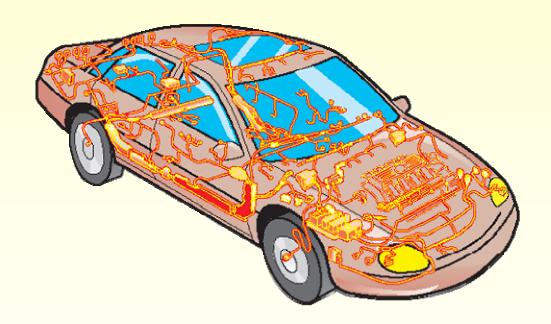
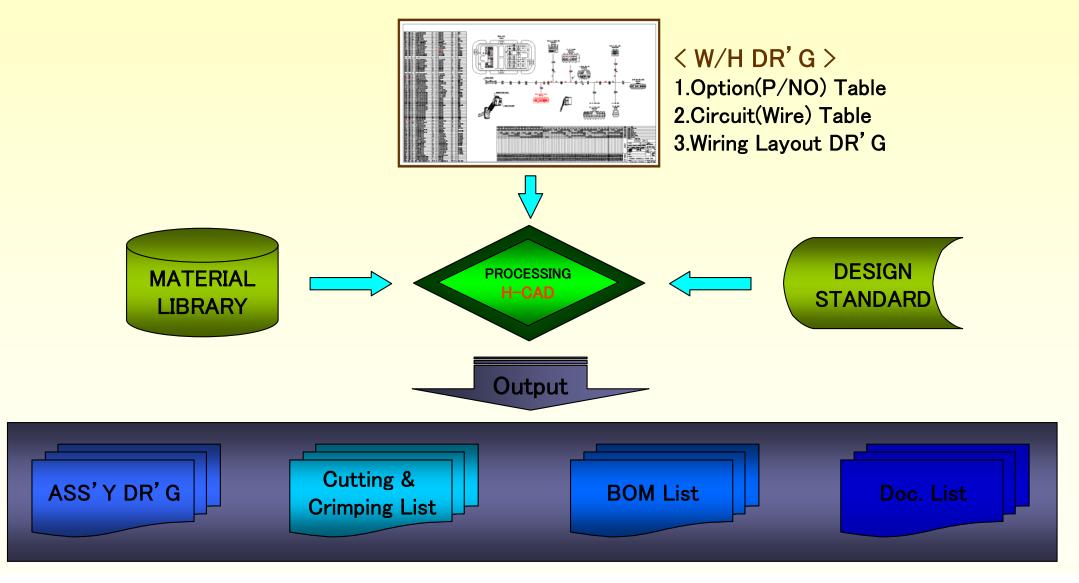
# Harness CAD System MFG. Design System (MDS)



## H-CAD MD system - Block Diagram



 Automatic Wire Harness MFG Process Design Tool through systematic conversion from Car maker's original drawing/spec to manufacturer's workable drawing/list



# Main Characteristics of H-CAD MD system Harne



- Efficient MFG process design capability using design standard and library
- The same and assured design quality by both of people skillful and unskillful
- Capable of keeping powerful material library and design superiority
- Capable of interface with ERP system
- Automatic and speedy generation of MFG process materials and reports
- Spec comparison/management, Cutting tag, Quotation and so on
- Ensure of the fastest skill enhancement for engineering resources
- A powerful system proven by several harness makers in Korea
- Workable based on general PC and Auto-CAD
- Lower price than other system requiring expensive server and DB S/W

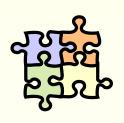
## Major effectiveness from H-CAD MD



- Standardization : MFG process design
- Simplicity : Design procedure
- Fast Speed : MFG process development
- Integration : All data to library and DB
- Reliability : MFG process quality
- Accuracy : Design review & assessment
- Economic Cost : Systematic MFG process design and build-up



- Highly advanced technological application
- Agile and systematic response to car maker's design change









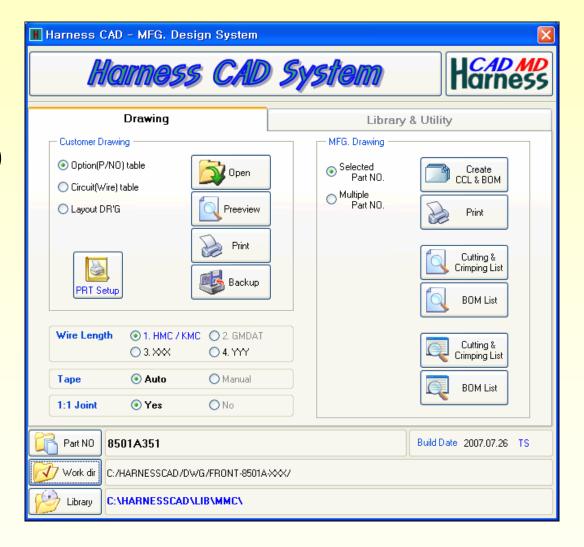




# Details of H-CAD MD System

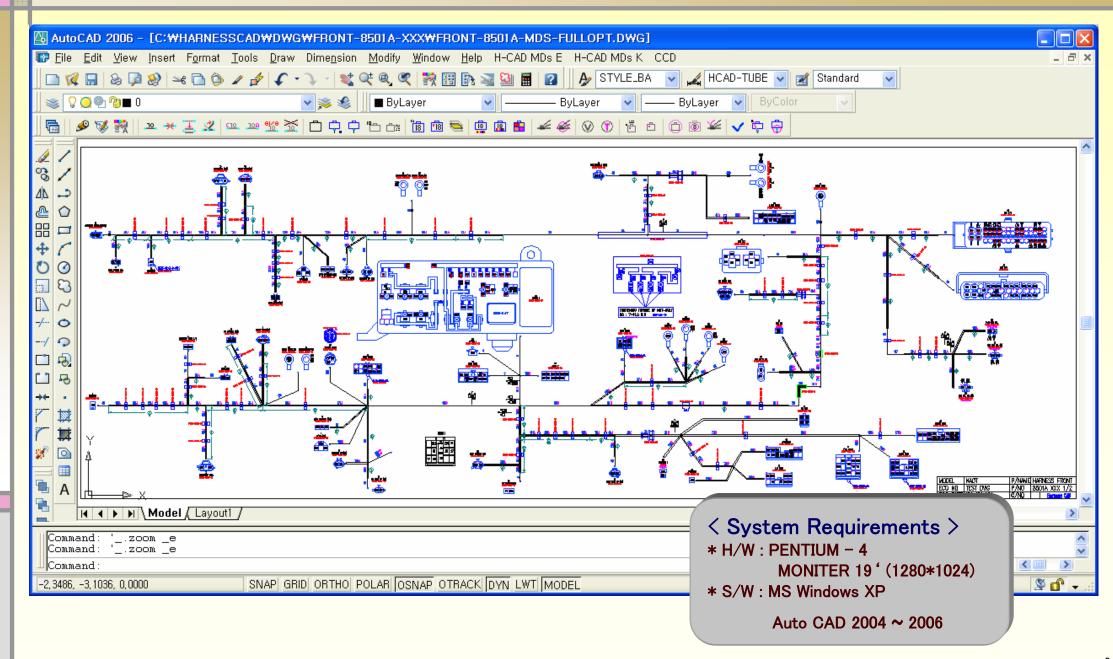


- Data input (Full Option DR'G)
  - Option (P/NO) Table
  - Circuit (Wire) Table
  - Wiring Layout DR'G
- MF'G DR'G Generation (each P/No.)
  - \* ASS'Y DR'G
  - Cutting & Crimping DR'G
  - \* BOM List
- Utility Functions
- Library Management Tool



# Details of H-CAD MD System



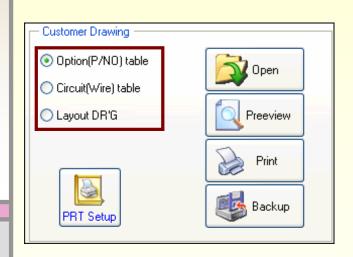


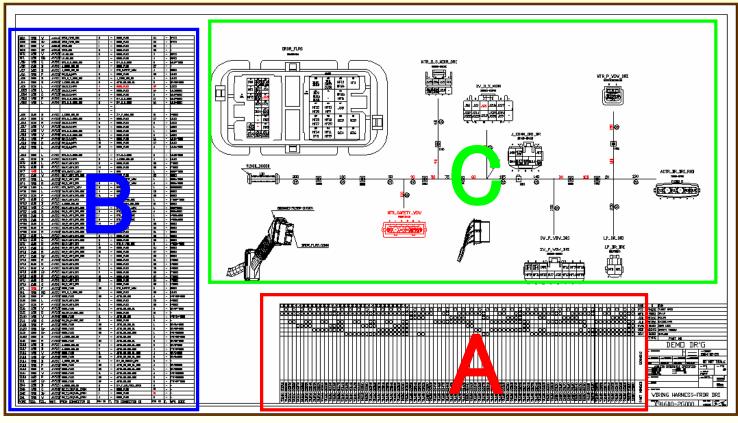
## Data input - Customer DR'G



- Option (P/NO) Table 'A'
- ◆ Circuit (Wire) Table 'B'
- Wiring Layout DR' G 'C'
  - Full Option DR' G

