
Fitzroy Systems

Lark Lodge, Fornham St Martin
Bury St Edmunds, Suffolk. IP31 1SR
Tel: 01284 754240
www.fitzroy.com

SAND - Structural Analysis and Design, & SCALE - Structural CALculations Ensemble, Information sheet 38; Jan 2012.

Support

(1) **Technical support**, for technical support for all aspects of SAND and SCALE please email Dr Ian Brown, ian@fitzroy.com tel 01284 754240 fax 0871 989 8261.

(2) **Accounts**, if you have changed address or if there is a new contact person, please email: Jeanette Brown, jeanette@fitzroy.com or post to Lark Lodge, Fornham St Martin, Bury St Edmunds, Suffolk IP31 1SR, tel 01284 754 240, fax 0871 989 8261.

Change of registered address

Please note our change of office address as given above. Jeanette Brown has taken over the invoicing and account correspondence. We wish Jennifer a long and happy retirement.

Online payment

In order to maintain our low prices, whilst making significant investment in the proformas for Eurocodes, we have introduced the option to pay invoices online. For many of you the 2012 invoice contains a link to securely pay online using credit and debit cards from Visa, Mastercard and American Express. Following online payment the website will redirect you to the download page, where you can download updates all year. These details will also be automatically emailed to you. A VAT receipt will then follow for your records.

If you have a strong preference, or if your company, council or university systems require it, then payment by BACS or cheque will of course be accepted, with update details being sent on receipt of payment.

Receiving the update

Over 500 modifications to the proformas were uploaded to the website for the Scale proformas alone during 2011, and a similar number are expected for 2012. Historically, Scale updates were sent out by floppy and CD as these were the appropriate media for their day. Now that the internet is fast enough and reliable enough for everybody to download the update, we believe that you will now be best served by having the latest version readily available for instant online download throughout the year, rather than an annual CD which is instantly superseded.

Eurocodes

We have made further significant investment in the development of Scale proformas to allow full calculations to the British Standards or full calculations to the Eurocodes in 2011. There are now 317 proformas with full workings to both codes, or are analytical and applicable to both codes.

We have completed the majority of all reinforced concrete, piling, composite buildings, timber and masonry proformas. We are now concentrating on Eurocode versions of the steel proformas as more guidance on them becomes available, and are also developing the bridge proformas.

Leaflets in PDF format

Leaflet37.pdf: “Cantilever beam analysed parametrically as an example.” (16 pages) This is accessible via the Help→Leaflets menu option.

List of SCALE proformas

To view the full list of SCALE proformas, click on the menu option File→Display File (or File→Print File to print); then in the File name box type scale.mnu and click Open. Proformas which have full Eurocode versions or are applicable to both are marked with an “(E)”.

Changes to SCALE program (Latest version is 4.71)

- Following feedback from users who got stuck in Imperial units, we have removed the option for alternative units as these are not required for the BS and Eurocode proformas.
- SAND and SCALE front screens now launch additional programs directly, rather than via batch files as some over-zealous antivirus software was causing problems with the previous version.
- The resizable window option has been removed as part of making the software more robust. The View→Change Window Sizes menu option still allows you to select 5 sizes from Small to XXL. In 2012 we plan to make the windows resizable by dragging on the window borders as you do for most Windows’ windows, with the text resizing automatically.
- We have completed many behind the scenes changes to the software, such that all programs build from a common pool of files which will aid future development. The 2012 development will focus on improving the user friendliness e.g. pop-up tooltips to show proforma summaries on the main menu, and Backspace at the start of the line not to be interpreted as a fast forward.
- Added BS449 proformas back onto the main index due to popular demand!
- The menu option Help→About now displays the correct amount of RAM present for machines with 64-bit versions of Windows with more than 4GB memory.

EC3CONT Correction to h'/b terms.

SC072 Cosmetic improvements, replaced fy with fyk, revised range for fck.

SC073,074 Cosmetic improvements, replaced fy with fyk, revised range for fck and added warning when fcu exceeds 60 N/mm².

SC075 Cosmetic improvements, replaced fy with fyk and yield with cylinder, revised range for fck range, added warning when fcu exceeds 60 N/mm².

SC076 **Added EC2 design option**, made cosmetic improvements.

