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## **Proceedings of the REAPS Technical Symposium**

### **Paper No. 23: User's Guide to Norm Packages**

U.S. DEPARTMENT OF THE NAVY  
CARDEROCK DIVISION,  
NAVAL SURFACE WARFARE CENTER

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USER'S GUIDE TO THE NORM PACKAGES

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## A. INTRODUCTION

The objective of the Autokon system may shortly be said to be to enable the user to describe in large detail the entire steel structure of a ship or other structure in the database, and extract a variety of design and production data.

Steel  
information  
system

It should in other words be a "drawing generator" (including information for NC-cutting) but also produce material lists, weight calculations etc. To- fulfill "these tasks the present system of routines called norms play an important role.

The basis of the present system of norms rests with ALKON, a problem oriented computer language. It is necessary to know some of the basic properties of this language in order to understand the norm system:

It maintains a dialog with the Autokon database.

It has very extensive features for describing plane geometry.

It is general in nature and may be used to store various types of information on the database.

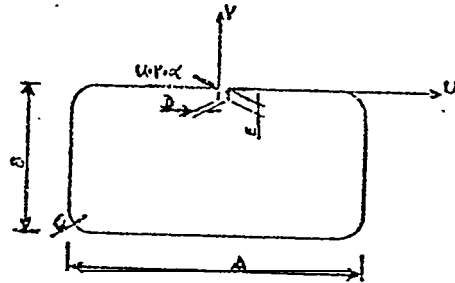
Various data structures may be defined by the user.

An ALKON manuscript may be stored temporarily (REP) or permanently (NORM) on the database

A description of the use of the language itself is given in the ALKON Users Guide.

The last mentioned property is the key feature which enables advanced commands to be built up in the AIXON language, commands called NORMS,

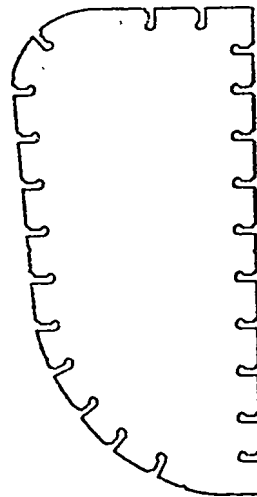
An example of a simple norm is a hole of a certain shape, but with variable parameters (hence the word norm) .



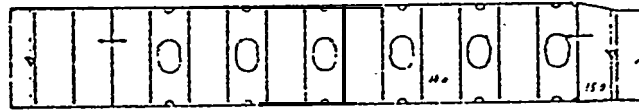
CALLING SEQUENCE

HOLE 101 (u+v+ $\alpha$  +A+B+C+D+E)

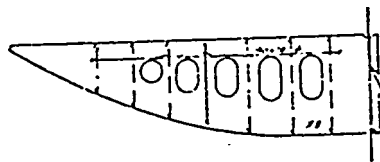
Examples of more complex norms are those building up a complete numerical description of all cutouts for longitudinals through a bulkhead:



And those defining, floors and girders in the double bottom:



MIDBÆRER.



BUNNST. # 59.

Presently the library contains between 600 and 700 norms, most of them written according to 'a philosophy. This..Useres Guide will try to explain the philosophy and also give some practical examles in the use of the system. It also gives some basic information which the user needs in order to understand the tool" he is using.

B. PRESENTATION Of THE PACKAGES.

B.1. THE FUNDAMENTAL IDEA OF THE PACKAGES.

Total definition of structure

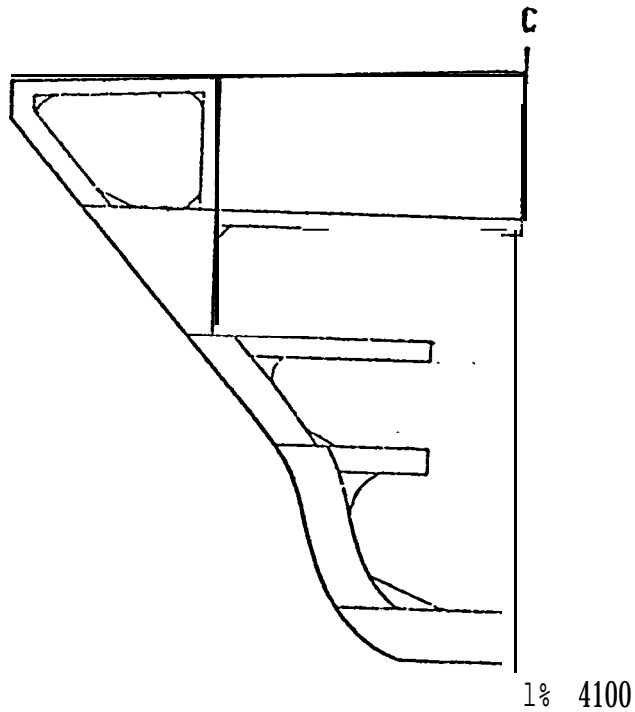
As mentioned in the introduction, the main objective of Autokon is to build a full description of the scantlings of a steel structure and to utilize this as an information system giving drawings, material lists, weight estimations etc. In this picture, the norms deal with the internal structure (excluding the shell and the Longitudinals on the shell).