< Product DR' G >
Customer DR' G

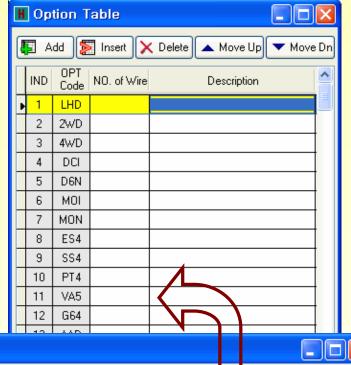


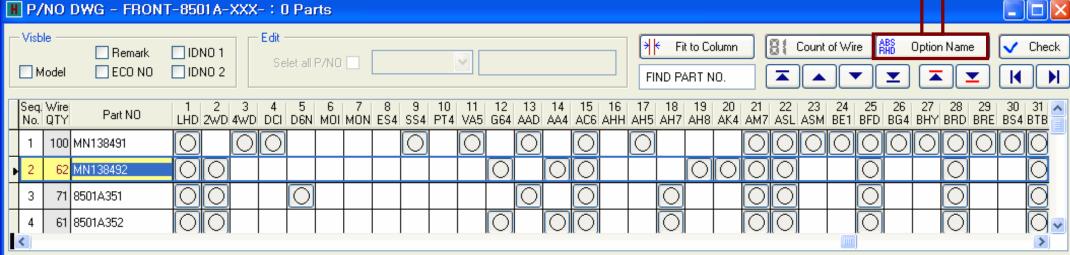


## Data input - Option (P/NO) Table



- Automatic analysis for # of circuit per part number
- Automatic analysis for # of circuit per option
- Automatic verification for input data
- Simple upgrade of part number in case of design change

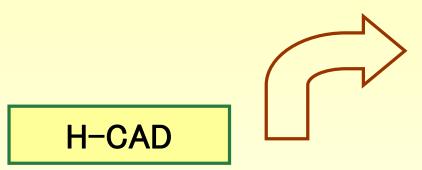


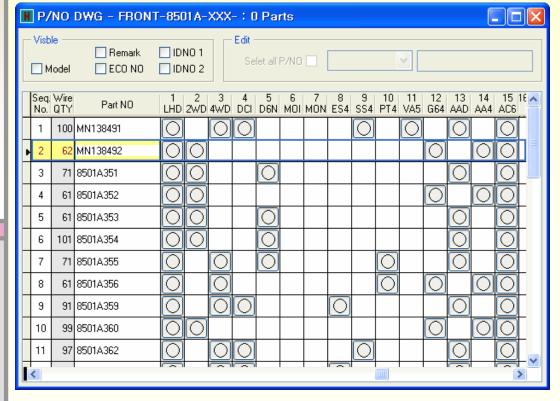


## Data input - Option (P/NO) Table

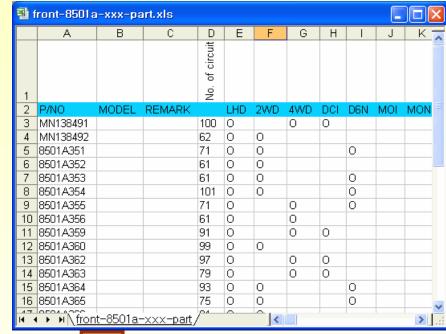


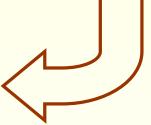
Automatic conversion : H-CAD <-> Excel





#### **MS Excel**



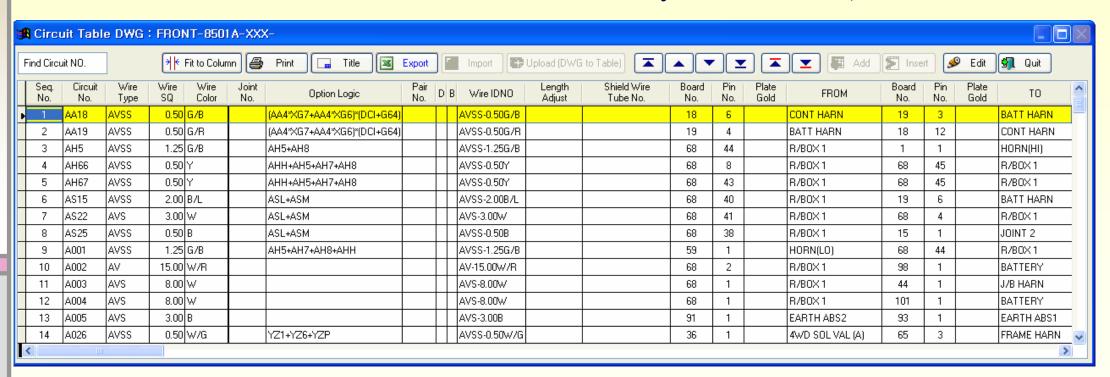


## Data input - Circuit (Wire) Table



- Automatic Verification for Input data
  - Wire Color, SQ
  - \* OPT Logic

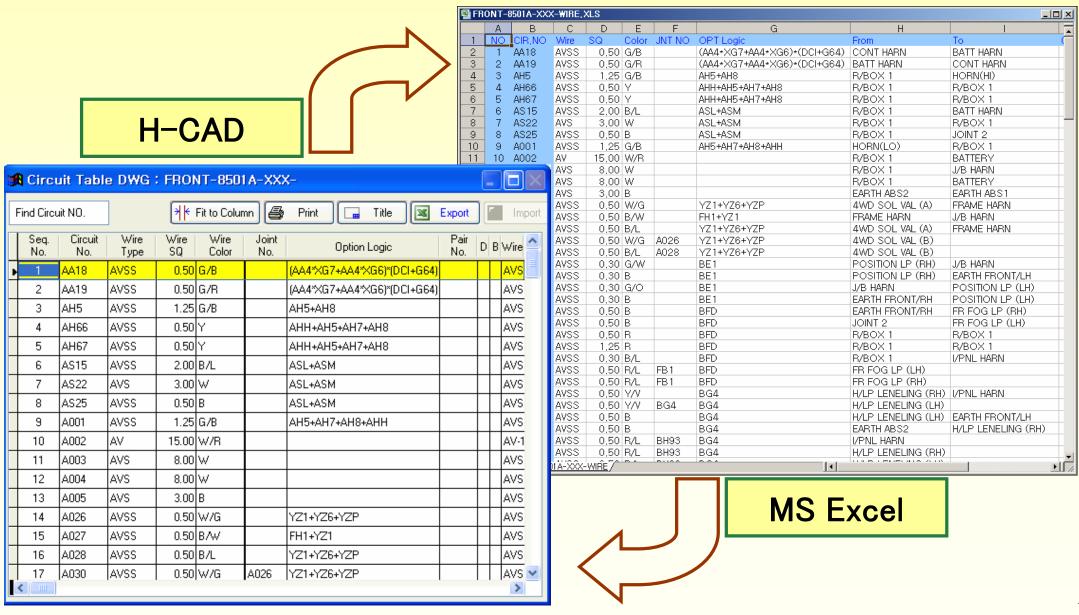
- Capability of Data sort
  - Circuit number
  - Wire Name, SQ, Color
  - OPT Logic
  - Address From, To
  - Hybrid Wire (Shield, Twist)



## Data input - Circuit (Wire) Table

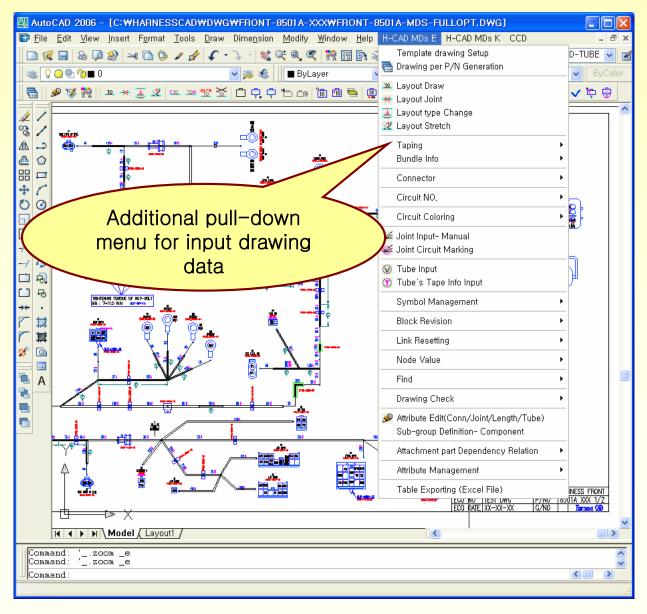


Automatic conversion : H-CAD <-> Excel





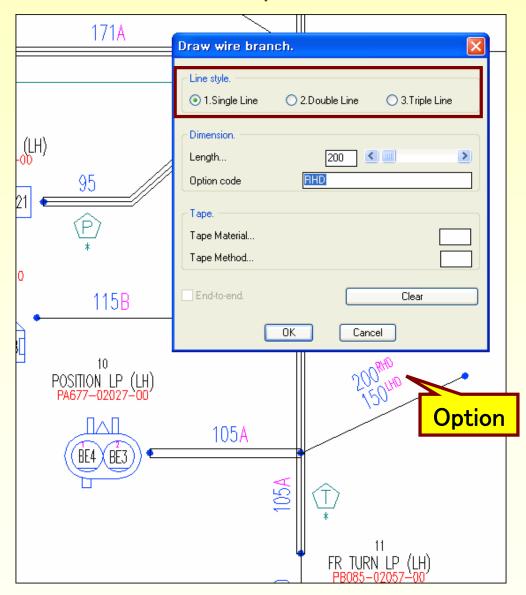
- Input using AutoCAD- Full Option DR' G
  - Layout Input
  - Connector Input
  - Circuit Number Input
  - Joint Configuration and Input
  - Outer Material Input
    - ◆ Tape
    - ◆ Tube
    - V/Sheet
    - Sponge Pad
  - Other Attachment
    - Grommet
    - Protector
    - Clip
    - Bolt / Nut
    - Etc.





