



Welcome to LINK-SeleCalc

LINK-SeleCalc is a module of a family of Habasit calculation programs created by the Habasit application engineer team.

Thanks to his simple update mechanism over the internet you always calculate with newest data.

Please enjoy the work with LINK-SeleCalc.

Internet online version

Online SeleCalc tools are continuously kept updated. It assures that the latest belt types and material combinations can be calculated. Complex version releases are not needed. It makes sure that you will always calculate with the latest version.

LINK-SeleCalc is an online program that allows calculating modular belt tensile strength utilization for straight and radius applications. It will indicate if the selected belt can run within the specified application parameters. It will provide additional information like number of sprockets needed, shaft deflection, number of shaft bearings need, shaft torque, shaft rotation and drive shaft power and else.

The program is optimized to run on Internet Explorer 9 and higher but does run on other browser like Chrome or Firefox as well but appearance and performance might be slightly different.

Pro version allows changing parameters and is reserved for product specialist.



First registration

Please register per website on: <https://selecalc.habasit.com/Link.aspx>

for access. You will be approved by a local Habasit approver and will receive a confirmation.

Getting started

Icon explanation:

Company  : Select an existing company name

   : Add, edit or delete a company name.

Projects  : Select an existing project name

      : Add, edit, copy, send by email, lock project or delete a project name.

Share this project  On : Projects can be shared with colleagues. All member of a group can share their projects. The group is specified by the approver (Habasit) but is usually the company name that allows all users within the same company to share projects.

User  Standard : Most of the users calculate in Standard mode. Pro uses can change certain parameters directly in the program but this calculation modus is preserved for product specialist.

Remarks:

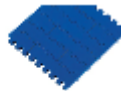
In the Header you can enter comments for your own use about the project. You cannot search in the remark field.

Remarks

Product:

In the header you can find a picture of the belt that is selected. If you click on this picture the product data (PDS) sheet will appear.

Product



Metric / Imperial

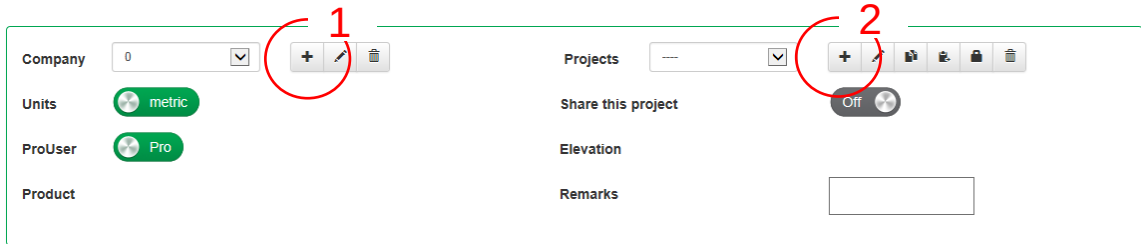
You can change the current project from metric to imperial and vice-versa. All values will be converted.

Units



Always [reselect the sprocket](#) after changing the unit system.

Calculation example



Company: 0 [dropdown] [add] [edit] [delete]

Units: metric

ProUser: Pro

Product:

Projects: --- [dropdown] [add] [edit] [delete] [lock] [unlock]

Share this project: Off

Elevation:

Remarks:

To start the first time a calculation:

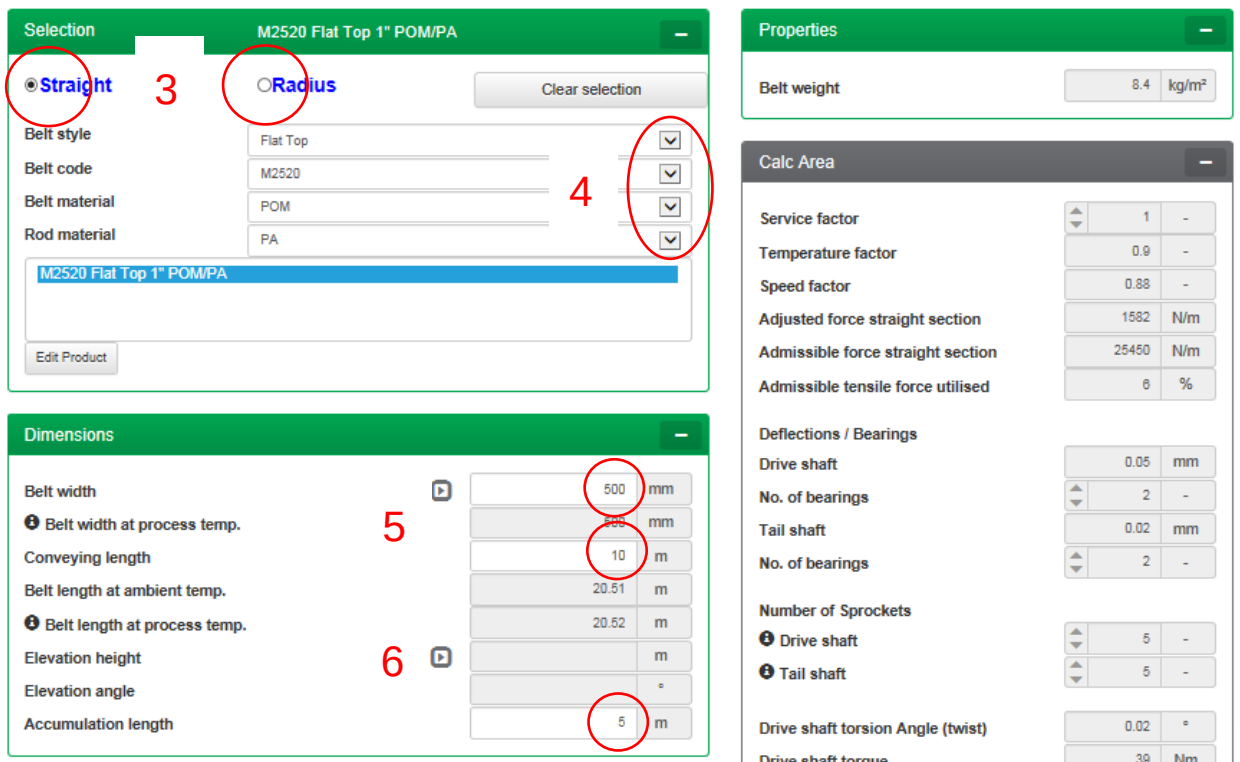
1. Enter a company name
2. Enter a project name.

The program uploads the graphical user interface (GUI)



the rotating arrows icon top left on the screen indicates the program is in contact with the server. Please always wait until this icon disappeared.

Please use tab button or click with cursor into next field instead the enter button.