Break down into smaller units

Logical tasks

This is quite a big task and to fulfill it required a large number of norms. Thus, to obtain complete knowledge of the system required a lot of time and practical use. It was therefore considered essential to break the system down into smaller more easily understood units. These units represent logical tasks to be performed, and very often they are also related to some specific location in the structure. The total objective of the norm system may thus be achieved using the packages as building blocks .

An example of such a building block "is the package dealing with web-frames in the engine room.. The final result after going through a number of steps is drawings of web-frames.



B.2. THE USE OF EACH NORM PACKAGE.  
# .

Each package boils down to being a description of how a number of norms are used in sequence to obtain a result within the specified framework. The number of norms used in each specific case may vary for the same package. A further description Cf each package is given in B.4. and in the Users Guide of each particular package.

Generality

An important point regards the generality of the system. Two methods have been used to take care of this.

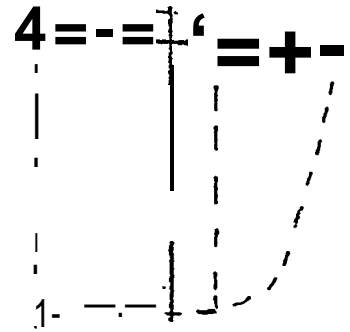
Levels of norms

1. Some of the packages deal with the steel structure at different levels, the higher level norms being more specialized. These tend to depend more on constraints imposed by the actual geometry of the structure. One example is found in the package of web-frames in tank area.

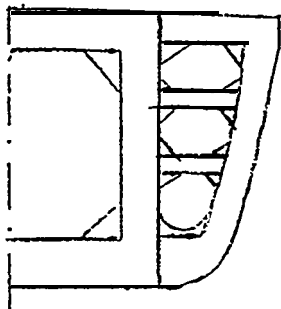
Norms in the tank area.



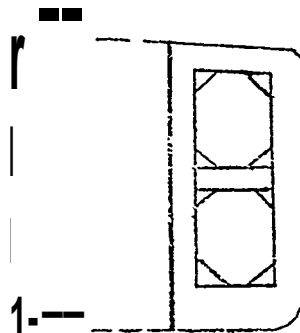
GEN PAR 351



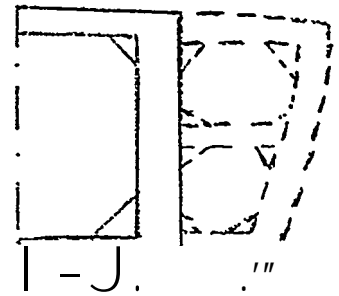
GEN PAR 352



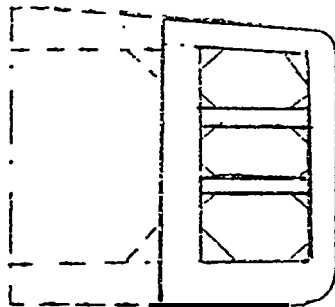
WEB 360



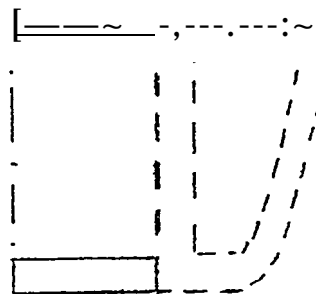
WEB 370



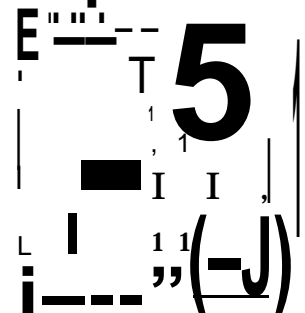
WEB 361



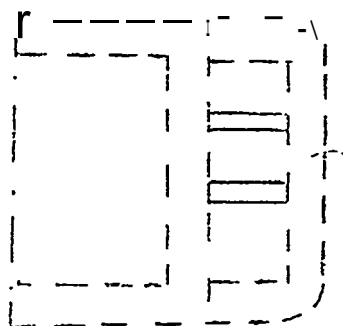
WEB 362



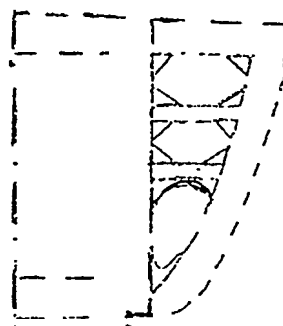
WEB 351



WEB 352



Wm 353



BKT 355

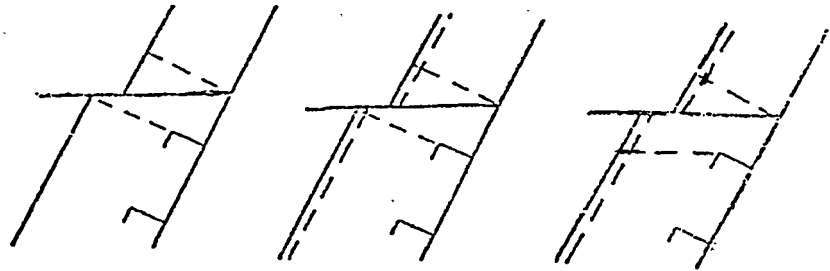


BKT 360

Modification  
of packages

The point is that in this case WEB 360 uses a number of other norms as subroutines. At the lower levels the norms are increasingly general. If your construction differs from possible variations within a package, the higher level norms may be modified or rewritten, still using the lower level norms.