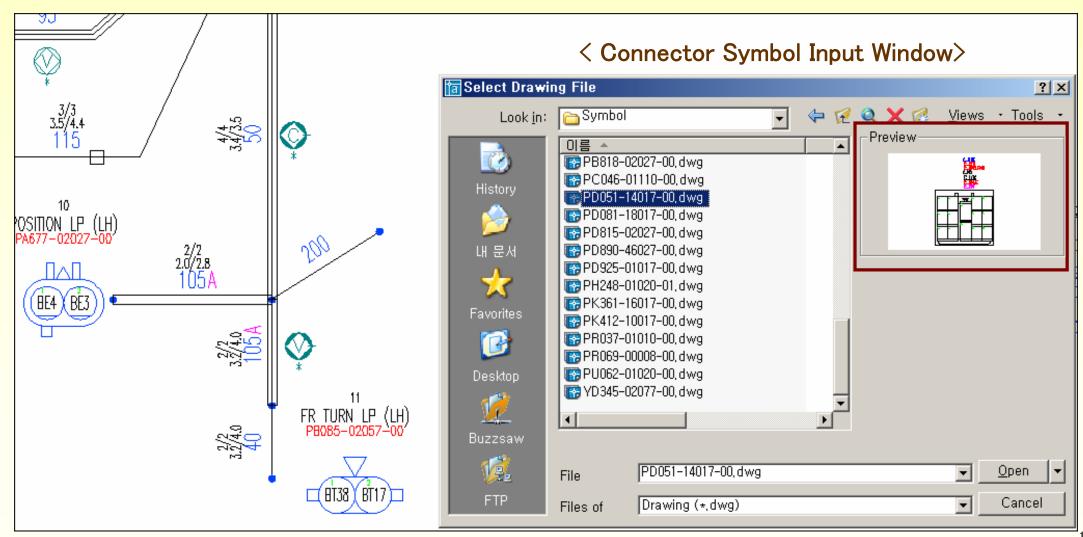
- Layout Input
  - User Friendly Input using Input Window
  - Usage of Various Typed Symbols
    - ◆ Single Line Non Taping route
    - Double Line Taping route
    - ◆ Triple Line Tubing route
  - Capable of Length Input per Option

#### < Dimension Input Window >



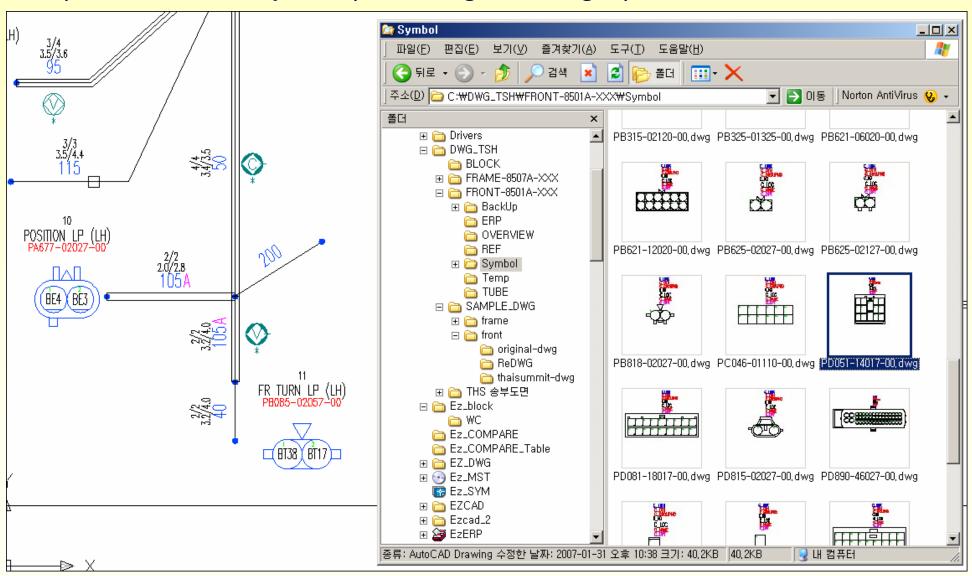


- Connector Input
  - Direct and User Friendly Input using Symbols on Input Window



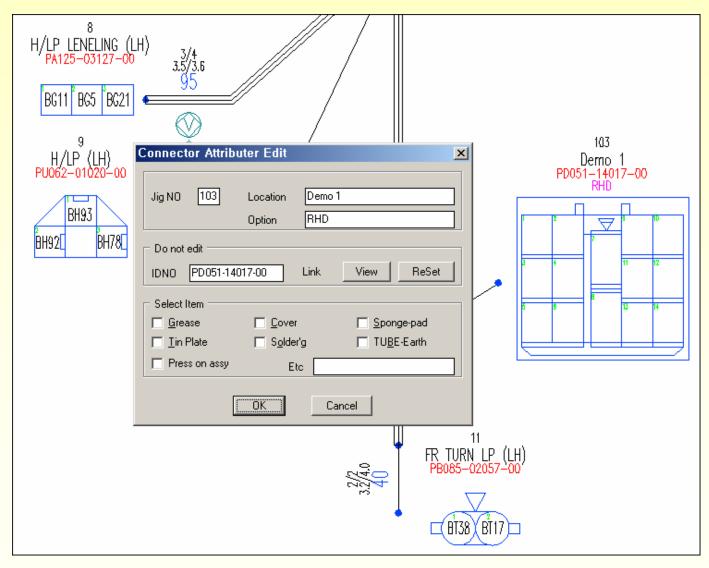


- Connector Input
  - Capable of Connector Symbol Input & Management using Explorer Window of MS Windows XP



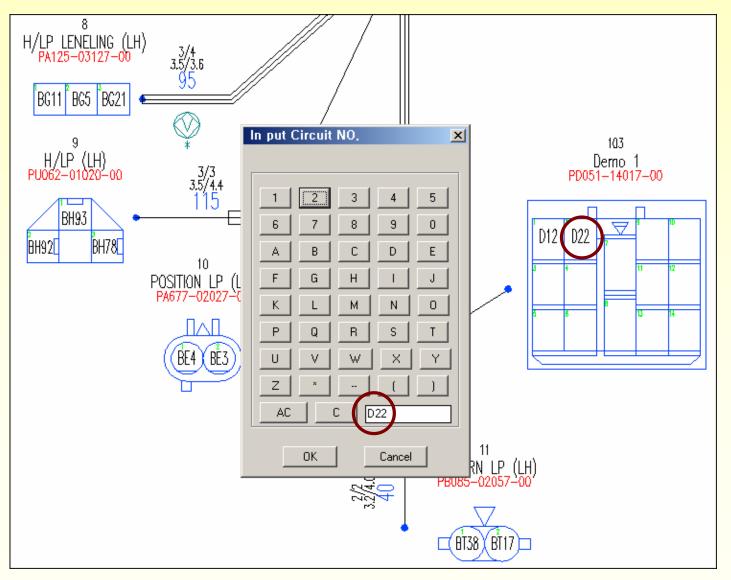


- Connector Input
  - Capable of Connector Attribute Information using Input Window
    - ◆ Jig Board NO.
    - Location Device Name
    - Option Code



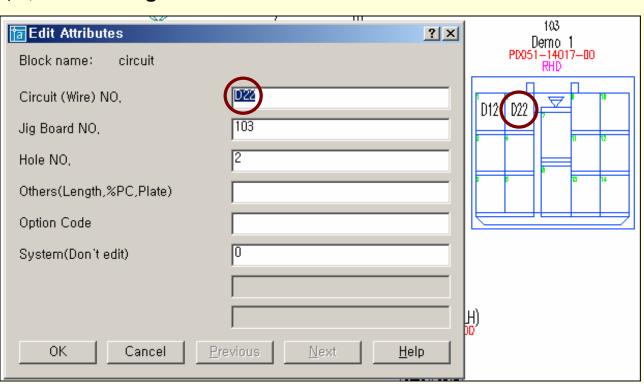


- Circuit No. (Wire No.) Input
  - Capable of Direct and User Friendly Input using Input Window



