Greenhouse Workbench v3

User Guide for BOM Operators

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Audience: End users (BOM operators & estimators)

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1. About this guide

This guide is meant for end-users — sales engineers, estimators, and BOM operators — who use the **Greenhouse Workbench v3** software to design greenhouse structures, preview them in 3D, and download the complete Bill of Materials (BOM) as an Excel file.

The guide walks you through the software from the very first screen up to the downloaded Excel workbook, and includes four fully-worked examples that you can replicate exactly. The examples use real numbers — pipe counts, clamp quantities, junction counts — generated by the same software you will be using.

Who should read this guide?

- Sales engineers preparing quotations for customers.
- Estimators verifying material requirements before procurement.
- Project managers checking that the design matches the order.
- Anyone new to the software who wants a one-shot, end-to-end walkthrough.

What this guide is *not*

- It is not a developer manual — internal code, APIs, and database schemas are not covered here.
- It is not a structural-engineering reference — load calculations, wind / snow design, and code compliance are outside the scope.
- It is not a fabrication / installation manual for the shop floor — that information lives inside the Excel workbook in the **Fabrication Process** sheet.

Note: Kindly keep this guide handy during your first few BOM exports. Once you are familiar with the flow, you may need to refer back only for the worked examples and the FAQ.

2. Software overview

Greenhouse Workbench v3 is a web-based design tool. You open it in your browser, pick a greenhouse model, set a few parameters (such as the number of spans, the number of bays, the gutter height, and which pipes to use), and the software does the rest:

- Generates the full 3D geometry of the structure — every column, every arch, every purlin.
- Shows the live 3D model in your browser so you can rotate, zoom, and inspect.
- Computes a complete Bill of Materials — pipes, clamps, bolts, accessories.
- Records every junction (every place two pipes meet) with the right clamp size and type.
- Exports a multi-sheet Excel workbook that you can share with procurement, fabrication, and the customer.

Key strengths

- **Geometry-driven BOM:** Quantities are derived from the actual 3D model — not from formulas — so the BOM matches what will be built.
- **Live pipe substitution:** Change a pipe size and the 3D model, weight, and BOM all update immediately.
- **Multiple greenhouse families:** NVPH (GA / TV-NHB / GA 9.6 m), FVPH, DRSHNH, FRSNH, and MSPT-SP — all from one interface.
- **Rectangular pipe support:** Square and rectangular hollow sections (SHS / RHS) with face-aware clamp labelling.
- **Standardised fabrication sheet:** Every export includes the standardised fabrication process for that model.

How to access the software: Open your browser, go to the internal URL provided by your IT team (typically of the form *http://<server>/greenhouse-v3/*), and log in with the credentials given to you by the administrator. If you do not yet have credentials, please contact your administrator.

3. Getting started — quick start in 5 steps

This is the golden path. Follow these five steps and you will have an Excel BOM downloaded to your laptop within a couple of minutes.

1. **Open the viewer.** Go to the internal URL and log in.
2. **Pick a model.** From the *Structure type* dropdown, choose the greenhouse model you want (for example, *NVPH-GA*). The 3D canvas shows a default design.
3. **Set dimensions.** Enter the number of spans, number of bays, span width, bay length, and gutter height. The 3D model regenerates as you type.
4. **Adjust pipes (optional).** Open the *Pipe groups* panel on the right. For any pipe role (main column, arch, purlin, etc.), pick a different pipe from the dropdown. The model, the legend, and the weight badge all update live.
5. **Download the Excel BOM.** Click *Download Excel* at the top. The browser saves an *.xlsx* file containing every sheet — Summary, Pipe BOM, Hardware BOM, Production Process, Fabrication Process, Junction Summary, and so on.

Tip: If you want to save your design for later, use the *Save design* button. You can re-open any saved design from the *My designs* list at the top of the viewer.

4. The 3D viewer interface

The viewer is a single page in your browser. It has three main areas — the toolbar (top), the 3D canvas (centre), and the side panels (right side).

4.1 Toolbar & generation controls

The toolbar runs along the top. From left to right you will typically find:

- **Structure type dropdown** — pick the model family (NVPH-GA, FVPH, DRSHNH, FRSNH, NVPH-TV-NHB, MSPT-SP, etc.).
- **Dimensions inputs** — number of spans, number of bays, span width (m), bay length (m), gutter height (m).
- **Generate / Update buttons** — regenerate the 3D model after a change. Most changes update live; some require a click.
- **Save design** — store the current configuration under a name so you can re-open it later.
- **Download Excel** — exports the full BOM as a .xlsx file.
- **Download PDF** — exports a printable summary PDF.

4.2 The 3D canvas — rotate, pan, zoom

Mouse controls on the 3D canvas:

- **Left-click + drag:** rotate the model around its centre.
- **Right-click + drag (or Shift + drag):** pan the camera.
- **Scroll wheel:** zoom in and out.
- **Double-click:** recentre the view on the picked point.

On a touch device — two-finger pinch to zoom, one finger to rotate, two fingers to pan.

4.3 Pipe legend & weight badge

The **Pipe legend** appears on the right side. It lists every pipe role in the structure (main column, anchor column, big arch, small arch, etc.) along with the currently-assigned pipe (for example, *76×2 mm* or *90×50×2 mm*) and its colour in the 3D view.

Below the legend you will see the **Weight badge** — the total weight of all pipes in the structure, in kilograms. The moment you change any pipe, this number updates instantaneously. Use it as a quick sanity check before you export.

> **Note:** If you change a pipe and the legend or weight badge does **not** update, please refresh your browser (Ctrl + F5). A persistent failure is something to report to your administrator.

4.4 Hide / show layers

Each pipe role has a small *eye* icon in the legend. Clicking it hides that role from the 3D view (useful to see inside a complex structure). Click it again to bring it back. Hiding a role does **not** remove it from the BOM — it is a view-only filter.

5. Choosing a structure model

5.1 The 8 supported models

The software supports 8 structure families. Pick the one that matches the kind of greenhouse you are quoting:

Code	Family	Use case
NVPH-GA	Naturally-ventilated, gothic arch	General-purpose vegetable and flower greenhouses, 8 m bay span.
NVPH-GA-96	Naturally-ventilated, gothic, 9.6 m	Wider 9.6 m bay variant of NVPH-GA for high crops and machinery.
NVPH-TV-NHB	Tunnel-ventilated, NHB-compliant	NHB subsidy-compliant NVPH variant with tunnel ventilation.
FVPH	Fan-and-pad ventilated polyhouse	Climate-controlled greenhouses with exhaust fans and cooling pads.
DRSHNH	Dry shade-net house	Shade-net house for dry climates and shade-loving crops.
FRSNH	Flat-roof shade-net house	Lower-cost shade-net structure with flat roof.
MSPT-SP	Mono-span single-pipe tunnel	Smallest mono-span tunnel — single-pipe arches, very low cost.
NVPH	Generic NVPH (legacy)	Older NVPH variants kept for compatibility.

5.2 Which model to pick — quick reference

- **Need natural ventilation, standard 8 m bay?** → NVPH-GA
- **Need wider bays (9.6 m) for machinery / tall crops?** → NVPH-GA-96
- **Building under NHB subsidy?** → NVPH-TV-NHB
- **Need climate control (fan / pad)?** → FVPH
- **Need shade only (no plastic cover)?** → DRSHNH or FRSNH
- **Smallest possible mono-span tunnel?** → MSPT-SP

Note: The NVPH-GA family has two important configuration flags — *End-line gutters* and *Custom bottom chord*. These change which fabrication-process sheet ships with the Excel. They are covered in section 6.5.

6. Configuration parameters

This section documents **every parameter** in the master configuration (*DEFAULT_GREENHOUSE_CONFIG*). Defaults shown are the system defaults — your project values may differ. Where a parameter is only meaningful for certain structure types or feature flags, that is noted in the *What it does* column.