2. The other solution is represented by the package of local stiffening. In this a rough picture is built up initially. this is then modified until the desired result is obtained.



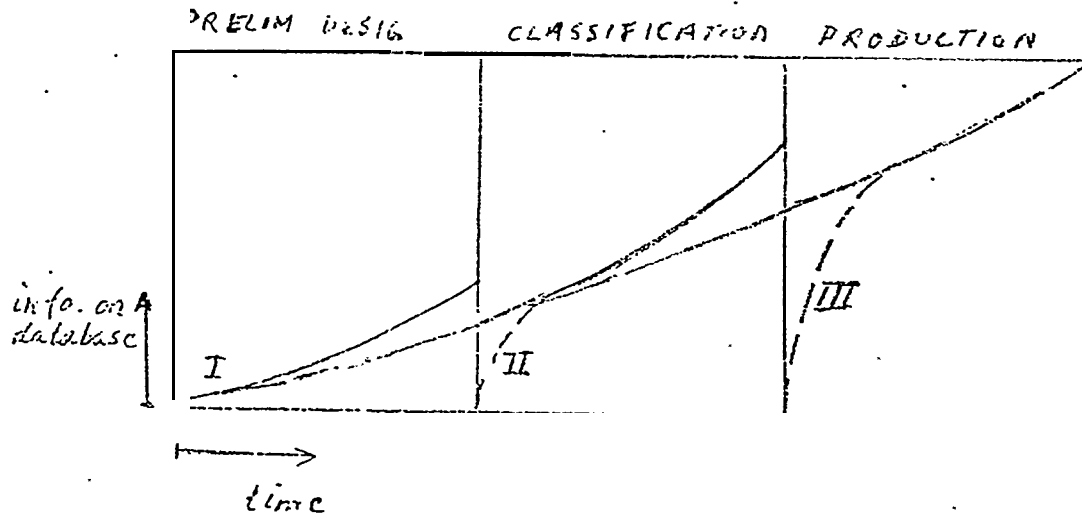
Examples of how you may design your own packages are given in chapter E.

B.3. INTEGRATED USE OF THE PACKAGES.

B.3.1. VARIOUS APPROACHES.

One of the main difficulties for a user is to get a general view of the system. As mentioned the packages play the role of building blocks sometimes cemented together by system norms.

Before proceeding to describe the various steps, the user should realize that the system may be used in various ways:



The fig. illustrates three different utilizations:

1. The system is used from early design, the database being gradually updated and fed new data.

The early steps may be done using a preliminary body plan (may be generated by the program FILIP), The system will produce early layout drawings for further evaluation of strength, layout and construction problems. Drawings will not contain detailed information.

FILIP  
prelim.  
bodyplan

11 The procedure is started in classification, preferably using the final bodyplan.

The procedure is roughly the same, but the amount of details like local stiffening is

of drawings to be manually furnished with text, measurements, identifications etc.

Key data like points and angles may be extracted for production **planning**.

Material (stiffener) lists may be extracted depending **on** the amount of detail which has been put in.

Class.drawings  
prod.information  
material lists

111 The actual design of a ship is in some cases done by others, and classification drawings simply supplied as part of the deal. In this case data which is normally input to the production phase may be generated quickly at the start of this phase.

Quick generation  
of data usually  
available from  
Classification

Note that the amount of work involved is significantly less than that of going through the entire classification procedure. This is mostly due to the fact that part of the work at earlier stages is concerned with output.

B..3.3. 'THE STEPS . .

In the description of each step, **some** comments will be given regarding the main approaches outlined in B.3. 3.1.

Building  
frames

- a. The initial input consists of a set of faired building frames and preferably also stem, stern and deck contours (The latter may be generated by norms if they are not available) .

TRABO

The input to Autokon database is performed by the program TRABO. (Further description of contours are given in ALKON Users Guide). Take care to obtain the correct location of origin.

- b. This step involves establishing some main parametric tables.

