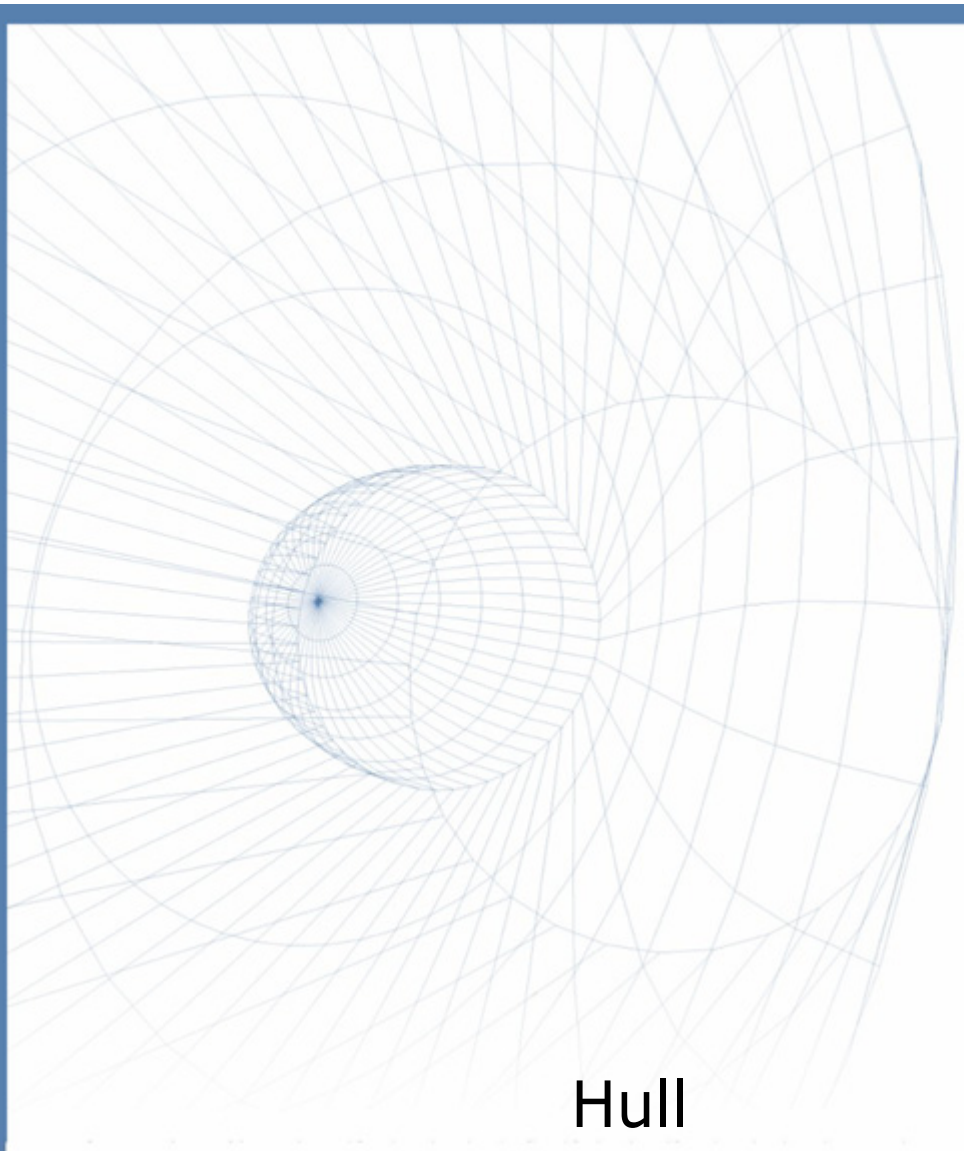

Hull

Miscellaneous Functions

User Guide

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AVEVA Hull Miscellaneous Functions

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Miscellaneous Functions

Parts List

1 Parts List

1.1 General

This program is used to produce parts lists based on a selection of data made in any of the interactive graphical applications of Hull (see *Manufacturing, General About the Production Program Interface*).

The automatic generation of parts is a prerequisite to this function, all data is fetched from the plate and the profile data banks.

Output can be either in comma-separated files or as drawings or both of these alternatives.

The output lists are comma-separated files suitable to customise via MS Excel or any other report generator tool.

The resulting drawings are based on drawing forms with a set of predefined rules possible to customise in any of the interactive graphical applications.

1.2 Set-Up of Program

The name of the executable of this program is sf101d. It communicates via an input file and resulting files. The program is normally activated through the Job Launcher (JL) where the following set-up is required:

Name recognised by JL: **Hull Parts List**

AVEVA Marine Logical	JL Set-Up and Explanation
SB_INPUT1	Input file to be set up with extension .dat in JL
SB_OUTPUT1	Output file with run-time information. To be set up in JL as first output file with extension .log
SB_OUTPUT2	Comma-separated parts list data for plates. To be set-up in JL as second output file with extension .csv1
SB_OUTPUT3	Comma-separated parts list data for profiles. To be set-up in JL as third output file with extension .csv2

1.2.1 Set-Up of the IP-file

IP's for this program can be given in an ordinary ASCII file with the fixed name `partlist.ip`, residing on the directory assigned to the environment variable SB_SHIP.

Currently only the following default parameter is possible:

[SINGLE_LINE,]

Normally lines in Hull Parts List are joined when the following attributes are identical.

- Part name according to part name control.
- Block name.
- Assembly name.
- Nested on.

By defining SINGLE_LINE, all parts are output on separate lines.

1.3 Input

Input to the program is based on the general selection tool and this input is normally generated automatically when activating this function through any of the interactive hull applications via a production program interface. This interface and the selection possibilities are described in *Manufacturing, General About the Production Program Interface*.

1.4 Output Files

The two comma-separated files will contain data as specified below.

1.4.1 Layout of the Parts List File for Plates

The layout of the first file:

Term	Term Type
Part name (created via Part Name Control)	String
Quantity	Integer
Block	String
Side	String
Weight	Real
Stock Number (if defined during modelling)	String
Steel quality	String
General Purpose String (GPS) 1	String
GPS 2	String
GPS 3	String
GPS 4	String
Ship number	String
Identification (from the LIS statement when modelling)	String
Nested on	String
Type of Part	String
Area	Real

Term	Term Type
Length	Real
Width	Real
Thickness	Real
No. of Portside instances	Integer
No. of Starboard instances	Integer
Functional property index	Integer
Functional property description	String
Assembly name	String
Position number	Integer
Part name	String

1.4.2 Layout of the Parts List File for Profiles

The layout of the second file:

Term	Term Type
Part name (created via Part Name Control)	String
Quantity	Integer
Block	String
Side	String
Weight	Real
Stock Number (if defined during modelling)	String
Steel quality	String
General Purpose String (GPS) 1	String
GPS 2	String
GPS 3	String
GPS 4	String
Ship number	String
Identification (from the LIS statement when modelling)	String
Nested on	String
Type of Part	String
Shape (i.e. HP, FB, etc.)	String
Dimension string	String
Length	Real

Term	Term Type
No. of Portside instances	Integer
No. of Starboard instances	Integer
Profile sketch	String
Functional property index	Integer
Functional property description	String
Assembly name	String
Position number	Integer
Part name	String

1.5 Output Drawings

The output drawings are created if the standard drawing forms defined for parts lists are defined on the standard data bank (SBD_STD). The drawing forms are described below. The created drawings are stored in the PADD data base pointing out by SBH_PARTLIST_DWG and SBH_PARTLIST_DWG_PADD. The logical name SBH_NSKETCH_DWG should point to it self and for the SBH_NSKETCH_DWG_PADD pointing out where these drawings are stored in PADD. See the *2D Drawing / Hull Drafting / Model Viewing and General Drafting / Concepts User Guide* for setting up the department and registry field for the SBH_NSKETCH_DWG_PADD reference.

If the logical name SBH_PARTLIST_DWG_PADD is not assigned the software will try to store the drawings in PADD where the standard drawings are stored (SB_PDB_PADD).

1.5.1 Drawing Form Names

The table below is describing the form names and how the program uses the forms. The actual layout of the forms and the possible drawing form rules are described in *Drawing Form Rules*

Name of Drawing Form	Usage
TB_PARTLIST_1	Drawing form for the plate parts list.
TB_PARTLIST_2	Optional drawing form for the plate parts list. If defined, then this form will be used for pages two and following pages. Drawing form TB_PARTLIST_1 will be used for page one.
TB_PROFLIST_1	Drawing form for the profile parts list.
TB_PROFLIST_2	Optional drawing form for the profile parts list. If defined, then this form will be used for pages two and following pages. Drawing form TB_PROFLIST_1 will be used for page one.

1.5.2 Drawing Form Rules

For general information on rules and dynamic texts, see *Drafting / Model Viewing and General Drafting / Drawing Forms and Rules*.

Both the plate parts and the profile parts list forms can be used with the following set of rules:

Rule Number	Usage
1001 (single text rule)	User name, fetched from logical SBB_USER_SIGNATURE
1002 (single text rule)	User phone number, fetched from SBB_USER_TELEPHONE
1003 (single text rule	Page number
1004 (single text rule)	Total number of pages
1005 (single text rule)	Assembly name if given via input
1010 (table text rule)	Part name as defined in *Part name Control*. Used as the main sorting key.
1011 (table text rule)	Quantity
1012 (table or single text rule)	Block
1013 (table text rule)	Side
1014 (table text rule)	Weight
1015 (table text rule)	Stock number (if defined during modelling)
1016 (table text rule)	Steel quality
1017 (table text rule)	General Purpose String (GPS) 1
1018 (table text rule)	GPS 2
1019 (table text rule)	GPS 3
1020 (table text rule)	GPS 4
1021 (table or single text rule)	Ship number
1022 (table text)	Identification (as defined by the LIS statement when modelling)
1023 (table text)	Name of nesting
1024 (table text)	Number of portside instances
1025 (table text)	Number of starboard instances
1998 (single text)	Rule used to define the lower left corner of the area where a picture of the selected data can be drawn
1999 (single text)	Upper right corner of this area

The plate part list forms can be given the following specific rules:

Plate specific rule numbers	Usage
1031 (table text)	Type of plate
1032 (table text)	Area
1033 (table text)	Length of circumscribed rectangle
1034 (table text)	Width of circumscribed rectangle
1035 (table text)	Thickness of plate

The profile parts list forms can be given the following rules:

Plate Specific Rule Numbers	Usage
1031 (table text)	Type of profile
1031 (table text)	Type of profile
1032 (table text)	Shape (i.e. FB, HP, etc.)
1033 (table text)	Dimension string
1034 (table text)	Total length

1.5.3 Automatic Generation of Drawing Names

The generated drawings will be named automatically with the following name for plate part lists:

`PL_<six-digit number>_<page number>(<total number of pages)`

And the profile part list drawings will be named:

`PR_<six-digit number>_<page number>(<total number of pages)`

The "six-digit number" is generated as specified in *Manufacturing, General About Production Program Interface, Automatic Generation of Names.*

Material Ordering

1 Material Ordering of Bars

1.1 General

This program extracts data (lengths, dimensions, etc.) of profiles in the AVEVA Marine model and creates a list file sorted in a way suitable to material ordering.