6.1 Structure type & occupancy grid

Parameter	Default	Type / Allowed values	What it does
structure_type	'nvph'	'nvph', 'drnsh', 'frsnh', 'fvph', 'nvph-ga', 'nvphga-96', 'nvph-family'	Drives which clamps, supports, and fabr
occupancy_grid	None	None or 2-D list [nS][nB] of 0/1	None = full rectangle. Use a grid to model L-shaped / step-cut polyg

6.2 Dimensions

Parameter	Default	Type / Allowed values	What it does
span_width	8.0	float (meters)	Centre-to-centre distance between columns across the structure. Ty
bay_length	4.0	float (meters)	Centre-to-centre distance between frames along the length. Typical:
no_of_spans	4	int	Number of spans across the structure width.
no_of_bays	10	int	Number of bays along the structure length.

Covered area = spans × bays × span_width × bay_length.

6.3 Heights

Parameter	Default	Type / Allowed values	What it does
column_height	4.0	float (meters)	Gutter height — top of column above ground. Typical: 4.0–5.0 m.
arch_height	2.5	float (meters)	Arch peak rise above column top.
foundation_depth	1.2	float (meters)	Depth of foundation below ground line.

6.4 Corridors (ASC)

Parameter	Default	Type / Allowed values	What it does
w_corridor	2.0	float (m)	West corridor width.
e_corridor	2.0	float (m)	East corridor width.
s_corridor	2.0	float (m)	South corridor width.
n_corridor	2.0	float (m)	North corridor width.
corridor_support_count	1	1, 2, or 3	1 = horizontal; 2 = horizontal + 45°; 3 = horizontal + 45° + horizontal
corridor_support_height	0	float (m), 0 = auto	0 = auto (column_height / 2). Otherwise explicit height.
corridor_pipe_ext	1.0	float (m)	Underground extension of corridor pipe (replaces separate foundatio

6.5 Arch configuration

Parameter	Default	Type / Allowed values	What it does
big_arch_ratio	0.7	float (0–1)	Small arch peak as a ratio of big arch peak. 1.0 = same height.
big_arch_ext_pct	10	int (%)	Big arch flat extension at peak, as % of span width.
big_arch_curve_pct	100	int (%)	Big arch curvature. 0 = straight (gable), 50 = half-curved, 100 = full a
small_arch_curve_pct	100	int (%)	Small arch curvature. 0 = straight, 100 = full arc.
invert_last_span	True	bool	Mirror last span: big arch on right, small arch on left.
arch_extra_support_type	'm'	'none','m','w','arch_bottom','arch_mid'	Extra support style under the arch. M = single diagonal, W = double
w_diag_height_pct	80	int (%)	W-mode: diagonal END height as % from bottom chord (0%) to vent

6.6 Column configuration

Parameter	Default	Type / Allowed values	What it does
thick_column_mode	'none'	'none','4_corner','bay_side','span_side','all_side'	Where thick columns are used. 4_corner = corners only, all_side = f
middle_column_mode	'fb'	'none','fb','all','fb_rows'	'fb' = front/back only; 'all' = every bay; 'fb_rows' = f/b plus every N ro
middle_column_row_interval	2	int	For 'fb_rows' mode — place a middle column every N rows.
middle_columns_per_span	1	1 or 2	1 = single mid col at peak; 2 = two mid cols at 1/3 & 2/3 (at arch heig
no_column_big_frame	1	int	Middle columns per anchor frame (for ASC Mid S/N clamps).

6.7 Supports (V-supports, vent supports, SA purlin support)

Parameter	Default	Type / Allowed values	What it does
v_support_per_frame	2	0 or 2	V-supports per arch frame. 0 = none, 2 = one V per frame.
v_support_length	1.2	float (m)	V-support pipe length.
v_support_in_mid_col_rows	False	bool	True = also place V-supports in middle column rows.
v_support_for_af	False	bool	Enable V-supports on anchor frames.
vent_support_count	1	1, 2, or 3	1 = big→small only; 2 = + mid fan; 3 = + 1/3 & 2/3 fans.
has_sa_purlin_support	False	bool	Small-arch purlin diagonal support (BC center → SA purlin).
sa_purlin_support_length	1.0	float (m)	Offset from frame on the SA purlin where the support lands.

6.8 Purlin configuration

Parameter	Default	Type / Allowed values	What it does
gable_purlin_arch_offset	0.3	float (m)	Gable purlin distance along the arch from the column.
big_arch_purlin_rows	1	int	Additional purlin rows on the big arch.
arch_mid_purlin_mode	'both_side'	'none','4_corner','both_side','front_back','all_4_sides'	Where the big-arch mid-purlin is placed.
arch_mid_purlin_pieces	1	1 or 2	1 = at 50% of arch; 2 = at 1/3 and 2/3.
sm_arch_mid_purlin_mode	'front_back'	Same options as arch_mid_purlin_mode	Mid-purlin placement on the small arch.
sm_arch_mid_purlin_pieces	1	1 or 2	Number of mid-purlin pieces on the small arch.

6.9 Border purlins (per side)

Each side (South/North/East/West) has an independent **lower** and **upper** border purlin with its own enable flag and height. Upper default = column_height – 0.5 = 3.5 m (auto-synced in the viewer).

Parameter	Default	Type / Allowed values	What it does
bp_south_lower	True	bool	Enable South lower border purlin.
bp_south_lower_h	1.0	float (m)	Height of South lower BP.
bp_south_upper	True	bool	Enable South upper border purlin.
bp_south_upper_h	3.5	float (m)	Height of South upper BP.
bp_north_lower	True	bool	Enable North lower border purlin.
bp_north_lower_h	1.0	float (m)	Height of North lower BP.
bp_north_upper	True	bool	Enable North upper border purlin.
bp_north_upper_h	3.5	float (m)	Height of North upper BP.
bp_east_lower	True	bool	Enable East lower border purlin.
bp_east_lower_h	1.0	float (m)	Height of East lower BP.
bp_east_upper	True	bool	Enable East upper border purlin.
bp_east_upper_h	3.5	float (m)	Height of East upper BP.
bp_west_lower	True	bool	Enable West lower border purlin.
bp_west_lower_h	1.0	float (m)	Height of West lower BP.
bp_west_upper	True	bool	Enable West upper border purlin.
bp_west_upper_h	3.5	float (m)	Height of West upper BP.
pipe_lower_border_purlin	'42x2'	pipe key	Pipe used for ALL lower border purlins (BOM only).
pipe_upper_border_purlin	'42x2'	pipe key	Pipe used for ALL upper border purlins (BOM only).

6.10 Bottom chord

Parameter	Default	Type / Allowed values	What it does
is_bottom_chord	True	bool	Enable bottom chord.
bottom_chord_height	0	float (m), 0 = auto	0 = auto (column_height + 0.05). Otherwise explicit height.
bottom_chord_clamp_type	'triple'	'single' or 'triple'	'single' = 3 clamps per segment; 'triple' = 5 clamps per segment.

6.11 Purlin clamp types

Parameter	Default	Type / Allowed values	What it does
bay_side_clamp_required	True	bool	ASC bay-side clamps (Gutter Arch Bracket only).
big_purlin_clamp_type_first	'full_clamp'	'full_clamp' or 'l_joint'	Big arch — edge purlin clamp type.
big_purlin_clamp_type_second	'half_clamp'	'half_clamp' or 't_joint'	Big arch — middle purlin clamp type.
small_purlin_clamp_type_first	'full_clamp'	'full_clamp' or 'l_joint'	Small arch — edge purlin clamp type.
small_purlin_clamp_type_second	'half_clamp'	'half_clamp' or 't_joint'	Small arch — middle purlin clamp type.

6.12 Cross bracing

Parameter	Default	Type / Allowed values	What it does
has_cross_bracing	True	bool	Enable X-bracing on bay sides.
x_brace_pipes	2	1 or 2	1 = single diagonal (alternating /\); 2 = full X pattern.
x_brace_extra_rows	''	comma-separated bay indices	Extra X-brace bay indices (valid range: 3 to nB-3).
x_brace_bottom_height	0	float (m), 0 = ground	X-brace bottom Z offset from ground.
x_brace_top_offset	0	float (m), 0 = column top	X-brace top Z offset down from column top.
is_arch_support_big	True	bool	Enable big arch support.

