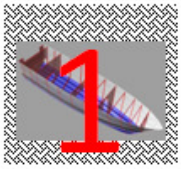
ICOMIA

INTERNATIONAL COUNCIL OF MARINE INDUSTRY ASSOCIATIONS

SELF-CERTIFIER-12215-5 TUTORIALS FOR COMPOSITES



MODULE's 1 & 2

Tutorials are supplied by ICOMIA as an aid to users and do not constitute part of the software

TUTORIAL No.1- LEARNING THE BASICS

APPLICABLE TO MODULE:	ALL
USER PROFILE:	First time users who have reviewed ISO-12215-5
PREREQUISTES:	- Any of the 6 modules - PC running Excel 2007 or Excel 2010 - Possession of a legal copy of ISO-12215-5

TERMS & CONDITIONS

1. The user should make reference to the official ISO standard 12215-5 when using this spreadsheet. It is ABSOLUTELY ESSENTIAL that users should read and understand the inherent limitations of ISO-12215-5 as spelt out in the 'Introduction' and 'Scope' sections of said standard.

WARRENTY DISCLAIMER

2. This software has been developed by the International Council of Marine Industry Associations (ICOMIA), the International Marine Certification Institute (IMCI) and Southampton Solent University. The SOFTWARE is supplied "AS IS". ICOMIA, IMCI or SSU disclaims all warranties, expressed or implied, including, without limitation, the warranties of merchantability and of fitness for any purpose. The user must assume the entire risk of using the SOFTWARE.

SOFTWARE VALIDATION

3. While all reasonable efforts have been made to validate the software against the standard the responsibility for checking the software against the standard prior to any commercial application rests solely with the user.

PURCHASE OF ISO-12215-5 (hard copy) STANDARD

4. SELF-CERTIFIER-12215-5 is a calculation tool and is distributed free of charge to anybody who has purchased the hard copy of ISO-12215-5 either from ISO or from its member bodies. The use of this program by anybody who does not own an authorised copy of the standard is strictly forbidden.

- This symbol and text means this is an action (e.g. click with mouse) that you should do. If you do not see this symbol then it is a note for you to read.

STEP 1

You need to have downloaded the Module of your choice (as indicated by the large red number) from the ISO website.

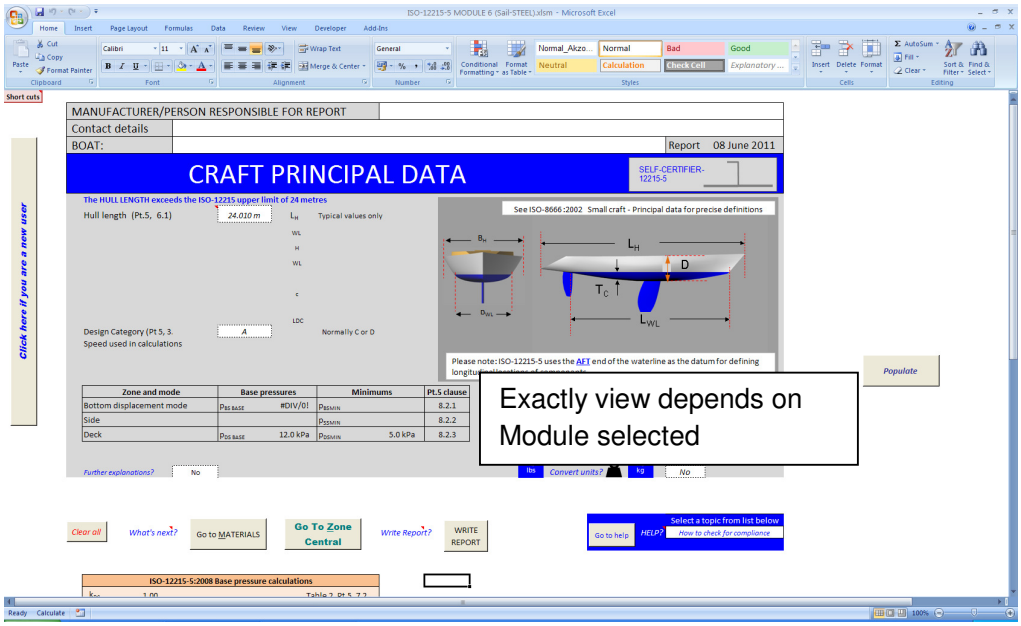
- Double click on the icon with your mouse 

- The program will start with a copy of the terms and conditions (as seen on page 1) which you must accept in order for the program to load up. This will only happen when you run the program for the first time

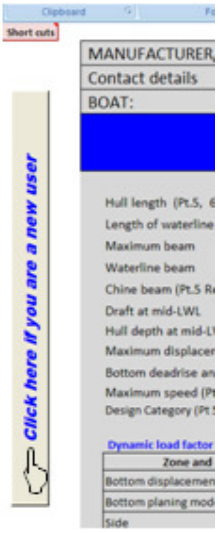
- You will then see a 'splash-screen'. This will appear every time you run the program and will disappear after a few seconds

STEP 2

You will then see this screen. Your screen will look similar but may not be exactly the same.



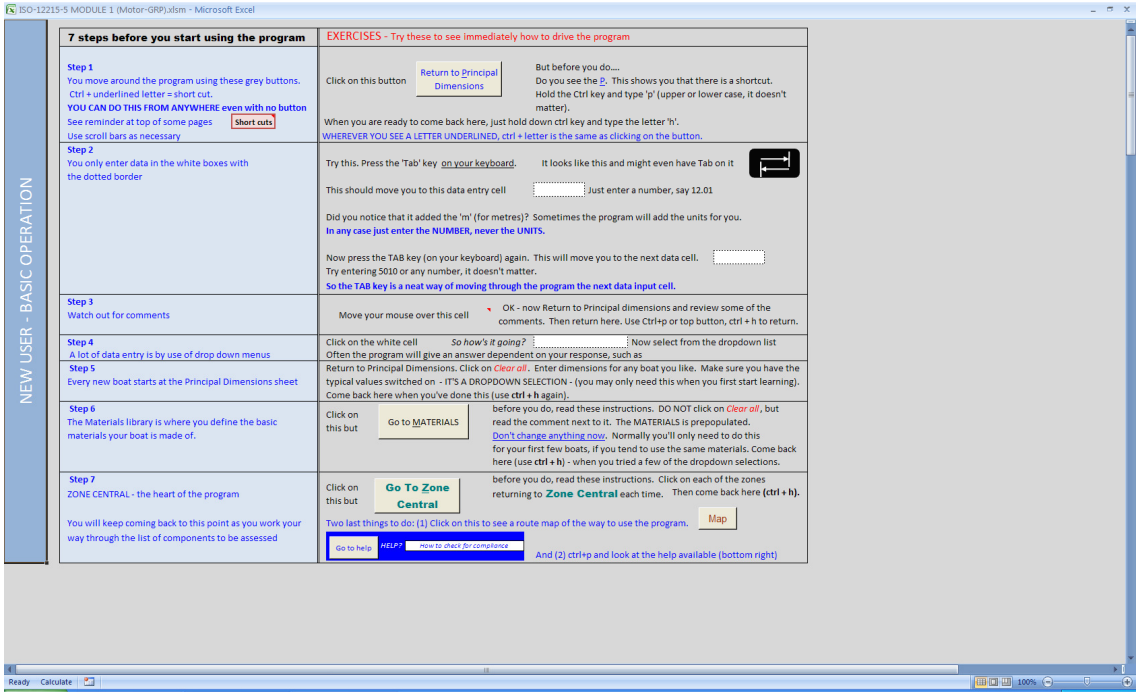
This is the screen you will see every time you start up the program. It's where you enter the CRAFT PRINCIPAL DATA, for example, Hull length, speed, design category etc.