1.2 Set-Up of Program

The name of the executable of this program is `sf500d`. It communicates via an input file and resulting files. The program is normally activated through the Job Launcher (JL) where the following set-up is required:

Name recognised by JL: **Hull Material Bars**

AVEVA Marine env.var.	JL set-up and explanation
SB_INPUT1	Input file to be set up with extension .dat in JL
SB_OUTPUT1	Output file with run-time information. To be set up in JL as first output file with extension .log
SB_OUTPUT2	Output file with resulting data formatted into a list. To be set-up in JL as second output file with extension .lst
SB_OUTPUT3	File created as a temporary storage at run-time. Can be deleted after execution
SB_OUTPUT4	File created as a temporary storage at run-time. Can be deleted after execution

1.3 Input

Input to the program is based on the general selection tool and this input is normally generated automatically when activating this function through any of the interactive hull applications via a production program interface. This interface and the selection possibilities are described in *Manufacturing, General About the Production Program Interface*.

1.4 Output

1.4.1 List File

1. The resulting output basic data will be sorted with respect to the following concept in the order given below:
2. The identification number (see below). A new page will be printed for each new identification number.
3. The building block number. An empty line will be edited between unequal building block numbers. (Not valid when record type 10 has been given).
4. Type of profile of the bar. An empty line will be edited between unequal types.
5. The dimension of the profile. An empty line will be edited between unequal dimensions.
6. Increasing length.

The layout of the output list is explained below.

For an example, see *Example*.

row 4	<KVXYARD>	<KVXLISTNAME>	<lno>
row 5	<KVXCSHIP><s>	DATE:<date>	PAGE <pno>
row 7	<KVXHEAD1>		
row 8	<KVXHEAD2>		
row 10..n	<data row>		

The rows 4 to 8 will be printed on the top of each new page.

<KVXYARD>	Yard name. Max. 45 characters. Can be controlled via a logical name SB_YARD.
<KVXLISTNAME>	A fixed string, 'BASIC DATA FOR ORDERING OF BARS LISTNO'.
<lno>	An identification number of the list. The number is a combination of the building block number, the number of the panel in the block and a running number.

Example:

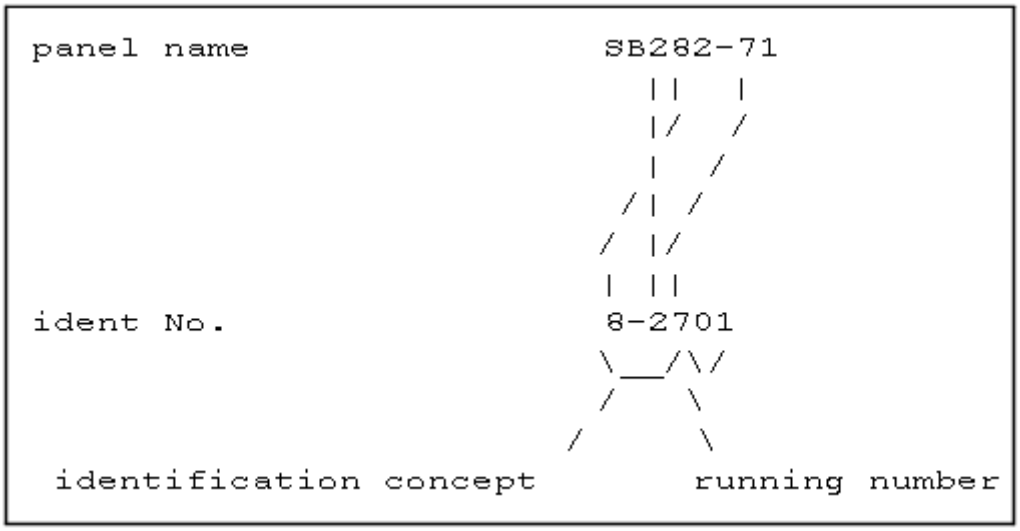


Figure 1:1. Identification number via panel name.

The running number will start at 01 as soon as any of the digits in the identification concept changes.

<KVXCSHIP>	A fixed string, 'SF500D SHIP:'
<s>	Ship letters, two characters. The characters will be fetched from the string defined by the logical name SB_HULLREF. If this is not defined, the letters will the initial letter/letters of the panel name.
<date>	Processing date.
<pno>	Page number.
<KVXHEAD1>	A fixed string, 'LOC TYPE PROF NO LENGTH TYPE A B S T EXCESS ENDCUTTYPE NOTES'
<KVXHEAD2>	A fixed string, 'NO NO NO LENGTH END1 END2'

The columns denote:

LOC TYPE NO NO	The name of the panel object without the initial letter/ letters.
PANEL NAME	The full panel name.
PROF NO	For longitudinals and transversals, the running number, otherwise the name of the attribute containing the information for a bar.

NO	Quantity.
LENGTH	The length of a bar including excess. Note that the excess is only the manufacturing excess.
TYPE	The profile type according to VIS standard.
A,B,S,T	The dimensions of the bar according to VIS-standard. The angle bar and the T-bar welded from two flat bars will be printed on the resulting list as two profiles 10 with 'L,' and 'T,' respectively in the concluding comment. The L-bar, VIS-standard code=33, welded from one L-bar and one flat bar will be printed on the resulting list as one profile 31 and one profile 10 with 'L,' in the concluding comment.
EXCESS LENGTH	The manufacturing excess for the length. The information may be missing.
ENDCUTTYPE END1 END2	The end cut types for the bar according to the conventions in the **HULL STANDARD**. The information may be missing.
NOTES	For concluding comments. The program will use the column for the printing of the following information:
L,	L-bar made of flat bars.
T,	T-bar made of flat bars.
BR,<no>,	Profile on bracket <no>.
H,<no>,	Profile in hole <no>.
L<no>,	Profile belonging to longitudinal <no>.
T<no>,	Profile belonging to transversal <no>.
FR<no>,	Profile defined at frame position <no> (defined by TAG).
LP<no>,	Profile defined at longitudinal position <no> (defined by TAG).

FB, Valid only for longitudinals and transversals. If the curvature of a bent profile exceeds the value given by:

$$h \leq (b / 10000)^2 \times 150$$

where h is the amplitude and b is the arc length of an arbitrary circular arc of the profile trace, then it might be impossible to bend the profile, and the indication FB will be printed in the column.

<name> The name of an object referred to by the panel object.

Several of these indications may occur in the same line.

1.4.2 Example

In the example below, two panels (SB272-281 and SB272-282) have been selected with the following resulting list:

KOCKUMS COMPUTER SYSTEMS AB BASIC DATA FOR ORDERING OF BARS LISTNO 7-2201
SF500D SHIP: SB DATE: 1993-11-10 PAGE 1

LOC NO	TYPE NO	PROF NO		LENGTH	TYPE	A	B	S	T	EXCESS LENGTH	ENDCUT END1	TYPE END2	NOTES
272	281	S3	2	1272	10	120		12.0			1302	1302	BR:4,
272	282	S4	2	656	10	150		12.0			1302	1220	LP16
272	282	S5	2	799	10	150		12.0			1302	1220	LP17
272	282	S6	2	928	10	150		12.0			1302	1220	LP18
272	281	S1	2	1777	10	150		12.0			1302	1302	BR:3,
272	281	S1	2	1858	10	150		12.0			1302	1302	BR:1,
272	281	S1	2	1869	10	150		12.0			1302	1302	BR:2,
272	281	S2	2	2336	10	150		12.0			1302	1302	BR:4,
272	282	S2	2	3171	10	200		15.0			1302	1302	BR:1,
272	281	S1	2	3261	10	200		15.0			1302	1302	BR:4,
272	282	S1	2	5347	10	250		20.0			1302	1302	BR:1,
272	282	F1	2	10557	10	350		20.0			1402	1402	
272	281	F1	2	11277	10	350		20.0			1402	1402	
272	282	S7	2	4926	31	200	90	9.0	12.0		2302	2302	
272	282	S3	2	10327	31	200	90	9.0	12.0		2101	2101	
272	282	S2	2	10327	31	200	90	9.0	12.0		2101	2101	
272	282	S1	2	10327	31	200	90	9.0	12.0		2101	2101	
272	281	S3	2	11179	31	200	90	9.0	12.0		2101	2101	
272	281	S2	2	11211	31	200	90	9.0	12.0		2101	2101	
272	281	S1	2	11243	31	200	90	9.0	12.0		2101	2101	

Figure 1:2. Example of resulting list.

2 Material Ordering of Plates

2.1 General

This program extracts data (dimensions, thickness, etc.) of plates in the model and creates a list file sorted in a way suitable to material ordering.

The plates may belong to plane or curved panels, and information will also be given about brackets belonging to a panel.

2.2 Set-Up of Program

The name of the executable of this program is sf501d. It communicates via an input file and resulting files. The program is normally activated through the Job Launcher (JL) where the following set-up is required:

Name recognised by JL: **Hull Material Plates**

AVEVA Marine env. var.	JL set-up and explanation
SB_INPUT1	Input file to be set up with extension .dat in JL
SB_OUTPUT1	Output file with run-time information. To be set up in JL as first output file with extension .log
SB_OUTPUT2	Output file with resulting data formatted into a list. To be set-up in JL as second output file with extension .lst
SB_OUTPUT3	File created as a temporary storage at run-time. Can be deleted after execution
SB_OUTPUT4	File created as a temporary storage at run-time. Can be deleted after execution

2.2.1 Control Information

The program uses some specific control variables. If used, it shall be added to a file with name `matplate.ip` placed on the directory associated with the logical SB_SHIP.