6.13 Gable bracing

Parameter	Default	Type / Allowed values	What it does
has_gable_col_arch_brace	True	bool	2nd-row column top → gable arch brace.
gable_col_arch_hdist	2.0	float (m)	Horizontal distance on the arch from column X.
has_gable_col_bc_brace	True	bool	2nd-row column top → gable bottom-chord brace.
gable_col_bc_hdist	2.0	float (m)	Horizontal distance on the BC from column X.

6.14 General feature flags

Parameter	Default	Type / Allowed values	What it does
has_gutter	True	bool	Enable gutters (3D + BOM).
has_side_screen	True	bool	Enable side screens.
has_straight_middle_col	False	bool	Straight middle column at frames where no middle column exists.
has_doors	True	bool	Master toggle for all doors (3D + BOM). See 6.24.

6.15 Gutter accessories

Parameter	Default	Type / Allowed values	What it does
enable_gutter	True	bool	Master enable for gutter accessories BOM.
gutter_type	'ippf'	'none','ippf','continuous'	Gutter family — IPPF (panel) or Continuous.
gutter_slope	'1'	'1' or '2'	'1' = one side slope; '2' = both sides slope.
gutter_ippf_full	True	bool	Include IPPF Full gutter pieces.
gutter_ippf_drainage_extension	False	bool	Include drainage extension pieces. Odoo default: False.
gutter_funnel_ippf	True	bool	Include funnel pieces.
gutter_end_cap	True	bool	Include end-cap pieces. Only effective when gutter_slope = '1'.
gutter_extension	'0'	'0','2','4' (meters)	Continuous gutter extension length.
enable_gutter_purlin	False	bool	Enable gutter purlin calculation.
gutter_clamp_type	'omega'	'omega' or 'clamps'	'omega' = omega clamp; 'clamps' = half + full clamp combo.
ippf_width	'400'	'400' or '500' (mm)	IPPF panel width. Affects nut-bolt calculation.

6.16 Brackets

Parameter	Default	Type / Allowed values	What it does
gutter_bracket_type	'arch'	'arch','f_bracket','none'	Gutter Arch Bracket, F Bracket, or none.
column_bracket_type	'l_bracket'	'l_bracket' or 'none'	L Bracket for middle columns, or disabled.
last_span_gutter	False	bool	True = gutter on all spans; False = no gutter on last span.

6.17 Covering accessories

Parameter	Default	Type / Allowed values	What it does
enable_covering	True	bool	Master enable for covering BOM.
is_apron	True	bool	Affects front/back span/bay covering width.
apron_width	1.5	1.5 or 2.0 (m)	Apron width.
calculate_insect_net	True	bool	Enable insect net calculation.
insect_net_width	3.2	1.5 / 2.0 / 2.5 / 3.0 / 3.2 / 3.6 / 4.2 (m)	Insect net width.

6.18 Profiles accessories

Parameter	Default	Type / Allowed values	What it does
enable_profiles	True	bool	Master enable for profiles BOM.
sds_profile_size	'10x25'	'10x20','10x25','12x25'	SDS screw size for the profile.

6.19 Wires accessories

Parameter	Default	Type / Allowed values	What it does
enable_zigzag_wire	True	bool	Enable zigzag wire calculation.
zigzag_wire_multiplier	'1.5'	'1.4','1.5','1.6'	Multiplier applied to total profile length to obtain wire length.

6.20 Miscellaneous accessories

Parameter	Default	Type / Allowed values	What it does
calculate_misc_components	True	bool	Master enable for misc BOM.
calculate_silicon	True	bool	Silicon (IPPF gutter only).
silicon_unit_price	250.0	float (■)	Price per silicon tube.
calculate_gutter_sealant_tape	True	bool	Gutter sealant tape (IPPF only).
calculate_drainage_pipe	False	bool	Drainage pipe.
drainage_pipe_length	'7'	'6','7','8' (m)	Length per drainage pipe.
funnel_pipe_size	110	int (mm)	Funnel pipe size.
calculate_hose_clamp	False	bool	Hose clamp.
hose_clamp_unit_price	15.0	float (■)	Price per hose clamp.
calculate_sliding_door	True	bool	Sliding door BOM.
no_of_sliding_doors	0	int	User-defined door count.
calculate_curtain_clamps	True	bool	Side screen curtain clamps.
curtain_clamp_gap	'1.0'	'1.0' or '0.5' (m)	Gap between curtain clamps.
enable_foundation_rods	True	bool	Foundation rods.
foundation_rods_per_foundation	2	int	Rods per foundation column.
foundation_rods_per_asc	2	int	Rods per ASC pipe.

6.21 Curtains & guards (side screen)

Parameter	Default	Type / Allowed values	What it does
curtain_front_span	True	bool	Curtain on front-span side.
curtain_back_span	True	bool	Curtain on back-span side.
curtain_front_bay	True	bool	Curtain on front-bay side.
curtain_back_bay	True	bool	Curtain on back-bay side.
guard_front_span	'all'	'none','all','even'	Guard on front-span side.
guard_back_span	'all'	'none','all','even'	Guard on back-span side.
guard_front_bay	'all'	'none','all','even'	Guard on front-bay side.
guard_back_bay	'all'	'none','all','even'	Guard on back-bay side.
no_curtains_front_span	2	int	Number of curtains on front-span.
no_curtains_back_span	2	int	Number of curtains on back-span.
no_curtains_front_bay	2	int	Number of curtains on front-bay.
no_curtains_back_bay	2	int	Number of curtains on back-bay.
guard_box_front_span	0	int	Guard boxes on front-span.
guard_box_back_span	0	int	Guard boxes on back-span.
guard_box_front_bay	0	int	Guard boxes on front-bay.
guard_box_back_bay	0	int	Guard boxes on back-bay.

6.22 Side screen geometry

Parameter	Default	Type / Allowed values	What it does
side_screen_height_from_ground	0.8	float (m)	Screen height from ground.
side_screen_guard_length	3.0	float (m)	Guard vertical pipe height.
guard_box_h_pipe_length	1.0	float (m)	Guard box horizontal pipe length.
guard_spacer_length	0.1	float (m)	Guard spacer length.
rollup_joiner_length	0.3	float (m)	Roll-up pipe joiner length.
rollup_handles_length	3.0	float (m)	Roll-up handles length.

6.23 Pipe specifications

Each structural pipe key is set independently. Defaults assume 2 mm thickness. See section 7 for the full pipe catalog and section 8 for rectangular pipe orientation rules.

Parameter	Default	Type / Allowed values	What it does
pipe_foundation_main	'60x2'	pipe key	Foundation pipe — main columns.
pipe_foundation_thick	'90x2'	pipe key	Foundation pipe — thick columns.
pipe_foundation_anchor	'60x2'	pipe key	Foundation pipe — anchor columns.
pipe_foundation_mid	'60x2'	pipe key	Foundation pipe — middle columns.
pipe_main_column	'76x2'	pipe key	Main vertical column.
pipe_anchor_column	'76x2'	pipe key	Anchor column (corners / anchor frames).
pipe_straight_mid_col	'48x2'	pipe key	Straight middle column.
pipe_thick_column	'90x2'	pipe key	Thick column (per thick_column_mode).
pipe_middle_column	'76x2'	pipe key	Middle column (per middle_column_mode).
pipe_big_arch	'42x2'	pipe key	Big arch pipe.
pipe_small_arch	'42x2'	pipe key	Small arch pipe.
pipe_arch_support	'33x2'	pipe key	Arch support (M/W diagonals etc.).
pipe_bottom_chord	'60x2'	pipe key	Bottom chord pipe.
pipe_v_support	'33x2'	pipe key	V-support pipe.
pipe_purlin	'42x2'	pipe key	Default purlin pipe.
pipe_corridor	'60x2'	pipe key	Main corridor (ASC) pipe.
pipe_corridor_support_1	'33x2'	pipe key	ASC support row 1.
pipe_corridor_support_2	'42x2'	pipe key	ASC support row 2.
pipe_corridor_support_3	'42x2'	pipe key	ASC support row 3.
pipe_bracing	'42x2'	pipe key	Cross-bracing pipe.
pipe_gutter	'48x2'	pipe key	Gutter pipe.
pipe_gable_purlin	'48x2'	pipe key	Gable purlin pipe.
pipe_gutter_purlin	'48x2'	pipe key	Gutter purlin pipe.
pipe_gutter_purlin_ext	'48x2'	pipe key	Gutter purlin extension pipe.
pipe_end_gutter_purlin_sup	'48x2'	pipe key	End-gutter purlin support pipe.
pipe_side_screen	'33x2'	pipe key	Side-screen frame pipe.
pipe_rollup_handle	'33x2'	pipe key	Roll-up handle pipe.
pipe_side_guard	'33x2'	pipe key	Side guard pipe.
pipe_guard_box	'33x2'	pipe key	Guard box pipe.
pipe_vent_support	'33x2'	pipe key	Vent support pipe.
pipe_sa_purlin_support	'33x2'	pipe key	Small-arch purlin support pipe.
pipe_arch_mid_purlin	'33x2'	pipe key	Big-arch mid purlin pipe.
pipe_sm_arch_mid_purlin	'33x2'	pipe key	Small-arch mid purlin pipe.
pipe_arch_extra_support	'33x2'	pipe key	Arch extra support pipe.
pipe_gable_col_arch	'42x2'	pipe key	Gable column → arch brace pipe.