SC078 Cosmetic improvements, replaced fy with fyk and yield with cylinder and revised range for fck.

SC080,081,082 Cosmetic improvements, replaced fy with fyk and yield with cylinder, revised range for fck, added warning when fcu exceeds 60N/mm2 and added crack control check.

SC083 Cosmetic improvements, replaced fy with fyk and yield with cylinder and revised range for fck.

SC084 Cosmetic improvements and revised range for fck.

SC085 **Added EC2 design option**, made cosmetic improvements.

SC086 **Added EC2 design option**, made cosmetic improvements, defined texpos and bexpos.

SC087 **Added EC2 design option**, made cosmetic improvements, added WARNING when the ratio of the longest span to the shortest exits 1.2 and added axes to diagrams.

SC088 **Added EC2 design option**, made cosmetic improvements, added gamc and gams, defined plx and ply and added default values for eccfac.

SC090,091,092 Cosmetic improvements, replaced fy with fyk, steel with reinft and yield with cylinder, added warning when fcu exceeds 60 N/mm2, revised fck range, added more screen display notes removed reference to BS8110, added Tables 23 & 24 effective length is now used for imperfections eccentricity e1, added more text to summary and revised biaxial bending section.

SC094 **Added EC2 design option**, made cosmetic improvements, added formula for stress in parabola and flg and mpa is now reported, removed ccheck=1.0E39 and ccheck=0 from EC2 option, added screen display notes for links and cover, revised min link size, added ecc1 ecc2.

SC095 **Added EC2 design option**, made cosmetic improvements, removed CLCMSHut as not used and added screen display notes for links, revised min link size added ecc1 & ecc2.

SC096 **Added EC2 design option**, made cosmetic improvements, removed CLCMSHut as not used and added screen display notes for links, revised min link size added ecc1 & ecc2.

SC097 **Added EC2 design option**, made cosmetic improvements, revised amx to 0.06*b, and revised range for fyk.

SC098 **Added EC2 design option**, made cosmetic improvements.

SC099 **Added EC2 design option**, made cosmetic improvements, added biaxial bending check for EC2 design, expression for Moe revised and added scenario IF Asc<Asmin.

SC100 Cosmetic improvements, replaced fy with fyk, steel with reinft, and yield with cylinder and revised range for fck.

SC102 Added IF NRESP > 5 around the values required for NL-STRESS pull through, made cosmetic improvements and revised range for fck.

SC104 Added IF NRESP > 5 around the values required for NL-STRESS pull through, made cosmetic improvements, replaced fy with fyk and yield with cylinder and revised range for fck.

SC106 Added IF NRESP > 5 and 7 around the values required for NL-STRESS pull through, made cosmetic improvements, removed line 976 (IF M = 1.0E39 THEN M = Mbef ENDIF), replaced fy with fyk and revised range for fck.

SC107 Added IF NRESP > 5 and 7 around the values required for NL-STRESS pull through, made cosmetic improvements, removed line 928 (IF M = 1.0E39 THEN M = Mbef ENDIF), replaced fy with fyk, added range for fcu and revised range for fck.

SC108 **Added EC2 design option**, made cosmetic improvements.

SC110 **Added EC2 design option**, made cosmetic improvements, revised Summary of reinforcement, and replaced N with VEd.