The ip's of the program are listed below.

`STEELDENSITY, <density>,`

If this ip is given, the calculations are made using the real <density> as the value of steel density in tons/m3. Otherwise the value 7.86 is used.

EXCESS, <excess>,

By this ip the addition of excess material can be controlled. Plane plates will be extended by <excess> millimetres at each side of their length and width. Default value is 15 mm if this ip is not given.

Note: This ip is valid for plane plates only! For developed plates, the excess may be controlled by the plate development program.

2.3 Input

Input to the program is based on the general selection tool and this input is normally generated automatically when activating this function through any of the interactive hull applications via a production program interface. This interface and the selection possibilities are described in *Manufacturing, General About the Production Program Interface*.

2.4 Output

2.4.1 List File

For a curved panel, whose name ends in S, only those developed plates will be listed, whose names also end in S. The resulting output data will be sorted with respect to the following concepts in the order given below:

1. The list identification number (see below). A new page will be produced when this number changes.
2. The building block number (cf <no1> above).
3. The group number (cf <no2> above).
4. The position number.

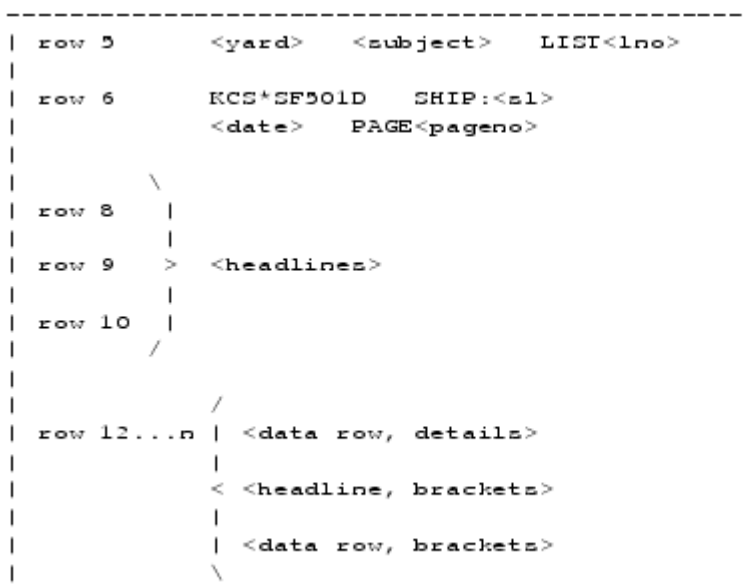
This means that plates originating from panels with identical block and group numbers will be listed together.

When the block or group numbers change, the following items will be listed:

The brackets belonging to the panel with the preceding block and group numbers. The brackets are listed in the order they are stored in the panel object.

The layout of the output list is explained below.

For an example see *Example*.



The rows 5 to 10 will be printed at the top of each new page.

<yard>	Yard name. Maximum 45 characters. Can be controlled via a logical name SB_YARD.
<subject>	DATA FOR ORDERING OF PLATES
<lno>	An identification number of the list. If record type 10 has been given, <lno> will be the list identification given in that record. Otherwise, the number is a combination of the building block number, the number of the panel in the block and a running number.

Example:

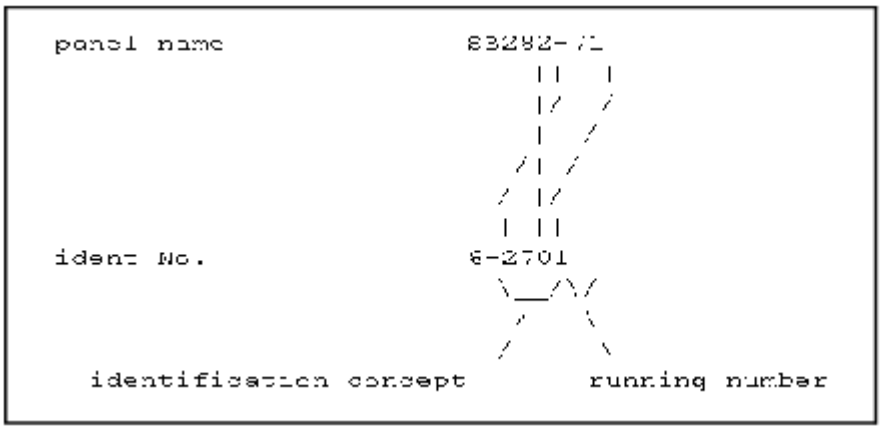


Figure 2:1. Identification number via panel name.

The running number will start at 01 as soon as any of the digits in the identification concept changes.

`<sl>` Ship letters, two characters. The characters will be fetched from the string defined by the logical name SB_HULLREF. If this is not defined, the letters will be the first two characters of a panel.

`<date>` Processing date.

`<page>` Page number.

rows 8 and 9 form the headlines for <data row, plates> and will be explained below in connection with these data rows.

`ORDER NO` intended for annotations by the user.

`BL NO` Number of the building block (taken from the name of the panel, cf. input).

`GR` The group number of the panel within the

`NO` building block (taken from the name of the panel, cf. input).

`PANEL NAME` The name of the panel whose plates are calculated.

Until the first record of type 10 has been given, the block and group number will be printed, otherwise the panel name.

POS NO	The position number of the plate (taken from the plate attribute in the panel object). If the name of the panel ends in S, P or SP, this ending will follow immediately after the position number.
PLATE NO	The name of the plate attribute within the panel resulting in the plate detail. **Note:** The name of the detail will be composed of BL NO, GR NO and PLATE NO or of PANEL NAME and PLATE NO.
QUAL	Quality code for the plate material.
TREAT	Code for treatment.
NUM	Number of the denoted detail to be ordered. 1. For plane plates the value of NUM will be 1, if the plate is unique for the starboard or portside part of the ship, otherwise 2. 2. For developed plates only S-marked plates will be ordered from a panel ending in S. NUM will be set 1, if the name of the plate ends in S, P or SP, otherwise 2.
LE	The length of the least circumscribed rectangle (inclusive manufacturing excess, defined when generating the panel) added with standard manufacturing excess 15 mm at both ends (= 30 mm). Cf. *Weight and Scrap Percentage.*.
BR	The same for the breadth of the least circumscribed rectangle.
TH	The thickness of the plate.
EXCESS LE BR	The manufacturing excess defined in the generation of the panel and in the direction of the length and the breadth of the least circumscribed rectangle respectively. Cf. *Excess Along Length and Breadth*. LE, BR, TH, EXCESS LE, EXCESS BR are all given in millimetres.
WEIGHT KG	The weight of the detail without manufacturing excess. Cf. *Weight and Scrap Percentage.*. The density is supposed to be 7860 kg/m3.
SCRAP	The scrap percentage. Cf. *Weight and Scrap Percentage.*.
COMMENT	For developed plates possible remarks are: 3 EDGES, 5 EDGES

<headline, brackets> has the concepts QUAL, NUM and TH common with the headline in data row 8 (cf. above). The meaning will be explained below in connection with

<data row, brackets> which contains information about the brackets belonging to the panel(s), the details of which are listed before the brackets.

BRACKETS:	The designation of the brackets.

NO	The number of the bracket in the panel. If there are several identical standard brackets, they will all be listed on one line and NO is not given.
QUAL NUM TH	Cf <data row, details> above. For standard brackets NUM will contain the number of the denoted bracket in the panel. This figure will be multiplied by two for a panel not ending in S, P or SP.
PLATE	The name of the bracket as a detail in the plate data bank. Not given for standard brackets.

2.5 Weight and Scrap Percentage.

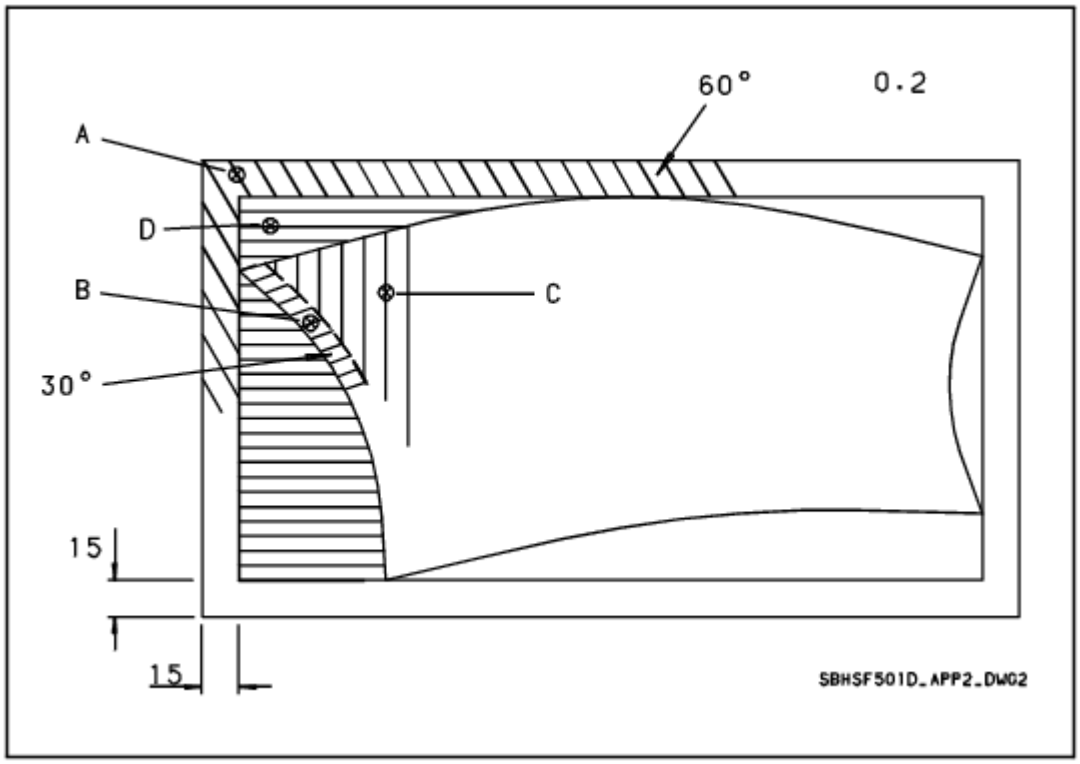


Figure 2:2. Figure describing material and the scrap areas.

