EMCoS Harness Studio Basic 4.0 is packed with many new features and program improvements.

Softwar

An extremely user-friendly interface allows the user to view, check, search, filter, group, or do further operations on data of extended cable harnesses.

Arbitrary views of selected sub data sets make even extremely large harnesses very simple to visualize and check.

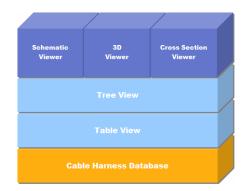
<u>Harness Studio Basic</u>

A Powerful Cable Harness Navigator

Harness Studio Basic brings together electrical and mechanical CAD-data into one program. The program gives the user all features to navigate through large cable harness data sets. Data sets can be visualized and checked. Any arbitrary information contained in the data set can be extracted in multiple ways.

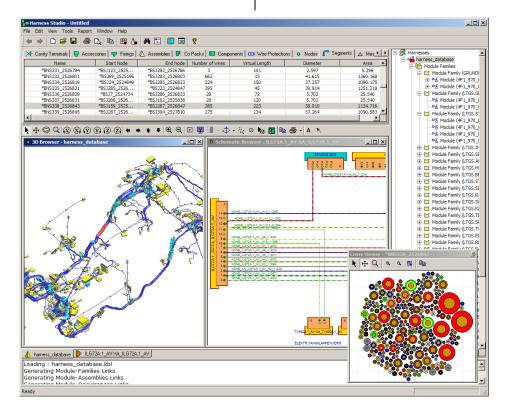
Harness Studio can bring you into a new area of cable harness handling. Paper plans, difficult to keep up to date, too large, and only with limited information were yesterday. Today electronic data, as it can be processed with Harness Studio, can easily be maintained, configured to your special needs and gives you more information than any paper plan can do.

Harness Studio includes different tool-sets for visualization and checking of harness data and allows comfortable data processing. Harness Studio can solve data visualization problems just with some mouse clicks that usually are very time consuming and require expensive hard- as well as software.



Structure of Harness Studio Views

Ideology of **Harness Studio** is very easy to understand and at the same time it is extremely flexible. The function set can be easily extended, we are always open to realize customer requests.



The Harness Studio user interface

EMCoS Overview

The work of EMCoS Ltd. focuses on the generation of special simulation software for electromagnetic field calculation and data visualization as well as on consultation on EM problems.

We help our customers with simulations of complex EMC problems by offering appropriate tools, or we support them with processing of, in most cases, complex data.

We see our mission in the generation of special methods and programs that are on the cutting edge of science and provide the most appropriate solution for each specific problem.

Company Background

EMCoS Ltd. was founded as a spin-off of scientists of the Laboratory of Applied Electrodynamics of the Tbilisi State University of Georgia. The Laboratory of Applied Electrodynamics has more than 20 years of experience in the field of data visualization and simulation of electromagnetic problems.

The fields of interest cover a wide range. Starting from the simulation of the non-linear arc resistance as generated by ESD or electrical switches to the calculation of field coupling, or radiation of complex cable harness systems in automobiles.

Harness Studio Main Features

- Visualization of complex cable harnesses. Capability to handle even very large data sets
- Import and export of data, different file formats like STEP AP 212 (*.kbl, *.xls, *.asc) supported
- Multiple database support
- Import and visualization of surrounding geometry in NASTRAN and ASCII STL formats
- Table, 3D, Schematic, and Cross Section View
- Linked functionality between the different views
- Comfortable navigation in any view
- Detailed information about each object and object group
- Reporting and BOM
- Powerful search
- Comfortable printing functions
- Labeling functions
- Browsing functions with browsing history
- Cable and signal tracing within the harness
- Macro support gives to user possibility to automate frequently used sequences of actions
- Conflict tables for displaying conflicts in cable harness databases
- Project Notes editor for adding comments to project
- Cable Harness Configurator
- Harness comparison functions
- Configurable and customizable workspace
- 64-bit version

The Modules of Harness Studio

Database Engine stores and optimizes the internal arrangement of data for very fast processing of large data sets even on slow computers.