-ROUT 1 always runs immediately after TRABO. If TRABO is run again so is ROUT 1. The norm establishes condensed frame table in record class  
(3+7+1023+7+1023+3)

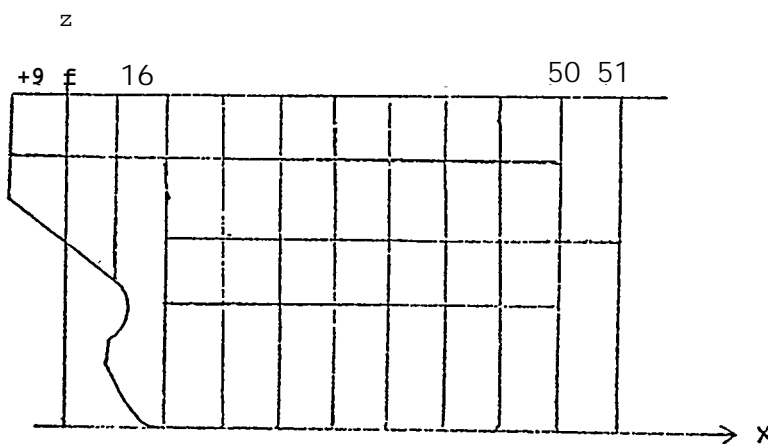
Main ship  
parameters

-Height of stringers, platforms and in some cases decks are defined by norms in GROUP 10. This information is later used by the norms STRINGERF, PLTHH and DRHT.

c\* Definition of the main stiffening.  
 (Note that double.bottoms are taken care  
 Of by two nearly selfsufficient packages) .

- Properties of the transverse frames are  
 described in the x - z projection.

Dimensions of  
 transverse  
 frames



This regards both Webframes and ordinary  
 profiles.

The description is stored in the Midem.  
 format (see C.4] and includes the dimensions  
 of each frame (these may vary between  
 different decks etc.) and wether the thickness  
 of a frame is aft or forward of the reference  
 line etc.

The norm used is GENMIDEM 1 of GROUP 1

```

#
NEW ARUF: PERM ABUF:
DECK(1)
GEN MIDEM 1(+ARUF+13
+13      +31  +13      +4440      +UD0      -1  +360002
+13      +34  +0       -UD0      +UD0      -1  +360002
+13      +37  +0       -15540     +15540     -1  +360002
+16      +37  +13      +15540     +UD0      -1  -20
) ↑
& ↑
FIN CONVID(+R+1)3+ARUF) ↑
13=web      frame no. sym.      V start.      V end.      below      plate
16=bulkh.                                     thickness.
!if standard profile

```

profile dimension  
Line 2 in Tabel 36  
in record(1,4,2,0,0,0)  
made by ROUT 415.

This information is later used for generation of the actual web--frames (G1%3L!}? 3[, 4) and also for weight and center of gravity calculations if the frame consists of a standard section (profile) like HP or flatbar etc.

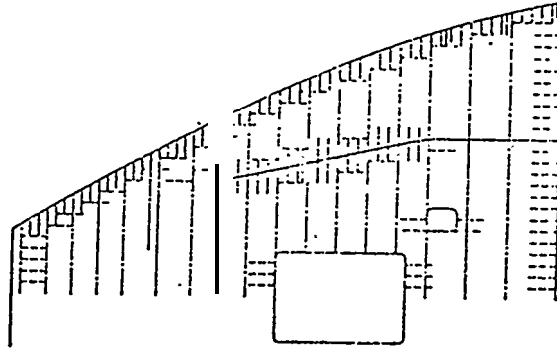
Deck  
stiffening

-The stiffening in the deck-planes should be described next. (GROUP 1). Again the MIDEM table (Minor DETail Matrix) is used for the description in the database, though a variety of norms are used according to task. The full description is given in the package for "Generation of deck planes" (GROUP 1)

Information  
used for  
web-frame  
drawings and  
for augmenting  
contours

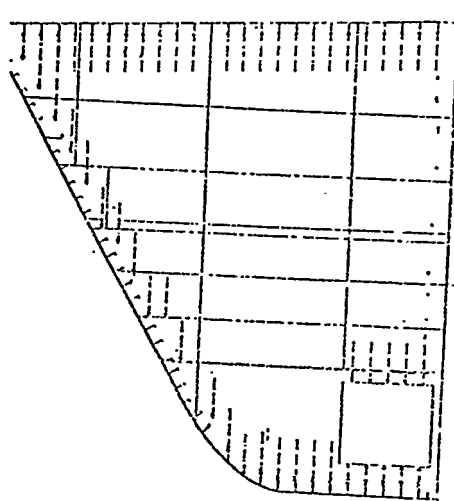
As for transverse web-frames in X-Z projection the information is later used for the generation of the actual web-frames, and the longitudinals are used for augmenting contours in the transverse plane.

An example of possible drawing output is shown in the fig.:



The package is general in that nearly all types of stiffened panels may be arrived at.

- Stiffening on transverse bulkhead (GROUP1.2)  
,Similar to deck planes.



- d. Definition of main structures.  
Concerns web-frames and stringers.

**-Web-frames:**

Three main  
Configurations  
each with  
many variations

Three main types are supplied, which are "typical for engine room, tank area and forepeak. Each yard number should, however, be inspected to find out where each of the packages may be used. The package for the engine room may for instance in many cases be used all through a ferry.

GROUP 3: Forepeak

GROUP 4: Engine room.

INPUT : Uses the information generated by GROUP 1 regarding transverse frames and deck-beams.