1. The area of the "frame" containing manufacturing excess. The width is 15 mm.
2. The area of the excess defined in the generation of the panel. For a plane plate, it is approximated by a straight "strip" between the starting point and the ending point of the excess interval. It is not taken into consideration that parts of this strip may fall within cutouts for profiles, etc.
3. The area of the detail as it is supposed to be when put into its final position in the ship (however, cf. B).
4. The area of the least circumscribed rectangle, falling outside the detail.

The weight of the detail is computed from the area C.

The scrap percentage is calculated as $SCRAP = D/(D+B+C) \times 100$.

2.6 Excess Along Length and Breadth

The part of the defined excess falling in the direction of the long and the short sides respectively of the circumscribed rectangles will be calculated in a way explained by the figure below.

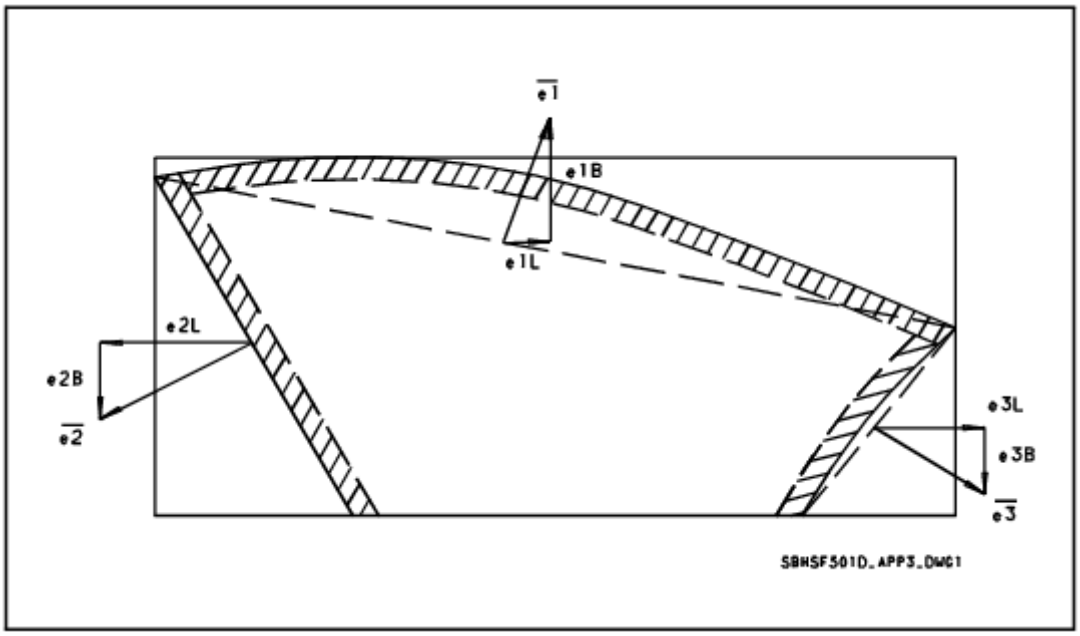


Figure 2:3. Figure describing the excess areas.

The shaded areas are manufacturing excess defined by the user. In this case, excess is supposed to have been defined along three intervals:

```
e1 = (e1L, e1B)
e2 = (e2L, e2B)
e3 = (e3L, e3B)
```

These are right-hand normals to the straight lines between end points of the intervals along which manufacturing excess is defined. The length of the vectors is equal to the breadth of the excess "strip".

For each edge, the largest component will be replaced by the value of the excess and the smallest component will be set to zero.

Then,

```
EXCESS, LE = |e2| + |e3|
EXCESS, BR = |e1|
```

2.7 Example

In the example below, two panels (SB272-281 and SB272-282) have been selected with the following resulting list:

```
KOCKUMS COMPUTER SYSTEMS AB                    DATA FOR PLATE MATERIAL ORDERING                    LIST 7-2201
*              KCS * SF501D  SHIP: SB       DATE: 1993-11-10                                      PAGE  1
ORDER    BL   GR              POS PLATE  QUAL TREAT NUM     LE    BR    TH    EXCESS  WEIGHT SCRAP COMMENT
 NO      NO   NO               NO    NO                                        LE    BR      KG   PCT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

       272  281                0     1              2   7087  3837  14.0             2602    12
       272  281                0     2              2   5249  3932  14.0             1985    11

       BRACKETS:          NO   POS NO                                      PLATE
       CK360/165-419       1      3              2              12.5     SB272-281-1B
       CK360/166-419       2      2              2              12.5     SB272-281-2B
       CK350/163-419       3      4              2              12.5     SB272-281-3B
       K310/310-319        4      5              2              14.0     SB272-281-4B
       GA31/35-109         5      7              2              12.5     SB272-281-5B
       GA31/35-109         6      7              2              12.5     SB272-281-6B
       GA31/35-109         7      7              2              12.5     SB272-281-7B
       SB272-283           8     10              2              14.0                      BRACKET PANEL


       272  282                0     1    36        2  11936  4098  19.0 +50         5958    17

       BRACKETS:          NO   POS NO                                      PLATE
       K500/320-329        1      1     36       2              19.0     SB272-282-1B
       GA60/46-109         2      6              2              14.0     SB272-282-2B
       GA60/46-109         3      6              2              14.0     SB272-282-3B
       GA60/46-109         4      6              2              14.0     SB272-282-4B
       SB272-284           5     11              2              14.0                      BRACKET PANEL
       SB272-285           6      9     36       2              16.0                      BRACKET PANEL
       SB272-286           7      8     36       2              16.0                      BRACKET PANEL
```

Figure 2:4. Example of material ordering result.

3 Material List for Nestings

3.1 General

This document describes a module used to produce material lists for plate and profile nestings sorted on the top level assembly. The result is comma-separated files to be customised via MS Excel or any other report generator tool.

3.2 Set-Up of Program

The name of the executable of this module is `se032`. It communicates via an input file and resulting files. The program is normally activated through the Job Launcher (JL) where the following set-up is required:

Name recognised by JL: **Hull Material Nestings**

AVEVA Marine env. variable	JL set-up and explanation
SB_INPUT1	Input file to be set up with extension .dat in JL
SB_OUTPUT1	Output file with run-time information. To be set up in JL as first output file with extension .log
SB_OUTPUT2	Output file with comma-separated result data for plates. To be set-up in JL as second output file with extension .csv1
SB_OUTPUT3	Output file with comma-separated result data for profiles. To be set-up in JL as third output file with extension .csv2

3.3 Input

Input to the module is created via the general selection tool and is normally generated automatically when the module is activated through any of the interactive hull applications via a production program interface. This interface and its selection options are described in *Hull Production Program Interface*.

3.4 Output

Output files will be produced in case the selected data contains plates and/or profiles that have been nested. The two comma-separated files will contain data as specified below.

3.4.1 Layout of Plate File

The first file contains information about nested plates. For each plate the following terms are output in the specified order. The type of the term is as specified. The meaning of the terms is supposed to be intuitively understood.

Term	Term type
Assembly	String
Quality	String
Length	Real
Width	Real
Thickness	Real
Quantity	Integer
Nesting name	String

3.4.2 Layout of Profile File

The second file contains information about nested profiles and should be interpreted in a similar way as the plate file above.

Term	Term type
Assembly	String
Quality	String
Length	Real
Shape and dimension	Real
Type	Integer
Number of parameters	Integer
Parameters (6)	Reals
Quantity	Integer

3.4.3 Examples

Examples to be added

4 Material List

4.1 General

This program is used to produce a material list based on a selection of data made in any of the interactive graphical applications of Hull (see *Manufacturing, General About the Production Program Interface*).

The material list function collects all references to nestings from the parts (plates and profiles) within the given selection and creates output data suitable for small shipyards or simply for checking purposes. More advanced material listing functionality is recommended to be handled via the Production Data Interface.

Output is sorted and presented in comma-separated files suitable to be customized via MS Excel or any other report generator tool.

4.2 Set-Up of Program

The name of the executable of this program is sf103d. It communicates via an input file and resulting files. The program is normally activated through the Job Launcher (JL) where the following set-up is required:

Name recognised by JL: **Hull Material List**

AVEVA Marine env. variable	JL set-up and explanation
SB_INPUT1	Input file to be set up with extension .dat in JL
SB_OUTPUT1	Output file with run-time information. To be set up in JL as first output file with extension .log
SB_OUTPUT2	Comma-separated result data for plates. To be set-up in JL as second output file with extension .csv1
SB_OUTPUT3	Comma-separated material list data for profiles. To be set-up in JL as second output file with extension `.csv`

4.3 Input

Input to the program is based on the general selection tool and this input is normally generated automatically when activating this function through any of the interactive hull applications via a production program interface. This interface and the selection possibilities are described in *Manufacturing, General About the Production Program Interface*.

4.4 Output Files

The comma-separated files will contain data as specified below.

4.4.1 Layout of the Material List File for Plates

The layout of the file with plate material:.

Term	Term type
Nesting Name	String
Quantity	Integer
Dimension	String
Stock Number	String
Steel Quality	String
Preparation	String
Charge	String
Weight	Real

4.4.2 Layout of the Material List File for Profiles

The layout of the file with profile material:

Term	Term type
Nesting Name	String
Quantity	Integer
Shape (i.e. HP, FB, etc.)	String
Dimension	String
Length	Real
Stock Number	String
Steel Quality	String
Purchase Information	String
Dimension String	String
Weight	Real

4.4.3 Examples

Examples to be added

WCOG Weight Calculation

1 Weight Calculations of Steel Structure

1.1 General

This program is used to produce parts lists based on a selection of data made in any of the interactive graphical applications of Hull (see *Manufacturing, General About the Production Program Interface*).

Output can be either in comma-separated files or as drawings or both of these alternatives.

The output lists are comma-separated files suitable to customise via MS Excel or any other report generator tool.

The resulting drawings are based on drawing forms with a set of predefined rules possible to customise in any of the interactive graphical applications.

1.2 Calculation Method

The next sections contain a short overview of the principles that have been followed in the calculations for different types of structural members.

The calculations of weight and centre of gravity are done in two steps.

- A preliminary WCOG value is calculated for each component when the planar or curved panel is stored. This simple calculation does neither consider excess, shrinkage or compensation for plates nor does it consider end cuts, notches, cutouts or holes for profiles.
- When the component is released for production, using ppanparts or cpanparts, a new exact calculation is made. This is done both with and without consideration of excess and shrinkage.

Both sets of WCOG values are stored in the planar panel, curved plate or shell stiffener object.