Converter performs bi-directional conversion of data between different data formats. Direct export of data to Excel table calculation program can be done with just a mouse click.

Configurator Engine gives access to modules within module families. Individual cable harnesses can be generated.

Families				Modules in Config	a sheep	
ID I	Description		*	Pat Number	Description	Logistic Control Informatio
	LTGS STANDHEIZUN	6		✓ 4F1_970_21		
	LTGS INNENSPEL					2024701
006	LTGS SITZHEIZUNG			✓ 4F1_970_07		
	LTGS ANHAENGEKU	20		✓ 4F1_970_07	u	
	LTGS.MOTORSTEUE					
164	LTGS BELEUCHTUN					
076	LTGS.LAUTSPRECHE					
175	LTGS STECKDOSE		_			
213	LTGS AUDID-SYSTEM	1				
045	LTGS.POLIZEI		×1			
	a mature a second second					
Nodules			1			
Modules Part Number	Description	Logistic Control I	<u>ک</u>			
Part Number 4F1 970 164 A	1	Logistic Control I				
Modules Part Number 4F1_970_164_A 4F1_970_164_B		Logistic Control I		. 1		
Modules Part Number #F1_970_164_0 #F1_970_164_8 #F1_970_076_H		Logistic Control I		>		
Modules Part Number 4F1_970_164_0 4F1_970_164_R 4F1_970_076_J 4F1_970_076_J		Logistic Control L.				
Modules Part Number 451_970_164_0 451_970_076_H 451_970_076_H 451_970_076_J 451_970_076_K		Logistic Control 1.		2		
Modules Pat Number 671_970_164_0 671_970_164_0 671_970_076_1 471_970_076_1 471_970_076_1 471_970_076_1		Logistic Control I				
Modules Pat Number 471_970_164_0 471_970_164_0 471_970_076_H 471_970_076_H 471_970_076_L 471_970_076_L 471_970_076_L		Logistic Control L.				
Modules Pat Number #71.970,164,0 #71.970,164,0 #71.970,076,1 #71.970,076,1 #71.970,076,1 #71.970,076,0		Logistic Control I				
Modules Pat Number 471 970 164 0 471 970 164 0 471 970 076 1 471 970 076 1 471 970 076 1 471 970 076 1 471 970 076 0 471 970 0 4		Logistic Control I				
Modules Part Number 471 970, 154, A 471 970, 154, A 471 970, 1076, J 471 970, 076, J 471 970, 076, A 471 970, 076, D 471 970, 076, D		Logistic Control L.				
And Jes Pat Number #1 970, 154, J #1 970, 076, D #1 970, 076, D #1 970, 076, D #1 970, 076, D		Logistic Control I				
Modules Part Number 471 970, 154, A 471 970, 154, A 471 970, 1076, J 471 970, 076, J 471 970, 076, A 471 970, 076, D 471 970, 076, D		Logistic Control L				

KBL Configurator

Visualizing Engine is a database and geometry data viewer for cable harness data. 2D, 3D, and schematic views are supported. The visualization engine allows direct interaction with the Table- and Tree-Views.

Reporting Engine creates fast and flexible reports on a harness. BOM can be created with a mouse click.