Selection M2520 Flat Top 1" POM/PA

☒ Straight **3** ☐ Radius

Clear selection

Belt style: Flat Top

Belt code: M2520 **4**

Belt material: POM

Rod material: PA

M2520 Flat Top 1" POM/PA

Edit Product

Properties

Belt weight: 8.4 kg/m²

Calc Area

Service factor: 1

Temperature factor: 0.9

Speed factor: 0.88

Adjusted force straight section: 1582 N/m

Admissible force straight section: 25450 N/m

Admissible tensile force utilised: 6 %

Dimensions

Belt width: 500 mm **5**

Belt width at process temp.: 500 mm

Conveying length: 10 m

Belt length at ambient temp.: 20.51 m

Belt length at process temp.: 20.52 m

Elevation height: m

Elevation angle: °

Accumulation length: 5 m **6**

Deflections / Bearings

Drive shaft: 0.05 mm

No. of bearings: 2

Tail shaft: 0.02 mm

No. of bearings: 2

Number of Sprockets

Drive shaft: 5

Tail shaft: 5

Drive shaft torsion Angle (twist): 0.02 °

Drive shaft torque: 39 Nm

3. Select Straight (default) or Radius application (radio button)
4. Select belt style, code, material and rod material

The belt article (belt code with module and rod material) will be uploaded into the header of the belt selection

5. Enter dimensions in white fields (gray fields are calculations). In case of radius belt the conveyor configuration will be defined in Radius section (see 7). In case the entered belt

width does not match a standard width a warning will appear. Click on  icon in the belt width line and a sub menu will open. Select either a standard or a non standard belt width and click OK.

Value entered				
	Width (mm)		Width (inch)	Diff (inch)
☒	500		19.69	

Standard values				
	Width (mm)	Diff (mm)	Width (inch)	Diff (inch)
☐	500	0	19.69	0
☐	550	50	21.65	1.97

Non Standard values				
	Width (mm)	Diff (mm)	Width (inch)	Diff (inch)
☐	483.33	-16.67	19.03	-0.66
☐	516.67	16.67	20.34	0.66

The selected belt width will be taken into the GUI and the warning will disappear.

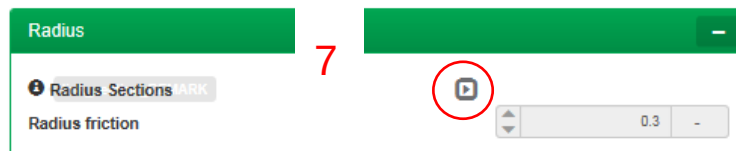
6. Elevation: In case it concerns an elevation configuration click on  in the elevation height line and a sub menu will open:

Elevation

					
---	---	---	---	---	---

Click on the icon indicating required elevating configuration. A sub menu will open:

7. In case of a radius configuration the belt click on  in the Radius section:



Enter required value for Straight length l_0 (section 0) in the menu. If required enter Accumulation length.

Radius sections

Section: 0

Radius Angle: °

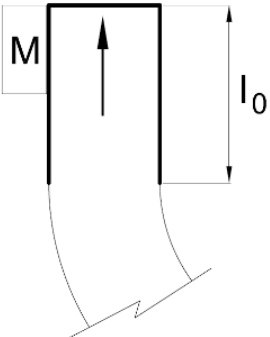
Radius: mm

MinRadiusLength: mm

Straight Length: 1 m

Accumulation Length: 1 m

MaxAccumulationLength: 1 m



Delete Last Section Add Section

Section	Radius	Angle	L straight	L radius	L section	Accumulation
0			1		1	1

Length of straight sections should be min. 1.5 x belt width (with a minimum of 1 m (3 ft) in section 0). A minimum straight section of 2 x belt width (2 x b0) is proposed between turns in opposite directions. Check all values of "L straight" in table above

Cancel OK

Press button Add Section:

A new menu for section 1 will appear. For section 1,2,3 etc. always a radius and a straight part needs to be defined. Enter radius angle, straight length l, accumulation length (if required) and inside radius if larger than the minimum that is indicated.

Radius sections

Section: 1

Radius Angle: 90 °

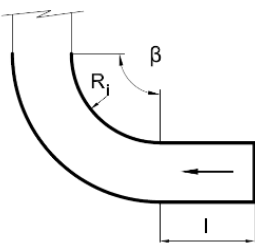
Radius: 1080 mm

MinRadiusLength: 1080 mm

Straight Length: 2 m

Accumulation Length: 4.48 m

MaxAccumulationLength: 4.48 m



Delete Last Section Add Section

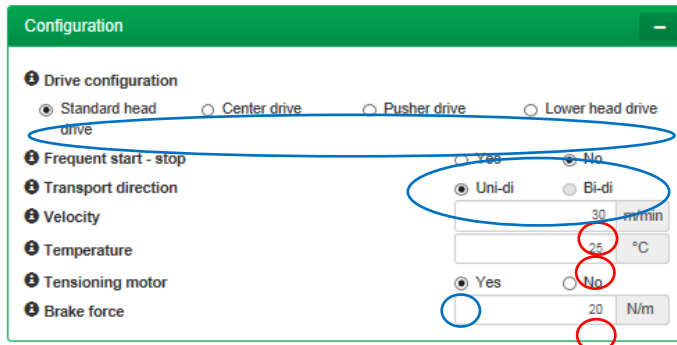
Section	Radius	Angle	L straight	L radius	L section	Accumulation
0			1		1	1
1	1080.00	90	2	2.48	4.48	4.48

Length of straight sections should be min. 1.5 x belt width (with a minimum of 1 m (3 ft) in section 0). A minimum straight section of 2 x belt width (2 x b0) is proposed between turns in opposite directions. Check all values of "L straight" in table above

Cancel OK

Add additional sections if needed.

8. Select or enter configuration parameters:



The Configuration window includes the following settings:

- Drive configuration:** Standard head (selected), Center drive, Pusher drive, Lower head drive.
- Frequent start - stop:** Yes, No (selected).
- Transport direction:** Uni-di (selected), Bi-di.
- Velocity:** 30 m/min.
- Temperature:** 25 °C.
- Tensioning motor:** Yes (selected), No.
- Brake force:** 20 N/m.

The brake force field will only appear if tensioning motor is set to yes.

9. Enter load conveyed and load accumulated:



The Conveyed load window includes the following settings:

- Load conveyed:** 10.0 kg/m².
- Load accumulated:** 20.0 kg/m².

Click on  if the load is not available in kg/m² (lb/sqft).

Note: This sub menu only works if the conveyor length (radius sections in case of radius application) is prior defined.



The Load calculation window includes the following input fields:

- Load on entire belt:** 50 kg.
- Load on belt area:** 10 kg/m².
- Load on belt length:** 5 kg/m.

Cancel OK

Enter a value and click tab to start calculation and as soon the rotating arrows on left top disappeared, click OK. The value in the GUI will be in kg/m² (lb/sqft) or kg/m (lb/ft) for mold to width (fix width) belts.

Note: The accumulation load is usually higher than the standard load because there is no room between products.

10. Environment and friction:

Application environmental conditions

Application conditions

☐ Regular
 ☒ Tough

Environmental conditions

☒ Dry
 ☐ Wet

Friction: Belt to Slider

Belt to Slider

☒ Selection based
 ☐ User defined

Belt to Slider material

☒ PE-UHMW
 ☐ PE-HD
 ☐ Lubricated PA
 ☐ Stainless steel
 ☐ Hard wood
 ☐ PE-UHMW ESD

Friction belt - slider

Friction: Belt to Product

Belt to Product

☒ Selection based
 ☐ User defined

Product material

☒ Cardboard
 ☐ Glass
 ☐ Metal
 ☐ Plastic (PET)
 ☐ Rollers

Friction belt - product

Select conditions. If not known, select tough condition.