- SC112 **Added EC2 design option**, made cosmetic improvements, replaced h' with d' and h with D.
- SC113 **Added EC2 design option**, made cosmetic improvements, replaced h' with d' and h with D.
- SC117 **Added EC2 design option**, made cosmetic improvements, program now stops when crack control check is not satisfied, also stops when $\text{minadp} < \text{minadr}$.
- SC118 **Added EC2 design option**, made cosmetic improvements.
- SC119 **Added EC2 design option**, made cosmetic improvements.
- SC159 Revised to include the documents from the current version of the DMRB.
- SC164 Cosmetic improvements removed imperial units, added more text.
- SC189 Updated to BS8500-1:2006 so **now EC2 compliant** WARNING when XC2 class selected for non-buried concrete, Table A.1 updated, concrete mix when exposure class is X0 now reported for designed and designated concrete.
- SC210 **Added EC4 design option**, made cosmetic improvements.
- SC212 **Added EC4 design option**, made cosmetic improvements.
- SC214 **Added EC4 design option**, made cosmetic improvements.
- SC216 **Added EC4 design option**, made cosmetic improvements, set $\text{NL}=1$ and $\text{edge}=1$, removed variable 'direct', replaced ENDI with ENDF.
- SC218 **Added EC4 design option**, cosmetic improvements, removed 'direct'.
- SC220 **Added EC4 design option**, cosmetic improvements, removed 'direct'.
- SC210-220 Added option for checking the beam's fire resistance.
- SC222 **Added EC4 design option**, made cosmetic improvements, revised text to 'Ultimate vertical shear capacity'.
- SC224 **Added EC4 design option**, made cosmetic improvements, replaced $\text{IF } D_p > 0.1$ with $\text{IF solid}=0$, repositioned $C=3$ made cosmetic improvements, 'under factored imposed load' replaced with 'under imposed load'.
- SC250 Added $\text{IF NRESP} > 5$ around the values required for NL-STRESS pull through and added largest section dimension lardim.
- SC251 Added $\text{IF NRESP} > 5$ around the values required for NL-STRESS pull through and added lardim.
- SC252 Cosmetic improvements, removed EC5 L/350 deflection check, revised floor vibrations statement, removed $\text{psi}2p$, replaced $\text{ps}2v$ with $\text{psi}2$.
- SC253,254,255 Made cosmetic improvements and added more text lines.
- SC256 Made cosmetic improvements, added non-brittle material deflection check, merged, added more text, added $\text{code}=1$, removed aload routine as no longer used and enhanced BS design summary.
- SC257 Replaced warnin with WARNING, added more text, made cosmetic improvements, shear condition across the packs now checked only when $\text{Nd} > 0$ and added lardim.
- SC258 Made cosmetic improvements, fixed assignment failure, removed line starting with $\text{IF type}=3 \text{ THEN type}=1 \text{ ENDF}$, added $\text{IF ans}11=1 \text{ AND ptype}=2$ and $\text{IF ans}11=2 \text{ AND ptype}=1$, updated deflection section, added EC5 expressions 9.8 and 9.9, added buckling check, modified shear section, added $\text{comp}1$ to $\text{comp}7$, sanded & unsanded ply.
- SC259 Removed references to BS5268-2:2002 when EC5 is selected, made cosmetic improvements, added text to deflections section, value of $+E_t = E_0 \text{mean } N/\text{mm}^2$ specified when $\text{ans}1=0$, replaced Ksys with kys and specified sanded and unsanded ply.
- SC269 **New proforma with EC4 design option**, Floor vibrations to EC5, extended design summary, added missing ply nominal thicknesses and set $\text{c}4=1$ (conservative upper limit).