- Move the mouse over the button *'Click here if you are a new user'* as indicated. You may see the mouse cursor change to a hand or other symbol which indicates an active button

- Click the left button on the mouse

STEP 3



Having arrived at this screen you now need to follow the seven steps indicated.

- Follow the 7 steps on NEW USER- BASIC OPERATION not forgetting to do view the 'Map' and returning to Principal Dimensions to review ALL the Help sheets. If you don't do this NOW it will cost you time later on.

End of Tutorial 1

TUTORIAL No.2- Exploring the limits

APPLICABLE TO MODULE:	ALL
USER PROFILE:	First time users who have reviewed ISO-12215-5
PREREQUISTES:	- Any of the 6 modules - PC running Excel 2007 or Excel 2010 - Possession of a legal copy of ISO-12215-5 - **COMPLETION OF TUTORIAL No.1**

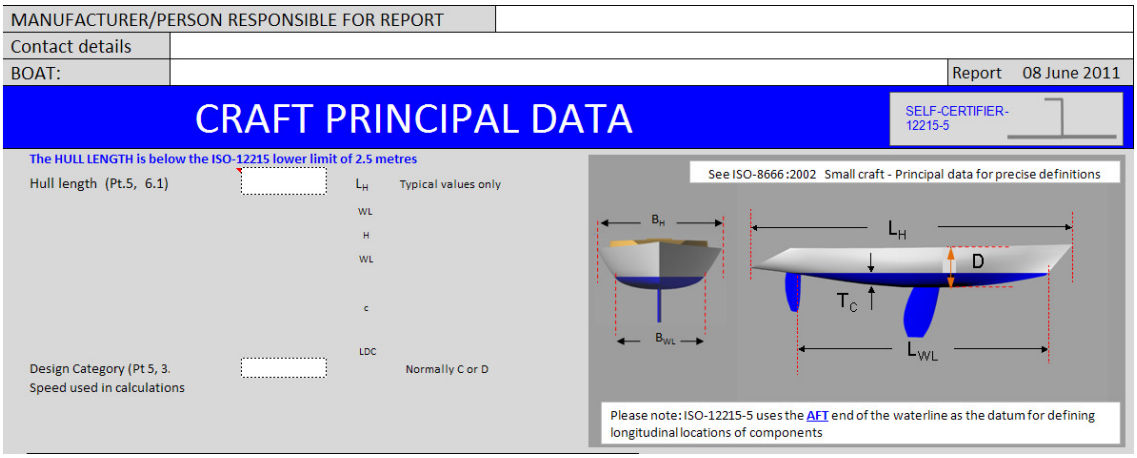
➢ This symbol and text means this is an action (e.g. click with mouse) that you should do. If you do not see this symbol then it is a note for you to read.

STEP 1

➢ Launch the module of your choice (SEE Tutorial No.1)

Notice that you are faced with a empty sheet, i.e. no boat has been defined. There is also a warning message 'The HULL LENGTH is below the ISO-12215 lower limit of 2.5 metres'.

No surprise there – no boat is defined so the program thinks the hull length is 0 metres.



STEP 2

➢ Set the Design category to A or B or C and then enter 16m in the Hull Length white box (remember you can use the TAB key on very left of keyboard to move around the white data entry cells).

Note the message which appears just above the 16m.

➢ Now go to the bottom and change the design category to D

The message has disappeared!

STEP 3

- Change the design category to A and the hull length to 12.00

There is no warning now.

STEP 4

- Change the hull length to 24.01

Now not only is there a warning but most of the data input boxes have disappeared again.

THIS ALL MEANS:

- ISO-12215 is not valid for hull lengths of greater than 24m. The program should not be used.
- For design category A, B and C self-certification normally applies only up to 12m hull length
- For design category D self-certification normally applies up to 24m hull length

HOWEVER with the exception of the 24m hull length limit you can ignore these warning messages and the program will still give answers, but IF you do you are straying off scope of ISO-12215-5.

SELF-CERTIFIER-12215-5 is intended as an aid to builders wishing to self-certify existing craft, i.e. without the assistance of a notified body or perhaps even a qualified structural engineer.

This is fine provided you observe some golden rules:

1. Do not ignore the limits even if these are only advisory

2. Do not try to use the program to design down to compliance factors of 1 (see Tutorial No.1 and help topics for an explanation of compliance factors)

3. Do not try to use the program for advanced composite layups.

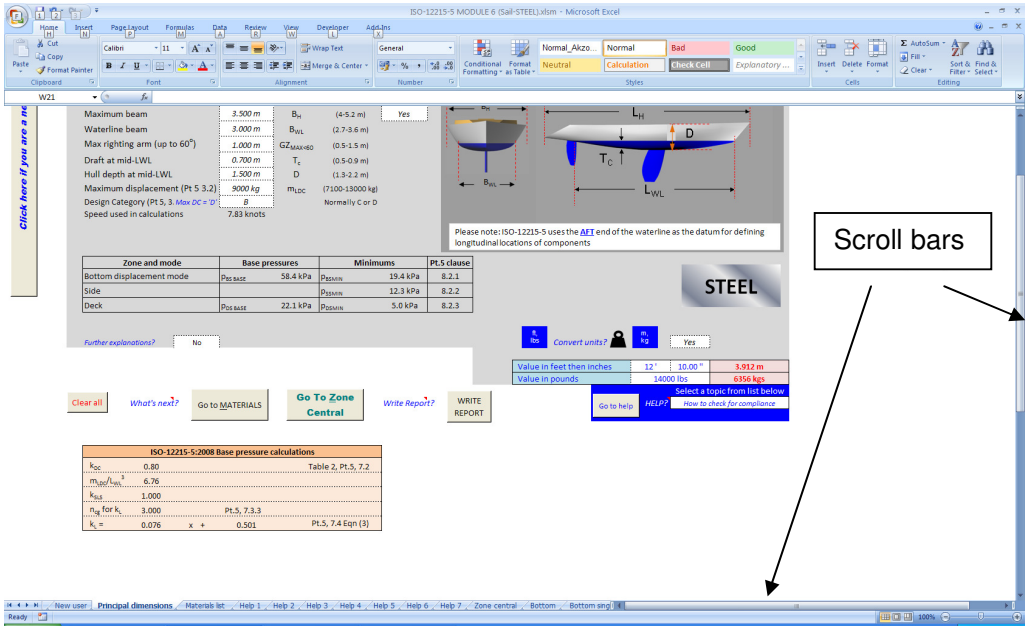
SELF-CERTIFIER-12215-5 is deliberately limited to E-glass. You *can* use double bias (±45^{o}), quadraxial plies in single skin but the method is an approximation – stick to mainly 0/90 layups consisting of CSM, WR and BX (0/90).

Double bias and quadraxials are fine in the skins of sandwich panels and webs of stiffeners. You can only use UD's in the crown of stiffeners.

If you find this does not meet your needs then you need to use the full ISO-12215-5 method. Commercial software is available but requires more specialised knowledge for fully orthotropic, non-symmetrical, angle-ply stacks.