Parameter	Default	Type / Allowed values	What it does
pipe_gable_col_bc	'42x2'	pipe key	Gable column → bottom-chord brace pipe.

Rectangular pipes: for any of the above keys you can use a W×H key (e.g. *90x50x2*) and combine it with *rect_orientation* = {pipe_key: degrees}. See section 8.

6.24 Doors

Parameter	Default	Type / Allowed values	What it does
has_doors	True	bool	Master toggle for all doors (3D + BOM).
single_door_side	'west'	'west','east','north','south'	Side where the single door is placed.
single_door_slot	1	int (bay/span #)	Position of the single door along that side.
entry_chamber_side	'west'	'west','east','north','south'	Side of the entry chamber.
entry_chamber_slot	1	int	Position of the entry chamber.
tractor_door_side	'west'	'west','east','north','south'	Side of the tractor door.
tractor_door_slot	1	int	Position of the tractor door.
standalone_doors_count	0	int	Number of simple door openings (X).
entry_chambers_count	1	int	Number of full entry chambers (Y).
door_column_length	3.5	float (m)	Standalone door column length.
chamber_column_length	3.5	float (m)	Chamber column length.
chamber_depth	3.0	float (m)	Chamber depth.
chamber_offset	1.5	float (m)	Chamber offset from structure column.
chamber_outer_height	2.5	float (m)	Chamber outer column height.
tractor_door_type	'none'	'none','vertical','openable'	Tractor door style.
nos_tractor_doors	0	int	Number of tractor doors.
tractor_door_height	3.0	float (m)	Tractor door height.
pipe_door_column	'42x2'	pipe key	Door column (vertical) pipe.
pipe_door_purlin	'42x2'	pipe key	Door purlin (horizontal) pipe.
pipe_door_base	'42x2'	pipe key	Door base (ground frame) pipe.
pipe_tractor_door_v	'42x2'	pipe key	Tractor door outer column pipe.
pipe_tractor_door_h	'42x2'	pipe key	Tractor door horizontal rail pipe.
pipe_tg_frame_v	'33x2'	pipe key	Tractor gate frame vertical (near column).
pipe_tg_center_v	'33x2'	pipe key	Tractor gate center vertical (opening).
pipe_tg_rail	'33x2'	pipe key	Tractor gate horizontal rails.
pipe_tg_base_top	'42x2'	pipe key	Tractor gate base & top rail.

6.25 ACF (Air Circulation Fan)

Parameter	Default	Type / Allowed values	What it does
enable_acf	False	bool	Toggle ACF on/off. Auto-spaces at 20–24 m intervals (target 22 m).
acf_unit_price	9000	int (■)	Price per ACF unit.
pipe_acf	'42x2'	pipe key	ACF mounting pipe.

Note: NVPH-GA family-specific flags such as *end_line_gutters* and *bottom_chord_custom* are not in DEFAULT_GREENHOUSE_CONFIG — they are set on the NVPH-GA assembler only and drive automatic selection of the fabrication process sheet (see section 9.6).

7. Pipe selection from the catalog

7.1 The pipe catalog

The pipe catalog is the master list of pipes available to the software. It includes:

- **Round pipes** — sizes like 33×2, 42×2, 42×2.3, 48×2, 60×2, 60×2.5, 76×2, 88×2 (OD × thickness in mm).
- **Square hollow sections (SHS)** — 30×30, 42×42, 50×50, 60×60, 70×70, 80×80, 90×90 (width × height in mm) at various thicknesses.
- **Rectangular hollow sections (RHS)** — 50×30, 60×40, 80×40, 90×50, 96×48 (width × height in mm) at various thicknesses.

The catalog is managed by the administrator in the *Admin panel*. If a pipe you need is missing, please ask your administrator to add it.

7.2 Changing pipe sizes (live)

Every pipe in the structure plays a **role** — main column, anchor column, middle column, big arch, small arch, big purlin, small purlin, bottom chord, V-support, vent support, and so on. Each role has its own dropdown in the right-side *Pipe groups* panel.

When you change a pipe in any role:

- The 3D model re-draws that role with the new pipe — different colour or thickness.
- The pipe legend updates the displayed size for that role.
- The weight badge recomputes and shows the new total weight.
- All clamp sizes that connect to that pipe role are updated in the BOM.

7.3 The weight badge

The weight badge is the most important live indicator. It tells you the total weight of all pipes in the current structure. Pipe weight × rate per kg is the dominant cost driver, so kindly watch this number as you change pipe sizes — it tells you immediately whether a substitution is moving the cost up or down.

8. Rectangular pipes (new)

8.1 Round vs square vs rectangular

The catalog supports three pipe shapes:

- **Round** — circular cross-section. Quoted as OD × thickness. Example: *76×2 mm*.
- **Square** (SHS) — square cross-section, width = height. Quoted as W×H×t. Example: *60×60×2 mm*.
- **Rectangular** (RHS) — rectangular cross-section, width ≠ height. Quoted as W×H×t. Example: *90×50×2 mm*.

In the 3D viewer, square and rectangular pipes are drawn with their actual cross-section — you can visually verify the orientation. Round pipes are drawn as smooth cylinders.

8.2 Orientation control — the rotation dropdown

For **rectangular** pipes (W ≠ H), the orientation matters. A 90×50 pipe with the 90 mm face vertical behaves very differently from one with the 90 mm face horizontal. Therefore, every rectangular pipe role gets an extra *rotation* dropdown in the pipe legend, with options:

- **0°** — default orientation. The wider face is oriented one way (depends on the role — see the 3D view).
- **90°** — rotated 90 degrees about the pipe axis. Swaps width and height.
- **180° / 270°** — provided for completeness; visually identical to 0° / 90° for hollow sections.

Square pipes (W = H) and round pipes look identical under any rotation, so the rotation dropdown is shown only for rectangular roles.

8.3 Clamp labels — W×H direction-aware

When a connecting pipe contacts a rectangular pipe, the clamp must grip a specific face. The face matters — a 90×50 clamp (gripping the 90 mm face) is a **different physical part** from a 50×90 clamp (gripping the 50 mm face).

The software derives the gripped face from the 3D geometry automatically. You will see two different clamp sizes in the Hardware BOM for the same rectangular pipe — for example:

```
GI Clamp Full    90×50    qty 40    (purlin → arch)
GI Clamp Full    50×90    qty 12    (brace → arch)
```

> **Note:** 90×50 and 50×90 are *different parts* in procurement and stock. Kindly do not treat them as interchangeable — the manufacturer makes the clamp to grip one specific face.

Round and square pipes are not affected by this — their clamp label is the same regardless of orientation.