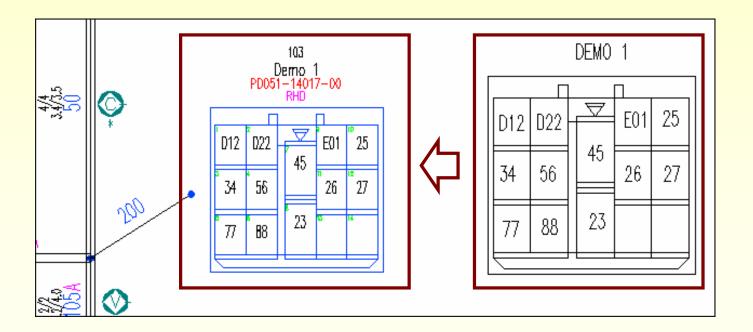


- Circuit No. (Wire No.) Input Attribute Information Management
  - Capable of Attribute Information Management for Direct and User Friendly Circuit No. using Input Window
    - Circuit No.
    - ◆ Jig Board NO. (Connector SEQ. NO.)
    - ◆ Hole (Pin) NO.
    - Option Code
    - ◆ Increment and Decrement (+, -) of Wire Length
    - Plate (Gold, Tin)





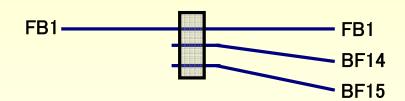
- Circuit No. (Wire No.) Input Conversion
  - \* Capable of Circuit No. Conversion on from the existing CAD drawing to H-CAD drawing

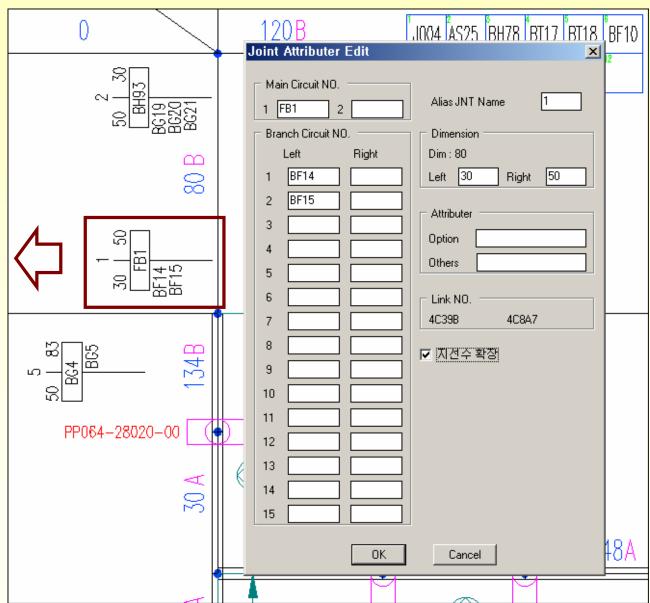




#### Joint Configuration & Input – Manual Process

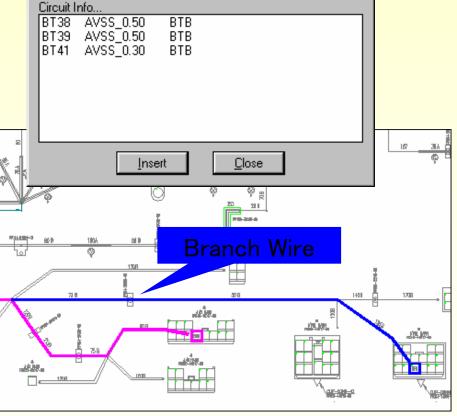
- ❖ Input using Input Window
  - Main Wire Number
  - Branch Wire Number (MAX 15)
  - **♦** Insulation Method (Tape or Tube)
  - Option Code







- Joint Configuration & Input Automatic Process
  - Automatic
    - Joint Circuit Configuration
    - Joint Location Assignment
  - Manual Input
    - ◆ Insulation Method (Tape or Tube) Selection
    - Selection of Branch Wire Direction



Splice Joint....

A026 A030 A028 A031

AA18 RH1 BG4 BG5

BT21 BT45

BT38 BT39 BT41 FB1 BF14 BF15

BH93 BG19 BG20 BG21

Joint List..

[Main Wire Path]

Main Wire

[Brach Wire Path]



- Outer Material (Protection Material) Input Tape
  - Input of Tape Type and Process Method on Length of Wire Path
    - Symbol for Tape Types

" " = Vinyl Black Tape

"Y" = Vinyl Yellow Tape

"C" = Cotton Tape

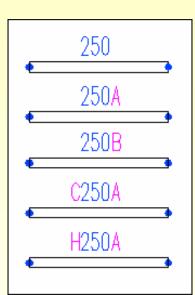
"H" = Heat Resistant Tape

Symbol for Taping Process Methods

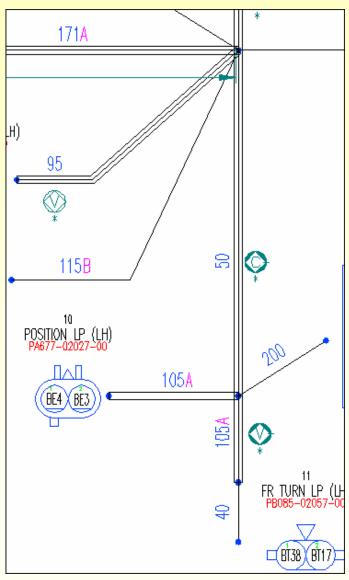
" " = Non Taping

"A" = All Taping

"B" = Intermittent Taping

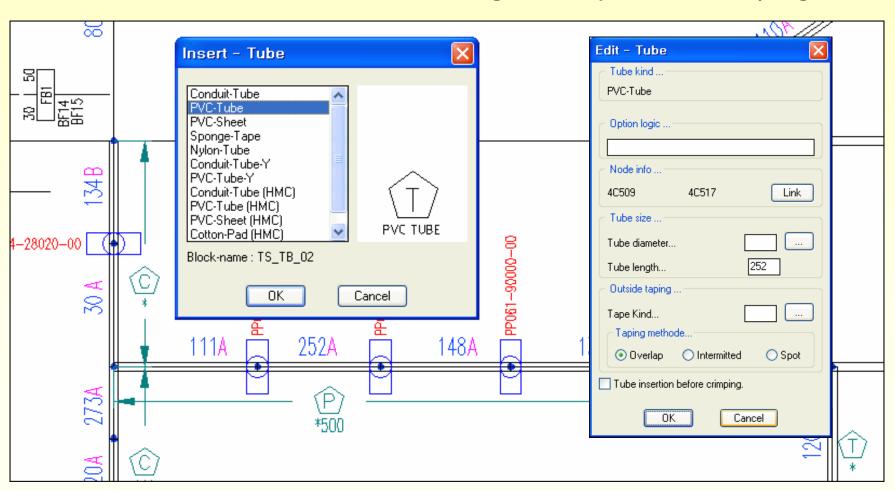


- Automatic Calculation for Tape Quantity Required (BOM)
  - Workload on Wire Path
  - Workload on Branches



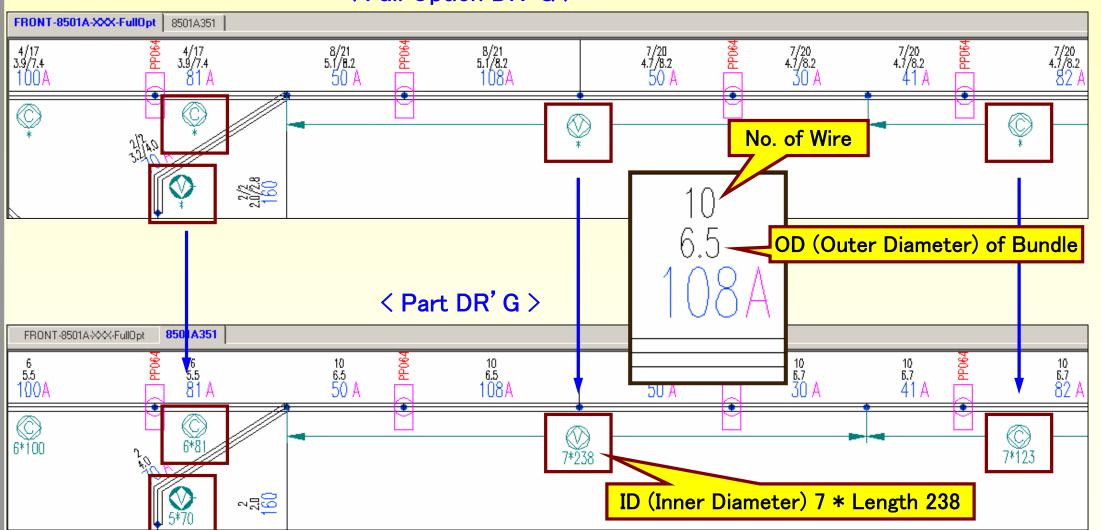


- Outer Material (Protection Material) Input Tube, Vinyl Sheet, Sponge Pad
  - Capable of Direct and User Friendly Input using Input Window
    - Automatic Calculation of Inner Diameter and Length of Tape
    - Automatic Calculation of Width and Length of Vinyl Sheet and Sponge Pad