STEP 5

- Find the scroll bars. Use these to see the full display (only necessary if you are working with a screen which is not set up to show the whole display- try 1680 x 1050 pixels)



STEP 6

- Find the grey button with 'Populate' on it. It's on the far right hand side (use the scroll bars if necessary).

There will be more discussion on this in a later tutorial. Just click on it for now and notice that the principal dimensions are populated (this may take a few seconds). We are now going to explore some of the further limits.

- In the appropriate box change the length on waterline to be greater than the hull length and the waterline beam to be greater than the maximum beam. Make the depth less than the draft. This is a pretty weird boat, right!

Notice what happens. **Absolutely nothing**!

SELF-CERTIFIER-12215-5 does not do your thinking for you. Although it does take some of the pain out of the calculations, it has *limited* checks on inappropriate data.

You might want to select 'yes' if not already selected on the see typicals' dropdown white cell. This should prevent data entry error but remember it is only intended to be guidance.

STEP 7

- Make deadrise 40 degrees and the speed 60 knots (or a really low speed and deadrise if you prefer). Enter a displacement in tonnes, say 12.

Notice what happens. **This time you get a warning**!

While every effort has been made to validate the software, YOU are responsible for ensuring that the program is fit for purpose. SELF-CERTIFIER-12215-5 is totally transparent in that it shows all the

intermediate calculations. You cannot turn these off, although they do not usually appear in the hard copy of any scantling report you may wish to create. You should review these from time to time against the formulae given in the ISO standard.

SUMMARY OF LIMITATIONS

The purpose of Tutorial No. 2 was to indicate the kinds of limitations which are associated with using SELF-CERTIFIER-12215-5. There are three types:

1. 'No-go' limitations – don't use SELF-CERTIFIER-12215-5 for hull lengths greater than 24m or speeds greater than 50 knots for motor.

2. Advisory limitations – used within the advisory limits for checking of craft which have proven to be satisfactory in service, SELF-CERTIFIER-12215-5 can be used with confidence. Anything remotely unconventional will require the services of a qualified structural engineer. This is an assessment tool for practical people who are expected to marry their extensive experience with what the computer is telling them. It should NOT be used by people with very limited experience of the type of craft being assessed

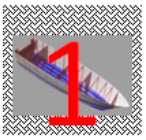
3. QUALITY INPUT IS EVERYTHING – the biggest bug in any computer program *can* sometimes be the person sitting in front of the screen. Rubbish data in = rubbish answers out. So take your time. Read the help sheets (see Tutorial No.1) get your plans together and make sure you are happy with the basic concepts (again see help sheets). If you get stuck while there is no formal technical support contact ICOMIA – they may be able to help

End of Tutorial No.2

TUTORIAL No.3 – COMPOSITE CRAFT

APPLICABLE TO MODULE:	Module 1 & 2 only
USER PROFILE:	First time users who have reviewed ISO-12215-5
PREREQUISTES:	- Module 1 & 2 - PC running Excel 2007 or Excel 2010 - Possession of a legal copy of ISO-12215-5 - **COMPLETION OF TUTORIALS 1 & 2**

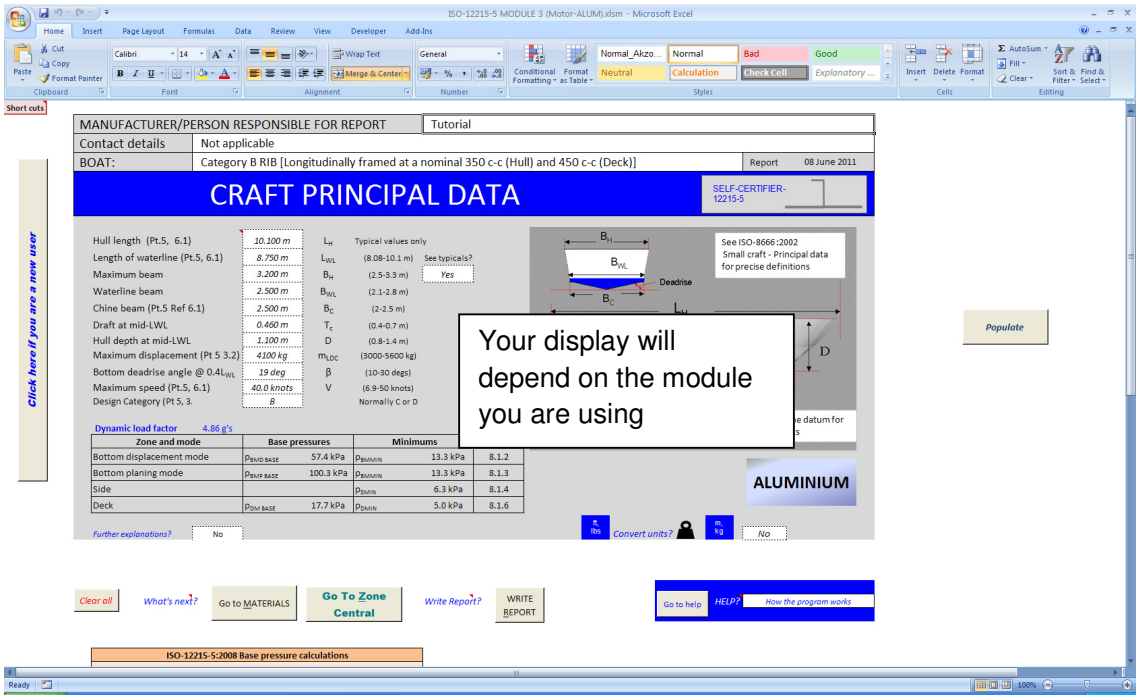
STEP 1



- Double click on the icon with your mouse to launch the module of choice, e.g. module

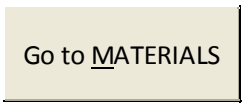
STEP 2

- You could enter a hull length and this will reveal the other boxes. This is what you WILL do once you are familiar with the program. For now we will use the 'factory-set' boat which varies with the module you are using. So click the *Populate* button you used in Tutorial 2.

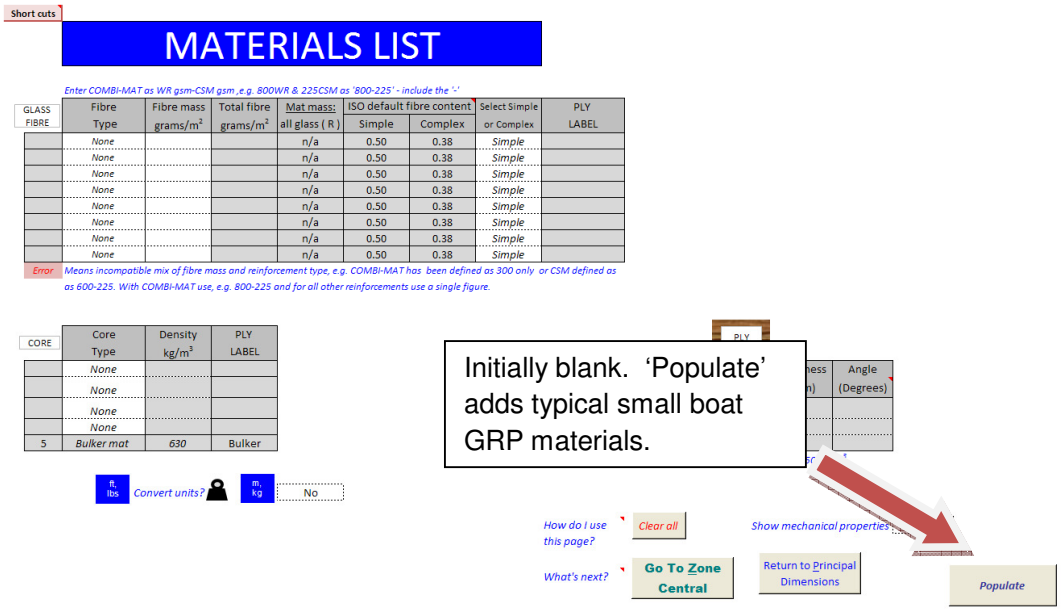


We now have a boat and are ready to go. Incidentally, you can override any of these values if you are not happy. Try it! The idea of the factory boat is to give you an indication of typical values – it's for guidance only while you are learning SELF-CERTIFIER-12215-5. Click on *Populate* again to reset.