Friction can be selected by support material or user defined that requires to enter a friction value.

By pressing the arrows  one can change the selected friction value in 0.01 steps.

Friction belt to product is required for product accumulation only.

11. Sprocket selection:

Sprockets

sprockets

Sprocket name

M25S1240Q

Sprocket material

POM

Teeth

12

Pitch

99 mm

ShaftType

solid

Shaft diameter

40.00 mm

Sprocket bore type

5

Journal diameter

30.00 mm

Shaft material

☐ Aluminium
 ☐ Carbon steel
 ☐ Stainless steel (high strength)
 ☒ Stainless steel (low strength)

Press  to open the sub menu to select a sprocket.

Filter in the light gray field for standard or non standard, metric or imperial size.

Select a sprocket in the selection field. For sprockets with a bore range, enter a shaft size within its range. For standard sprockets the bore size will be taken into the shaft size field that turns to gray. For shafts made of a tube, select Tube and enter the wall thickness into the field Wall Thickness. Enter a journal diameter (connection to motor) that must be smaller or equal shaft size. Press tab for selection and as soon rotating arrow disappeared press OK.

Sprockets x

☒ Standard Sprockets Only
☒ mm
☐ inch

☒ one-piece
☐ split

☒ square
☐ round

Code	Teeth	dp	Bore	Material	Type
M25S0825Q	8	68 mm	s 25	PA	S-C2
M25S0825Q	8	67 mm	s 25	POM	S
M25S0825Q	8	67 mm	s 25	PP	S
M25S1040Q	10	84 mm	s 40	PA	S-C2
M25S1040Q	10	82 mm	s 40	POM	S
M25S1040Q	10	82 mm	s 40	ST	S
M25S1240Q	12	100 mm	s 40	PA	S-C2
M25S1240Q	12	99 mm	s 40	POM	S

Shaft Size 40 mm

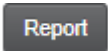
Shaft Type ☐ Solid ☒ Tube

Wall Thickness 5 mm

Journal Diameter 30 mm

Cancel
OK

The sprocket parameters will be taken into the GUI. Please check values in the GUI.

12. Press . Note: As long save button is not pressed the data are not stored and will get lost if program gets closed or with program timeout. Press  to receive a result pdf file.

Tips and hints

The web based LINK-SeleCalc needs to transmit the data via internet. The program shows the connection to server by a rotation arrow on top left of the screen. Please wait until the rotating arrows disappear for intermediate and final calculations.



Please use tab button or click with cursor into next field instead the enter button. Sub menu need intermediate calculation.



OK is light green, press tab button or wait until the button turns dark green.



OK is dark green, press tab or click with cursor on button.

For radius and straight applications the load conversions (load per square to entire load or load per length) in the Conveyed load sub menu requires **prior** a conveyor length that is defined in the dimension menu (for straight belts) or in the sub menu Radius.

Radius	Conveyed load
Radius Sections Radius friction 0.30	Load conveyed 2.00 lb/ft Load accumulated 4.00 lb/ft

If you stop working with the program it will run into a timeout. The data entered will not be stored automatically. Please press save button to store data.



If an internet connection is not available it is possible to work via mobile phone net. But it requires a smart phone that is able to be a Hot Spot. You can find on YouTube several tutorials how to generate a Hot Spot for specific smart phones.

For Samsung S3: <https://www.youtube.com/watch?v=yYbNgyJnOIs>

For iPhone S5: <https://www.youtube.com/watch?v=-BiWUEtM9Us>

After Hot Spot is active on your smart phone and selected by your device (tablet or laptop) it is possible to do LINK-SeleCalc calculation just as you are used to do. Don't forget to switch off Hot Spot after you did the calculation.

Belt selection

For a belt overview please consult: <http://www.habasit.com/en/mod-belt-types-and-data-sheets.htm>

For belt per application consult our Engineering Guide 6031 in the download section of our website:
http://www.habasit.com/en/download.htm#Modular_belts

Material

Belt material

The following standard materials are used for HabasitLINK® Modular belts.

Material	Code	Description	Density g/cm ³	Temperature range
Polypropylene	PP	Thermoplastic material with good cost/performance relation (material for most of the common conveying applications). Excellent chemical resistance to acids and alkalines. * High impacts below 10 °C (50 °F) must be avoided.	0.9	+5 °C to +105 °C (*) +40 °F to +220 °F (*)
Polyethylene	PE	Thermoplastic material well suited for very low temperatures and/or high impact applications. Excellent chemical resistance to acids and alkalines. Not suitable for abrasive applications. * Below -40 °C (-40 °F), thermal belt shrinkage requires a sprocket pitch diameter adaptation.	0.94	-70 °C to +65 °C (*) -94 °F to +150 °F (*)
Polyoxymethylene (Acetal)	POM	Thermoplastic material with high strength and low coefficient of friction. Impact and cut resistant surface. Suitable for heavy duty applications and low temperatures. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	1.42	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
Polyamide (Nylon)	PA	Thermoplastic material with high strength and abrasion resistance. Suitable for heavy duty applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.	1.14	Wet conditions: not recommended Dry conditions: -46 °C to +130 °C (short-term +160 °C) -50 °F to +266 °F (short-term +320 °F)

For detailed declarations of compliance per material and color, please contact Habasit.

Selected special belt materials:

Material	Code	Description	Density g/cm ³	Temperature range
Antistatic Polypropylene	PP +AS	Thermoplastic material with reduced electrical surface resistance to reduce dust accumulation and belt charge-up. * High impacts below 10 °C (50 °F) must be avoided.	0.9	Wet conditions: not recommended Dry conditions: +5 °C to +105 °C (*) +40 °F to +220 °F (*)
Detectable Polypropylene	PP +DE	Thermoplastic material with a special additive which makes the material very well detectable (X-ray and metal detectors). Excellent chemical resistance to acids and alkalines. * High impacts below 10 °C (50 °F) must be avoided.	1.09	+5 °C to + 105 °C (*) +40 °F to 220 °F (*)
Electrically conductive Polypropylene	PP +EC	Thermoplastic material with a low electrical surface and volume resistance. Electrical resistance fulfills DIN EN 61340 for ESD safety areas.	1.02	+5 °C to +105 °C +40 °F to +220 °F
Electrically conductive and flame retardant Polypropylene	PP +FC	Thermoplastic material with a combination of low electrical resistance and very good flame retardant properties. Burning behavior classified as Cfl-S1 according DIN EN 13501, (comparable to former DIN 4102 B1). Halogen free and RoHS conform. Electrical resistance fulfills DIN EN 61340 for ESD safety areas.	1.08	+5 °C to +80 °C +40 °F to +176 °F
Flame retardant Polypropylene	PP +FR	Flame retardant thermoplastic material for most of the common conveying applications with special demand on low flammability. Burning behavior classified as Cfl-S1 according DIN EN 13501, (comparable to former DIN 4102 B1). Halogen free and RoHS conform. * High impacts below 10 °C (50 °F) must be avoided.	1.05	+5 °C to +105 °C (*) +40 °F to +220 °F (*)
Submersible Polypropylene	PP +GH	Thermoplastic material with a density which allows that the material sinks in water. It has a good chemical and hot water resistance which allows a continuous use in boiling water. * High impacts below 10 °C (50 °F) must be avoided. For the detailed chemical resistance please contact Habasit.	1.24	+ 5 °C to + 105 °C (*) +40 °F to + 220 °F (*)
Hot water resistant Polypropylene	PP +HW	Stabilized thermoplastic material with improved resistance against oxidation and embrittlement.	0.9	+ 5 °C to + 105 °C +40 °F to + 220 °F