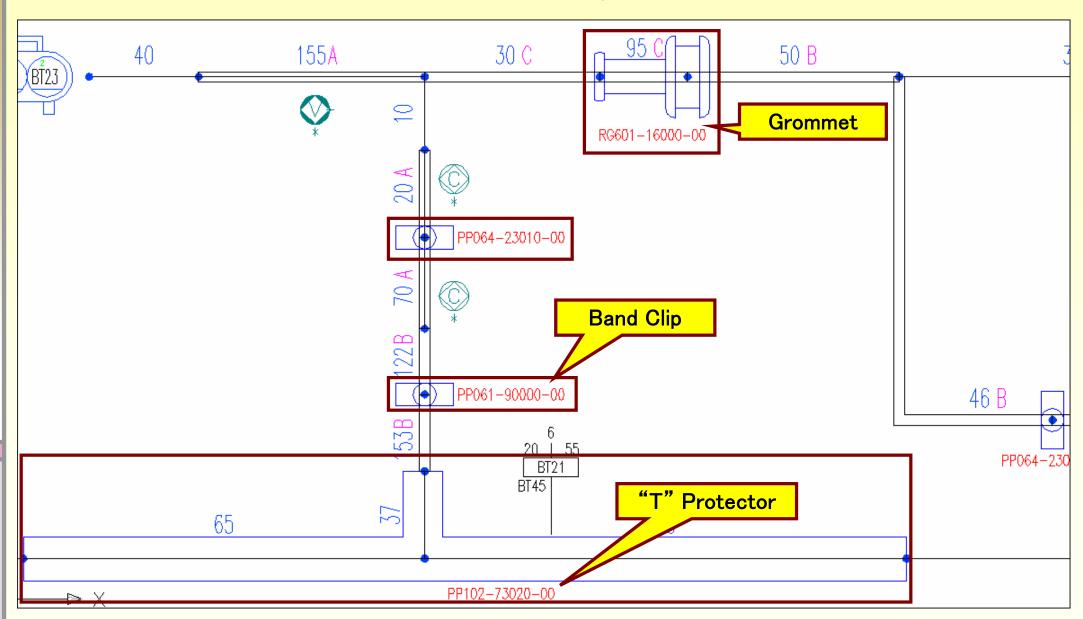


Outer Material (Protection Material) Input – Automatic Calculation of Specification of Tube, Vinyl Sheet and Sponge Pad < Full Option DR' G >



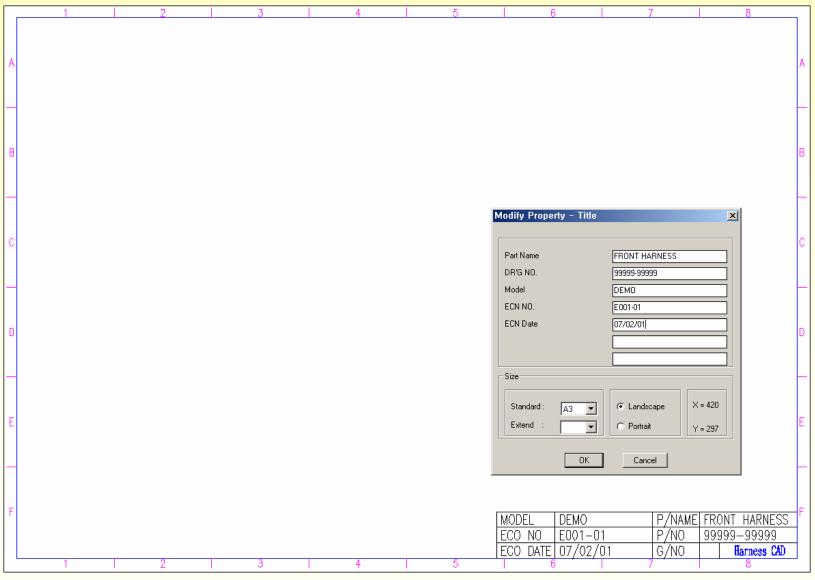


Other Attachment – Grommet, Protector, Clip etc.





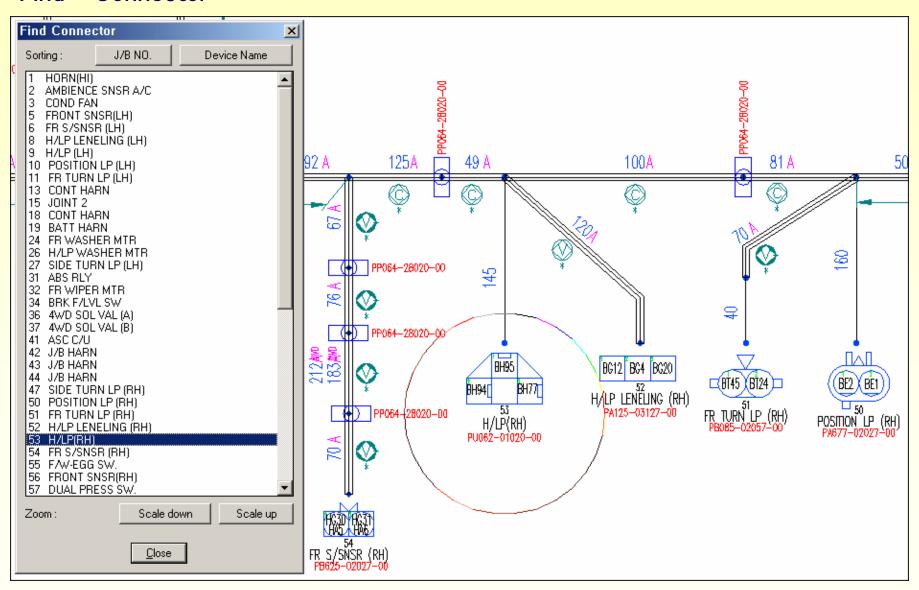
- Utility Function
  - Product Title Management





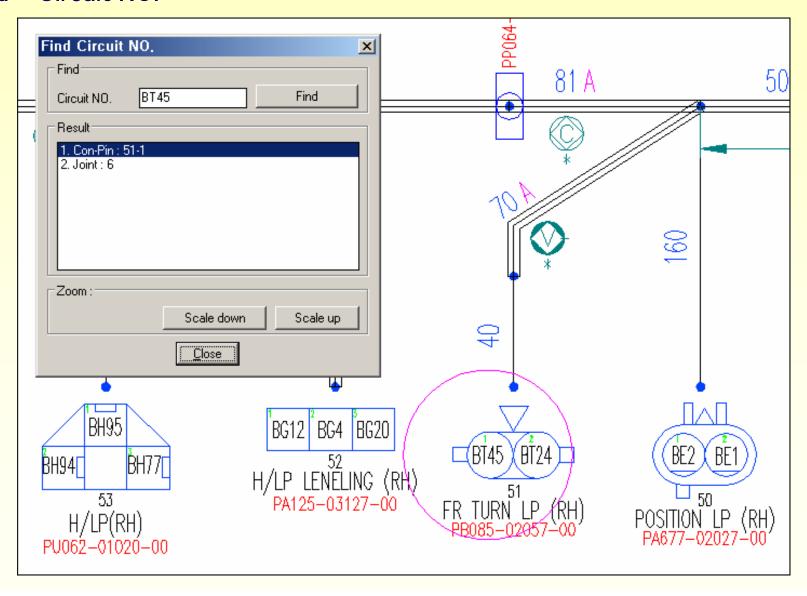
#### Utility Function

Find - Connector





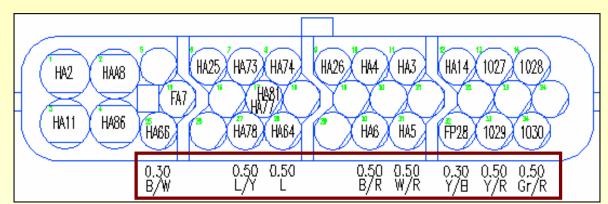
- Utility Function
  - Find Circuit NO.



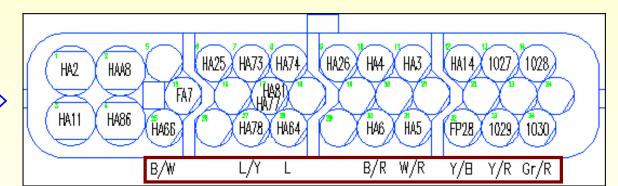


- Utility Function
  - Automatic Coloring Circuit No.