	A	0	C C	D	1	
	Hamess hamess database	0		0		-
	CONNECTORS (753)					
3	connections (ras)					
20	ID	Description	General Class	Part Number	Pin Number	Infataiomer
ç î	HUG11A 1-3E HUG11A 1	STECKEROLIMMY 11POLIG	None	UN FCP 11	11	NO
	NV091A13E NV091A1	STECKERDUMMY 11POLIG	None	UNEFCP 10	11	NO
	SPNONE 2 M	Schweissverbinder/Crimp	None	SPUCE	30	NO
e i	SPLWR 15.1 AD	Schweitsverbinder/Crimp	None	SPLICE	30	NO
	SPESP SEN HL 1	Schweissverbinder/Crimp	None	SPUCE	30	NO
0	SPDVB-BOX AV	Schweissverbinder/Crimp	None	SPUCE	30	NO
1	SP30.2.1.AD	Schweissverbinder/Crimp	None	SPUCE	30	NO
2	SPMMI 31HE1.T	Schweissverbinder/Crimp	None	SPUCE	30	NO
31	SPESP SEN HL 1 AV	Schweissverbinder/Crimp	None	SPUCE	30	NO
4	SPDVB-BOX AV 1	Schweissverbinder/Crimp	None	SPUCE	- 30	NO
5	SPBTS 1 M	Schweiseverbinder/Crimp	None	SPUCE	30	NO
61	SP30.2 AD	Schweissverbinder/Crimp	None	SPUCE	30	NO
2.	SP15.1 AD	Schweissverbinder/Crimp	None	SPUCE	- 30	NO
81	SPMMI 31HL1 T AV	Schweissverbinder/Crimp	None	SPUCE	30	NO
91	SPESP_SEN_HL 2	Schweissverbinder/Crimp	None	SPUCE	30	NO
0	SPOVEBOX AV 2	Schweissverbinden/Crimp	None	SPUCE	30	NO
2.	SPCAN DATALOGGER	Schweissverbinder/Crimp	None	SPUCE	30	NO
2	SPBLFHSW_LWR_HR_1_AV	Schweissverbinder/Crimp	None	SPUCE	30	NO
3	SP30.20 AD	Schweistverbinder/Crimp	None	SPUCE	30	NO
4	SP15.1.M	Schweissverbinder/Crimp	None	SPUCE	30	NO
5	SPTV_FBAS_S3_AV	Schweissverbinder/Crimp	None	SPUCE	30	NO
6	SPMML31VO.1.M	Schweissverbinden/Crimp	None	SPUCE	- 30	NO
2	SPESP_SEN_HL_2_AV	Schweissverbinder/Crimp	None	SPUCE	30	NÖ
8	SPEPB U 1	Schweissverbinden/Crimp	None	SPUCE	30	NO
9[SPCAN DATALOGGER_1	Schweissverbinder/Crimp	None	SPUCE	- 30	NO
0	SPBLEHSW LWR HR 2	Schweissverbinder/Crimp	None	SPUCE	30	NO
	PBI FHSW LWR HL D 1 AV	Schweissverbinder/Crimp	None	SPUCE	30	NO
2	SP30.20.AD_AV	Schweissverbinder/Crimp	None	SPUCE	30	NO
a.	FILCONNECTOR / Sent2 / St	Schweistweitinder/Comp.	None	SPLICE	- 30	NO

Excel report contains detailed information about harness objects

Search and Group Engine allows comfortable and powerful manipulation as well as filtering of the harness data.

Ø Vire Name - 'TV_FBAS' Ø Park Ninher - 'N_037' Ø Secial Wire ID - 'Move Up Ø Citors Secial Aites > 2.4 Inhal Connector - - Inhal Connector E - - Inhal Connector P - -	N	Parameter	Operation	Value	Search
Image: Special Vire ID - 11,037* Move Up Special Vire ID - 24 Move Dow Initial Connector - - - Initial Connector E - - - Initial Connector F - - - Final Connector C - - -		Wire Number	-		
Special Vive ID = Varial Connector = Initial Connector C = Initial Connector E = Final Connector P.L. = Final Connector C =	\square	Wire Name	-	*TV_FBAS*	
Special Wire ID = Vices Section Area > 2.4 Initial Connector E = Initial Connector E = Initial Connector E = Initial Connector FL = Initial Connector FL = Initial Connector FL = Final Connector FL = Final Connector FL =	Ø	Part Number	-	"N_037"	Move Up
Initial Connector - Initial Connector C Initial Connector E Initial Connector E Initial Connector E Initial Connector P Final Connector P Final Connector C		Special Wire ID	-		
Initial Connector C = Initial Connector C = Initial Connector E = Initial Connector E = Initial Connector P.L. = Final Connector P.L. = Final Connector C =	\checkmark	Cross Section Area	>	2.4	Move Dow
Initial Connector E Initial Connector P Initial Connector P Final Connector C Final Connector C		Initial Connector	-		
Initial Connector E = Initial Connector P = Final Connector P = Final Connector C =		Initial Connector C	-		
Initial Connector E = Initial Connector PL = Final Connector P = Final Connector C =		Initial Connector E	-		Beset
Final Connector = Final Connector Co =		Initial Connector E	-		
Final Connector Co =		Initial Connector Pi	-		
		Final Connector	-		
Final Connector F		Final Connector Co	-		
	Π.	Final Connector F			
	•				