Material	Code	Description	Density g/cm ³	Temperature range
HabaGUARD® Polypropylene	PP +H15	Thermoplastic material containing antimicrobial additive, with excellent chemical resistance to acids and alkalines.	0.9	ambient temperature
HabaGUARD® Polyethylene	PE +H15	Thermoplastic material containing antimicrobial additive, well suited for low temperatures and high impact applications. Excellent chemical resistance against acids and alkalines.	0.94	ambient temperature
Detectable Polypropylene	PE +DE	Thermoplastic material with a special additive, which makes the material very well detectable (X-ray and metal detectors). Well suitable for low temperature and/or high impact applications. Excellent chemical resistance to acids and alkalines. * Below -40 °C (-40 °F), thermal belt shrinkage requires a sprocket pitch diameter adaptation.	1.15	-70 °C to +65 °C (*) -94 °F to +150 °F (*)
Antistatic Polyoxymethylene (Acetal)	POM +AS	Thermoplastic material with reduced electrical surface resistance to reduce dust accumulation and belt charge-up. Suitable for heavy duty applications and low temperatures. Material has high strength, low coefficient of friction and scratch-resistant surface.	1.42	Wet conditions: not recommended Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
Detectable Polyoxymethylene (Acetal)	POM +DE	Thermoplastic material with a special additive, which makes the material very well detectable (X-ray and metal detectors). The material has a good chemical resistance against oil and alkalines, but not suitable for long term contact with high concentration of acids and chlorine.	1.67	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
X-ray detectable Polyoxymethylene (Acetal)	POM +DX	Thermoplastic material with special filler to make the material X-ray detectable.	–	Wet condition: -40 °C to + 60 °C -40 °F to + 140 °F Dry condition: -40 °C to + 93 °C -40 °F to + 200 °F
Electrically conductive Polyoxymethylene (Acetal)	POM +EC	Thermoplastic material with a low electrical surface and volume resistance. Electrical resistance fulfills DIN EN 61340 for ESD safety areas. Material has a high strength and low coefficient of friction. Suitable for heavy duty applications and low temperatures.	1.42	Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
Impact and cut resistant Polyoxymethylene (Acetal)	POM +IM	Thermoplastic material with advanced impact and cut resistant surface. Suitable for meat cutting conveyors and high impact applications. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	1.42	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +93 °C -40 °F to +200 °F

Material	Code	Description	Density g/cm ³	Temperature range
Fatigue resistant Polyoxymethylene (Acetal)	POM +JM	Thermoplastic material with high strength, low coefficient of friction and improved fatigue resistance. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	1.42	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
Low friction Polyoxamethylene (Acetal)	POM +LF	Thermoplastic material with high strength and low coefficient of friction. Impact and cut resistant surface. Suitable for fast running applications. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	1.42	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
Wear resistant Polyoxymethylene (Acetal)	POM +PK	Extra wear resistant thermoplastic material with high strength, low coefficient of friction and very good fatigue resistance. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	1.42	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
Ultra low friction Polyoxymethylene (Acetal)	POM +UF	Thermoplastic material with high strength and low coefficient of friction (ultra low friction grade self-lubricating additives). Impact and cut resistant surface. Suitable for fast running applications. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	1.42	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
UV protected Polyoxymethylene (Acetal)	POM +UV	Thermoplastic material with improved resistance against UV radiation, especially for outdoor applications. The material has a high strength and low coefficient of friction. It is suitable for heavy duty applications and low temperatures.	1.42	Wet conditions: -40 °C to + 60 °C -40 °F to + 140 °F Dry conditions: -40 °C to + 93 °C -40 °F to + 200 °F

Material	Code	Description	Density g/cm ³	Temperature range
Reinforced Polyamide (Nylon)	PA +GF	Reinforced thermoplastic material with high strength. Suitable for heavy conveying applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.	1.35	Wet conditions: not recommended Dry conditions: -40 °C to +145 °C (short-term +175 °C) -40 °F to +293 °F (short-term +347 °F)
Reinforced Polyamide (Nylon)	PA +HT	Reinforced thermoplastic material with very high strength and toughness. Suitable for heavy conveying applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.	1.37	Wet conditions: not recommended Dry conditions: -40 °C to +170 °C (short-term +200 °C) -40 °F to +338 °F (short-term +392 °F)
Reinforced non-stick Polyamide (Nylon)	PA +HN	Reinforced non-stick thermoplastic material with high strength. Suitable for heavy conveying applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.	1.41	Wet conditions: not recommended Dry conditions: -40 °C to +170 °C (short-term +200 °C) -40 °F to +338 °F (short-term +392 °F)
Impact resistant Polyamide (Nylon)	PA +IM	Tough thermoplastic material with good strength and fatigue resistance. Suitable for heavy conveying applications with high impact load. The belt properties and dimensions change with moisture absorption. The material can replace impact resistant acetal in impact intensive applications, but is more susceptible to cuts. In wet environment, dimension change needs to be considered.	1.08	Wet conditions: -46 °C to +60 °C -50 °F to +140 °F Dry conditions: -46 °C to +80 °C -50 °F to +176 °F
Polyamide (Nylon)	PA +RM	Tough thermoplastic material with good strength and fatigue resistance. The belt properties include good dimensional stability, low moisture absorption and high level of heat resistance. Flammability UL94 V2		Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +118 °C (short term 135 °C) -40 °F to +245 °F (short term 275 °F)

Material	Code	Description	Density g/cm ³	Temperature range
Super High Temperature	ST	Reinforced thermoplastic material with very good heat and hydrolysis resistance. Suitable for light conveying applications at elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures. Flammability UL94 V0.	1.65	Wet conditions: on request Dry conditions: 0 °C to +200 °C (short-term +240 °C) +32 °F to +392 °F (short-term +464 °F)
Flame retardant Polybutylene-terephthalate	PBT +FR	Flame retardant thermoplastic material with excellent stiffness and hardness. Suitable for conveying applications with special demand on low-flammability. Material has good friction and wear properties by showing a good dynamic long-term behavior. Flammability UL94 V0.	1.47	Wet conditions: -40 °C to +60°C -40 °F to +140 °F Dry conditions: -40 °C to +130°C (short-term +150°C) -40 °F to + 266 °F (short-term + 302°F)
Thermoplastic elastomer	TPE	Soft thermoplastic material with a hardness of 50 or 65 Shore A. Material has high friction values and good abrasion resistance. Suitable for conveying applications where a high grip between belt and product is required. Used for GripTop modules.	1.12	-40 °C to +60 °C -40 °F to +140 °F
Flame retardant thermoplastic elastomer	TPE +FR	Flame retardant soft thermoplastic material with a hardness of 50 shore A. Material has high friction values and good abrasion resistance. Suitable for conveying applications where a high grip between belt and product is required. Used for GripTop modules. Flammability UL94 V0.	1.25	-40 °C to +60 °C -40 °F to +140 °F
Thermoplastic elastomer	TPV	Soft thermoplastic material with a hardness of 55 or 72 Shore A. Material has high friction values and good abrasion resistance. Suitable for conveying applications where a high grip between belt and product is required. Used for GripTop modules.	0.96	-40 °C to +71 °C -40 °F to +160 °F

For further detailed material properties and food approvals, please contact Habasit.