STEP 3

- Click on Go to MATERIALS or ctrl _ m 

and then on the *Populate* button you'll find at the right hand side of this sheet.



This is a reasonable selection for the type of boat SELF-CERTIFIER-12215-5 is mainly intended for.

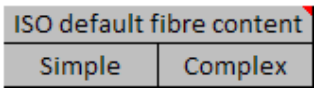
If you are using many different types of fibre type, fibre mass, etc you may be doing a complex composite boat which should really be engineered by a professional composite engineer.

- Experiment with the Glass fibre options. You can select from CSM (chopped strand mat), WR (woven roving), a Combi-mat (WR first , then CSM stitched product), BX 0/90 (a sticthed biaxial consisting of identical warp and weft), DB (double bias, i.e. ±45 degrees), a quadraxiall (0/90/45/-45) and a UD-0 (uni-directional in the fibre direction).

- Try entering some fibre weights in grams per square metre (also called the areal density). Take a bit of time to read the instructions about how you must enter a combi-mat gsm (grams/m^2).

- Notice how the left hand column changes colour as a visual aid

- Now go to the comment (red triangle) to find out what 'Simple' and 'Complex' are all about.



- Lastly look at the right hand column, select 'Complex' and see how the ply label changes from (S) to (C). These labels are used when you build a laminate schedule later on.

IMPORTANT NOTE: This is the MATERIAL LIST.

Here's how you should think about it in boatyard terms.

The MATERIAL LIST is what you have available in your store. The entries may be made in any order just as there is no reason why you should store the CSM over the WR rack.

IT HAS NOTHING TO DO WITH LET'S SAY THE BOTTOM SHELL LAMINATE ON BOAT #001, ALTHOUGH THE BOTTOM SHELL CAN ONLY BE MADE OF MATERIAL THAT YOU HAVE IN THE STORE .

Having said that, as in the case of a store room, some order is necessary. It is recommended that the list should be all the CSM's first, then the Combi-mats, then the WR and finally probably just the one UD.

- Move over the core material list and see what is available. Note: NO honeycomb e.g. NOMEX.

Where's the Divinycell H80 or the C70.75? ISO standards do not permit the use of trade names and so all the cores are generic.

There is a separate program called 'CORE-HELPER'.

This compares commercial available cores against the generic ones contained within SELF-CERTIFIER-12215-5. It is then down to you to decide which is the best match.

- Now move over to the plywood table. You will recognise typical available thickness' such as 12.7mm = ½ inch. Read the comment cells (red triangle)

- Go to *Show mechanical properties* No and use the drop down to select 'yes'

These properties are the default values given in Annexes C, D and E of ISO-12215-5.

WHY CAN'T I OVERWRITE THESE?

SELF-CERTIFIER-12215-5 is aimed at builders who do not test to obtain the mechanical properties or make glass:resin ratio tests by ignition ('ashing' test). The program uses EVALUATION LEVEL 'C' and the generic core properties are generally lower than manufacturers' TYPICAL values (but not so the manufacturers' specified minimum values – see CORE-HELPER).

In practice this means that the requirements will probably be conservative (by about 10-20%) when compared to a fully engineered structure backed up by a materials test programme.

HOWEVER, while this may not be the best way to engineer larger, weight sensitive craft, for many smaller craft (hull length less than 12m) robustness and stiffness considerations may mean that many builders will want to exceed ISO minimums. You will recall this if you've completed Tutorial 1 and went through the help sheets.

If you are working in the USA you might find the unit converter useful.

ft, lbs	Convert units?	m, kg	Yes

COMBI-MAT, CSM, WR CONVERTER			
US notation	2415	ISO equivalent	813-457
DENSITY CONVERTER			
lb/cubic ft	5.0	kg/cubic metre	80

STEP 4

Go To Zone Central

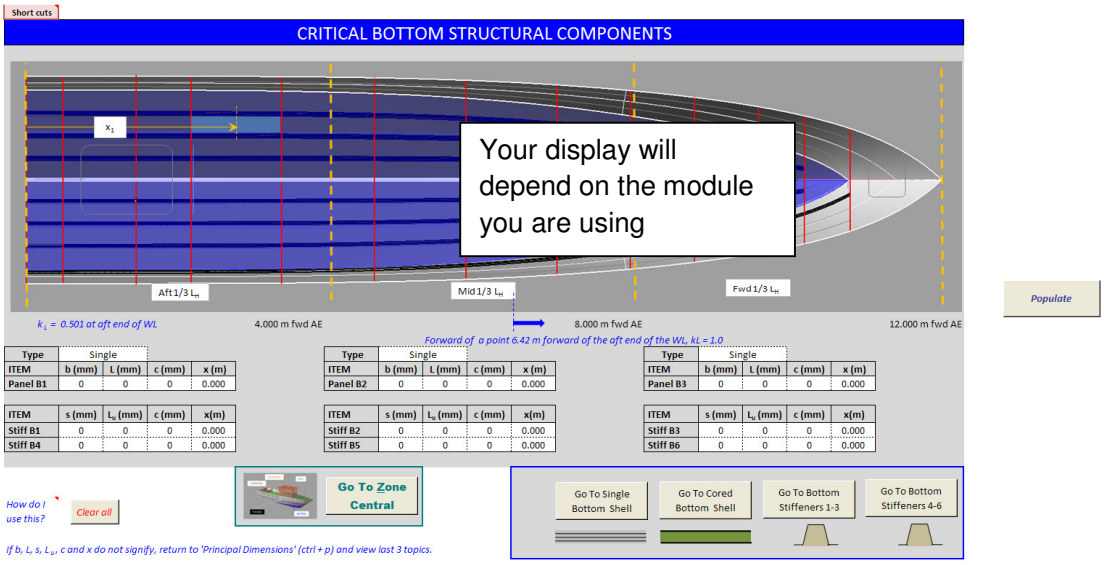
- Click on Go To Zone Central or ctrl + z and
- Click on Go to BOTTOM zone or ctrl + b
- Then on *Populate* for the factory-set boat panels/stiffeners*

Go To BOTTOM zone

* Normally this is where you will spend most of your time, picking off panel and stiffener sizes and locations from your construction drawings

Actually you could have gone directly to the bottom zone from anyway in the program by holding down the ctrl key and pressing the letter b.

Once you get familiar with the program you may want to use these short cuts but if you only use the program occasionally the click on buttons is probably best. Note the short cut reminder in the top left.



This is where you specify the sizes and locations of the critical panels and stiffeners.

The program looks more restrictive than it is. To give form to the assessment, SELF-CERTIFIER-12215-5 suggests you look at three zones (aft L/3, middle L/3 and forward L/3) looking for the most critical panel and or up to two stiffeners in each.