9. Generating the BOM (Excel export)

9.1 Sheets in the workbook

Clicking *Download Excel* produces a single workbook with multiple sheets. Each sheet has a clear role:

Sheet	What it contains
Summary	Project header, dimensions, total area, total weight, headline cost.
Pipe BOM	Every pipe role with quantity, length per piece, total length, weight, rate per kg, and pipe cost.
Hardware BOM	Every hardware item — clamps (full / half / L / T), bolts, nuts, washers, accessories — with size, quantity,
Production Process	Section-by-section production / shop-floor process notes — built dynamically from the project geometry.
Fabrication Process	Standardised fabrication process for this model — Sr.No., Component, Pipe, Process, Connection / Note
Junction Summary	Every junction type in the structure with count and clamp size — the geometry-driven BOM in summary fo
Process Verification	Cross-checks the BOM against the geometry — helps quality assurance verify numbers before procurem
Structural Report	Section properties, structural calculation outputs (informational; not a substitute for a sealed engineering r

9.2 Summary sheet

The Summary sheet is the cover page of the workbook. It shows the structure type, dimensions, total covered area, total pipe weight, and the headline cost. It is the sheet most customers and managers look at first.

9.3 Pipe BOM

The Pipe BOM lists every pipe role with the following columns:

- **Component** — the role name (Main Column, Anchor Column, Big Arch, etc.).
- **Pipe** — the pipe specification (76×2, 60×60×2, 90×50×2, etc.).
- **Quantity** — number of pieces.
- **Length per piece (m)** — typical cut length.
- **Total length (m)** — quantity × length per piece.
- **Weight (kg)** — total weight contribution.
- **Rate per kg** — current procurement rate.
- **Cost** — weight × rate.

9.4 Hardware BOM

The Hardware BOM lists every non-pipe item — clamps, bolts, nuts, washers, wire rope, grippers, vent rack-and-pinion, etc. The columns are:

- **Name** — the hardware item (GI Clamp Full, GI Clamp Half, M10×40 Bolt, etc.).
- **Category** — Clamps, Bolts, Accessories, Wire Rope, …
- **Size** — the dimension or specification (42 mm, 60 mm, 90×50 for rect clamps, etc.).
- **Quantity** — total pieces.
- **Unit price** and **Total cost**.

9.5 Production Process

The Production Process sheet is the section-by-section shop-floor narrative — what gets fabricated first, what depends on what, and which sub-assemblies leave the factory as one piece. It is generated dynamically from the project geometry.

9.6 Fabrication Process (new)

The Fabrication Process sheet is a **standardised** reference — it ships with every export, and the correct variant is picked automatically based on the model and the configuration flags:

Model / configuration	Fabrication sheet
DRSHNH / DRSNH	DRSHNH-8X4
FRSNH	FRSNH-8X4
FVPH	FVPH-8X4
NVPH-TV-NHB	NVPH-TV-NHB
NVPH-GA (with end-line gutters)	NVPH-END GUTTERS LINE
NVPH-GA (with custom bottom chord)	NVPH-wo end gutters-custom bott
MSPT-SP	(not in master — graceful "no data" message)

Columns in the sheet: Sr.No. · Component · Pipe · Fabrication Process · Connection / Note. The rows are grouped into section bands — Foundation, Frame, Truss, Lower, ASC, Doors, Side Screen, etc. — so the shop floor can read it section by section.

9.7 Junction Summary

The Junction Summary sheet is the geometry-driven BOM in summary form. Every junction type (arch-column, purlin-arch, V-of-M base, vent-support-peak, bottom-chord-arch, …) is listed with the count and the clamp size used at that junction. Use it to cross-check the Hardware BOM.

9.8 Process Verification

The Process Verification sheet cross-checks the BOM against the geometry — it reports any discrepancies, missing junctions, or unexpected counts. Quality assurance uses it to sign off the BOM before it goes to procurement.

9.9 Structural Report

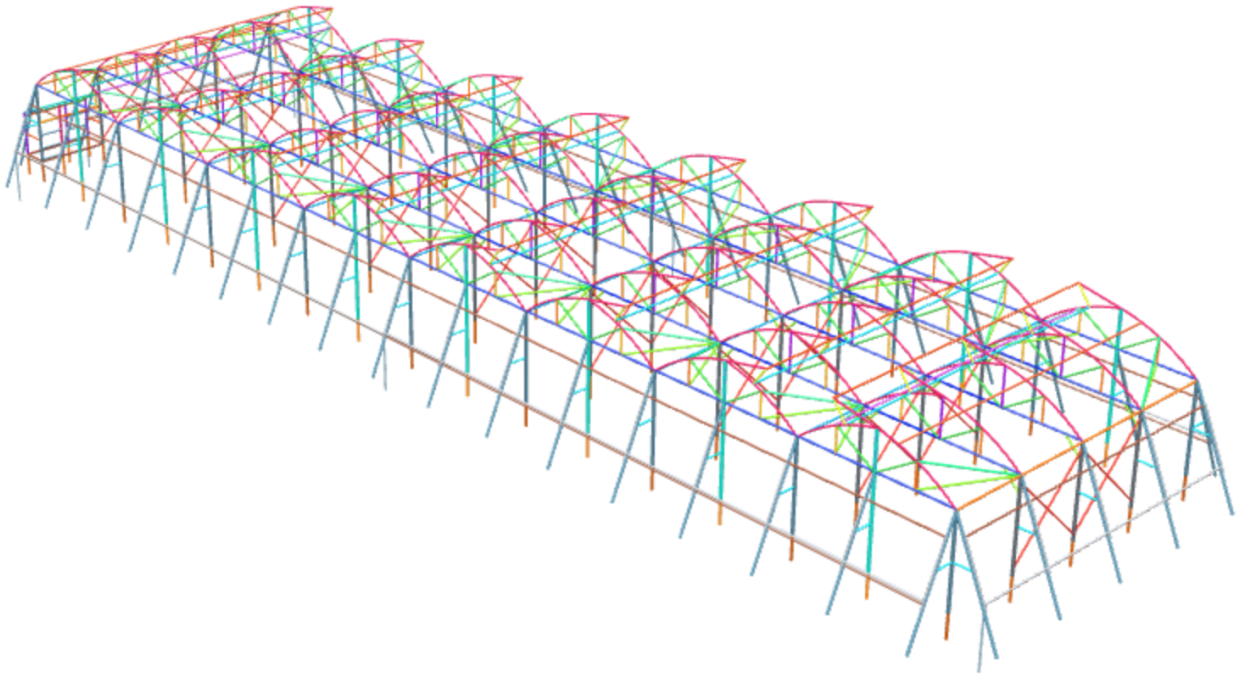
The Structural Report sheet contains section properties (Ix, Iy, weight per metre) and structural calculation outputs. It is provided for informational purposes — please note that it is **not** a substitute for a sealed structural engineering report. For load / wind / snow design certified by a chartered engineer, kindly consult your structural engineering team.

10. Worked examples

Each example below was generated by the live assembler. Numbers shown — pipe quantities, weights, hardware counts, junction counts — are real, not illustrative. Reproduce the steps in the viewer and you should see the same totals.

10.1 Example 1 — NVPH-GA standard 8×4 (round pipes)

This is the most common quotation — a naturally-ventilated gothic-arch greenhouse, 8 spans wide × 4 bays long, with standard round pipes throughout. Use this as your reference for understanding the BOM structure before moving to the more complex variants.



Live 3D isometric view generated by the software — pipes coloured by structural role.

Steps to reproduce

1. Open the viewer and log in.
2. Pick *NVPH-GA* from the structure-type dropdown.
3. Set 8 spans, 4 bays, 8.0 m span width, 4.0 m bay length, 4.5 m gutter height.
4. Leave all pipe roles at their model defaults.
5. Click *Download Excel*.