1.2.1 Plane Plates

The mass and the centre of gravity for plane plates are calculated as follows.

If the panel has been split after the last generation or updating date, the plate object is read from the data bank. This object contains the cutouts and notches.

For an existing plate object, the area and moments of the outer contour are calculated in the panel plane, and these results are subtracted by the corresponding results for inner contours (= holes). The mass centre of the plate is obtained by dividing the moments by the area.

The weight of the plate is the area multiplied by the thickness and the steel density. The steel density is fetched from the quality control file.

The mass centre is moved from the moulded plane of the panel to the centre of the plate thickness. Then it is transformed into the ship coordinate system and the dimensions are transformed into mm and kg.

1.2.2 Straight Stiffeners, Straight Flanges

The mass and mass centre of a straight stiffener and a straight flange are calculated in the following way.

The starting- and ending points of the moulded line define the moulded length. The geometry of the cross-section figure is generated for the profile. Its area and moments in the cross-section plane are calculated.

So the weight of the stiffener or flange is the length of the moulded line multiplied by the cross-section area and steel density.

Before calculation of the mass centre, the cross-section figure is turned at the prescribed angle with regard to the panel plane and moved to that side of the panel plane, which is defined in the stiffener or flange attribute. The thickness of the first panel plate is taken into account in the movement.

The mass centre of the stiffener is now calculated by making a transformation in the cross-section plane from the middle point of the moulded line to the mass centre of the cross-section figure, see *Figure 1:1.: Transformation of moulded line.*

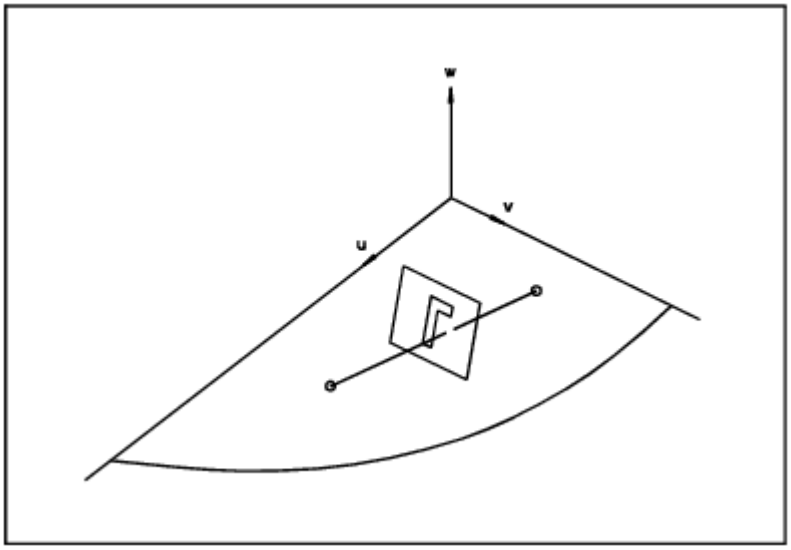


Figure 1:1. Transformation of moulded line.

1.2.3 Curved Flange

The moulded line of a curved flange, along which it is welded is extracted from the contour. The calculations are performed in principle in the same way as for straight flanges, only that the straight moulded line is replaced by the flange trace.

1.2.4 Brackets

The geometry and other information of a bracket are found either from the bracket contour of the panel object or from a separate bracket object.

The outer contour of the bracket contains the cutouts and notches. Its area and moments are subtracted by the area and moments of the holes. The moments divided by area give the mass centre of the bracket in its own plane coordinate system.

The mass centre is then moved to the centre of plate thickness in w-direction and transformed to the ship coordinate system.

If the bracket contains stiffeners, their weight results are obtained in the same way as those of the straight stiffeners.

The weight of panel brackets is calculated as for panels.

1.2.5 Clips

The mass centre is positioned in the centre of the clip and the displacement due to the plate thickness is taken into consideration.

1.2.6 Shell Plates

The area and the moment of the surface contained in one shell plate is calculated. Then the weight of the shell plate is calculated as the area multiplied by the plate thickness and the density. The coordinates of the mass centre are the calculated moments divided by the area of the plate.

If the shell plate contains holes, they are not brought into the calculations.

1.2.7 Curved Stiffeners

The object of the curved stiffener is read from SB_OGDB. The mould line is shortened at its terminal points, according to the variables ss, se defined in the attribute 101 (DIC) of a curved stiffener.

The cross-section figure of the profile is generated and turned to angle (ts + te)/2 measured from the moulded plane of the stiffener, where ts and te are the angles at the terminal points of the profile.

The mass centre of the cross-section figure, (au1, av1) is calculated in its own plane coordinate system, see *Figure 1:2.: Mass centre of cross-section.*

The moulded contour of the stiffener is moved in the moulded plane, resulting in the neutral axis of the profile. The length of the neutral axis is changed at the terminal points so that the end cuts can be considered as perpendicular without errors in volume or weight. The w-coordinate of the mass centre is av1 (of the cross-section figure). The mass centre is now transformed into the ship coordinate system.

The weight is now equal to the length multiplied by the cross-section area and density.

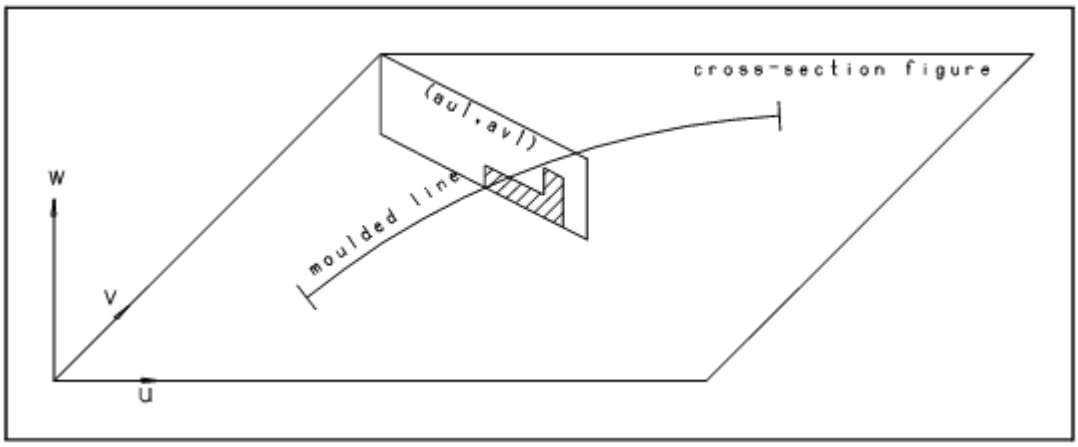


Figure 1:2. Mass centre of cross-section.

1.3 Set-Up of Program

The name of the executable of this program is sf102d. It communicates via an input file and resulting files. The program is normally activated through the Job Launcher (JL) where the following set-up is required:

Name recognised by JL: **Hull Weight & COG**

AVEVA Marine Logical	JL Set-Up and Explanation
SB_INPUT1	Input file to be set up with extension `.dat` in JL
SB_OUTPUT1	Output file with run-time information. To be set up in JL as first output file with extension `.log`
SB_OUTPUT2	Comma-separated parts list data for plates. To be set-up in JL as second output file with extension `.csv1`

1.3.1 Set-up of the IP-file

IP's for this program can be given in an ordinary ASCII file with the fixed name wcog.ip, residing on the directory assigned to the environment variable SB_SHIP.

The following list shows all possible default parameters:

```
[WCOG_MODE, EXACT | EXACT_WITHOUT_EXCESS,]
[WCOG_SEP_BUILT_PROF,]
```

When the planar or curved panel is stored a simple calculation is done. This calculation disregards excess, shrinkage and compensation for plates and disregards end cuts, notches, cutouts and holes for profiles.

When the component is released for production a new exact calculation is done. This is done both with and without excess and shrinkage.

When WCOG values are to be presented or used in some other way, the stored values are retrieved from the model.

By defining ip `WCOG_MODE, EXACT` values including excess and shrinkage for weight and centre of gravity may be retrieved. Values excluding excess and shrinkage are retrieved by defining ip `WCOG_MODE, EXACT_WITHOUT_EXCESS`. If exact calculations not yet have been performed then simple values are returned.

The WCOG_MODE ip may be enclosed in groups using the START_GROUP and END_GROUP keywords.

WCOG values for panel components are displayed on separate lines. For built profiles the presentation may be further split up into one line for the web part and one line for the flange part. This is accomplished by defining ip `WCOG_SEP_BUILT_PROF,.`

1.4 Input

Input to the program is based on the general selection tool and this input is normally generated automatically when activating this function through any of the interactive hull applications via a production program interface. This interface and the selection possibilities are described in *Manufacturing, General About the Production Program Interface*.

1.5 Output Files

The comma-separated files will contain data as specified below.

Layout of the File

Term	Term Type
Part name (created via Part Name Control)	String
Weight	Real
COG X	Real
COG Y	Real
COG Z	Real
Panel	String
Block	String
Part name	String
Type of part	String
Side	String
Stock Number (if defined during modelling)	String
Steel quality	String
General Purpose String (GPS) 1	String
GPS 2	String
GPS 3	String
GPS 4	String
Ship number	String

Term	Term Type
Identification (from the LIS statement when modelling)	String
Nested on	String
Area (if plate part)	Real
Circumscribed Length (if plate part)	Real
Circumscribed Width (if plate part)	Real
Thickness (if plate part)	Real
Shape (If profile part)	String
Dimension string (if profile part	String
Total Length (if profile part)	Real
Moulded length (if profile part)	Real

1.6 Output Drawings

The output drawings are created if the standard drawing forms defined for parts lists are defined on the standard data bank (SBD_STD).

The drawing forms are described below. The created drawings are stored in the PADD data base pointed out by SBH_WCOG_DWG and SBH_WCOG_DWG_PADD. The logical name SBH_WCOG_DWG should point to it self and for the SBH_WCOG_DWG_PADD pointing out where these drawings are stored in PADD. See the drafting documentation for setting up the department and registry field for the logical name SBH_WCOG_DWG_PADD reference.

If the logical name SBH_WCOG_DWG_PADD is not assigned the software will try to store the drawings in PADD where the standard drawings are stored (SB_PDB_PADD).