Design loads tend to be greater in the forebody but then panel sizes and stiffener spans can be larger in the after body (to accommodate engine seats for example).

You could have all your critical structure in the forebody and you may wish to put all 9 bottom components (3 panels, 6 stiffeners) in the forebody zone. However it is recommended that you don't do this. It's mostly a BAD idea ** and it is easy to overlook components. **The recommended approach is to find the WORST (most critical) component in each zone** and see how the boat looks. It might be that all components easily comply (compliance factor say 1.5+). In this case the job is done.

If you do want to consider more components it might be better to just make a second copy of the file. For small boats with fairly uniform scantlings you probably won't need to do this.

Warning – you need to be REALLY careful when entering in curvature values. See Tutorial No.1 help sheets for guidance here.

**Warning – The program matches the shell B1 with stiffener B1 and B4 and shell B2 with stiffener B2 and B5 etc so it REALLY pays to stick to the ZONE APPROACH.

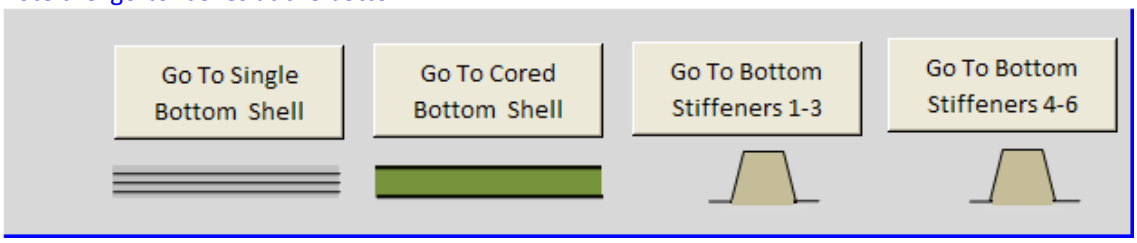
Note – You might find it easier to use stiffeners B1, B2 and B3 as stringer, longitudinals or transverses (secondary members, see ISO-12215-6) and B4-B6 are transverse web frames or girders or other stiffener members (primary members, see ISO-12215-6). You don't HAVE to define all 9 components but this is considered to be good practice.

Before we start laying up the bottom shell, please note:

Type	Single			
ITEM	b (mm)	L (mm)	c (mm)	x (m)
Panel B1	780	920	0	1.800

You MUST make sure you have selected EITHER 'Single' or 'Sandwich'

Note the 'go-to' boxes at the bottom.



- Click on Go To Cored Bottom Shell (yes I mean that!)

Of course, it's blank because all three bottom panels were defined as Single skin.

- Go back to Bottom zone (Ctrl + 'b') and change the midships panel (B2) to 'Sandwich'. Click on Go To Cored Bottom Shell, return to bottom zone, then visit Go To Single skin – got the idea!

Press Populate to return all three panels to Single skin

STEP 5

- Click on Go to Single Bottom Shell and *Clear all plies for each of the three panels*
- Using the drop-down (remember you can only enter data in the white boxes) build a laminate schedule from the available materials.

PANEL	B1		Zone	Aft 1/3 L	
	Clear all plies				
Ply No.	Label	No. plies	Glass	+ Resin	t (mm)
1	CSM300(S)	1	300	1000	0.70
2	CSM450(S)	1	450	1500	1.05
3	CM900(S)	7	6300	15750	10.34
4	None	0	0	0	0.00
5	None	0	0	0	0.00
6	None	0	0	0	0.00
7	None	0	0	0	0.00
8	None	0	0	0	0.00
9	None	0	0	0	0.00
10	None	0	0	0	0.00
11	None	0	0	0	0.00
12	None	0	0	0	0.00
ISO-12215-5 REQUIREMENT					
Criterion		Required	Actual	CF	RESULT
Glass to meet robustness		2457 gsm	7050 gsm	2.87	PASSES
Thickness to meet strength		10.79 mm	12.09 mm	1.12	PASSES

To continue the analogy we have now taken the material we needed out of the store and are laying up the bottom shell

Notice: this panel passes

PANEL B1

b (mm)	780	L (mm)	920	k_c
c (mm)	0	x (m)	1.80	1.000
L_{max} (mm)	920	for A_D	A_D (m^2)	0.7176
L_{max} (mm)	920	for k_2	k_2	0.378
Mode	k_R	k_{AR}	k_L	P_{BM}
Planing	1.000	0.455	0.641	36.88
Displacement	1.266	0.576	0.641	21.84
Actual fibre content by mass		0.39	P_{BM}	**36.88**
Effective UFS (MPa)		146		

With some detailed intermediate ISO calculations for you to check if you wish.

STEP 6

- Click on or ctrl + b

Go To BOTTOM zone

- Click on

Go To Bottom Stiffeners 1-3

- *Clear all entries*
- Start by entering the size of the TOPHAT (only tophats are allowed in the program) FORMER, i.e. before any laminate goes on. Select the type of former (which may actually be structurally effective plywood)

Did you notice that there is no underlined letter on the Go To Shell or Stiffener is boxes? There aren't short-cuts for everything. This is done deliberately to provide structure to the program. You are forced to keep returning to the zone you are currently working on.

Clear all entries

STIFFENER	B1	Zone	Aft 1/3 L

CORE/FORMER (INSIDE) DIMENSIONS

Crown width	50 mm		
Core material		Depth	
Structural core		75 mm	
Base width	75 mm		
Attached plating		Single	
Bond width per side		0 mm	

COVER LAMINATE (ONE SIDE ONLY)

Label	No. plies
None	0
None	0
None	0
None	0

ADDITIONAL CROWN REINFORCEMENT

Label	No. plies
None	0

ISO-12215-5 REQUIREMENT

Criterion None	Required	Actual	CF	RESULT
Flexural strength (N.m)	2401	#DIV/0!	#DIV/0!	#DIV/0!
Shear strength (N)	14551	#DIV/0!	#DIV/0!	#DIV/0!
Stiffness (N.sq.m)	1486	#DIV/0!	#DIV/0!	#DIV/0!
Buckle web t both sides	#DIV/0!	0.00	#DIV/0!	#DIV/0!

STIFF B1

s (mm)	830	L_u (mm)	990	k_{cs}
c (mm)	0	x (m)	1.80	1.000
s_{min} (mm)	830	for A_D	A_D (m^2)	0.822
Mode	**k_R**	**k_{AR}**	**k_L**	**P_{BM}**
Planing	1.000	0.437	0.641	35.42
Displacement	0.802	0.350	0.641	17.82
			P_{BM}	35.42

Notice lots of #DIV/0! meaning we haven't defined everything.

Cover laminate first (this goes over the first web, over the crown and then down the second web, lapping onto the shell by the bond width at start and finish. DEFINE ONE SIDE ONLY.

STIFFENER	B1	Zone	Aft 1/3 L

CORE/FORMER (INSIDE) DIMENSIONS

Crown width	50 mm		
Core material		Depth	
Structural core		75 mm	
Base width	75 mm		
Attached plating		Single	
Bond width per side		50 mm	

COVER LAMINATE (ONE SIDE ONLY)

Label	No. plies
CSM450(S)	4
None	0
None	0
None	0

ADDITIONAL CROWN REINFORCEMENT

Label	No. plies
None	0

ISO-12215-5 REQUIREMENT

Criterion None	Required	Actual	CF	RESULT
Flexural strength (N.m)	2401	1619	0.67	FAILS
Shear strength (N)	14551	14759	1.01	PASSES
Stiffness (N.sq.m)	1486	13878	9.34	PASSES
Buckle web t both sides	4.26	8.41	1.98	PASSES

4 plies of CSM450 doesn't quite do it.