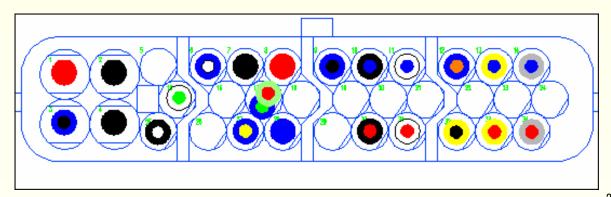
< Wire SQ & Color >



< Wire Color >

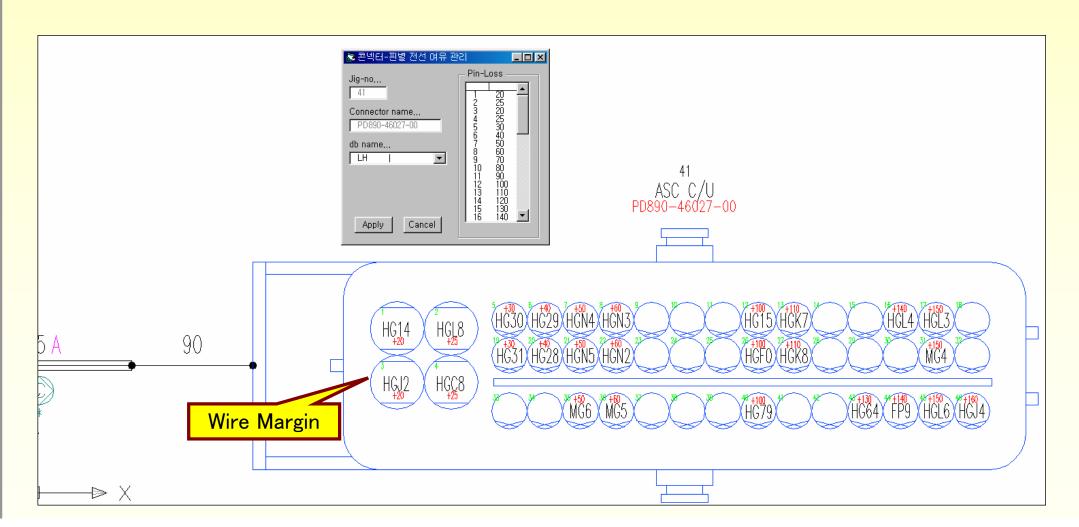


< Wire Color Symbol >



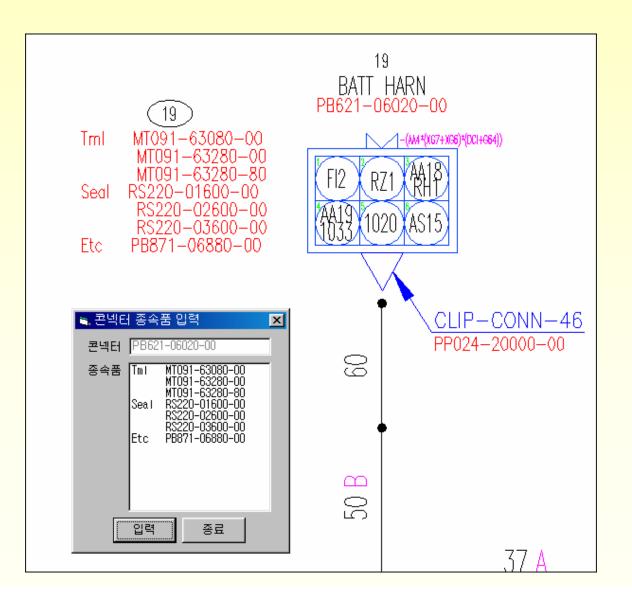


- Utility Function
  - In case of applying Hybrid Typed Connector, Automatic Management of Wire Allowable Length (Margin) per Cavity Hole
    - ◆ Fuse Box, Relay Box, Multi-Pole ECU Connector





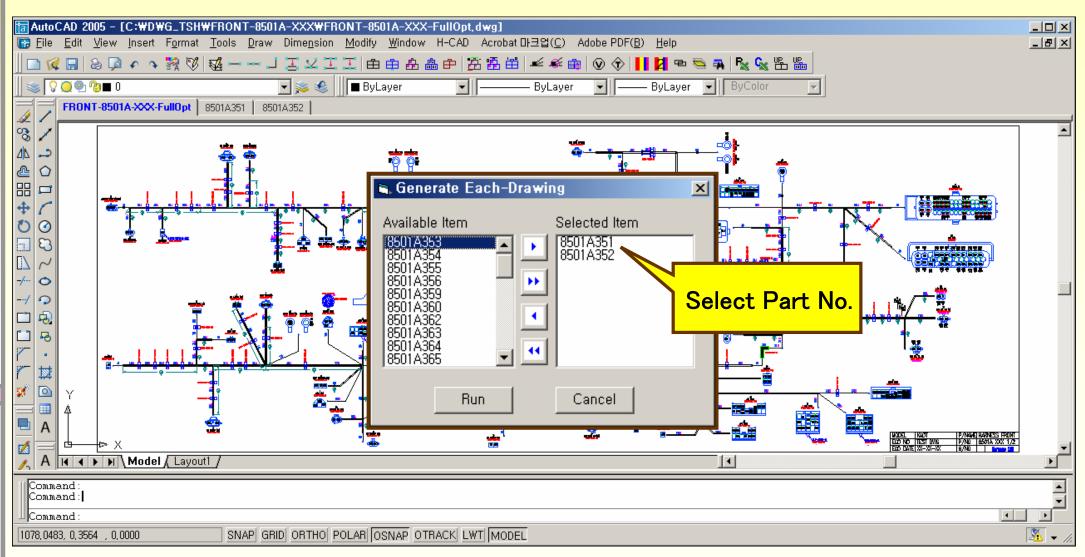
- Utility Function
  - \* Automatic Marking for Miscellaneous Materials by interfacing with Connector DB



## MFG DR'G Generation - Assy DR'G

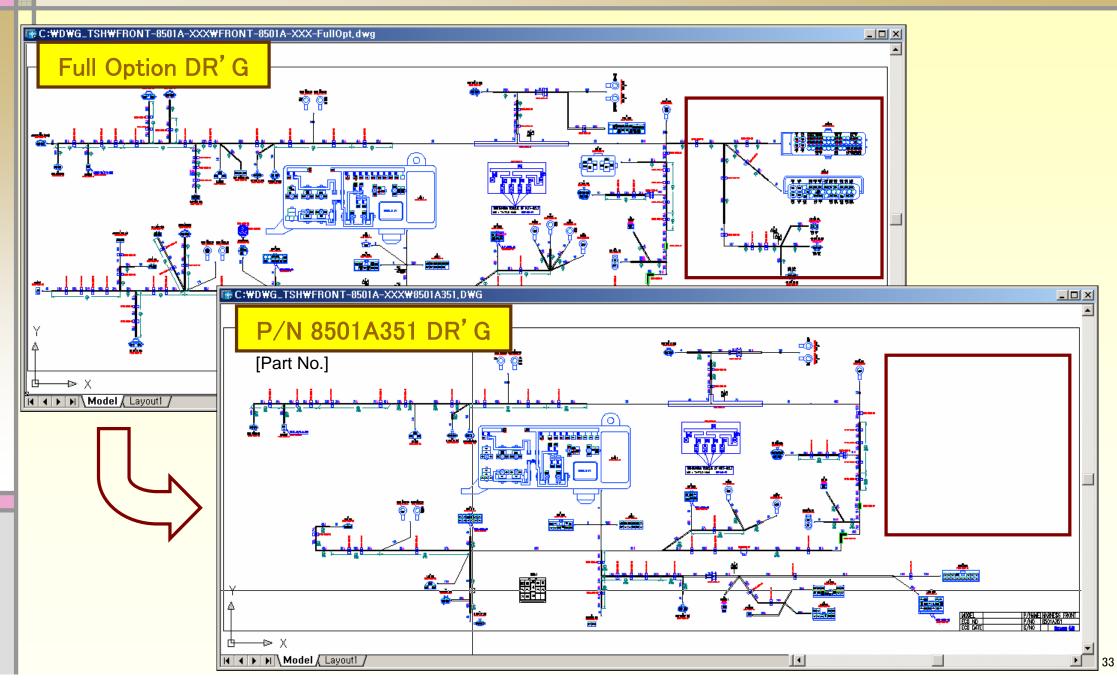


- Assy Drawing Generation Assembly Drawing per Part Number
  - Automatic Generation per Part Number (Selected Part No.)



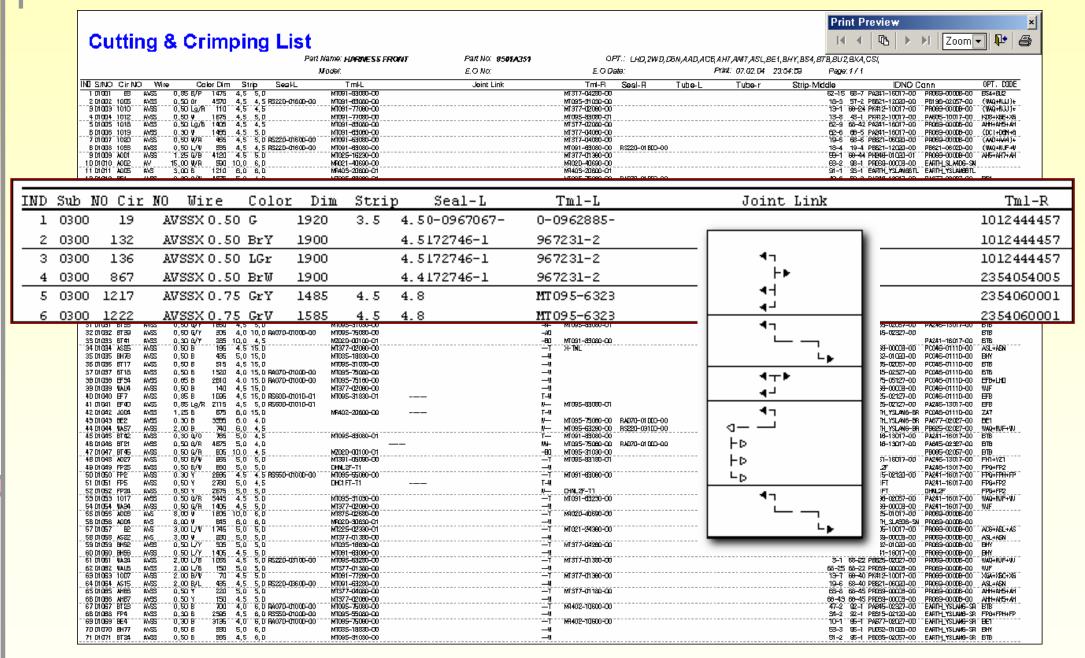
## MFG DR'G Generation - Assy DR'G per P/N