1.6.1 Drawing Form Names

The table below is describing the form names and how the program uses the forms. The actual layout of the forms and the possible drawing form rules are described in *Drawing Form Rules in Chapter Parts List*

Name of Drawing Form	Usage
TB_WCOG_1	Drawing form for the WCOG drawing.
TB_WCOG_2	Optional drawing form for the WCOG drawings. If defined, then this form will be used for pages two and following pages. Drawing form TB_WCOG_1 will be used for page one.

1.6.2 Drawing Form Rules

For general information on rules and dynamic texts, see *Drafting / Model Viewing and General Drafting / Drawing Forms and Rules*.

The following set of rules can be used:

Rule Number	Usage
1001 (single text rule)	User name, fetched from logical SBB_USER_SIGNATURE
1002 (single text rule)	User phone number, fetched from SBB_USER_TELEPHONE
1003 (single text rule	Page number
1004 (single text rule)	Total number of pages
1005 (single text rule)	Assembly name if given via input
1010 (table text rule)	Part name as defined in *Part name Control*. Used as the main sorting key.
1011 (table text rule)	Quantity
1012 (table or single text rule)	Block
1013 (table text rule)	Side
1014 (table text rule)	Weight
1021 (single text rule)	Project name
1050 (single text)	Scope - Possible values are either the block or the assembly name if the selection has been made with one of these alternatives. All other selection alternatives will result in the fixed string "Panels Total"
1051 (single text)	Centre of gravity - X value for the total selection
1052 (single text)	Centre of gravity - Y value for the total selection
1053 (single text)	Centre of gravity - Z value for the total selection
1054 (table text)	Centre of gravity - X value for the individual part
1055 (table text)	Centre of gravity - Y value for the individual part
1056 (table text)	Centre of gravity - Z value for the individual part
1057 (table text)	Panel name
1058 (table text)	Type of part
1059 (single text)	Total weight
1998 (single text)	Rule used to define the lower left corner of the area where a picture of the selected data can be drawn
1999 (single text)	Upper right corner of this area

1.6.3 Automatic Generation of Drawing Names

The generated drawings will be named automatically with the following name:

`WCOG_<six-digit number>_<page number>(<total number of pages)`

The "six-digit number" is generated as specified in *Manufacturing, General About Production Program Interface, Automatic Generation of Names*.

Hull Marks

1 Hull Marks - User Guide

1.1 Introduction

The function for Hull Marks is used to mark characters and symbols. The characters/ symbols can be retrieved from:

- Special symbol font
- Setting drawing
- General subpicture
- Standard subpicture
- Dxf file
- True type font
- Geometry selected on screen

Once the symbols/characters are available the characters can be combined in an arbitrary way to establish a generalised ‘text’ to be marked. Thus a text in this sense may contain both ordinary letters and arbitrary symbols. In case of ordinary characters the text can be created very much like ordinary text key-in. This is done in a special sub-function, **Hull Tools>Hull Mark>Prepare,** that also supports manipulation of the text (e.g. control of spacing between characters, size/height, characters to be set horizontally or vertically (above each other)). The approved text is stored as a ‘drawing’ and is in this document referred to as a Mark Text.

Another sub-function, **Hull Tools>Hull Mark>Project**, may then be used to place this text on selected hull surfaces or on planar panels.

The text, when set, will result in an object called **Hull Mark** object that may be visualized in 3D views.

The final Hull Mark object may be of two kinds:

- The symbols/characters should be cut from plate and the resulting parts will be welded onto the surface.
- The character is a contour that will be created as welding string.

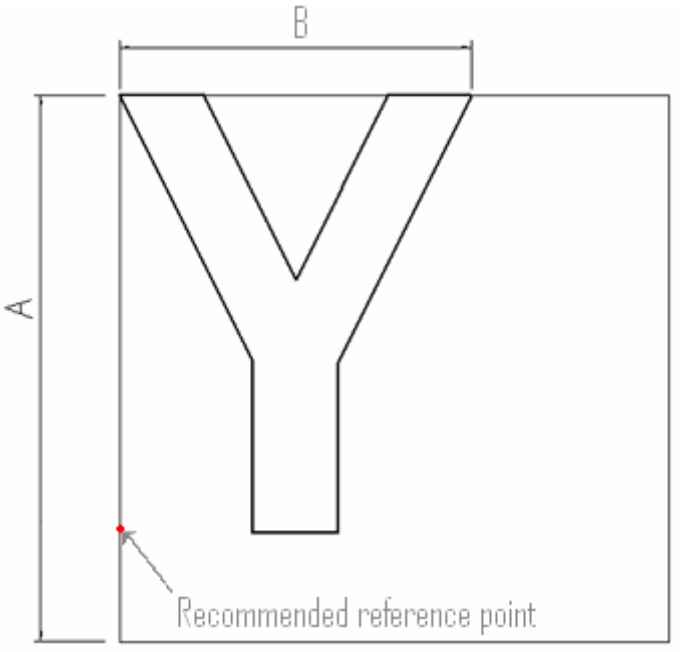
1.2 Setup and Customisation of Hull Marks

1.2.1 Data Bank for Mark Texts

The ‘drawings’ containing generalised texts, Mark Texts, for marking are stored in a special databank which name should be assigned to the environment variable SBH_MARK_PICT.

1.2.2 Symbols and Symbol Font

The mark symbols are created using the ordinary tools for symbol definition **Tools->Symbol->Open and Save**.



When defining a hull text its height must be specified. The given height is interpreted as the measure A in the figure above.

1.2.3 Setting Drawing

Figure bellow show example of setting drawing which you can use as source of characters/ symbols for creating of hull text.

One setting drawing can have many views. One view must have one sub view with many components.

Components represent:

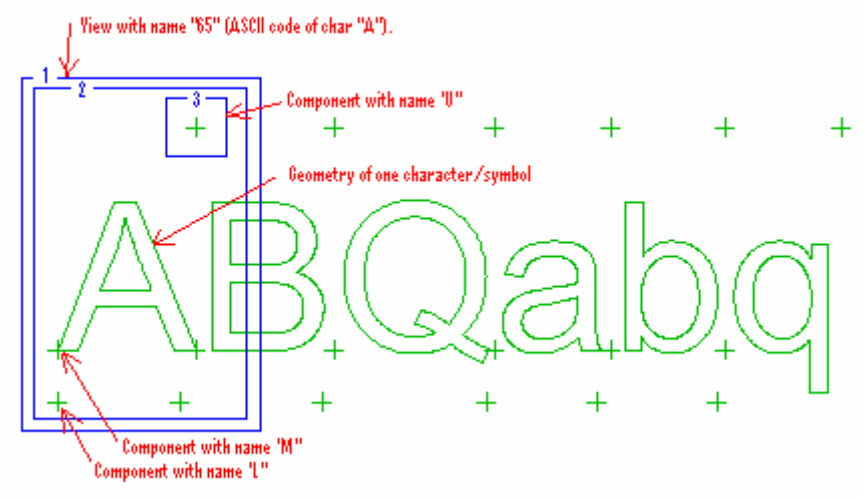
- Geometry of one character/symbol (unrequired)
- Lower point of geometry (unrequired)
- Reference point (unrequired)
- Upper point of geometry(unrequired)

Lower and upper points define width and height measure of character/symbol. If not set, width and height measure are solved automatically based on the circumscribed rectangle of geometry of one character/symbol. You don' not need a set reference point. In this case it is solved automatically (centre of gravity of circumscribed rectangle of geometry of one character/symbol).

Lower, upper and reference points must be identified by its unique name:

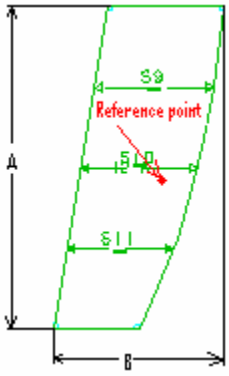
- Lower point name is **L**
- Upper point name is **U**
- Reference point name is **M**

Views of setting drawing should have unique names. If you want to regard one setting drawing as one font it is recommended to use ASCII numbers as names of views.



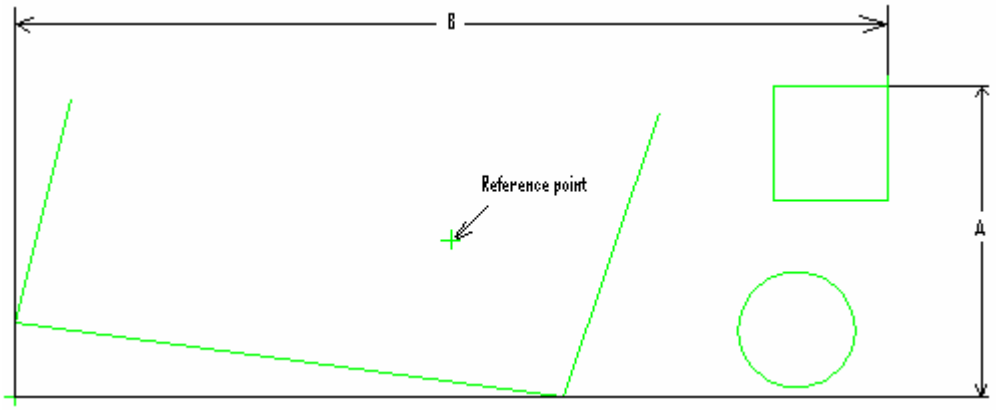
1.2.4 General and Standard Subpicture

If a subpicture is used as source geometry of a character/symbol then points which define width and height measure of a character/symbol are solved automatically. This is based on that the circumscribed rectangle of geometry and reference point are set in the centre of gravity of the circumscribed rectangle. See figure below.



1.2.5 DXF File

If the dxf file is used as source geometry of character/symbol then points which define width and height measure of character/symbol are solved automatically. This is based on that the circumscribed rectangle of geometry and reference point are set in the centre of gravity of the circumscribed rectangle. See figure below.



1.2.6 True Type Font

You can use all true type fonts installed in Windows as source geometry.

Width and height measure and reference point are retrieved from the definition of the selected true type font.

1.2.7 Geometry Selected on Screen.

You can use a character/symbol geometry from another drawing as source geometry. Points which define width and height measure of the character/symbol are solved automatically. This is based on if the circumscribed rectangle of the selected geometry and reference point are set in the centre of gravity of the circumscribed rectangle.

1.2.8 Hull Mark Object.

The user creates the Hull Mark object by projection of the Hull Text drawing on hull surface or planar panel. The Hull Mark object is not a graphical object.