Finally let's put some UD-0 in the crown

STIFFENER	B1	Zone	Aft 1/3 L

CORE/FORMER (INSIDE) DIMENSIONS

Crown width	50 mm
Core material	Structural core
Depth	75 mm
Base width	75 mm

COVER LAMINATE (ONE SIDE ONLY)

Label	No. plies
CSM450(S)	*4*
None	*0*
None	*0*
None	*0*

Attached plating	*Single*
Bond width per side	50 mm

ADDITIONAL CROWN REINFORCEMENT

Label	No. plies
UD600(S)	*4*

ISO-12215-5 REQUIREMENT

Criterion None	Required	Actual	CF	RESULT
Flexural strength (N.m)	2401	2524	1.05	PASSES
Shear strength (N)	14551	14759	1.01	PASSES
Stiffness (N.sq.m)	1486	28698	19.32	PASSES
Buckle web t both sides	4.26	8.41	1.98	PASSES

That does it.

Compliance factor = 1.05

- Review the green or red boxes to see the criteria that must be satisfied for stiffeners

1. Flexural Strength
2. Shear Strength
3. Stiffness
4. Resistance to buckling (i.e. is t_{WEB} big enough?)

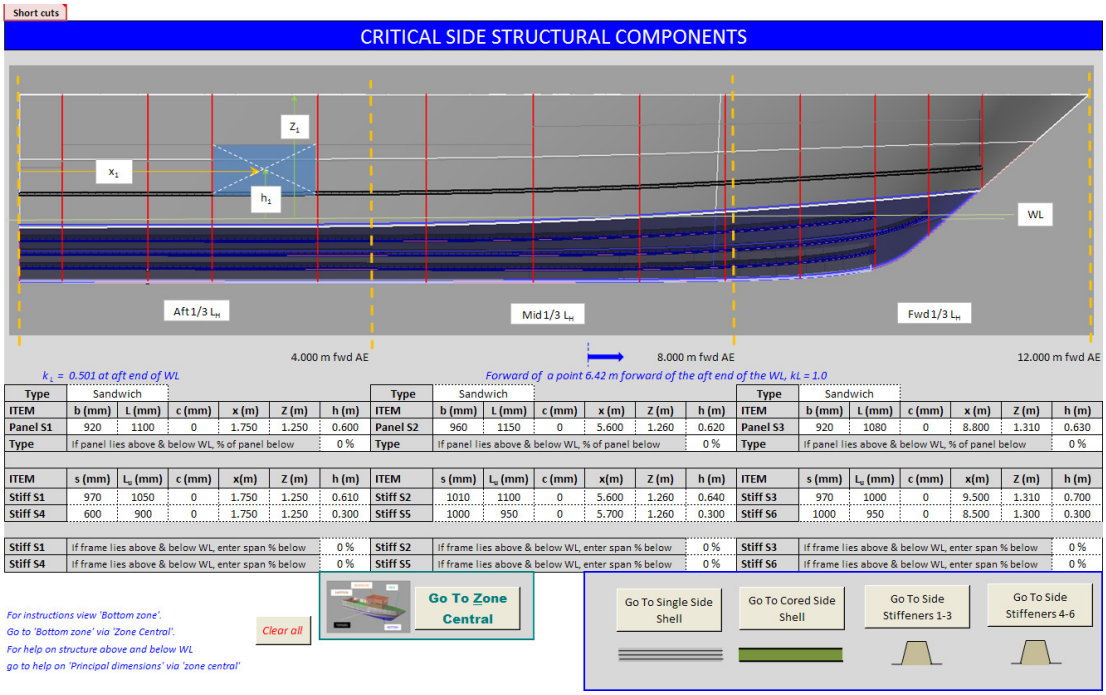
The box underneath contains some of the ISO calculations you would need if you wanted to check the program against the standard.

STIFF B1

s (mm)	830	L_u (mm)	990	k_{cs}
c (mm)	0	x (m)	1.80	1.000
s_{min} (mm)	830	for A_D	A_D (m^2)	0.822
Mode	**k_R**	**k_{AR}**	**k_L**	**P_{BM}**
Planing	1.000	0.437	0.641	35.42
Displacement	0.802	0.350	0.641	17.82
			P_{BM}	**35.42**

STEP 7

- Return to Zone Central and then go to Topside Zone or simply ctrl + ‘s’.
- Use the Populate box to enter the factory data for topside panel and stiffener dimensions and locations



You could try Go To Single Side Shell but what would you expect to see? Try it and see if you were right.

Go To Cored Side Shell and *Clear all plies*

PANEL	S1		Zone	Aft 1/3 L	
	Clear all plies				
Ply No.	Label	No. plies	Glass	+ Resin	t (mm)
1	None	0	0	0	0.00
2	None	0	0	0	0.00
3	None	0	0	0	0.00
4	None	0	0	0	0.00
5	None	0	0	0	0.00
6	None	0	0	0	0.00
Core	None				0.00
7	None	0	0	0	0.00
8	None	0	0	0	0.00
9	None	0	0	0	0.00
10	None	0	0	0	0.00
11	None	0	0	0	0.00

ISO-12215-5 REQUIREMENT				
Criterion	Required	Actual	CF	RESULT
Min Fibre gsm - OUTER	#DIV/0!	0	#DIV/0!	#DIV/0!
Min Fibre gsm - INNER	#DIV/0!	0	#DIV/0!	#DIV/0!
Shear strength (N/mm)	4.20	0.00	0.00	FAILS
Flexural strength (N)	653	500000	765.26	PASSES
Stiffness (kN.m)	0.874	#DIV/0!	#DIV/0!	#DIV/0!

You probably already know what to do here. Select from the 'store' and give the number of plies.

Try this….

PANEL	S1		Zone	Aft 1/3 L	
	Clear all plies				
Ply No.	Label	No. plies	Glass	+ Resin	t (mm)
1	*CSM300(S)*	*1*	300	1000	0.70
2	*CM900(S)*	*1*	900	2250	1.48
3	*None*	*0*	0	0	0.00
4	*None*	*0*	0	0	0.00
5	*None*	*0*	0	0	0.00
6	*None*	*0*	0	0	0.00
Core	*EGB-140*				15.00
7	*CM900(S)*	*1*	900	2250	1.48
8	*None*	*0*	0	0	0.00
9	*None*	*0*	0	0	0.00
10	*None*	*0*	0	0	0.00
11	*None*	*0*	0	0	0.00
ISO-12215-5 REQUIREMENT					
Criterion		**Required**	**Actual**	**CF**	**RESULT**
Min Fibre gsm - OUTER		878	1200	1.37	PASSES
Min Fibre gsm - INNER		553	900	1.63	PASSES
Shear strength (N/mm)		4.20	18.11	4.31	PASSES
Flexural strength (N)		653	1214	1.86	PASSES
Stiffness (kN.m)		0.874	1.912	2.19	PASSES

Again note the criteria that must be satisfied.