Sprocket material

Material	Code	Description	Temperature range
Polypropylene	PP	Thermoplastic material with excellent chemical resistance to acids, alkalines and hot water. Abrasion resistance not as good as for POM.	+5 °C to +105 °C +40 °F to +220 °F
Polyoxymethylene (Acetal)	POM	Lubricated thermoplastic material specially formulated for molded sprockets, with high strength and good abrasion resistance. Good chemical resistance to oil and alkalines, but not suitable for long-term contact with high concentration of acids and chlorine.	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +93 °C -40 °F to +200 °F
Polyamide	PA	Thermoplastic material for molded or machined sprockets with high strength and very good abrasion resistance. Suitable for heavy duty applications at dry conditions and elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures.	Wet conditions: not recommended Dry conditions: -46 °C to +130 °C (short-term +160 °C) -50 °F to +266 °F (short-term +320 °F)
Thermoplastic Polyurethane	TPU	Tough thermoplastic material for molded or machined sprockets with very good abrasion resistance. Suitable for abrasive applications at wet or dry conditions with medium load. Material is specially formulated to reduce the teeth wear to a minimum.	-20 °C to +50 °C -4 °F to +120 °F
Super High Temperature	ST	Reinforced thermoplastic material with very good heat and hydrolysis resistance. Suitable for light conveying applications at elevated temperatures. Material is specially modified to keep its good properties stable over a long time at elevated temperatures. Flammability UL94 V0	Wet conditions: on request Dry conditions: 0 °C to +200 °C (short-term +240 °C) -32 °F to +392 °F (short-term +464 °F)
Ultra high molecular weight Polyethylene	PE-UHMW	Ultra high molecular weight material for machined sprockets. Good abrasion resistance and very good chemical resistance.	-70 °C to +50 °C -94 °F to +120 °F

Wear strip Material

Material	Code	Description	Temperature range
Low friction ultra high molecular weight Polyethylene	TP40	High performing material for high speed and high load applications (high PxV limit). Compared to standard PE40 reduced friction, again minimized dusting and wear. Not suitable for abrasive conditions.	-70 °C to +65 °C -94 °F to +150 °F
Ultra high molecular weight Polyethylene	PE40 (PE-UHMW)	For heavy conveying applications (high loads); offers reduced wear and longer lifetime. Not suitable for abrasive conditions.	-70 °C to +65 °C -94 °F to +150 °F
Cast Polyamide with incorporated Polymer and/or solid lubricating additives	PA6G-LF	Cast material with high molecular weight, high strength and very high wear resistance. Due to the incorporated lubricating additives the friction values are very low, and due to the high molecular weight the material is very tough and therefore very abrasion resistant. Suitable for heavy applications and high speeds. Material is hygroscopic (water adsorption should be taken into account).	-46 °C to +120 °C -50 °F to +248 °F
Polyester	PET	Very hard material which does not absorb moisture. Suitable for high loaded applications. In abrasive applications the wear on the wear strip and on the belt are in a good balance.	Wet conditions: -40 °C to +60 °C -40 °F to +140 °F Dry conditions: -40 °C to +100 °C -40 °F to +212 °F

Other materials on request. For detailed declarations of compliance per material and color, please contact Habasit.

Material selection

Module/rod/sprocket/support material combinations are recommended:

Application		Modules	Rods	Sprockets	Support
Standard	General use	PP	PA	POM	PE40
	General use, wet	PP	POM	POM	PE40
	Chemical resistance	PP	PP	PP	PE40
	Impact, low temperature	PE	PE	POM	PE40 / TP40
	High load, dry	POM+JM	PA	POM	TP 40 / PA6G-LF
	High load, wet	POM+JM	PBT	POM	PE40 / TP40
Specifically for meat	Cutting, low temperature	POM+IM	PE	POM	PE40 / PET
Abrasive environment	Wet, up to 60 °C (140 °F)	PP	POM	TPU, PA, Steel	Steel
	Wet, up to 60 °C (140 °F), high load	POM	PBT	POM, PA, Steel	Steel
	Dry	POM	PA	PA	PA6G-LF Steel
	Dry, high load	POM	PA	PA	PA6G-LF Steel
High temperatures	Wet, 60 °C to 105 °C (140 °F to 220 °F)	PP	PP	PP, Steel	Steel
	Dry, high load	POM	PA	PA	PA6G-LF
	Elevated temperatures 130 °C (266 °F)	PA	PA	PA	Steel
	Food contact and temperatures up to 145 °C (293 °F)	PA+GF	ST/Steel	ST	Steel
	Temperatures up to 170 °C (338 °F)	PA+HT	ST/Steel	ST	Steel
	Temperatures up to 200 °C (392 °F)	ST	ST/Steel	ST	Steel
Special	Fryer up to 205°C	ST	ST/Steel	ST	Steel
	Microwave unfreezing -30 to 40°C	PE	PE	POM	PE40 / Steel
	Microwave cooking up to 100°C	PP	PP	POM	PE40 / Steel
	Microwave baking 140 – 160°C	ST	ST	ST	Steel

The suitable material combination has to be selected depending on the actual application and environment.

Always check the chemical resistance of the material selected (see Engineering Guide).

Low temperature applications

Applications below -40°C (-40°F) have to be analysed carefully. Since the belts are shrinking at low temperature, the sprockets will no more properly engage. This is particularly the case, if the sprockets stay warmer than the belt. This can be the case if the belt is passing through a cooling tunnel and the sprockets are positioned outside in warmer environment. For applications below -40°C (-40°F) it is recommended to contact Habasit.

Select radius run

If you select calculation of a radius run, the choice of belt types is reduced to Radius belts. The conveying and accumulation lengths will be calculated according to the outer length of the radius sections.

☐ Straight

☒ Radius

Enter the radius sections in its submenu.

Note: In the submenu conveyed load the load conversion calculation i.e. total load to load per square or length cannot be calculated as long the radius section are not defined.



The image shows a software window titled "Radius" with a green header bar. Inside the window, there is a section titled "Radius Sections" with a plus icon to its left. Below this title, the text "Radius friction" is displayed. To the right of the text, there is a numeric input field containing the value "0.3". To the right of the input field is a minus sign icon. Above the input field, there is a small square icon with a plus sign inside.

Radius belt sections

Radius belt sections

Open radius sub menu by pressing  button.

Radius
—

 Radius Sections

Radius friction



0.3

-

Enter required value for Straight length l_0 (section 0) in the menu. If required enter Accumulation length.