OUTPUT: Contours in "wire-model" (see C.3).  
This concerns in particular parallel contours which constitute the inner boundary curves of the web-frames. These contours are used in production for actual "production parts;" drawings of entire web-frames. If starting off in production, this last point is of course irrelevant.

Parallel  
contours -  
PCONS

**GROUP 6:** Web-frames in tankarea.

INPUT : Only the bcdy plan.

W this case information about  
dimensions of framessis given in the  
norms.

OUTPUT: As for GROUPS 3 & 4.

-Stringers:

Two *paclages* are suppl ied.

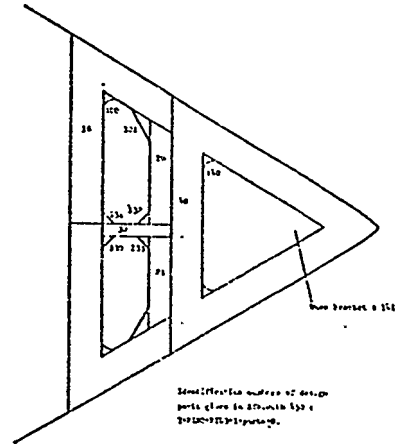
GROUP 2: Stringers in forepeak

GROUP 12: Stringers in tank area.

INPUT : Information about stringers gencrated  
hy GROUP 1 ( GROUP 12! .

This regards both str.ingers on bulkhead::  
and on the shell.

OUTPUT' : Parallel]. contours (PCONS) " and drawings.



d. Augmcilting contours.

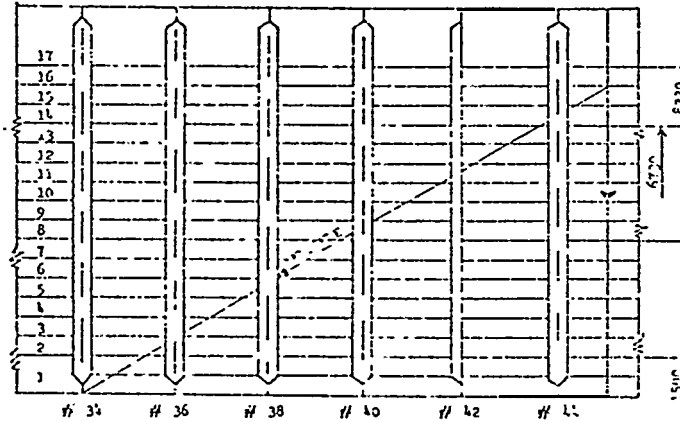
-The method is first to produce information regarding all the cutouts on some contour. This information is stored in DETTAB Matrices (DETTABN- see c. 4. ) which have entries for position, type, parameters etc. for each cutout along a contour. Note that the standard types of cutouts in GROUP 5 are referred to.

DETTAB

For the shell contours of transverse sections, this information is generated by LANSKI.

For the internal contours like transverse frames at deck or at longitudinal bulkheads, the information is generated by the normal package for "Generating DETTABs", GROUP 7.

Input to this package is information about longitudinals previously generated by GROUP 1.

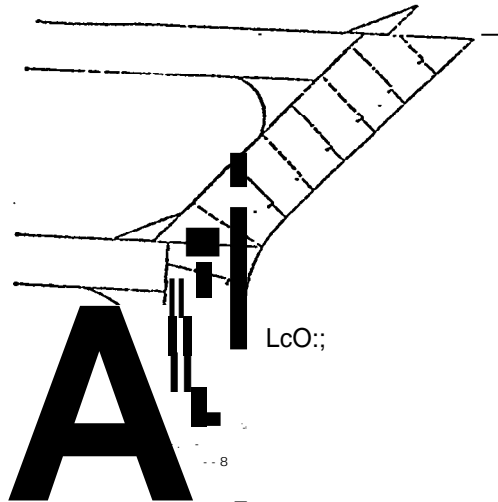


GENACON

- The next step is simply to produce the actual contours using GENACON norms. These norms will fetch the standard cutouts from the norm library.
- The norm GENACON 800 is available to produce augmented deck contours at shell directly on basis of the MIDEM of transverse frames in the X-Z projection (paragraph c)

e. Local stiffening.

One package, GROUP 14 is designated to deal with the problem of local stiffening at web-frames and brackets. For the former, an initial solution may be obtained automatically using the information about longitudinals.



See also the package concerned.

Note, however, that the main significance of this package is obtained by introducing Standard Details (paragraph f.)

#### f. Divide/Standard Details

This box in the flowchart concerns obtaining the actual "production parts", i.e. single plates.

There are three main procedures involved, of which only one is described in a specific norm package (if using a Standard Details)

Note again that parts in the double bottom are treated slightly different and are dealt with in paragraph h.

1. Parts are generated by ALKON or specifically designated NORMS or REPs on basis of previously generated contours. A web-frame part for instance is generally limited by an ACON, a PCON and two seams consisting of straight lines.

In ships where many parts in the structure are of similar type this is a very efficient method . This procedure is more typical for parts on web-frames and stringers than for parts in large stiffened panels.

