.920  0.000  312.080  50.000  1
!
```



ERC_3D_PDF_EXPORT RESET_LAYOUT
ERC_3D_PDF_EXPORT LOAD_LAYOUT
ERC_3D_PDF_EXPORT SAVE_LAYOUT
ERC_3D_PDF_EXPORT PAGE_AREA
ERC_3D_PDF_EXPORT VIEWPORT_AREA
ERC_3D_PDF_EXPORT CONTROL_AREA
ERC_3D_PDF_EXPORT LABEL_FONT_SIZE

filename.3pl
filename.3pl
width height
left(x) upper(y) width height
left(x) upper(y) width height
valid values are between 1 and 50

ERC_3D_PDF_EXPORT IMAGE_PATH
ERC_3D_PDF_EXPORT IMAGE_PATH
ERC_3D_PDF_EXPORT IMAGE_PATH
ERC_3D_PDF_EXPORT IMAGE_PATH
ERC_3D_PDF_EXPORT IMAGE_PATH
ERC_3D_PDF_EXPORT ADD_IMAGE

path
USERPROFILE
WORKING_DIRECTORY
3PL_FILE_FOLDER
""
"filename.jpg" left(x) upper(y) width height scaling

A detailed description of the commands can be found in the chapter "New ERCL-commands" or in the corresponding document for the ERPL- / ERCL- Program language „**EASY-ROB-ERPL_ENG.pdf**“.

Space Mouse

Space Mouse Connection

Navigation through 3D-Scene with a 3D-Mouse (Space Mouse) from 3DConnexion:
The 3-dimensional navigation through the robot-complex is very intuitive and accurate



Picture: 3DConnexion

Assignment of keys in your Space Explorer.

- | | | |
|--------------|----------------|--|
| 1 | Toggles | -> PanZoom -> Rotate -> Pan+Rotate |
| 2 | Toggles | -> Cruise World -> Jog cTcp -> Jog cRobot Joints |
| Shift | | as Keyboard |
| Esc | | as Keyboard |
| Ctrl | | as Keyboard |
| Alt | | as Keyboard |



- | | |
|-----------|-----------------------|
| - | Reduces Sensitivity |
| + | Increases Sensitivity |
| T | Top View |
| L | Left View |
| 2D | ohne Funktion |
| R | Right View |
| F | Front View |

Panel Open Menu
Fit Zoom World, cRobot, cTag, ..

TIP: Further settings can be made in the Environment-file „easy-rob.env“.

```
! Activates/Deactivates Space Mouse Menu
S3DM_MENU 1
! Scales Space Mouse sensitivity
S3DM_SPEED 1.000000
! Scales Space Mouse threshold
S3DM_THRESHOLD 1.000000
```

Appendix

Inverse / forward Kinematics ID's

The Inverse Kinematics ID defines the inverse kinematics and forward solution for each robot. EASY-ROB provides you with a couple of solutions for common robots like 3- or 5-axis, portalrobots, scaras, etc.

For every Kin-ID exists a Sub-ID.

You can edit the KIN-IDs and Sub-IDs in over Robotics Menu:

cRobot Kinematics -> Kinematics Data -> Inverse Kinematics ID -> Special Inverse Kinematics

| Kin-ID | Name | Sub ID | Kin_Type | Kommentar |
|--------|-------------------------|-------------------------------|----------------------------|---|
| 0 | | | | no inverse Kinematics available |
| 1 | DLL #1 | | | User-definied Kinematics in „er_kinx64.dll“ #1 |
| 2 | DLL #2 | | | User-definied Kinematics in „er_kinx64.dll“ #2 |
| 3 | DLL #3 | | | User-definied Kinematics in „er_kinx64.dll“ #3 |
| 4 | DLL #4 | | | User-definied Kinematics in „er_kinx64.dll“ #4 |
| 5 | DLL #5 | | | User-definied Kinematics in „er_kinx64.dll“ #5 |
| 6 | DLL #6 | | | User-definied Kinematics in „er_kinx64.dll“ #6 |
| 7 | DLL #7 | | | User-definied Kinematics in „er_kinx64.dll“ #7 |
| 8 | DLL #8 | | | User-definied Kinematics in „er_kinx64.dll“ #8 |
| 9 | DLL #9 | | | User-definied Kinematics in „er_kinx64.dll“ #9 |
| 10 | DLL #10 | | | User-definied Kinematics in „er_kinx64.dll“ #10 |
| 11 | DLL #11 | | | User-definied Kinematics in „er_kinx64.dll“ #11 |
| 12 | DLL #12 | | | User-definied Kinematics in „er_kinx64.dll“ #12 |