Headline numbers (from the live software)

Metric	Value
Length × Width	68.0 m × 20.0 m
Height	7.0 m
Covered area	1360.0 m²
Total pipe length	3434.92 m
Total pipe weight	8117.77 kg
Members	3402
BOM rows	65
Hardware rows	57

Pipe BOM excerpt (top 10 rows by sequence)

Component	Pipe	Qty	Total length (m)	Weight (kg)
Main Column	76x2	27	121.50	455.6
Anchor Column	76x2	18	81.00	303.8
Middle Column	76x2	16	103.20	387.0
Straight Mid Col	48x2	40	78.00	187.2
Big Arch	42x2	40	272.00	598.4
Small Arch	42x2	40	180.00	396.0
V Of M Left	33x2	40	95.32	162.0
V Of M Right	33x2	40	95.32	162.0
Bottom Chord Half	48x2	32	128.00	307.2
Bc Male	48x2	24	96.00	230.4

Hardware BOM excerpt (top 10 rows)

Hardware	Category	Size	Qty	Unit ■	Total ■
GI Clamp Full	Clamps	48mm	232	14.70	3,410
GI Clamp Full	Clamps	42mm	238	14.20	3,380
GI Clamp Half	Clamps	42mm	60	17.80	1,068
GI Clamp Full	Clamps	76mm	313	21.00	6,573
GI Clamp Half	Clamps	76mm	37	25.90	958
GI Clamp Full	Clamps	60mm	66	17.20	1,135
GI Clamp Half	Clamps	60mm	72	21.50	1,548
Gutter Arch Bracket HDG	Brackets	5.0mm	35	280.00	9,800
Gutter Arch Bracket Half Left	Brackets	Half	5	220.00	1,100
Gutter Arch Bracket Half Right	Brackets	Half	5	220.00	1,100

Top junction types (geometry-driven)

Junction type	Count
Xbrace Column	144
Bp Column	86
Vom Arch	80
Bc Arch	80
Arch Sup Bc	80
Arch Sup Arch	80
Bc Inner Clamp	72
Foundation Column	65
Gable Brace Col	64
Vsup Col End	48
Vsup Bc End	48
Gutter Arch	45

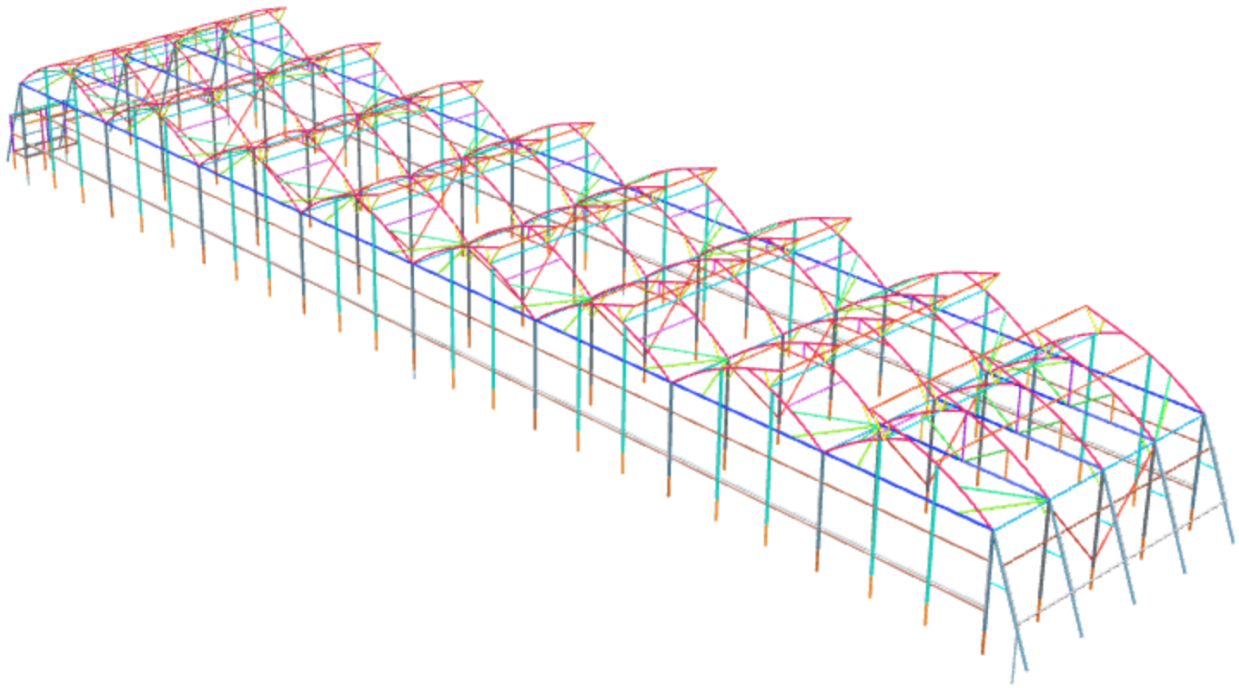
What to take away

- Total weight is your headline procurement cost driver — note it.
- Compare against the customer's target weight or the previous-quarter average — large deviations are worth investigating.
- Clamp counts (Full / Half) are the next-biggest line items — verify the Junction Summary matches the Hardware BOM.

Note: The numbers above were generated by the same software you will use. If you reproduce the steps exactly, your Excel should show the same totals (rounding may vary on the last digit).

10.2 Example 2 — NVPH-GA 9.6 m with custom bottom chord + end gutters

The NVPH-GA 9.6 m variant is used when the customer needs wider bays — tall crops, machinery access, or simply a more open canopy. With **custom bottom chord** and **end-line gutters** enabled, the fabrication sheet that ships in the Excel changes to the custom-bottom variant.



Live 3D isometric view generated by the software — pipes coloured by structural role.

Steps to reproduce

1. Open the viewer and log in.
2. Pick *NVPH-GA-96* (the 9.6 m variant) from the dropdown.
3. Set 8 spans, 4 bays, 9.6 m span width, 4.0 m bay length, 5.0 m gutter height.
4. Tick **End-line gutters** and **Custom bottom chord** in the configuration panel.
5. Click *Download Excel*. Open the Fabrication Process sheet — it should say *NVPH-wo end gutters-custom bott* in the reference header.

Headline numbers (from the live software)

Metric	Value
Length × Width	80.8 m × 16.0 m
Height	8.2 m
Covered area	1292.8 m²
Total pipe length	3190.29 m
Total pipe weight	7849.18 kg
Members	3270
BOM rows	60
Hardware rows	58

Pipe BOM excerpt (top 10 rows by sequence)

Component	Pipe	Qty	Total length (m)	Weight (kg)
Main Column	76x2	27	135.00	506.2
Anchor Column	76x2	18	90.00	337.5
Middle Column	76x2	32	222.69	835.1
Straight Mid Col	33x2	6	15.30	26.0
Big Arch	48x2	40	312.00	748.8
Small Arch	48x2	40	218.80	525.1
V Of M Left	33x2	6	17.23	29.3
V Of M Right	33x2	6	17.23	29.3
Bottom Chord Third	60x2	48	153.60	460.8
Bc Male	60x2	6	28.80	86.4

Hardware BOM excerpt (top 10 rows)

Hardware	Category	Size	Qty	Unit ■	Total ■
GI Clamp Full	Clamps	60mm	98	17.20	1,686
GI Clamp Full	Clamps	48mm	316	14.70	4,645
GI Clamp Full	Clamps	42mm	24	14.20	341
GI Clamp Half	Clamps	48mm	66	18.00	1,188
GI Clamp Full	Clamps	76mm	193	21.00	4,053
GI Clamp Half	Clamps	76mm	107	25.90	2,771
GI Clamp Half	Clamps	60mm	12	21.50	258
Gutter Arch Bracket HDG	Brackets	5.0mm	35	280.00	9,800
Gutter Arch Bracket Half Left	Brackets	Half	5	220.00	1,100
Gutter Arch Bracket Half Right	Brackets	Half	5	220.00	1,100

Top junction types (geometry-driven)

Junction type	Count
Bp Column	118
Foundation Column	81
Vent Sup Peak	80
Bc Arch	80
Xbrace Column	72
Gable Brace Col	64
Vsup Col End	48
Gutter Arch	45
Bracket Arch	45
Arch Column Big	40
Arch Column Small	40
Arch Peak	40