Radius sections
×

Section: 0

Radius Angle

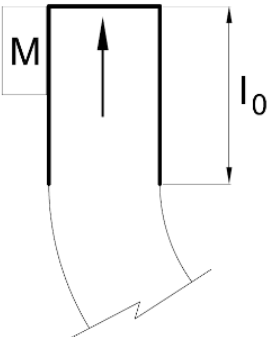
Radius

MinRadiusLength

Straight Length m

Accumulation Length m

MaxAccumulationLength m



Delete Last Section

Add Section

Section	Radius	Angle	L straight	L radius	L section	Accumulation
0			1		1	1

Length of straight sections should be min 1.5 x belt width (with a minimum of 1 m (3 ft) in section 0). A minimum straight section of 2 x belt width (2 x b0) is proposed between turns in opposite directions. Check all values of "L straight" in table above

Cancel

OK

Press button Add Section:

A new menu for section 1 will appear. For section 1,2,3 etc. always a radius and a straight part needs to be defined. Enter radius angle, straight length l , accumulation length (if required) and inside radius if larger than the minimum that is indicated.

Radius sections

Section:

Radius Angle

90°

Radius

1080 mm

MinRadiusLength

1080 mm

Straight Length

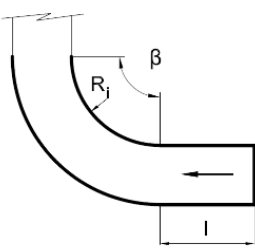
2 m

Accumulation Length

4.48 m

MaxAccumulationLength

4.48 m



Delete Last Section

Add Section

Section	Radius	Angle	L straight	L radius	L section	Accumulation
0			1		1	1
1	1080.00	90	2	2.48	4.48	4.48

Length of straight sections should be min. 1.5 x belt width (with a minimum of 1 m (3 ft) in section 0). A minimum straight section of 2 x belt width (2 x b0) is proposed between turns in opposite directions. Check all values of "L straight" in table above

Cancel

OK

Add additional sections if needed.

If accumulation over the whole section is planned, insert the maximal accumulation length into the accumulation length field. The length of straight part plus outer length of the curve is indicated in the max. accumulation field.

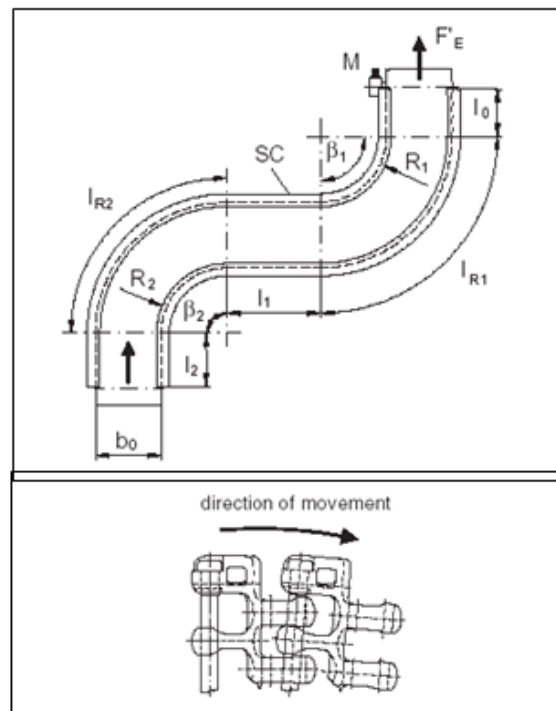
Design aspects radius belts

The following design principles have to be considered: otherwise appropriate information will be displayed in the info line:

- R** The minimum inner curve radius R is defined by the **collapse factor Q** of a particular Radius belt: **$R_{min} = Q \cdot b_0$**

For best running conditions it is advisable to design the curves R of the conveyor near to the minimum radius.
- l0** To ensure proper sprocket engagement the belt needs a catenary sag. For this reason the **belt section l0** behind the driving motor must be straight for a length of preferably **$1.5 \cdot b_0$** with a minimum of 1 m (3 ft).
- l1** A minimum **straight section of $1.5 \times$ belt width** is required for radius configurations with two or more curves that have opposite directions. There is no minimum straight length between curves with the same direction.
- l2** **At the belt end** near the idling shaft, a minimum straight length of **$1.5 \times b_0$** is required.

Place the longer straight section behind the driving motor instead of near the idling shaft to lower the belt forces in the curves.



For different requirements please contact your Habasit Representative.

Friction radius

The **preselected friction value 0.3** is based on experience and practical measurements. This value is particularly critical for the result of the Radius belt calculation. If you have questions about the radius friction value, please contact Habasit.

Accumulation on Radius belts

Accumulation can be applied on any section of the conveyor. It is assumed that the accumulation starts at the front end of a section. For the calculation, insert the accumulation length requested for a section into the respective accumulation fields. This value must be smaller than or equal to the maximum possible accumulation length indicated for this section.

Length of a section (i.e. section 1) = length of the curve plus length of the following straight part (view from front (motor) to back).

It is advisable to start the accumulation at the head end (drive) of the conveyor and if possible, to limit it to the straight section only. If accumulation in the curve is necessary, keep it as short as possible.

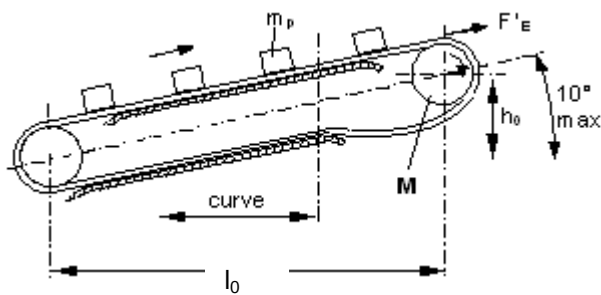
If accumulation over a whole section is planned, insert the maximal accumulation length indicated.

For smaller Radius belts with 1 curve only, accumulation may be possible over the total length of the conveyor. In this case insert the maximum possible accumulation length as indicated for each individual section.

Incline Radius belts

Steadily incline Radius belts without backbend are possible. In order to provide proper function of the catenary sag behind the drive shaft, the inclined conveyor should not be steeper than 10° . GripTop modules might be needed.

For the calculation, insert the horizontal projection length l_0 in meters or feet (relating to the straight parts; for curves only the radius and angle are relevant).



Z-conveyors are not recommended. If requested contact Habasit representative.

Dimension data

Belt width

Insert the belt width in millimeters or inches.

Compared to steel, plastics are lighter weight and materials are more sensitive to thermal elongation. Polyamide is even sensitive to water absorption and consequently elongates. When used in conveyors made of steel it is necessary to have enough space to the frame on each side with a minimum 2-3 mm (0.12") at maximum process temperature. There are also differences between the different materials in width. Therefore sufficient tolerances between the plastic and the steel frame must be built in.

The belt width deviates from the nominal width under the following influences:

- Due to molding and material differences: Consult product data sheet.
- Due to temperature shrinkage or elongation. This value is calculated (see Engineering Guide)

The belt width calculated for belt report is the nominal width expected at the assumed temperature ± 3 mm (± 0.118 ").

For accurate dimensions, contact your Habasit representative.