| 13-99 | User Inverse Kinematics | | | User-definied Kinematics in „er_kinx64.dll“ #13-99 |
| 100 | NumSol | 0 | any serial | Numerical Solution Kinematic >= 6 axis Further parameters: tolerances, joint weight, mask vector |
| 100 | NumSol | 1 | any serial | Numerical Solution Kinematic with less than 6 axis (in compliance with Approach-axis) |
| 140 | NumSol-Ref | | any serial | Numerical Solution using reference kinematic |
| 110 | articulated | | RzRyy:Rxyx , RzRyy:Rzyz | and Tracking-Axis „Standard RRR:RRR on Y-Track“ |
| 111 | articulated | | RzRyy:Rxyx , RzRyy:Rzyz | as 110, with „Backlink“ /. „A2A3 linking“ „Back Link RRR:RRR on Y-Track“ |
| 116 | articulated | | | as 110, solution w.r.t Robot Base |
| 117 | articulated | | | as 111, solution w.r.t Robot Base |
| 122 | Güdel | 0, 10, 11, 12, 13 | | RoboFlex (Jet Roboter) xyz- Gantry xyz:Rz Gantry xz or yz Gantry xyz:Rz, yxz:Rz Gantry |

Inverse Kinematics ID

| Kin-ID | Name | Sub ID | Kin_Type | Kommentar |
|--------|--------------------|-----------|---|--|
| 120 | b+m | | | T1 Paintingrobot |
| 123 | Denso | 0, 1 | different types | Standard RRR:RRR on Y-Track Scara 4 axis RzRzTzRz |
| 124 | Mitsubishi | 0, 1 | different types | Standard RRR:RRR on Y-Track Scara 4 axis RzRzTzRz |
| 125 | Eisenmann | 0,1,2, 10 | different types | vrbh6,vrbc6,vrbl5, E-Shuttle |
| 126 | Adept | 0, 1 | different types | Standard RRR:RRR on Y-Track Scara 4 axis RzRzTzRz |
| 127 | Jet Robot | | TyRyy:Rxyx, TyRyy:Rzyz | without „A2A3 coupling“ |
| 128 | Jet Robot | | TyRyy:Rxyx, TyRyy:Rzyz | same as ID 127, but with „Backlink“/„A2A3 coupling“ |
| 129 | Palletizer | 0 1 | RzRyyRz | without Backlink with Backlink |
| 131 | SCARA4 | 0 1 2 3 | RzRzTzRz RzTzRzRz TzRzRzRz RzRzRzTz | 4 Axis Scara |
| 139 | SCARA6 | 0 1 2 | RzRzTzRxzx RzTzRzRxzx TzRzRzRxzx | 6 Axis Scara |
| | | | | |
| 133 | Gantry 2 Achsen | 13,23 | Txz,Tyz, Tzx, Tzy, Txy, Tyx | 2 Axis Portal |
| | Gantry 3 Achsen | 123,0 | Txyz,Tyxz,Tz xy,Tzyx,Txzy, Tyzx | 3 Axis Portal |
| | Gantry 1 Achse | 1,2,3 | Tx, Ty, Tz | 1 Axis Portal, Conveyor |
| 134 | Gantry 2+1 Achsen | 13, 23 | Txz,Tyz, Tzx, Tzy, Txy, Tyx, Rz | 2 Axis Portal + Rz Rotary-Axis |
| | Gantry 3+1 Achsen | 123, 0 | Txyz,Tyxz,Tz xy,Tzyx,Txzy, Tyzx, Rz | 3 Axis Portal + Rz Rotary-Axis |
| 135 | Gantry, 3+2 Achsen | | Txyz,Tyxz,Tz xy,Tzyx,Txzy, Tyzx, CA=Rzx | 5-Axis Portal with C- und A-axis |
| 136 | Gantry 6 Achsen | | Txyz,Tyxz,Tz xy,Tzyx,Txzy, Tyzx, Rzxz,Rzyz | 6-Axis Portal with Rzxz oder Rzyz Joint |
| 138 | Comau | | different types | |
| 119 | Reis | | different types | |

Inverse Kinematics ID

Optional Robot Libraries

| | | | | |
|-----|---------|--|-----------------|---|
| 114 | Abb | | different types | Option required |
| 118 | Motoman | | different types | Option required |
| 115 | Staubli | | different types | Option required |
| 112 | Kuka | | different types | Option required |
| 113 | Fanuc | | different types | Option required |
| 132 | Tricept | | Parallel kin | Option required |
| 137 | PKM | | Parallel kin | Option required, Delta-Kinematics, FlexPicker |



EASY-ROB™

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Online Shop: <http://www.easy-rob.com/en/product/shop.html/>

EASY-ROB customer area

Content: Program updates and robot libraries

Web: www.easy-rob.com/en/downloads-2/client-area/

Log in data:
User name: customer
Password: *****

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Notes