## MFG DR'G Generation - Cutting / Crimping DR'G Harness





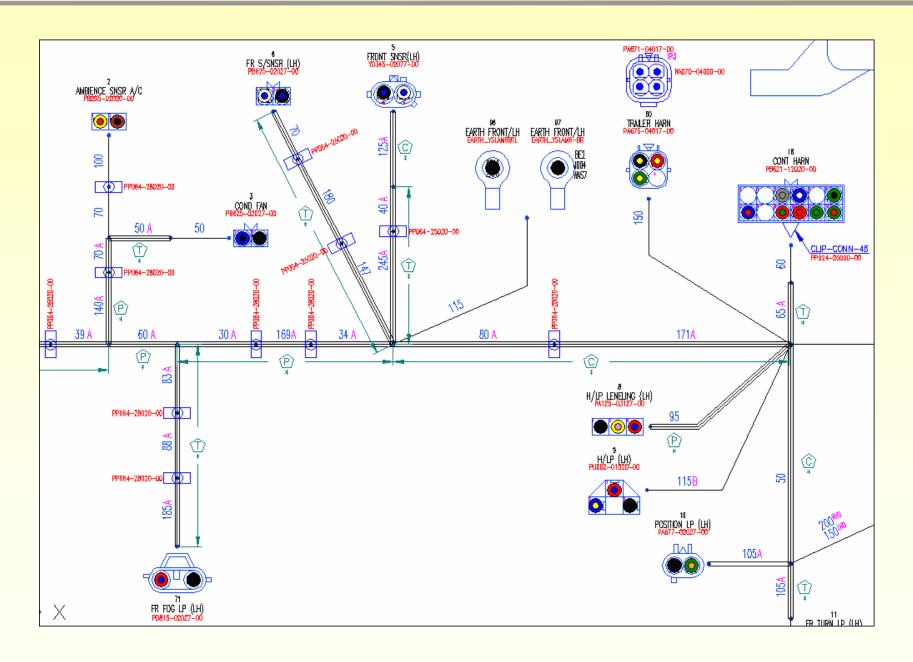
## MFG DR'G Generation - BOM List



									Print Preview	
	BOM LIST			Part Name: HURNESS FRONT		Part No: 8501A351		Print: 07.02.00 00.03:03		
				Miodel:		E.O No:	E.O Dat			
Idho		DIM Class	Description	Vender	Yender-no	Ind Ideo	Qty DIN 1,000 BA 78 FF		Vender	Yender-no
HC1FT HML2F	1.000 EA 1.000 EA	HDUSING HDUSING				63 MT875-02680-00 64 MZ020-00100-01		INAL 975F-15 INAL 3J-8-TN		N7675-0266D N2020-0010D
PA125-D2127-G0	1. dod <b>ka</b>	HDUSING	HTD27-GT A'Y		PA125-02127	65 RAG70-01G0G-DG	12.000 BA 10/3B			RA070-0100D
PA241-16017-00		HDUSING	0902-16 <b>E-N</b> A'Y		PA241-16017	66 BA070-02000-00	1.000 BA W/SE			BA070-0200D
PA246-13017-00		HDUSING	0902-13 <b>7</b> 8-N A'Y		PA246-13017	67 BS220-01600-DO	6.000 HA SKAI		45	RS220-0110D
A6D5-10017-00 A675-D5127-00		HDUSING HDUSING	090/187 HYLOF-WISAY TS080-5F-GY SA'Y		PA605-10017 PA675-05127	68 R\$220-03100-00 69 R\$220-03600-00	2.000 BA SEAL 1.000 BA SEAL			R\$220-0310D R\$220-0210D
A677-D2027-G0		HDUSING	075090-02FY-B 3A'T		PA677-02027	70 R3550-01000-D0	2.000 HA W/3E			R3550-0100D
A845-D2827-Q0		HDUSING	07909D-027I-DGT A'Y		PA845-02327	71 R3600-01010-D1	2.000 HA SKAI		.3	R3600-01010
B085-0Z057-00		HUUSING	COTP-OZB-Y1 (BR) S1Y		VE085-02057	7Z 1 Tube_000050	1.000 BA TOES			
B196-0Z057-00		HUUSING	COMPTOZET-ER A'T		VE196-02057	73 00050049	1.000 RA 49 TORE			
9915-D2120-Q0 9621-D6020-Q0		HDUSING HDUSING	YVD2F-GY NENEOBN (B)		PBG15-02120 PB621-06020	74 TC050125 75 TC050400	1.000 BA 125 TUBE 1.000 BA 400 TUBE			
										<b>=</b>
<u>Ind</u>	Idno			Qty	DIN	1 Class	Desci	ript ion		
1	1204075	3		2.000 <b>R</b> A		HOUSING	150 2F	COMMECT	OR(AK7330)	
2	1204075	4		1.000 KA		HOUSING	150-4F	COMMECT	'OR	
3	1206528	7		1.000 KA		HOUSING	DELPHI	ASM CON	IN 3F M/P 150	.1
4	1212994	6		1.000 KA	<b>.</b>	HOUSING	MP-3F			.D .iō 
5	1216285	9		1.000 KA		HOUSING	MP -4 F			ā: <u>a.</u> 0.
6	1-93632	1-2		1.000 RA		BOX	J/B0X	I/O		.D
7	216271_	1		1 OOO <b>1</b> 7		unite tur	04.0_1002	TT_2/10		.D
										:0
T025-16230-00	1. 00D EA	TERRINAL	PLS-S-SU		MT025-16230	102 RG360-17000-D1	1.000 MA Btc	C-369-D1		RG360-1700D
T025-10030-00	6. QOD <b>k</b> a	TERRINAL	NQP-0.5		WL032-T8830	109 RG601-16000-D0	1.000 BA GROP	MET GROW E-116		RG-601-1600D
T091-63080-G0		TERRINAL	NETWER-0.3		MT091-63060	104 RG601-17000-D0	1.000 BA GROP			RG601-17000
091-63280-00 091-77080-00		TERMINAL	NEWPE-9 NEW-0.3		MT091-63260 MT091-77080	105 87075-06000-00 106 87100-06000-00	1.000 HA FUSE 7.000 HA FUSE			8F075-0600D
091-77080-00 091-77280-00	6.000 EA	TRUMINAL	NSH-3		MT091-77080	105 37100-06000-00 107 37150-06000-00	7.000 BL FUSE			97100-06000 97150-06000
1091-83080-00	8.00D.8	TEUMINAL	090-z-K-0.3		WL031-83080	108 57200-06000-00	1.000 HA FOSE			51200-06000
T091-B3230-Q0	1. QOD KA	TERMINAL	09D-2-N-S		MT091-93230	109 \$\$406-01000-DO	2.000 NA FUSE	LP BD7-40A  G	-J7	S\$406-0100D
		TERRINAL	DWPF-H-0.5		HT095-91030	110 TAPE-19*20 (B)	23627.122ME Btc			
r095-31030-d0		TERMINAL TERMINAL	DWPF-D.9-01		HT095-91830	111 JOINT TAPE		J/Tape	5400	
095-31030-00 095-31630-01			YYF-0.5		MT095-55080 MT095-63280	112 07050060 113 07050070	1.000 HA 60 TUBE 1.000 HA 140 TUBE			
095-31030-00 095-31630-01 095-55080-00	2.00D <b>KA</b>		NAME 4-8			114 07050130	1.000 HA 130 TURE			
T095-31030-00 T095-31630-01 T095-55080-00 T095-63280-00	2.00D KA 2.00D KA	TERMINAL TERMINAL	NENUP 7-3 YS 12-6-0.3		NT095-75080	TT# 04020T20				
T095-31030-00 T095-31030-01 T095-55080-00 T095-63280-00	2.000 KA 2.000 KA 8.000 KA	TERMINAL				115 07050185	1.000 BA. 185 TORE	ANC TORI SLI	( - 5×185	
1095-31030-00 1095-31630-01 1095-55080-00 1095-63280-00 1095-75080-00 1095-75180-00 1095-83080-01	2.000 EA 2.000 EA 8.000 EA 5.000 EA 14.000 EA	TERMINAL TERMINAL TERMINAL TERMINAL	YSTZ-#-0.3 YSTZ-#-1.ZS O9D-2-P-0.9		RT095-75080 RT095-75180 RT095-93090	115 07050185 116 07070060	1.000 NA 90 TUBE	AVC TUBE SLI	l - 7*60	
T095-31030-00 T095-31630-01 T095-55080-00 T095-63280-00 T095-75080-00 T095-75180-00 T095-83080-01 T095-83080-01	2.000 EA 2.000 EA 8.000 EA 5.000 EA 14.000 EA 2.000 EA	TERMINAL TERMINAL TERMINAL TERMINAL	YS IZ -F- D. 3 YS IZ -F- L. XS		MT095-75080 MT095-75180	115 07050185 116 07070060 117 07070140	1.000 BA 60 TUBE 1.000 BA 140 TUBE	AVC TUBE SLI	( - 7*60 ( - 7*140	
T095-31030-00 T095-31630-01 T095-55080-00 T095-63280-00 T095-75080-00 T095-75080-00 T095-8100-01 T095-83180-01 T225-02330-01	2.000 EA 2.000 EA 8.000 EA 5.000 EA 14.000 EA 2.000 EA	TERRINAL TERRINAL TERRINAL TERRINAL TERRINAL TERRINAL TERRINAL	YSIZ-F-D.3 YSIZ-F-L.ZS QQD-2-P-D.3 QQD-2-P-S-D1		MT095-75080 MT095-75180 MT095-93090 MT095-93190	115 UVUSU185 116 UVU70060 117 UVU70140 118 UVU70233	1.000 BA 60 TUBE 1.000 BA 140 TUBE 1.000 BA 233 TUBE	WC TOBE SLI WC TOBE SLI WC TOBE SLI	t - 7*60 t - 7*140 t - 7*293	
T095-31030-00 T095-51830-01 T095-55080-00 T095-63280-00 T095-75180-00 T095-75180-00 T095-83180-01 T095-83180-01 T225-02330-01	2.000 EA 2.000 EA 3.000 EA 5.000 EA 14.000 EA 2.000 EA 1.000 EA	TERMINAL TERMINAL TERMINAL TERMINAL TERMINAL TERMINAL TERMINAL	YSIZ-F-D.3 YSIZ-F-L.ZS O9O-2-F-O.3 O9O-2-F-S-D1 2SO-NIY-F-S		MT095-75030 MT095-75130 MT095-93090 MT095-93190 MT377-01160	115 07050185 116 07070060 117 07070140 116 07070233 119 07070236	1.000 BA 50 TOBS 1.000 BA 140 TOBS 1.000 BA 233 TOBS 1.000 BA 238 TOBS	MC TODE SLI MC TODE SLI MC TODE SLI MC TODE SLI	! - 7*60 ! - 7*140 ! - 7*293 ! - 7*298	
T095-91030-00 T095-91630-01 T095-55080-00 T095-65280-00 T095-75180-00 T095-89180-01 T095-89180-01 T095-89180-01 T097-01180-00 T297-01380-00	2.000 MA 2.000 MA 8.000 MA 5.000 MA 14.000 MA 1.000 MA 1.000 MA 5.000 MA	TERRINAL TERRINAL TERRINAL TERRINAL TERRINAL TERRINAL TERRINAL	YSIZ-F-D.3 YSIZ-F-L.ZS QQD-2-P-D.3 QQD-2-P-S-D1		MT095-75080 MT095-75180 MT095-93090 MT095-93190	115 UVUSU185 116 UVU70060 117 UVU70140 118 UVU70233	1.000 BA 60 TUBE 1.000 BA 140 TUBE 1.000 BA 233 TUBE	WC TOBE SLI WC TOBE SLI WC TOBE SLI WC TOBE SLI WC TOBE SLI	( - 7*60 ( - 7*140 ( - 7*233 ( - 7*238 ( - 9*453	
T095-51030-00 T095-55030-00 T095-55280-00 T095-53280-00 T095-51830-00 T095-89180-01 T095-89180-01 T095-89180-01 T377-01180-00 T377-01830-00	2.000 EA 2.000 EA 8.000 EA 5.000 EA 14.000 EA 1.000 EA 1.000 EA 5.000 EA E.000 EA	TEMMINAL	YS 17-F-0.3 YS 17-F-1. YS 090-2-F-0.3 090-2-F-S-01 250-NY-F-8 250-NY-F-0 127-NY-F-0.3 1.37-NG-1-0.30-X		MT095-75080 MT095-75180 MT095-93090 MT095-93190 MT377-01190 MT377-01280 MT377-02080 MT377-04080	115 UVD50185 116 UVD70060 116 UVD70140 116 UVD70233 119 UVD70238 120 UVD50455 121 UVD50100 122 UVD50110	1.000 RA 50 TUBE 1.000 RA 140 TUBE 1.000 RA 233 TUBE 1.000 RA 253 TUBE 1.000 RA 453 TUBE 1.000 RA 110 TUBE 1.000 RA 110 TUBE	POC TUBE SLE  WC TUBE SLE	( - 7*60 ( - 7*140 ( - 7*233 ( - 7*236 ( - 9*453 ( - 13*110	
095-91030-00 095-91630-01 095-55080-00 095-63280-00 095-75180-00 095-75180-00 095-93090-01 095-93090-01 095-93090-01 095-02930-01	2.000 EA 2.000 EA 8.000 EA 5.000 EA 1.000 EA 1.000 EA 1.000 EA 5.000 EA 5.000 EA 5.000 EA 8.000 EA 2.000 EA	TERRITAL	YS IZ -F- D. 3 YS IZ -F- L. Z 5 O9 D- 2-P- D. 3 O9 D- 2-P- S- DL 25 D- NLY -F- 8 25 D- NLY -F- 8 12 7- NLY -F- D. S		MT095-75080 MT095-75180 MT095-83080 MT095-83180 MT377-01180 MT377-01380 MT377-02080	115 UVID50185 116 UVIO70060 117 UVIO70140 116 UVIO70233 119 UVIO70236 120 UVIO90459 121 UVIO0100	1.000 BA 60 TUBE 1.000 BA 140 TUBE 1.000 BA 233 TUBE 1.000 BA 239 TUBE 1.000 BA 483 TUBE 1.000 BA 100 TUBE	NOC TUBE SLE	( - 7460 ( - 74140 ( - 74293 ( - 74298 ( - 94459 ( - 194100 ( - 137110 ( - 147643	