STEP 8

There is no step 8 at least as far as the tutorial is concerned even though in terms of completing the assessment there is a lot more to be done (i.e. picking off panel/stiffener dimensions, deciding what's a critical panel) and then….

a) Specify the layup for panels B2 and B3
b) Specify the layup for stiffeners B1-B6
c) Go to topside zone, enter the 9 critical component sizes and locations (topsides are bit more complicated so go to Tutorial No.1 and review the appropriate help sheet before trying this for real)
d) Check topside 9 components by selecting the 'as-fitted' layup schedules for plating and stiffener as defined in the MATERIAL LIST
e) Go to deck zone, do the same thing
f) Go to deckhouse zone, do the same thing
g) Go to bulkheads and enter the data indicated (bulkheads are basically plywood or sandwich rather than stiffened as found in metal boats)

h) Write report (try holding down ctrl key and pressing letter 'r' to see this – it is intended to be pretty obvious)

However in terms of what more you need to know to drive the program, we've covered everything. It's just more of the same; it's boring but here boring is good! For anything else which is not clear you will need to go back to the ISO standard).

IMPORTANT TECHNICAL NOTE

Driving the program is one thing but it is essential that time is spent reading ISO-12215-5 (and probably ISO-12215-6 as well). It is not possible in the program or its supporting documentation to go into the full technical background. For example you may notice in the course of using SELF-CERTIFIER-12215-5 that the order of stacking of the single skin seems to make no difference to the results. This rather flies in the face of what we know about composites. However the presumption is that the layup will be mainly CSM or regularly alternating plies of CSM and WR (as in Combi-mat).
If you want a place all the WR around a CSM core then SELF-CERTIFIER is not for you. In fact a standard laminate stack approach (see Annex H of ISO-12215-5) will be massively pessimistic unless you use flexural failure strains.

IF IN DOUBT CONSULT A COMPOSITE ENGINEER

End of Tutorial No.3

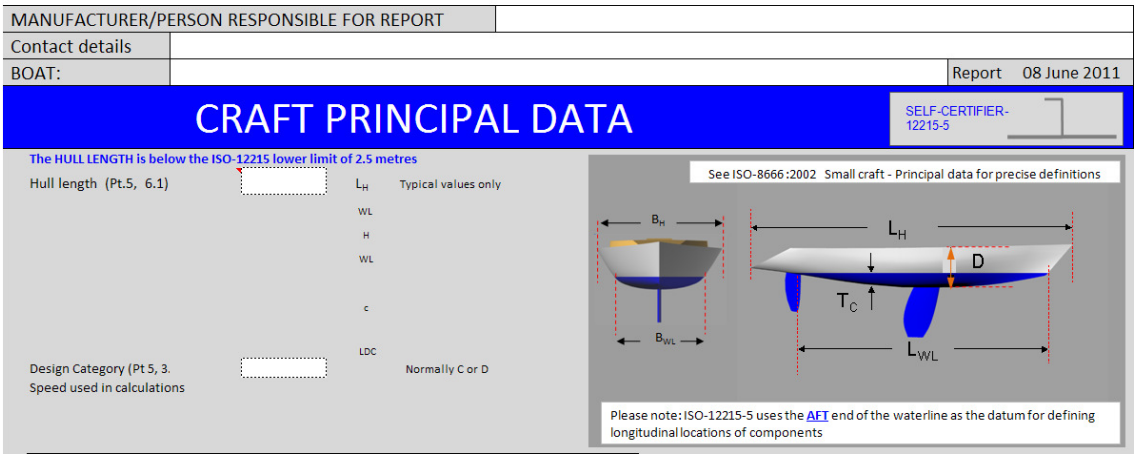
TUTORIAL No.4- The Report

APPLICABLE TO MODULE:	ALL
USER PROFILE:	First time users who have reviewed ISO-12215-5
PREREQUISTES:	- Any of 6 modules - PC running Excel 2007 or Excel 2010 - Possession of a legal copy of ISO-12215-5 - **COMPLETION OF TUTORIAL No.1, 2 and 3**

➢ This symbol and text means this is an action (e.g. click with mouse) that you should do. If you do not see this symbol then it is a note for you to read.

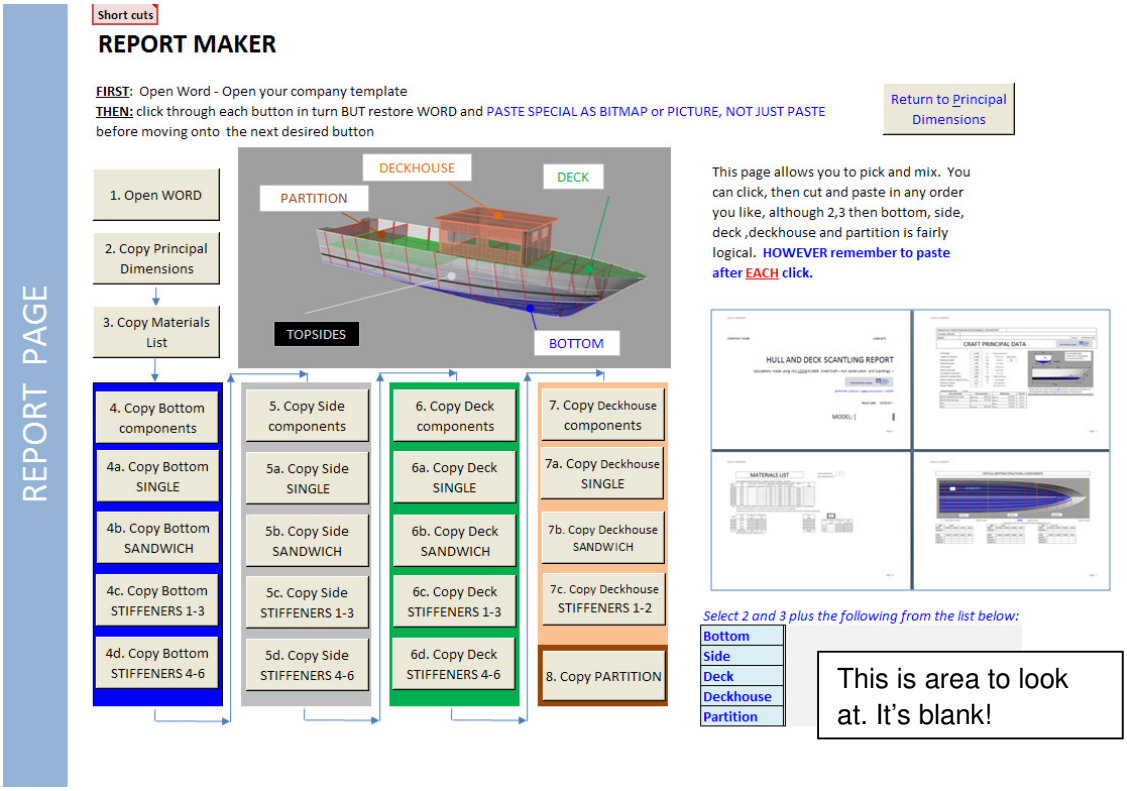
STEP 1

➢ Launch the module of your choice (SEE Tutorial No.1) but make sure it's one with everything cleared (use *Clear all*)