- SC271 Removed ref to Table 62, made cosmetic improvements, added more text, added DESIGN SUMMARY & length of nail when type=6, ply density pk1 now selected by the program, added CASE 1 & CASE 2, eucp1, eucp2 and Ntot, set ans8=1 when type=6.
- SC272 Made cosmetic improvements, added more text and diagrams, added design summary, ply density pk1 now selected by program, revised text for design withdrawal capacity of screws, added eucp1, eucp2 and Ntot, removed references to dowels, Table 66.1 and scinput modified.
- SC273 Added several α_1' & α_2' , reversed given values for α_1' and α_2' for bolted joint comprising three members with bolts in double shear, added option for checking splitting capacity of the connection, changed alpha to radians, added/modified display screen notes, removed Fd' from diagram at 2 locations, added more text lines, added design splitting capacity for hardwoods, added option to use toothed-plate connectors replaced Bolts/dowels with Fasteners and replaced BS EN 20890-1 with BS EN 20898-2.
- SC274 Made cosmetic improvements, added more text, title revised to "Spliced timber joint with axial load & moment", max diam for bolt holes reduced, added splitting capacity, added option to use toothed-plate connectors with bolts, replaced effnof with euenof, EC design restricted to dowels only, replaced BS 20890-1 with BS EN 20898-2.
- SC275 Made cosmetic improvements, added more text, ka1 and ka2 clarified, revised DESIGN SUMMARY text, removed eutspa, eusstc and eudstc, tensile strength of bolts defined and replaced BS EN 20898-1 with BS EN 20898-2, added heading Design shear capacity of joint.
- SC351 **Added EC3 design option**, made cosmetic improvements replaced Gst with fy changed several headings, replaced Grade of steel with Yield strength, added deflection statement.
- SC408 Changes to default example.
- SC410,412,414 Extra IF's for NRESP NL-STRESS pull through.
- SC428 Re-arranging IF statements for bearing.
- EC428 load factor changed to 1.25, value kwt limited to 1.0.
- SC429 Corrections to summary table.
- SC440,442,444 Extra IF's for NRESP NL-STRESS pull through.
- SC457 Correction to table looked up
- SC459 code=1 added allowing for length of segment to be input
- SC465 Correction to mid-span (m3) moment for a single load
- SC492 Correction to interaction eqn for minor axis should be Pt not Pf
- SC505 Revised range for gamM and made cosmetic improvements.
- SC510 Added section on design wind moments and eccentricities, added concentric load on top of wall, introduced Gk(1), Gk(2), Qk(1), Qk(2), updated partial safety factors section, added gamG1 & gamG2 and cjoint=0, removed lhd=75 & rb and added note to summary.
- SC511 Made cosmetic improvements, added option to select an alternative value for Qkw, replaced load 1 with Load(1) and moment 1 with Moment(1) etc, removed rb from EC option, added load combinations 9, 10 & 11, revised combination 6, introduced factors psi0f & psi0w, made reference to PD 6697:2010, replaced Qkw with Wk and revised note relating to combination factors.
- SC512 Added partial safety factors section, updated vertical load resistance section, revised units for ecc, added Load(1) & Load(2), added text relating to eccentricity ecc(2) & cjoint=0, removed rb, load factors section revised and replaced Qkw with Wk.

- SC515 Made cosmetic improvements, added $c_{joint}=0$, removed r_b , added heading 'Characteristic loads', added load factors routine and variable γ_M & γ_Q , revised note relating to combination factors.
- SC519 Added $c_{joint}=0$, replaced e_{ufk} with e_{ufkc} , removed r_b , corrected summary error, introduced further $h_u(1)$, $h_u(2)$, $l_{hd}(1)$ & $l_{hd}(2)$, made cosmetic improvements and added more scenarios.
- SC520 Made cosmetic improvements, program will now stop when $d > 0.3$, text revised when $M_{rd} < M_d$, expressions for b_{max} updated to EC5 Section 6.3.1(5) and replaced Q_{kw} with W_k .
- SC521 Made cosmetic improvements, added more text lines relating to section resistance moment M_{rd} , added $c_{joint}=0$, set $l_{hd}=100$, corrected units for D_s , replaced A_{sw} with A_{links} , added limiting value from eqn 6.43, added L_{cl} , t_1 , t_2 , h , replaced L with L_{ef} .
- SC525 Added $c_{joint}=0$, $h_u=65$, $l_{hd}=100$, removed r_b , revised screen display diagram when $Ref=1$ and expanded summary note.
- SC528 **New proforma with EC6 design option:** Simplified sub-frame analysis.
- SC530 Made cosmetic improvements, replace 'Vertical load' with 'Design load', N_{rd} only reported when $G_k(2) < > 0$ OR $G_k(3) < > 0$, N_{id} replaced with N_{sd} in summary, revised Ex_1 defaults, removed "Concrete Block Dimensions" from output, added more text, specified e_{cc} range, updated partial safety factors section, added γ_{M2} , γ_{M3} , $h_u(1)$, $h_u(2)$, $l_{hd}(1)$, $l_{hd}(2)$, removed r_b , $t=t(a)$, ans_3 and replaced e_{ufk} with e_{ufkc} .
- SC532 Added partial safety factors section, updated vertical load resistance section, made cosmetic improvements added $Load(1)$, $Load(2)$, $Load(3)$, $h_u(1)$, $h_u(2)$, $l_{hd}(1)$, $l_{hd}(2)$ removed r_b , ans_3 & $t=t(a)$, replaced e_{ufk} with e_{ufkc} , set $t=t(1)$ & $t=t(2)$, added $c_{joint}=0$, replaced q_{lat} with W_k , added γ_Q and revised note relating to combination factors.
- SC535 Added $c_{joint}=0$, $h_u=65$, $l_{hd}=100$ and removed r_b , ans_3 , replaced Q_{kw} with W_k made cosmetic improvements, added factor ψ_0 & load combinations.
- SC536 Made cosmetic improvements, added several WARNINGS, removed r_b & ans_3 , added $h_u(1)$, $h_u(2)$, $l_{hd}(1)$, $l_{hd}(2)$, replaced e_{ufk} with e_{ufkc} , added $h_b(1)$, $h_b(2)$, $l_{hd}(1)$, $l_{hd}(2)$, restricted effective flange width to BS EN 1996-1-1 only, removed ans_8 , replaced Q_{kw} with W_k .
- SC537 Made cosmetic improvements, added Pocket-Type wall, removed $t=t_1$, assigned values to h_u & l_{hd} , added $ans_{40}=0$, $ans_{40}=1$, removed r_b , corrected t_1 units, modified limiting ratio of span to effect depth, made reference to BS8500-1:2006, and revised pocket-type RW effective width of flange to BS EN 1996-1-1.
- SC538 Added $l_{hd}=100$ for brick, $l_{hd}=215$ for block and $c_{joint}=0$.
- SC701 **Added EC1 design option**, made cosmetic improvements, added more scenarios, added routines rf_3 & rf_4 , introduced CASE 2: Asymmetric load & CASE 3: Asymmetric load, replaced S_{ocase} with 'method' and 'Design snow load' with 'Snow load'.
- SC725 **Added EC design option**, made cosmetic improvements.
- SC726 **New proforma with EC design option:** Eurocode load combinations. Added EQU limit state to cantilever beam, replaced Q_k with G_k for EQU load combinations, made cosmetic improvements, added more text lines, revised text for steel frames.
- SC731 **Added EC2 design option**, made cosmetic improvements.
- SC732 **Added EC2 design option**, made cosmetic improvements.
- SC734 **Added EC2 design option**, made cosmetic improvements.
- SC735 **Added EC2 design option**, made cosmetic improvements.