## Utility Functions - Coloring Jig Board DR'G

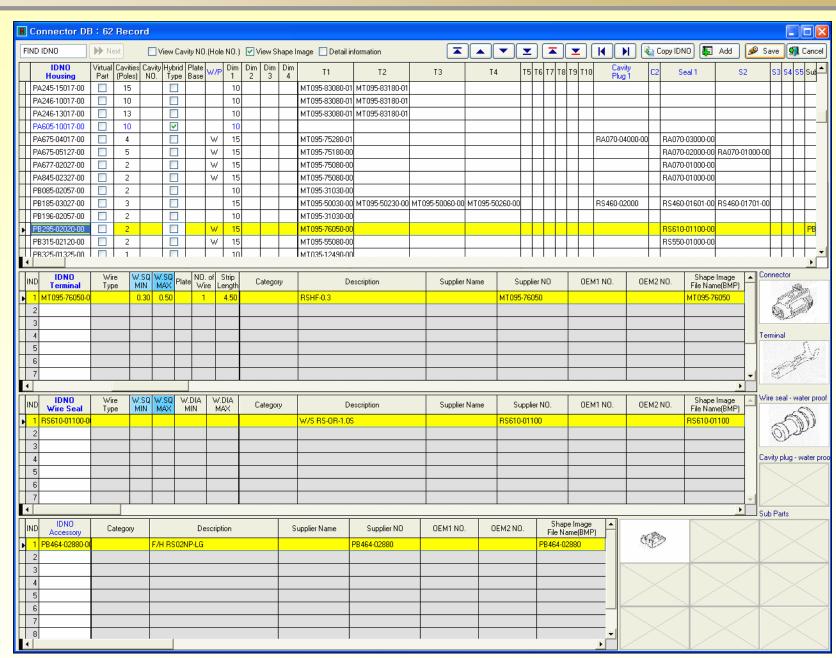


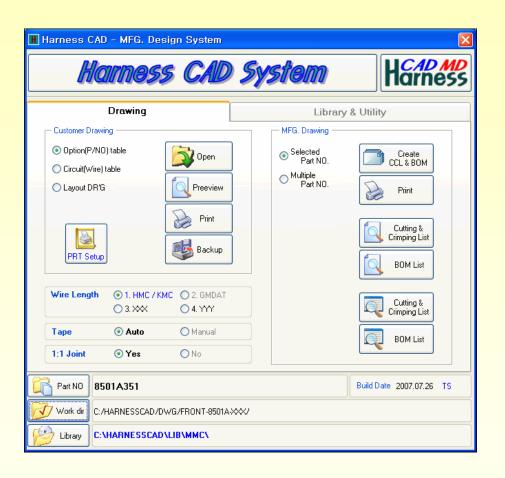


### Library Management Tool - Conn & Term.



- Connector
- Terminal
- Wire Seal
- Retainer
- Wire
- Tube
  - \* PVC
  - Corrugated
  - Vinyl Sheet
  - Sponge Pad
  - \* Etc.
- etc.
  - Grommet
  - Protector
  - Clip
  - Sponge Pad
  - Etc.







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