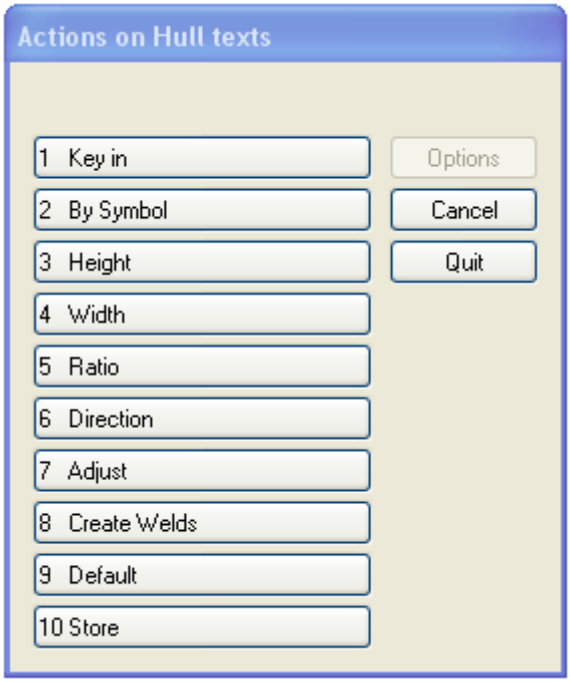
It holds all the data that passes during creation and also eferences to graphical objects that are graphical representation of the Hull Mark object.

The type of graphical object depends on the type of object on which the Hull Text is projected and the marking info.

Input		**Output**	
Hull Text projected on	**Marking info**	**Panel Type 2**	**Shell curves**
Plane Panel	Continuous	YES	NO
	Interval	YES	NO
	Plate	YES	NO
Surface	Continuous	NO	YES
	Interval	NO	YES
	Plate	YES	NO

1.3 Creation of Hull Texts

The menu function **Hull Tools>Hull Mark>Prepare** is used to generate and store the Mark Text. The following menu will appear:

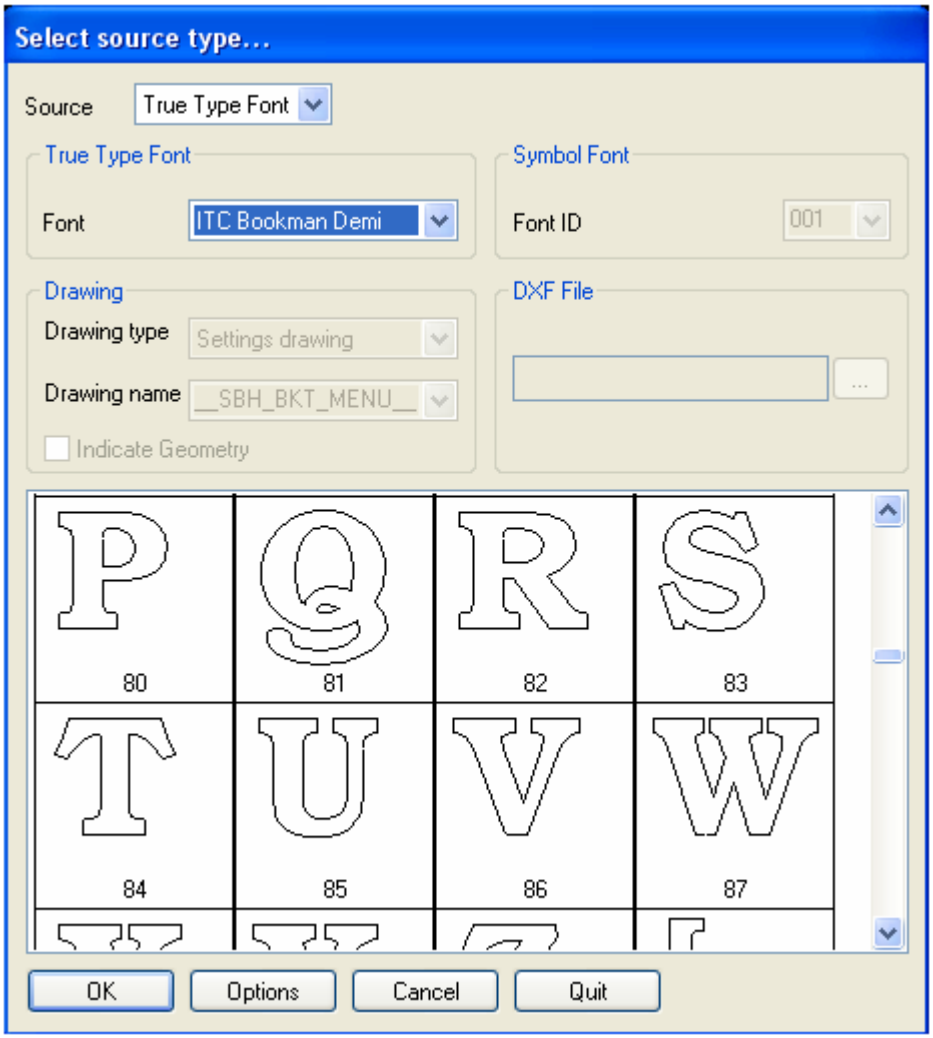


The following fields are available to the user:

Key in

The Mark Text can be keyed in using the keyboard.

The following menu will be shown:



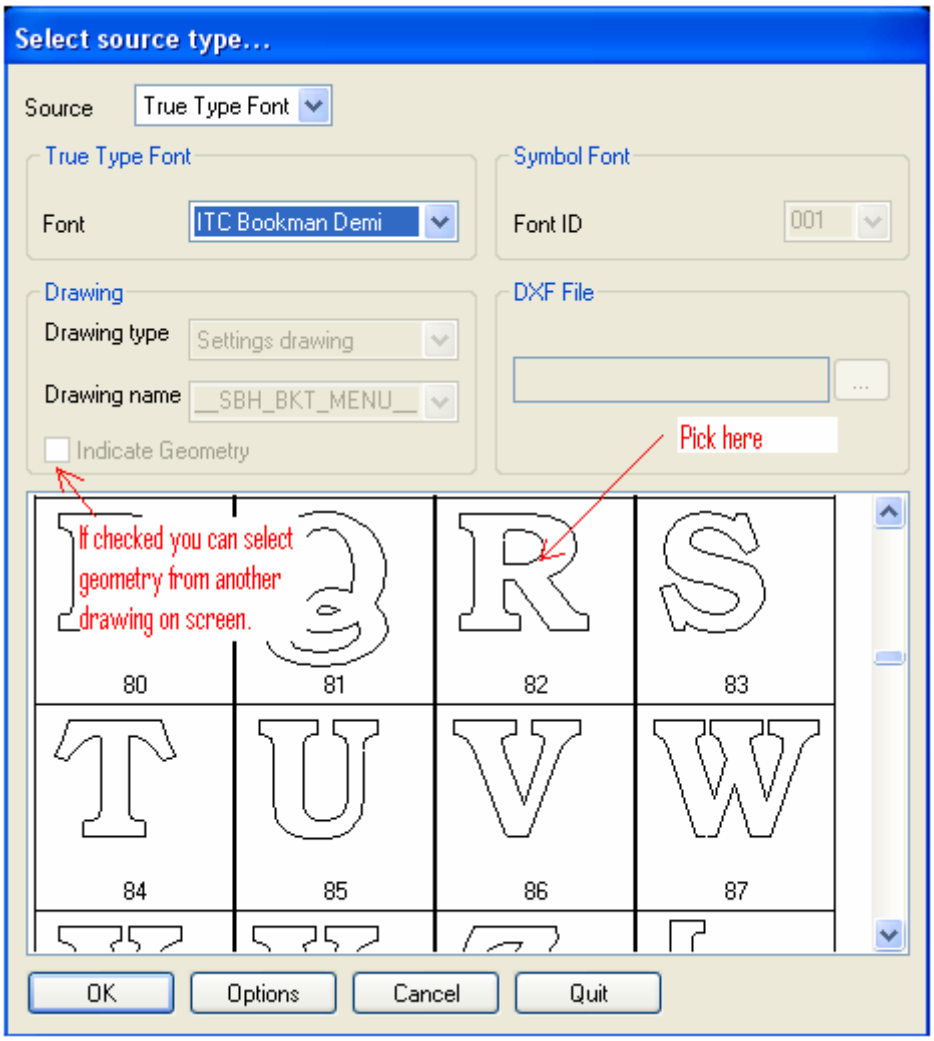
You can select as source True type font, special symbol font or setting drawing.

In the case of setting drawing the ASCII number of the given character will be connected to the name of view.

By symbol

You can pick a character/symbol one by one from a menu or use as source geometry a character/symbol geometry from another drawing.

The following menu will be shown:



Height

You can set the height of one or all characters/symbols on the mark text drawing.

Width

You can set the width of one or all characters/symbols on the mark text drawing.

Ratio

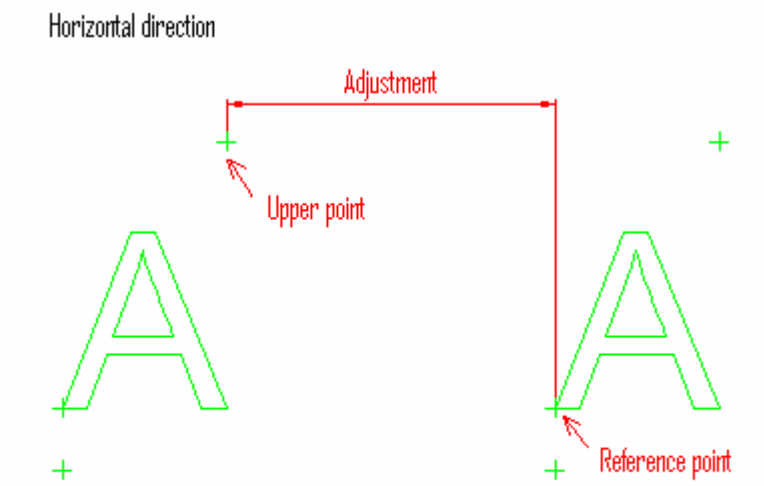
You can lock or unlock ratio. If the ratio is locked then width/height ratio is always constants.