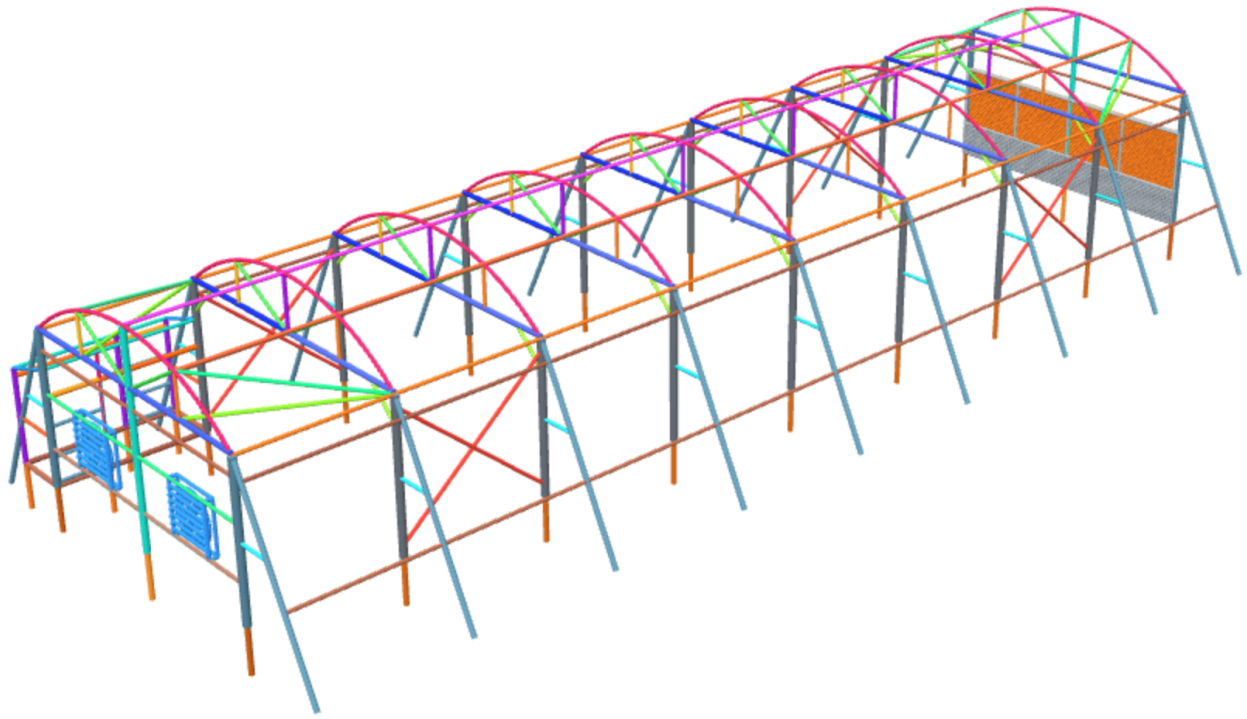
What to take away

- The Fabrication Process sheet picked the *custom bottom chord* variant automatically — no manual selection needed.
- With end-line gutters, additional gutter junctions appear in the Junction Summary at the end frames.
- Wider bays mean longer arches — note the higher big-arch / small-arch length contribution in the Pipe BOM.

Note: The numbers above were generated by the same software you will use. If you reproduce the steps exactly, your Excel should show the same totals (rounding may vary on the last digit).

10.3 Example 3 — FVPH single-span with 90×50 rectangular columns

This example demonstrates the rectangular-pipe support. The main and anchor columns use 90×50×2 RHS pipes rotated 90° about their own axis — the 90 mm face faces the span direction, the 50 mm face faces the bay direction. Notice how the Hardware BOM lists both *90×50* and *50×90* clamps — these are different parts.



Live 3D isometric view generated by the software — pipes coloured by structural role.

Steps to reproduce

1. Open the viewer and log in.
2. Pick *FVPH* from the structure-type dropdown.
3. Set 1 span, 8 bays, 8.0 m span width, 4.0 m bay length, 4.0 m gutter height.
4. In the pipe groups panel, change **Main column** and **Anchor column** to *90×50×2*.
5. Set the **Rotation** dropdown next to each rect column to **90°**.
6. Verify in the 3D view that the columns are drawn with the 90 mm face along the span direction.
7. Click *Download Excel*. Inspect the Hardware BOM for *90×50* and *50×90* clamp entries.

Headline numbers (from the live software)

Metric	Value
Length × Width	12.0 m × 32.0 m
Height	5.5 m
Covered area	384.0 m²
Total pipe length	899.1 m
Total pipe weight	2263.01 kg
Members	1459
BOM rows	45
Hardware rows	48

Pipe BOM excerpt (top 10 rows by sequence)

Component	Pipe	Qty	Total length (m)	Weight (kg)
Main Column	90x50x2	14	56.00	250.9
Anchor Column	90x50x2	4	16.00	71.7
Middle Column	76x2	2	11.00	41.2
Straight Mid Col	48x2	7	10.15	24.4
Big Arch	42x2	9	39.28	86.4
Small Arch	42x2	9	39.28	86.4
V Of M Left	33x2	9	20.82	35.4
V Of M Right	33x2	9	20.82	35.4
Bottom Chord Half	60x2	4	16.00	48.0
Bc Male	60x2	7	28.00	84.0

Hardware BOM excerpt (top 10 rows)

Hardware	Category	Size	Qty	Unit ■	Total ■
GI Clamp Full	Clamps	42mm	43	14.20	611
GI Clamp Full	Clamps	60mm	85	17.20	1,462
GI Clamp Half	Clamps	42mm	15	17.80	267
GI Clamp Full	Clamps	50x90mm	73	6.00	438
GI Clamp Full	Clamps	90x50mm	40	6.00	240
GI Clamp Half	Clamps	60mm	27	21.50	580
GI Clamp Half	Clamps	76mm	6	25.90	155
Gutter Arch Bracket Half Left	Brackets	Half	9	220.00	1,980
Gutter Arch Bracket Half Right	Brackets	Half	9	220.00	1,980
L Bracket HDGI	Brackets	Standard	4	110.00	440

Top junction types (geometry-driven)

Junction type	Count
Bp Column	46
Xbrace Column	32
Foundation Column	24
Bc Inner Clamp	21
Gable Purlin Frame	18
Vom Arch	18
Bc Arch	18
Arch Sup Bc	18
Arch Sup Arch	18
Asc Column	18
Corridor Ground	18
Asc Support Column	18

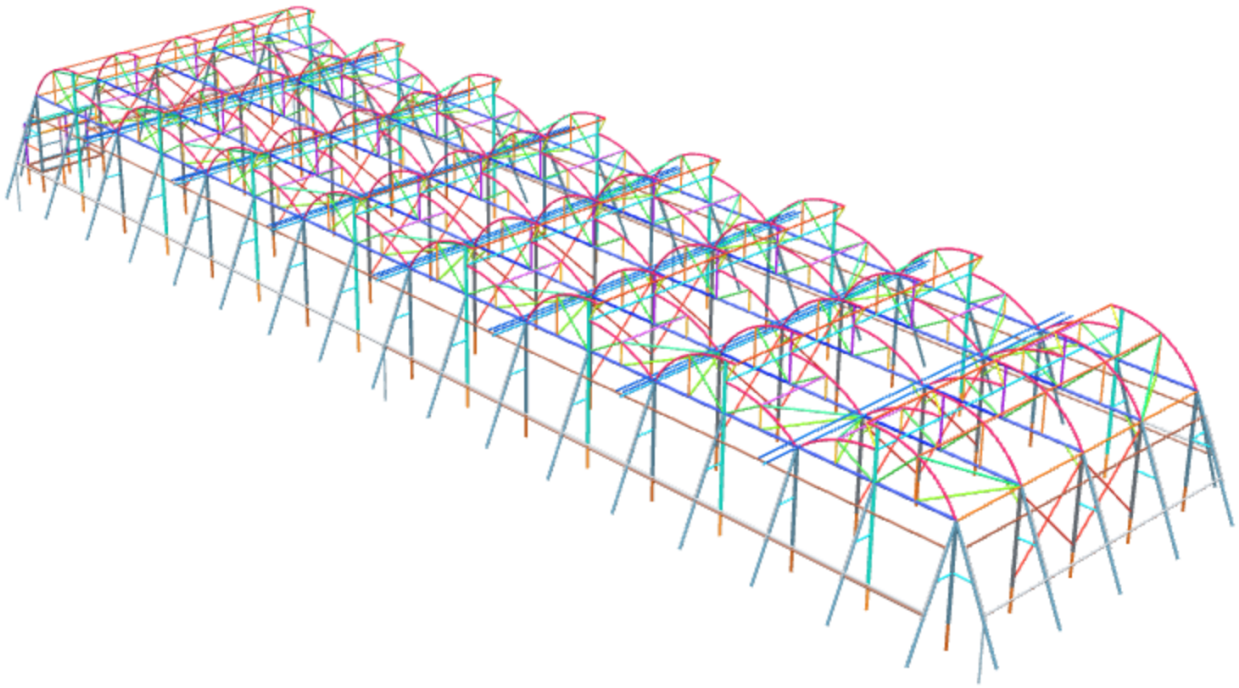
What to take away

- Rectangular columns mean two clamp sizes for the same pipe role — kindly procure both *90×50* and *50×90* separately.
- The weight badge shows the rect columns contribute more weight than equivalent round columns — factor this into the quotation.
- Use the rotation dropdown deliberately — the 3D view will show whether the column orientation matches your structural intent.