Elevation

Incline / decline conveyors

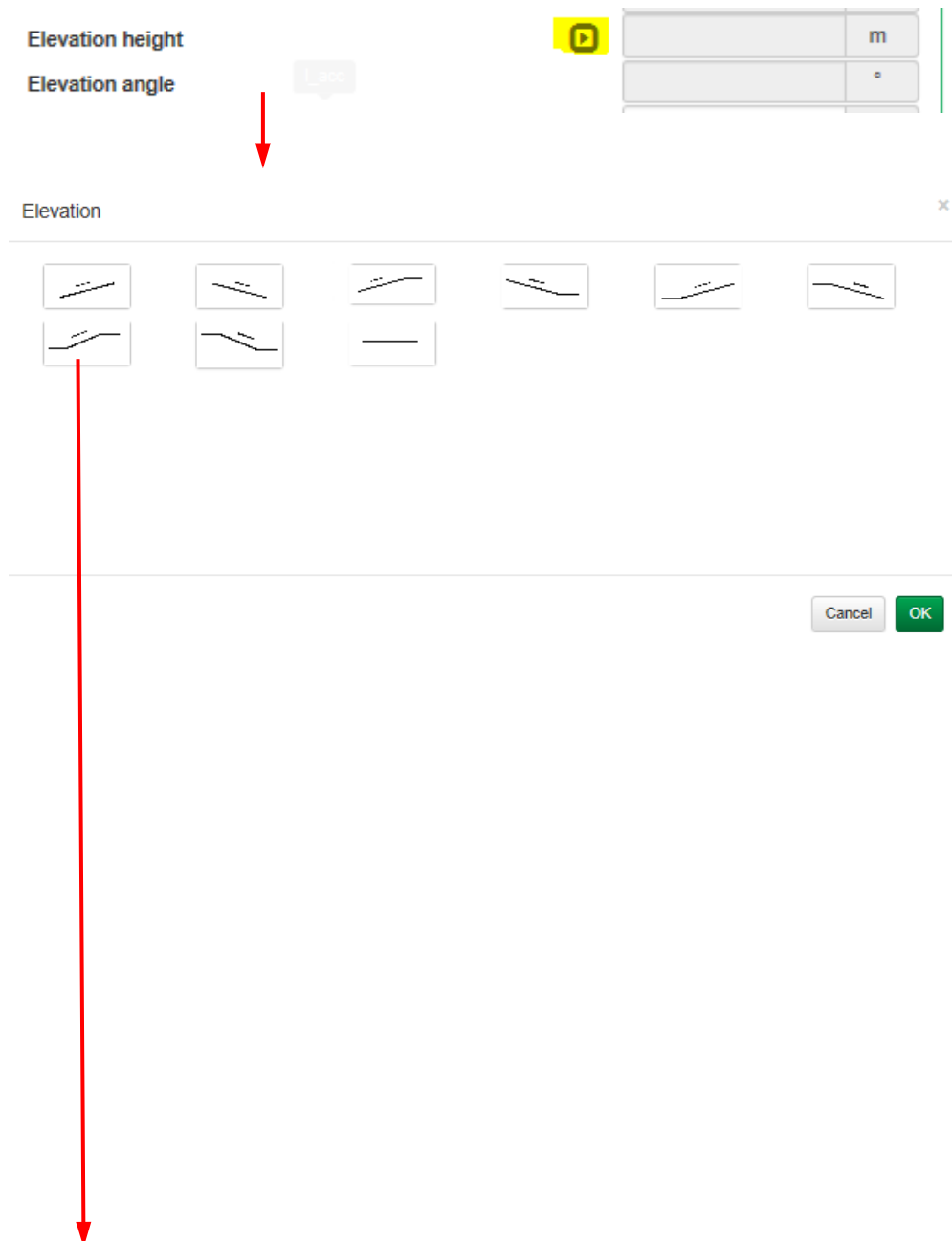
The program does have a sub menu containing 8 configurations for inclined and declined conveyors.

For straight belts configuration 1-8 (pro version) is applicable except M0800 series.

For straight belts configuration 1-5 (standard version) is applicable except M0800 series.

For M0800 series configuration 1, 2, 5 and 7 are applicable.

For radius belts configuration 1 and 5 are applicable.



Elevation height

Elevation angle

Units

Save

Elevation

Cancel OK

Elevation
✕





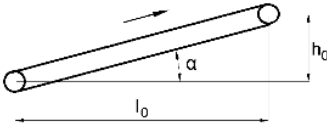



← Change configuration





← Back horizontal



l0

m

h0

m

or

alpha

°

Cancel
OK

Vertical conveyors (90° vertical transport, e. g. with scoops)

Enter the elevating height in meters or feet. For the conveying length (horizontal shaft center distance) enter 0. The result shows the power needed to lift the conveyed load (the belt weight compensates for itself). If a product load of 0 is entered (empty conveyor), the tensile strength and utilized load is 0. This is not real (due to the belt weight), but the belt weight on both sides is balanced and friction losses over the sprockets are ignored in this calculation. Therefore the power needed to drive the conveyor is theoretically 0.

Down-going elevators (declined)

Insert the height as a positive value in meters or feet.

At a certain height (inclination angle) the utilized % of belt strength becomes 0. This means that the product pulling the belt down the inclination compensates for the belt friction against the base and consequently the motor does not need to drive anymore. Above this height the product load will begin to drive the belt and the motor brakes it (torque negative).

Combined up- and down-going conveyors (incline / decline)

For the conveying length insert the distance between the shaft centers at the very ends of the conveyor (horizontal projection) l_0 in meters or feet. Further insert the difference between the up- and down-going heights (sum of all up-going heights minus the sum of all down-going heights).

[Inclined radius belts](#)

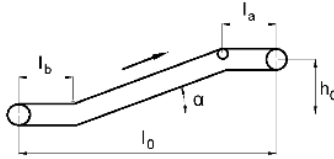
Conveyor configurations with belt back bending

Configurations 3, 4, 6, 8 include **at least 1 belt backbend** (special case)

Elevation ✕



back to horizontal



l_0 10 m
 h_0 5 m
 or
 α 32.01 °
 l_a 1 m
 l_b 1 m

holder ☒ Shoes only ☐ Shoes and device

Cancel OK

Conveyors with belt back bending

Keep the belt infeed section as short as possible but not longer than 2 m (79"). If possible reduce the infeed section to smaller than 800 mm (31"). This allows wider belts without hold down devices.

Determination if hold down devices are needed

Following table considers admissible deflection of 1% of max. belt widths b_0 for POM and PP belts and 2% for PE belts

Max belt widths b_0 mm (inch) for speed < 30 m/min belt load	2" and 2.5" belts		1" and 1.5" belts				0.5" belts	
	< 50%	50–100%	M2520 and 1.5" belts < 50%	50–100%	other 1" belts < 50%	50–100%	< 50%	50–100%
for inclination $\alpha < 50^\circ$								
$l_b \leq 800$ mm (32") (possibly self-adjusting belt tensioner needed!)	1500	1000	1200	800	800	600	700	500
	59	39	47	32	32	24	28	20
$l_b = 800 - 2000$ mm (32"–78") (longer sect. l_b not recommended)	1200	800	1000	600	600	500	550	400
	47	32	39	24	24	16	22	16
for inclination $\alpha \geq 50^\circ$								
$l_b \leq 800$ mm (32") (possibly self-adjusting belt tensioner needed!)	1050	700	850	550	550	400	500	350
(longer sect. l_b not recommended)	41	28	33	22	22	16	20	14

The program does check if hold down devices are needed and will show respective information in the warning area:

Warning Area

Reduce the infeed section l_b to = 800 mm (32") or contact Habasit representative.
The selected width requires hold down devices in the center of the belt. If possible use a stronger belt type. If not, select hold down device in the configuration menu.
Shaft overloaded. Increase journal diameter or select material with higher strength.