A search template

Product Features Summary

- Visualization of complex cable harnesses
- Import and export of data, different file formats like STEP AP 212 (*.kbl, *.xls, *.asc) supported
- Multiple database support
- Import and visualization of surrounding geometry in NASTRAN and ASCII STL formats
- Table, 3D, Schematic, and Cross Section View
- Linked functionality between the different views
- Reporting and BOM
- Powerful search functions
- Comfortable printing functions
- Labeling functions
- Browsing functions with browsing history
- Detailed information about each object and object group
- Cable and signal tracing within the harness
- Macro support
- Conflict Tables and Project Notes for making fast notes on harnesses
- Cable Harness Configurator
- 64-bit version
- Configurable and customizable workspace

Graphical User Interface

The Graphical User Interface (GUI) allows easy interaction with any object of the underlying data base. Harness Studio is intuitively to use even for very complex data sets. The GUI includes following main modules:

- Tree View
- Table View
- 3D Viewer
- Schematic Viewer
- Cross Section Viewer
- Formboard View

Table View

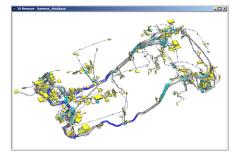
The Table View module shows information of a harness data file in table format. This module gives to you a free configurable view of all objects available in the harness database.

vire Number	Part Number	Wire Name	Signal Name	Initial Connector	Initial Connector Comment 1	Initial Connector EQT Part
203	N 037 006 5	NONE 3/672A	NONE	8.672A.1-38.8.672A.1	KOMPORTGERAET	470.907.209
204	N 037 005 3	NONE 11/672A	NONE	8,672A.1-08 8,672A.1	KOMPORTGERAET	470 907 209
285	N 037 006 7	NONE BIG72A	NONE	XA HSS60A.2		
286	N 037 098 0	NONE INSIA	NONE	P451A.3-XA P451A.3	INVENJEUCHTE HINTEN	470.947.111
287	N 037 093 5	NONE INSIA	NONE	PASIA 2-XA PASIA 2	INVENJEUCHTE HENTEN	470.947.111
200	N 037 097 5	NONE_INISIA	NONE	P451A.3-XA_P451A.3	INVENJEUCHTE HENTEN	470 947 111
289	N 037 090 3	NONE INISIA	NONE	INSIA 3-XA INSIA 3	INVENJEUCHTE HINTEN	470 947 111
290	None(->5(124)	NONE K.L.SWR	NONE	K.L. SHRIPE I		
291	None(->5L124)	NONE_KLISWR	NONE	K.L. SHR RE I		
292	N_037_090_5	NONE_KLISWR	NONE	K.L.WISOHR 1		
293	N_037_090_3	NONE_KLISWR	NONE	K.L. SHR RE I		
294	N 037 090 3	NONE_KLISWR	NONE	K.L.SWR.LL.I		
295	N_037_093_3	NONE_K.L.WIS	NONE	K.L.WISCHER 1		
296	N 037 090 6	NONE KEGOIA	NONE	KBG11A.2-IIC KBG11A.2	KLIMABEDIENTEIL KOMFO	REF KLIMA C6
297	N 037 099 6	NONE REGOLA	NONE	KING11A.2-HC KING11A.2	KLIMAREDIENTER, KOMPO	REF KLIMA C6
290	N 037 099 0	NONE REGOLA	NONE	K.L.WISCHER 1		
299	N 037 090 1	NONE REGOLA	NONE	K.L.WISCHER 1		
300	N 037 095 8	NONE KEGOTA	NONE	K.L.WISCHER 1		
301	N 037 098 8	NONE XEGOTA	NONE	K.L.WISCHER 2		
302	N 037 095 3	NONE REGOLA	NONE	K.L.WISCHER 1		
303	N 037 095 1	NONE_KEG01A	NONE	K.L.WISCHER 1		
304	N 007 090 8	NONE KEGOLA	NONE	K.L.WISCHER 2		
305	N 037 095 7	NONE XEG01A	NONE	K8G11A.20D.K8G11A.2	KLIMABEDIENTER, KOMPO	REF_RLIMA_C6
306	N 037 097 5	NONE_REGOLA	NONE	MA011A.1-XA_MA011A.1	MANN-ANSTROEMER LL-HE	4F1_820_951
307	N 037 093 1	NONE_KEG01A	NONE	SPNONE.25.M		
300	N 037 096 6	NONE_KEG01A	NONE	K.L.WISCHER 1		
309	N 037 097 9	NONE_REGOLA	NONE	K.L.WISCHER 1		
350	N_037_099_7	NONE_REGOLA	NONE	K.L.WISCHER 1		
311	N 037 099 8	NONE_KEGOIA	NONE	K.L.WISCHER 1		
312	N_037_095_1	NONE_KEG01A	NONE	KBG11A.2-3D_KBG11A.2	KLIMABEDIENTEIL KOMFO	REF_KLIMA_C6
313	N_037_091_5	NONE_KIO11A	NONE	K.L.WISCHER 2		