Note: The numbers above were generated by the same software you will use. If you reproduce the steps exactly, your Excel should show the same totals (rounding may vary on the last digit).

10.4 Example 4 — NVPH-TV-NHB 8×4 (round pipes)

The NVPH-TV-NHB is a tunnel-ventilated, NHB-subsidy-compliant variant of the NVPH. Geometry and BOM are similar to the NVPH-GA but with NHB-mandated ventilation hardware. Use this when the customer is claiming NHB subsidy.



Live 3D isometric view generated by the software — pipes coloured by structural role.

Steps to reproduce

1. Open the viewer and log in.
2. Pick *NVPH-TV-NHB* from the structure-type dropdown.
3. Set 8 spans, 4 bays, 8.0 m span width, 4.0 m bay length, 4.5 m gutter height.
4. Leave all pipe roles at their NHB-compliant defaults.
5. Click *Download Excel*. Open the Fabrication Process sheet — it should say *NVPH-TV-NHB*.

Headline numbers (from the live software)

Metric	Value
Length × Width	68.0 m × 20.0 m
Height	6.95 m
Covered area	1360.0 m²
Total pipe length	3711.83 m
Total pipe weight	9069.23 kg
Members	2838
BOM rows	67
Hardware rows	47

Pipe BOM excerpt (top 10 rows by sequence)

Component	Pipe	Qty	Total length (m)	Weight (kg)
Main Column	76x2	27	121.50	455.6
Anchor Column	76x2	18	81.00	303.8
Middle Column	76x2	16	111.20	417.0
Straight Mid Col	48x2	24	57.60	138.2
Big Arch	48x2	40	219.80	527.5
Small Arch	48x2	40	174.03	417.7
V Of M Left	33x2	40	112.57	191.4
V Of M Right	33x2	40	92.03	156.4
Bottom Chord Half	60x2	32	128.00	384.0
Bc Male	60x2	24	96.00	288.0

Hardware BOM excerpt (top 10 rows)

Hardware	Category	Size	Qty	Unit ■	Total ■
GI Clamp Full	Clamps	48mm	340	14.70	4,998
GI Clamp Full	Clamps	60mm	294	17.20	5,057
GI Clamp Half	Clamps	48mm	112	18.00	2,016
GI Clamp Full	Clamps	76mm	313	21.00	6,573
GI Clamp Half	Clamps	76mm	37	25.90	958
GI Clamp Half	Clamps	60mm	71	21.50	1,526
F Bracket Big HDGI	Brackets	Big	40	198.00	7,920
F Bracket Small HDGI	Brackets	Small	40	198.00	7,920
L Bracket HDGI	Brackets	Standard	32	110.00	3,520
Gutter Continuous	Gutter Accessories	500mm x 1.0mm GI x 18.0m	37	6005.25	42,037

Top junction types (geometry-driven)

Junction type	Count
Xbrace Column	144
Bp Column	86
Vom Arch	80
Bc Arch	80
Arch Sup Bc	80
Arch Sup Arch	80
Bc Inner Clamp	72
Foundation Column	65
Gable Brace Col	64
Vsup Col End	48
Vsup Bc End	48
Gutter Arch	45

What to take away

- BOM structure is very similar to NVPH-GA, but the fabrication sheet is *NVPH-TV-NHB* — the NHB-mandated reference.
- Junction counts will differ slightly from NVPH-GA because of the tunnel-vent hardware.
- If you are claiming NHB subsidy, save this BOM as the reference for your subsidy application.

Note: The numbers above were generated by the same software you will use. If you reproduce the steps exactly, your Excel should show the same totals (rounding may vary on the last digit).

11. Tips and FAQ

Tips

- **Always check the weight badge after every pipe change** — it is the fastest way to spot a wrong substitution.
- **Save your design before exporting** — if the customer comes back tomorrow, you can reload it with one click.
- **Compare Junction Summary against Hardware BOM** — if the totals do not reconcile, do not export until the discrepancy is understood.
- **For rectangular pipes, use the 3D view to verify orientation** — the rotation dropdown is your friend, not just a number.
- **Refresh the browser if the legend / weight badge fails to update** — a hard refresh (Ctrl + F5) clears stale cache.
- **For NVPH-GA, double-check which fabrication-sheet variant landed in the Excel** — open the sheet and read the reference header.

Frequently Asked Questions

Q. The legend did not update after I changed a pipe — what do I do?

Hard-refresh the browser (Ctrl + F5). If the problem persists, kindly report it to your administrator — the live-update is a core feature and a persistent failure indicates a server issue, not a workflow issue.

Q. The Hardware BOM lists both 90×50 and 50×90 clamps — is this a bug?

No — this is by design. A 90×50 clamp grips the 90 mm face of a rectangular pipe; a 50×90 clamp grips the 50 mm face. They are physically different parts, manufactured separately, and must be procured separately. See section 8.3.

Q. The Fabrication Process sheet is missing in my Excel — why?

Two possible causes: (1) The model is *MSPT-SP*, which is not in the standardised fabrication master — in this case the sheet shows a graceful “no data” message. (2) You are on an old version of the software — please ask the administrator to update the server.

Q. The 3D view shows pipes as round even though I picked square / rect — why?

Hard-refresh the browser (Ctrl + F5) to clear cached JavaScript. If the problem persists, please report to the administrator.

Q. Why does the total weight differ slightly between two exports of the same design?

If you changed any parameter (even a pipe size), the design is no longer the same. If you have not changed anything and the weight differs by more than 1 kg, please report — this is unexpected.

Q. Can I edit the standardised fabrication process?

Not from the viewer. The fabrication-process master is managed in the source *FABRICATION_PROCESSES-STANDARDISED.xlsx*. Please send change requests to the engineering team — they will update the master and re-deploy the server.

Q. The structure I need is not in the dropdown — what do I do?

Please contact your administrator. New structure families require a software update — they cannot be added from the viewer.

12. Glossary

A quick reference for the terms used in the software, the Excel BOM, and this guide.

Term	Meaning
Anchor column	The column at the gable end (front / rear) of the structure.
Arch	The curved member spanning between two columns at the roof. "Big arch" is the outer arch; "small arch"
Bay	One section of the structure along its length, between two frames. The number of bays multiplied by the b
BOM	Bill of Materials — the complete list of pipes, hardware, and accessories needed to build the structure.
Bottom chord	The horizontal member tying the bottom of an arch — completes the truss. May be "regular" or "custom" i
Clamp	A bolted connector used to join two pipes at a junction. Common types: Full, Half, L-joint, T-joint.
Frame	One vertical slice of the structure — columns + arches + truss at a single position along the length.
Gutter	The horizontal channel running along the top of the columns where two adjacent arches meet — catches
NHB	National Horticulture Board (India) — provides subsidies for greenhouse construction; the NVPH-TV-NHE
NVPH	Naturally-ventilated polyhouse — uses passive openings (roof vents) for ventilation.
Purlin	A horizontal member running along the length of the structure, on top of (or below) the arches — supports
RHS	Rectangular Hollow Section — a steel pipe with a rectangular cross-section (width ≠ height).
SHS	Square Hollow Section — a steel pipe with a square cross-section (width = height).
Span	One section of the structure across its width, between two columns. The number of spans multiplied by th
Trellising	Wires and grippers used to train climbing crops (tomato, cucumber, capsicum, etc.).
V-of-M / VoM	A V-shaped member assembly used in NVPH variants to brace the middle column to the arch.
V-support	A V-shaped support tying columns to the bottom chord — provides lateral stability.

End of guide. For any clarifications, please contact HARDIK RAKHOLIYA or your administrator.