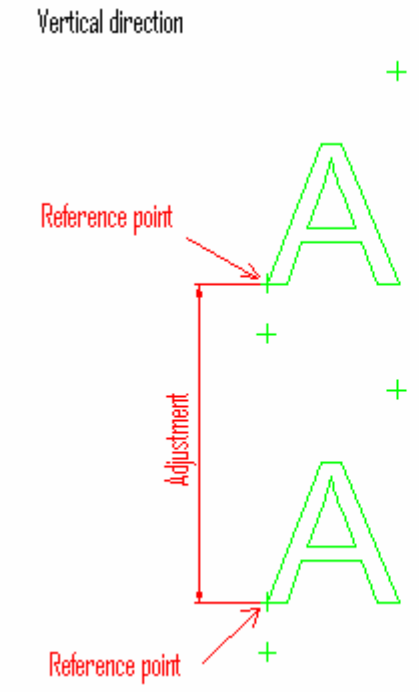
Direction

The direction of the text can be set to be either horizontal or vertical.

Adjust

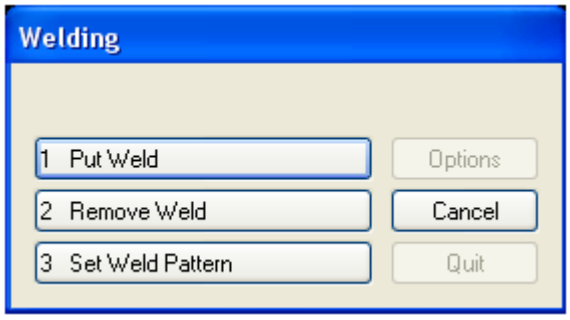
The space between characters may be adjusted either individually per character or for the complete text.





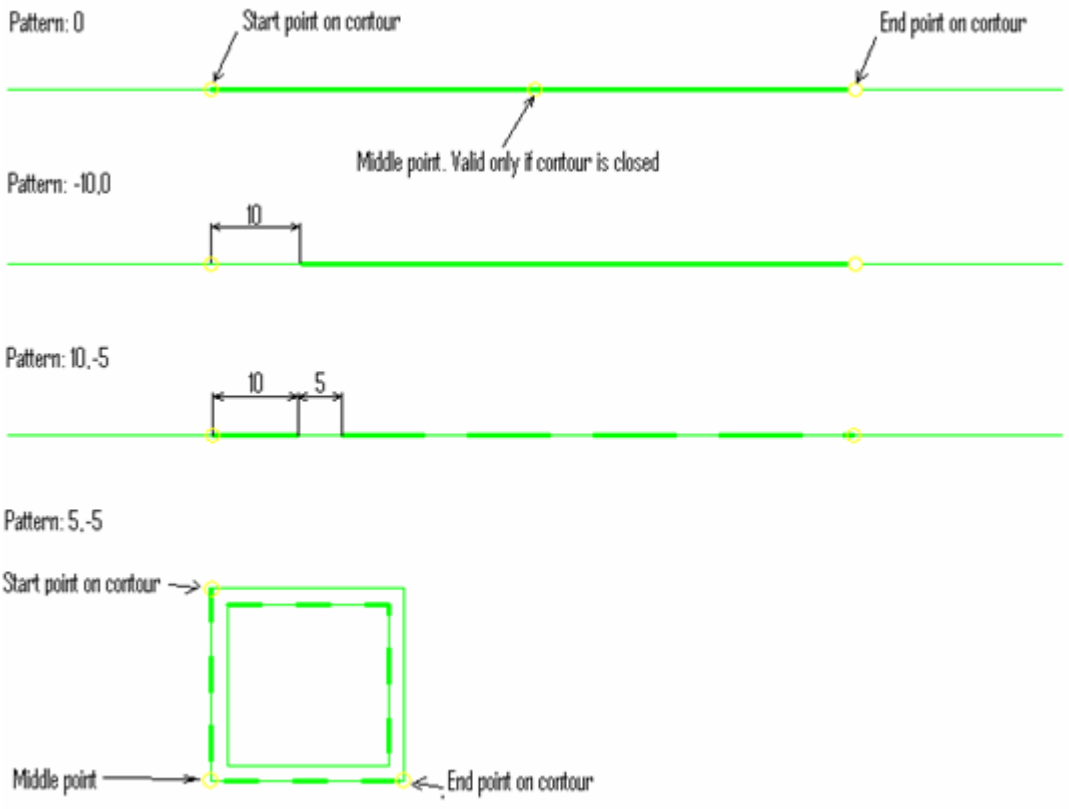
Create welds

By this option you can create a weld trace valid only when you want to create Hull Mark as an intermittent welding bead. The following menu will be shown:



Via the **Put Weld** option you can select trace, begin and end point on this trace.

Via the **Set Weld Pattern** option you can create a pattern for weld. See examples below.



Default

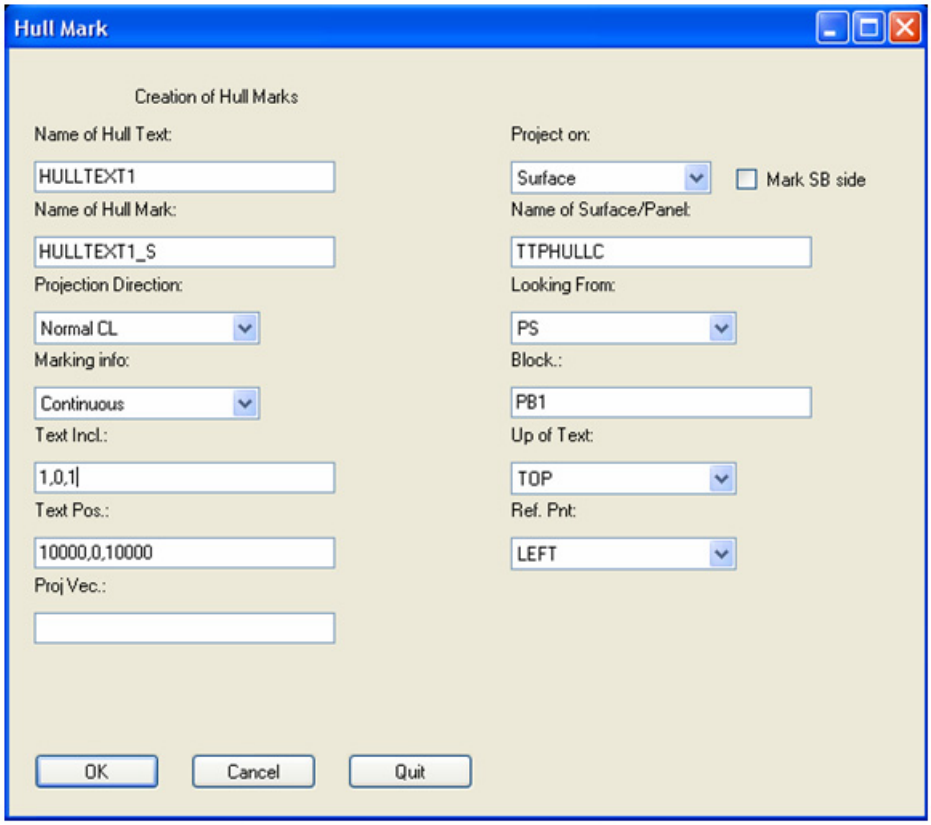
It is possible to set thickness of plate, bead width and bead height.

Store

Stores Mark Texts in the databank.

1.4 Creation of Hull Marks

Hull Marks are created via the function **Hull Tools>Hull Mark>Project**. When activated the following dialogue is presented:



The following fields are available (described in the order from left and downwards):

Field Name	Description
Name of Hull Text	Used to specify the name of the text to be projected.
Name of Hull Mark	Offers the user to give the name of a resulting Hull Mark object. By default, the name will be set to the name of Mark Text followed by _S
Projection Direction	Specifies the vector along which the Mark Text should be projected. The following options are available: • Normal to the CL plane • Normal to the BL plane • Normal to a frame plane • Normal to a given panel (this option is currently restricted to ordinary planar panels). • Any direction - the user will be prompted to key-in a projection vector (this option is currently restricted to ordinary planar panels).

Field Name	Description
Marking Info	Specifies conditions for the resulting marking contour. The following options are available: • **Continuous** means that the complete outer contour of the Mull Mark will be marked. • **Intervals** means that the marking will be dashed. • **Plate** means that the marking is created as plate parts.
Text Incl	This is used to specify a vector by which the text should be rotated. Three coordinates should be given, separated by blanks or commas. If not given the system uses a default inclination. The default inclination of the text is depending on the orientation of the projection plane. • If the projection plane is the CL plane, or close to it, the default inclination will be along a plane at a constant z (in the positive direction of the x-axis). • If the projection is into a BL plane, or close to it, the default inclination will be along the intersection with a plane at a constant y (in the positive direction of the x-axis). • If the projection plane is a frame plane, or close to it, the default inclination will be along a plane at a constant z (in the direction of the y-axis).
Text Pos	Defines a point in space that should be projected into the specified surface along the given projection vector to form a reference point of the Mark Text. Three coordinates should be given, separated by blanks or commas. FR- and LP-terms may be used. See also **Ref. Pnt**. For a horizontal text position it is by default locked to the lower left corner of the first character. For a vertical text it is locked to the upper left corner of the first (upper) character.
Project on	This is used to specify the surface or plane panel onto which the Mark Text should be projected.
Mark SB	The side, if checked, indicates that the text should be set on the SB side of the selected surface.
Name of Surface/Panel	Contains the name of the surface or panel onto which the Mark Text should be projected.
Block	Contains the name of the block that the panel type two should belong to.
Looking from	Specifies from which direction the selected surface should be regarded when projecting the Mark Text. Options are PS, SB, FOR, AFT, TOP, and BOT.

Field Name	Description
Up of Text	Defines the upwards direction of the characters of the specified text relative to text inclination. Options are TOP, BOT, PS, SB, AFT and FOR.
Ref. Pnt.	Specifies the location of the given text position relative to the Mark Text as a whole (cf. Text Pos). The following options for control of the text are available: LEFT, RIGHT and MIDDLE (LEFT is default). (This allows e.g. the same position to be specified for the ship name on PS and SB).

Click OK and the Hull Mark will be generated and stored.

1.5 Marking on Plates

Marking traces are added automatically to both planar parts and to shell plates in their normal release functions.

The marking on planar plates is added when releasing parts for production using the ppanparts function. Condition for this is that the IP (default parameter) HULLMARKINGS, is available in the IP file of this function.

The marking on developed shell plates is added when releasing parts for production using the cpanparts function. Condition for this is that the IP MARK_HULLM, is available in the IP file of this function.