Table View

3D Viewer

3D Viewer for harness visualization has a large number of features for database previewing and selection of elements directly from the graphical window.



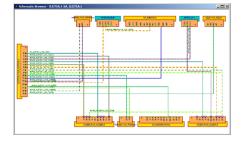
3D Viewer

Schematic Viewer

The Schematic Viewer shows schematics configured by the user just by selection of connectors. The STEP 212 routing data is sufficient, there is no need for additional data.

All connectors belonging to a selected connector or a module are extracted and visualized automatically. The schematic can be extended interactively by a mouse click on any connector.

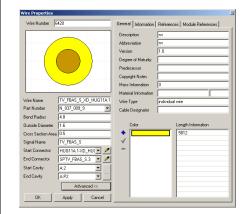
A maximum of data is shown in the Schematic Viewer window by applying multiple colors.



Schematic Viewer

Property Viewer

Property Viewer shows detailed information about each data base object. Any property of any object can be shown in the object dependent property windows.



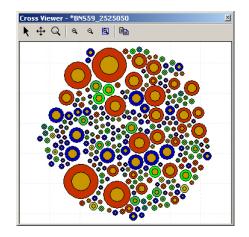
Property Viewer

Cross Section Viewer

The Cross Section Viewer shows the crosssection of any segment interactively. User can click on any cable and the appropriate selection in the cable table will be shown. Colours are shown according to a customizable colour list, this way realistic view of cable bundles is possible. Cable objects are linked to data base. With mouse click on cable additional information will be provided.

Research Topics of EMCoS

- Specialized software for EMC calculations
- Method of Moments (MoM)
- Transmission Line Methods (MTL)
- Method of Auxiliary Sources (MAS)
- Geometry pre processing, meshing and re-meshing software
- Data visualization software for complex cable harnesses
- Device modelling with behavioural models



Cross Section Viewer

High Flexibility by Customizable and Expandable Interfaces

Harness Studio is a powerful cable harness CAD program that can satisfy numerous requirements. Nevertheless if special demands make additional functions or program changes necessary, Harness Studio can be customized and adapted to fulfil nearly any requirement.

Please contact us for further information.

www.emcos.com

EMCoS

27 Pekin Str. 0160, Tbilisi GEORGIA

Email: <u>info@emcos.com</u> Phone: ++995-32-389091 Fax: ++995-32-389092