2. This method consists of subdividing large, previously defined design parts. Norms are supplied for subdividing both parts (DIVIDE norms) and stiffening information.

DIVIDE  
GENMIDEM 850

The design parts may have been generated by norms described in paragraph c where these can handle 7'icons (if needed) .

Note that this procedure is under revision and that some norms are now available in GROUP 18 (Datastructure in production) which handle the transition from Design to Production in a more standardized and simpler fashion (FIN11,2 - FJX114j

- 3 . Smaller parts like brackets etc. may be generated as Standard Details. Brackets on web-frames (GROUP 14 - Local Stiffening) and brackets under decks along shell. other longitudinal structure (GROUP 1) , have been previously defined in MIDEM format (paragraphs b and c).

Standard  
details,  
GROUP 19.

Using GROUP 19, information on type of detail may be entered in the MIDEEM which will then contain sufficient information for the part to be generated automatically.  
. See also Book of Standard Details.

g. Double Bottom in Design.

The task of defining the double bottom structure in design is taken care of by norm-- GROUP 11, to which may be referred. The **main input** to this package is defined. as in the tank-top plane (concerns girders, floors, holes etc..). The package contains features for avoiding contradicting information.

The output consists of double bottom drawings of a standard which after adding text etc. is also suitable as "production drawings".

Illustrative "check and coordination" drawings may also be generated.



#### h. Double Bottom in Production:

The detailed information available from the design package makes it possible to extract production parts semi-automatically. This is done by norm-GROUP 16. Information to be added concerns margins for weld-shrinks.gc, notches and serial. number of each part.

#### i. Datastructure in Production.

This package (GROUP 18) contains the norms necessary to update and maintain the data-structure in production. The norms are important because the possible output hinges on this structure. The Users Guide for the package itself is necessary reference for a description of the structure.

See also chapter D.2.

Note that shell plates (from SHELL), longitudinal frames (from LFRAME) and transverse frames (see paragraph b) as well as all ALKON defined parts and stiffening are included.

Detailed material lists as well as weight and center of gravity calculations may be obtained for assemblies, subassemblies at any level (panels) or single parts.

Drawings may be obtained for entire assemblies or single planes within an assembly.

Note that the Datastructure is important, though not essential for input to INTERACTIVE NEST

LISTING FOR ASSEMBLY 2365 -SUBASSEMBLY -LEVEL 1

MSFACE= MAJOR SURFACE, -FIRST PART= RID2 AND LAST PART= RID3 OR FRACTIONAL FRAME NO.  
OCSIWPM2TSI

| VIS                       | QUAL | DIMA | DIMB | DIMS | DIMT | DIMC | DIMU | POS | STYP | ETYP | LGHT    | MASS   | M S F A C L I | SIDE |  |
|---------------------------|------|------|------|------|------|------|------|-----|------|------|---------|--------|---------------|------|--|
| 20                        |      | 220  | 42   | 11.0 | .0   |      |      |     |      |      | MM      | KG     |               |      |  |
|                           |      |      |      |      |      |      |      | 6   | 1    | 1    | 5660    | 138    | 2 116.00      | PORT |  |
| TOTAL LENGTH AND WEIGHT : |      |      |      |      |      |      |      |     |      |      | 5660 MM | 138 KG |               |      |  |

| VIS | QUAL | DIMA | DIMB | DIMS | DIMT | DIMC | DIMU | POS | STYP | ETYP | LGHT | MASS | M S F A C L I | SIDE |
|-----|------|------|------|------|------|------|------|-----|------|------|------|------|---------------|------|
| 20  |      | 220  | 41   | 10.0 | .0   |      |      |     |      |      | MM   | KG   |               |      |
|     |      |      |      |      |      |      |      | 7   | 1    | 1    | 5660 | 129  | 2 116.00      | PORT |
|     |      |      |      |      |      |      |      | 8   | 1    | 1    | 5660 | 129  | 2 116.00      | PORT |
|     |      |      |      |      |      |      |      | 9   | 1    | 1    | 5660 | 129  | 2 116.00      | PORT |
|     |      |      |      |      |      |      |      | 10  | 1    | 1    | 5660 | 129  | 2 116.00      | PORT |

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LISTING FOR ASSEMBLY 2385 -SUBASSEMBLY -LEVEL 1

LOCATION OF ORIGO: X-VALUE 60.000 M FROM AP Y-VALUE .000 M FROM CL Z-VALUE .000 M FROM RL

MSFACE= MAJOR SURFACE: 1ST PART=RID2 AND 2ND PART=RID3 OR FRACTIONAL FRAME NO.