SC742 **Added EC2 design option**, made cosmetic improvements.
 SC743 **Added EC2 design option**, made cosmetic improvements.
 SC744 **Added EC2 design option**, made cosmetic improvements.
 SC745 **Added EC2 design option**, made cosmetic improvements.
 SC746 **Added EC2 design option**, made cosmetic improvements.
 SC747 **Added EC2 design option**, made cosmetic improvements.
 SC748 **Added EC2 design option**, made cosmetic improvements.
 SC749 **Added EC2 design option**, made cosmetic improvements.
 SC750 **Added EC7 design option**, made cosmetic improvements and updated BS Design Summary, made modifications to SUMMARY, added combination 2 overturning, added sub-base soil properties and option to vary calculated Kp' value.
 SC751 **Added EC7 design option**, made cosmetic improvements
 SC752 Replaced phi with phi', removed maxmin and all lines relating to mass=1, added EC7 design option , added combination 2 overturning, added soil properties for sub-base and option to vary calculated Kp' value.
 SC755 **Added EC7 design option**, made cosmetic improvements, added more text, and revised screen display text.
 SC756,757,758,759,760 Made cosmetic improvements.
 SC767 Made cosmetic improvements, renamed phi' phi'.
 SC768 Made cosmetic improvements, renamed ph1' and ph2', revised layout, phi1' and phi2' shown in degrees.
 SC776 **Updated to BS EN 13108** Bituminous mixtures and made reference to PD 6691:2010. Wearing course/basecourse/roadbase now referred to as surface course/binder course/base respectively, cosmetic improvements.
 SC805 **Incorporated amendment 17041** dated (March 07), cosmetic improvements.
 SC924 SCALE logic separated from NL-STRESS logic. For SCALE logic only: increased max num runs to 9999, increased number of patterns to 15, replaced LOG() logic by IF for readability, changed scrtch.001 and scrtcha.001 to e.g. sc078.0001.stk and sc078.0001.cal to simplify bulk runs added more ply and osb data, added progress to screen during run.
 SC4010 Minor corrections.
 SC4800 Pause allowed for unfactored shears.

Downloading updates during 2012

Further updates in 2012 will be posted to the download website at the beginning of April, July and October, please visit the download website for the latest version of 2012.EXE.

Ian Brown 01/01/12