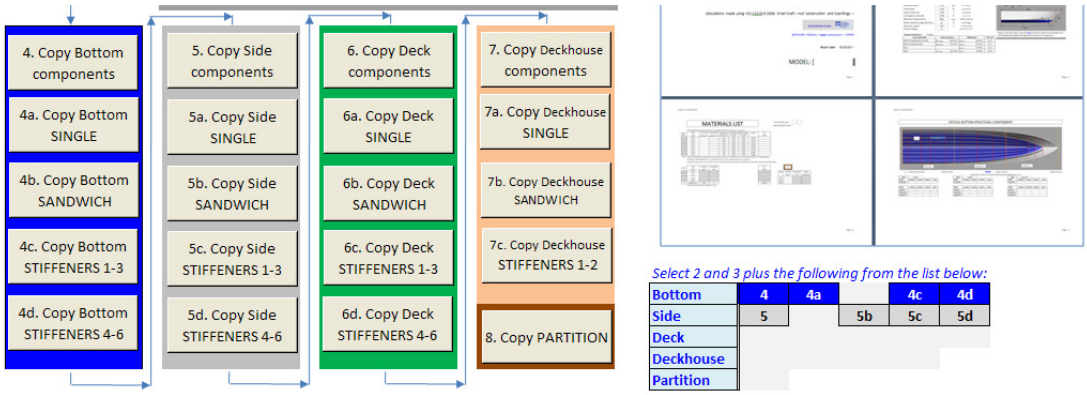
STEP 2

➢ This time DON'T *Populate* but either click on Write Report or ctrl + 'r'.



➢ Now do this: ctrl + b and *Populate* then ctrl + s and *Populate* and finally ctrl + 'r'

Provided you started with a completely unpopulated file before you did this last step, you should see…



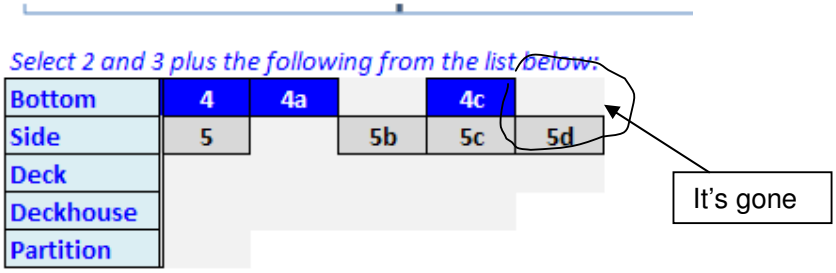
You have defined structure for the bottom shell (but not sandwich) and the topsides (but not single).
Look at the matched colour coded boxes to the left. The boxes to be clicked correspond to those identified on the right.

You need to do this manually, pasting into a word document after each copy button is clicked.

STEP 3

- Do this: ctrl + 'b' and delete the data for stiffeners B4, B5 and B6 (leave the plate and stiffeners B1-B3, i.e. don't just *Clear all*).

You should see 4c (Bottom STIFFENERS 4-6) is no longer on the 'things to copy' list.



Now read the rest of the Write Report sheet – it should be pretty obvious.

End of Tutorial No.4

TUTORIAL No.5- Doing your first boat

APPLICABLE TO MODULE:	ALL
USER PROFILE:	First time users who have reviewed ISO-12215-5
PREREQUISTES:	- Any of 6 modules - PC running Excel 2007 or Excel 2010 - Possession of a legal copy of ISO-12215-5 - **COMPLETION OF TUTORIAL No.1, 2, 3 or 4**

BEWARE THE *.Populate.* BOX

All modules contain a quick method for entering DEFAULT (or 'factory') DATA. This is done for three reasons:

1. To avoid a distraction while you were getting to grips with the operation

2. To help the developer with validation (you might have noticed that some of the values were a little inconsistent – this was done to check various features of the software)

3. To help users unfamiliar with scantling calculations to enter the right data – typical errors are parameters in the wrong uses such as tonnes rather than kilograms or metres rather than millimetres. ISO-12215-5, like all boat scantling rules is far from being a pure SI (System International) with a mix of metric units.

In same cases it might be worth loading the default boat and then editing the data if your boat happens to be very similar **but be really careful here** as it's easy to overlook items and so your RCD assessment can end up as a mixture of your actual boat and a fictional craft.

RECOMMENDATION 1

For a real job, **before** you do anything else:

1. Create a directory called 'ISO MASTER*' and transfer all your modules to that directory

2. Create a directory for each project, called 'BOAT #001*'

3. Copy and paste the Module of interest into C:\RCD assessments\BOAT #001 and rename the module BOAT001.exe

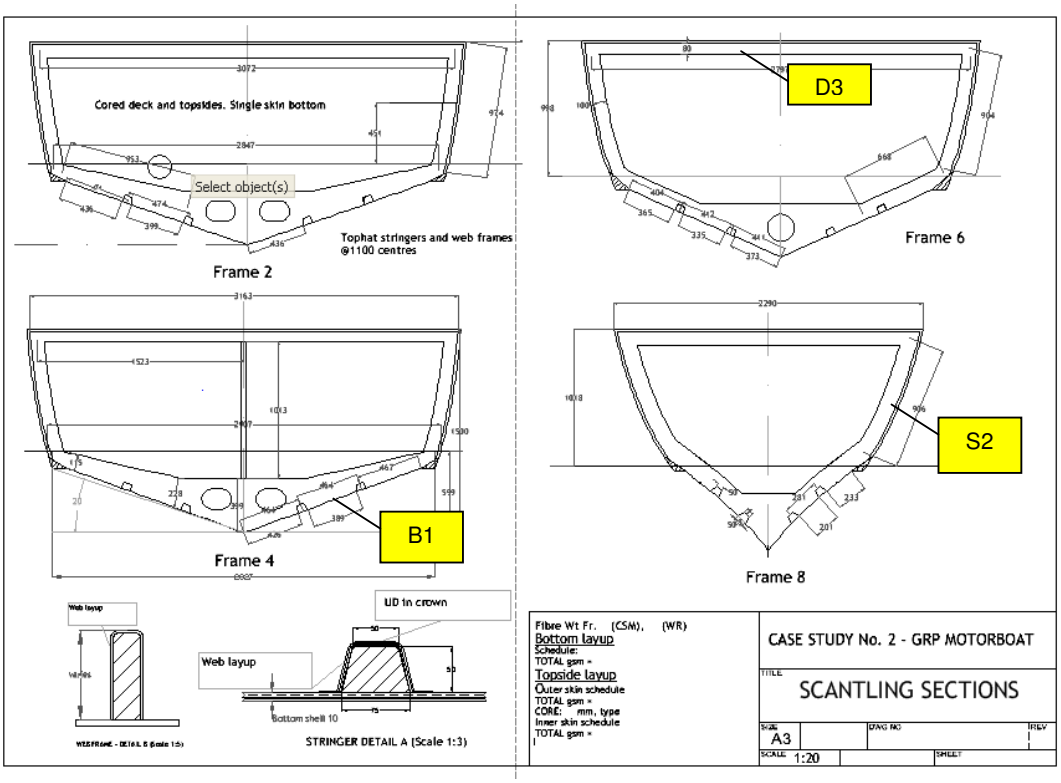
4. Now start entering the data – with this scheme you will never corrupt the master copy. In practice if the boats in your range are similar you will want to create a sub directory of ISO MASTER called BASIS BOAT* where you store a module set up with the right material list.

**Suggestion only – anything you like as long as it's meaningful to you*

RECOMMENDATION 2

1. Make a hard copy of the report – relying on electronic is dangerous. Technical Construction Files need to be kept for many years after the boat is placed on the market. You might upgrade your computer and this may mean the program will no longer work

2. Provide a set of annotated drawings using the component notation used in SELF-CERTIFIER-12215-5 as there is no facility to rename components



Good luck!