DESIGN PARTS

| POS/PART           | AREA            | THICK | MASS   | MOM. Y2          | MOM. Z2          | MOM. XY | ICG  | YCG  | ZCG  | M S F A C L I | SIDE |
|--------------------|-----------------|-------|--------|------------------|------------------|---------|------|------|------|---------------|------|
|                    | CM <sup>2</sup> | MM    | KG     | KPM <sup>2</sup> | KPM <sup>2</sup> | KPM     | M    | M    | M    |               |      |
| PLATE 1            | 5.14            | 12.0  | 493.1  | 2954             | 1634             | 1770    | 5.97 | 3.25 | 3.55 | 1 39.00       | PORT |
| PLATE STIFF.       |                 |       | 600.3  | 3619             | 1968             | 2152    | 5.97 | 3.25 | 3.55 |               |      |
| PLATE 2            | 4.35            | 12.0  | 418.5  | 3285             | 1234             | 1515    | 7.07 | 2.89 | 3.59 | 1 40.00       | PORT |
| PLATE STIFF.       |                 |       | 525.4  | 4143             | 1522             | 1691    | 7.07 | 2.89 | 3.59 |               |      |
| PLATE 3            | 3.93            | 12.0  | 377.7  | 3682             | 939              | 1451    | 9.77 | 2.42 | 3.78 | 1 41.00       | PORT |
| PLATE STIFF.       |                 |       | 480.2  | 4692             | 1162             | 1817    | 9.77 | 2.42 | 3.78 |               |      |
| PLATE 4            | .12             | 10.0  | 9.7    | 56               | 25               | 57      | 5.72 | 2.60 | 5.84 | 1 39.00       | PORT |
| PLATE 5            | .14             | 10.0  | 11.0   | 17               | 49               | 37      | 1.55 | 4.40 | 3.40 | 1 39.00       | PORT |
| PLATE 6            | .13             | 10.0  | 10.5   | 11               | 45               | 23      | 1.57 | 4.29 | 2.20 | 1 39.00       | PORT |
| PLATE 7            | .22             | 10.0  | 17.8   | 8                | 75               | 24      | .43  | 4.15 | 1.52 | 1 39.00       | PORT |
| PLATE 8            | .07             | 10.0  | 5.7    | 44               | 15               | 51      | 7.07 | 2.62 | 6.05 | 1 40.00       | PORT |
| PLATE 9            | .12             | 10.0  | 9.6    | 47               | 37               | 33      | 4.85 | 3.04 | 3.40 | 1 40.00       | PORT |
| PLATE 10           | .12             | 10.0  | 9.6    | 20               | 43               | 21      | 2.05 | 4.42 | 2.20 | 1 40.00       | PORT |
| PLATE 11           | .05             | 10.0  | 6.6    | 63               | 13               | 40      | 9.63 | 1.95 | 6.05 | 1 41.00       | PORT |
| PLATE 12           | .11             | 10.0  | 8.9    | 74               | 28               | 46      | 6.31 | 3.12 | 5.20 | 1 41.00       | PORT |
| PLATE 13           | .11             | 10.0  | 8.9    | 74               | 27               | 50      | 6.23 | 2.99 | 3.46 | 1 41.00       | PORT |
| PLATE 14           | .09             | 10.0  | 7.5    | 38               | 26               | 23      | 5.03 | 3.76 | 1.76 | 1 41.00       | PORT |
| PLATE TOTAL        | 14.75           |       | 1299.1 | 10557            | 4156             | 5094    | 7.42 | 3.09 | 3.65 |               |      |
| PLATE STIFF. TOTAL |                 |       | 1125.6 | 12289            | 5035             | 4219    | 7.51 | 2.93 | 3.62 |               |      |

TOTAL WEIGHT OF THE ABOVE ASSEMBLY 1.72 TONS

TOTAL CENTER OF GRAVITY IN RELATION TO CHOSEN ORIGO: X-VALUE 7.51 M Y-VALUE 2.93 M Z-VALUE 3.62 M

j. output functions:

The general norms involved in this are contained in two packages, GROUP 5 for drawings and GROUP 20 for list output.

Note that in some cases there are also output-functions contained as part of other packages if the norms are special to this group only.

LEVEL KEYWORDREFC

ELT007 RL70-1 05/08-11:37:05-(0,)

| KEYWORD | REFC | MAIN ENTRY                       | SUB ENTRY          | REFERENCE       | COMMENTS   |
|---------|------|----------------------------------|--------------------|-----------------|--|
| 000001  | 000  |                                  |                    |                 |  |
| 000002  | 000  | MAIN ENTRY                       | SUB ENTRY          | REFERENCE       | COMMENTS   |
| 000003  | 000  |                                  |                    |                 |  |
| 000004  | 000  |                                  |                    |                 |  |
| 000005  | 000  | LONGITUDINAL FRAMES AT SHELL     |                    |                 |  |
| 000006  | 000  |                                  |                    |                 |  |
| 000007  | 000  |                                  | ANGLE CALCULATIONS | ANGLE2          | ANGLE FOR CALC. OF CUTOUT HEIGHT                   |
| 000008  | 000  |                                  |                    | ANGLE4          | ANGLE RELATED TO BRACKETS ON LONG.                 |
| 000009  | 000  |                                  |                    | ANGLE5          | MOUNTING ANGLE FOR BRACKET                         |
| 000010  | 000  |                                  |                    | ANGLE6          | ANGLE RELATED TO BRACKETS ON LONG.                 |
| 000011  | 000  |                                  |                    |                 |  |
| 000012  | 000  | CONTOURS,AUGMENTED               |                    | MAIN ENTRY      |  |
| 000013  | 000  |                                  |                    |                 |  |
| 000014  | 000  | CONTOURS,GENERAL                 |                    | GENCON100       | LONGITUDINAL CONTOUR IN PROJECTION OF LONGITUDINAL |
| 000015  | 000  |                                  |                    |                 |  |
| 000016  | 000  |                                  |                    |                 |  |
| 000017  | 000  | CUTOUTS                          |                    | MAIN ENTRY      |  |
| 000018  | 000  |                                  |                    |                 |  |
| 000019  | 000  |                                  |                    |                 |  |
| 000020  | 000  | LONGITUDINALS,INTERNAL STRUCTURE |                    |                 |  |
| 000021  | 000  |                                  |                    |                 |  |
| 000022  | 000  | DEFINITION m                     |                    | GROUP1 ETC.     |  |
| 000023  | 000  |                                  |                    | GENMIDEM0       | GENERAL  |
| 000024  | 000  |                                  |                    | GENMIDEM3       | FOR TANKTOP  |
| 000025  | 000  |                                  |                    | GENMIDEM811     | GENERAL - ENTRY FOR ENDINDICATORS                  |
| 000026  | 000  |                                  |                    | GENMIDEM2       | ENDING LONGITUDINALS AT SHELL/AFT                  |
| 000027  | 000  |                                  |                    | GENMIDEM10      | ENDING LONGITUDINALS AT SHELL/FORE                 |
| 000028  | 000  |                                  |                    | GENMIDEM480     | ENDING LONGITUDINALS AT LONGITUDINAL BULKHEAD      |
| 000029  | 000  |                                  |                    |                 | DIVIDE LONG. OR REMOVE PARTS FOR HATCHES           |
| 000030  | 000  |                                  |                    | GENMIDEM850     |  |
| 000031  | 000  |                                  |                    |                 |  |
| 000032  | 000  |                                  |                    |                 |  |
| 000033  | 000  | CONTOURS*AUGMENTED               |                    | SEE ALSO GROUP7 |  |
| 000034  | 000  |                                  |                    | GENACON10       | CONTOURS AT DECKS                                  |
| 000035  | 000  |                                  |                    | GENACON20       | CONTOURS AT LONG. BULKHEADS                        |
| 000036  | 000  |                                  |                    |                 |  |
| 000037  | 000  | CUTOUT TABLES                    |                    | GROUP7          |  |
| 000038  | 000  |                                  |                    | GENCUTTAB0      | TABLE OF CUTOUTS RELATED TO MIDEM                  |
| 000039  | 000  |                                  |                    |                 |  |
| 000040  | 000  | DETAIL TABLES                    |                    | GROUP7          |  |
| 000041  | 000  |                                  |                    | GENTAB100       | INTERMEDIATE DETTAB                                |
| 000042  | 000  |                                  |                    | GENTAB101       | SORTS AND MERGES INTERMEDIATE DETTAB               |
| 000043  | 000  |                                  |                    | GENTAB102       | DETAIL TABLES AT DECK SEE GENTAB100                |
| 000044  | 000  |                                  |                    | GENTAB103       | DETAIL TABLES AT LBULK SEE GENTAB105               |
| 000045  | 000  |                                  |                    | GENTAB103       | DETAIL TABLES AT LBULK SEE GENTAB105               |
| 000046  | 000  |                                  |                    | GENTAB104       | SORTS AND MERGES INTERMEDIATE DETTAB               |
| 000047  | 000  |                                  |                    | GENTAB105       | GENERATES TABLE OF DETAILS FOR DECKS OR LBULKS     |
| 000048  | 000  |                                  |                    |                 |  |
| 000049  | 000  |                                  |                    |                 |  |
| 000050  | 000  | CUTOUTS                          |                    | MAIN ENTRY      |  |
| 000051  | 000  |                                  |                    |                 |  |
| 000052  | 000  |                                  |                    |                 |  |
| 000053  | 000  | PARALLELL CONTOURS               |                    |                 |  |
| 000054  | 000  |                                  |                    |                 |  |
| 000055  | 000  | GENERAL                          |                    | GENPAR1         | PARALLEL TO LOFTING CONTOURS                       |
| 000056  | 000  |                                  |                    | GENPAR850       | MODIFICATION FOR BRACKET SHAPE                     |
| 000057  | 000  |                                  |                    | GENPAR08/889    | STRAIGHT LINE APPROXIMATIONS                       |
| 000058  | 000  |                                  |                    |                 |  |
| 000059  | 000  | FOREPEAK                         |                    | GROUP3          |  |
| 000060  | 000  |                                  |                    | GENPAR461       | TRANSVERSE FRAME AT SHELL                          |
| 000061  | 000  |                                  |                    | GENPAR461       | TRANSVERSE FRAME AT DECKS                          |



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