Warning Area

Reduce the infeed section l_b to = 2000 mm (78") or contact Habasit representative.
The selected width requires hold down devices in the center of the belt. If possible use a stronger belt type. If not, select hold down device in the configuration menu.

Hold down device selection

Open Elevation sub menu:

Elevation
×

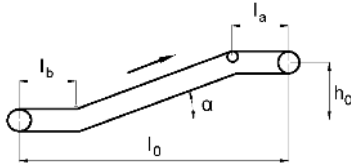










l₀ m

h₀ m

or

alpha °

l_a m

l_b m

holder ☐ Shoes only ☒ Shoes and device

Cancel OK

Select shoes and hold down device. The warning to use hold down devices will disappear in the info field. But it will be shown on the belt report file.

Calculation for conveyors with back bending

To provide an exact calculation for conveyors with belt backbend it is necessary to have all the conveyor data including length of horizontal sections, friction of hold down shoes, etc. In practice these values are often unknown. For this reason the calculation is simplified.

A higher inclination influences the friction force in the hold down devices and the belt tensile force will increase.

For Z-conveyors with a spring-loaded tensioning device please contact your Habasit representative.

A loaded long straight section lb increases the friction forces in the hold down devices and leads to a higher belt tensile force. For this reason long straight sections lb in front of the inclination should be avoided.

Speed limit for conveyors with belt back bending

For conveyors with belt back bending the speed is limited to 30 m/min (98ft/min.) due to increased friction. It is possible to over write it. Please contact Habasit.

[Incline / decline conveyors](#)

[Incline radius belts](#)

Service factor

Service factors take into account the impact of stress conditions that reduce the belt life.

Z-conveyors include all elevators with at least 1 backbend.

Service factors for Z-conveyors consider additional friction in the backbend.

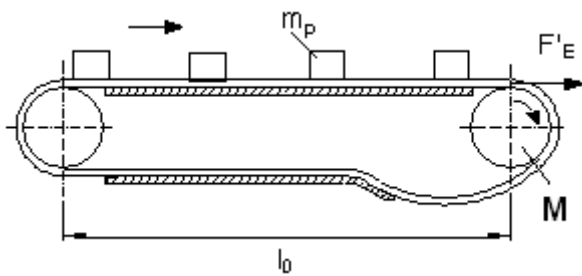
Operating condition Note: Drive with soft start is recommended and is mandatory for frequent start/stops and start-up with full load.	Standard straight belts				Service factor c_s		Radius belt curves with 90° (*)
	Standard head drive	Lower head drive	Pusher drive (uni- and bi-directional)	Center drive (uni- and bi-directional)	head side	both ends	
Start-up prior to loading	1	1.1	1.4	1.2	1.6	2	1.6 (*)
Frequent start/stops during process (more than once per hour)	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2
Z-conveyors							
inclination <20°							
hold-down shoes only	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2
hold-down tabs	+ 0.3	+ 0.3	+ 0.3	+ 0.3	+ 0.3	+ 0.3	+ 0.3
inclination 20°–50°							
hold-down shoes only	+ 0.4	+ 0.4	+ 0.4	+ 0.4	+ 0.4	+ 0.4	+ 0.4
hold-down tabs	+ 0.6	+ 0.6	+ 0.6	+ 0.6	+ 0.6	+ 0.6	+ 0.6
inclination 50°–70°							
hold-down shoes only	+ 1.1	+ 1.1	+ 1.1	+ 1.1	+ 1.1	+ 1.1	+ 1.1
hold-down tabs	+ 1.4	+ 1.4	+ 1.4	+ 1.4	+ 1.4	+ 1.4	+ 1.4
inclination 70°–90°							
hold-down shoes only	+ 1.8	+ 1.8	+ 1.8	+ 1.8	+ 1.8	+ 1.8	+ 1.8
hold-down tabs	+ 2.2	+ 2.2	+ 2.2	+ 2.2	+ 2.2	+ 2.2	+ 2.2
Speed greater 30 m/min					+ 0.2	+ 0.2	+ 0.2

(*) The Radius belt service factor depends on the angle of the curve.

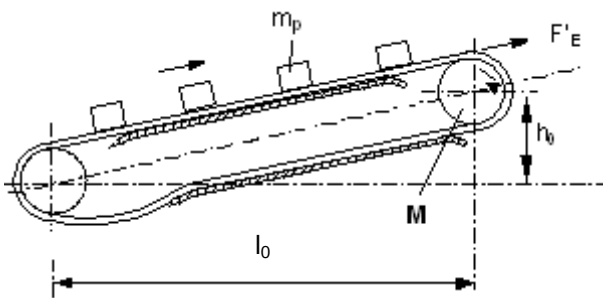
(**) Z-conveyors with nosebar are not recommended

Conveying length

The **conveying length** is identical to the horizontal shaft center distance. Please insert the conveying length l_0 in meters or feet.



For the conveying length of elevators (inclined or declined conveyors, Z-conveyors) insert the **horizontal projection** l_0 .



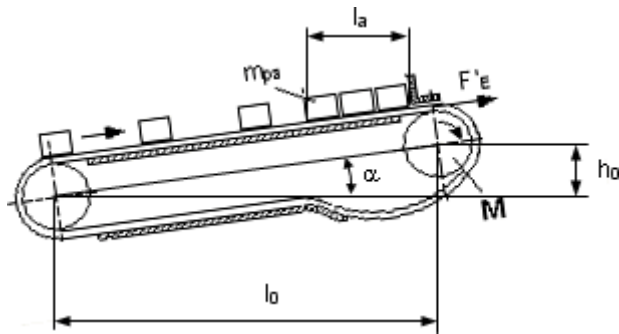
Remarks

For inclination angles $< 12^\circ$ the catenary sag is normally positioned at the upper end of the conveyor.

The belt length needed to produce the conveyor is called the **total geometric belt length**. The calculated geometrical belt length (l_g) is equal to the length of the transport side plus return side and sprocket circumference plus the excessive length of the catenary sag (l_c). The length of the belt must be finally adjusted on the machine. It is important to order sufficient material, since re-order is costly for all parties involved. In addition, extra material also helps in emergency cases. Due to the hinge clearance, the effective belt length is always approximately 0.6% to 1% longer than the calculated geometrical length. For applications in cold environments (e.g. freezers) the belt shortening due to temperature differences between the installation temperature and the lowest service temperature must be considered. For most other cases the catenary sag length calculation can be ignored. For conveyors shorter than 5 meters (15 feet) it is advisable to add 50 mm (2") to the calculated length.

The total belt length indicated in the print-out includes an additional 1% of the calculated geometric belt length (at least an extra 100 mm), for the catenary sag.

Accumulation length



Accumulation only works for horizontal and lightly inclined conveyors. The limit is reached when the friction force and gravity force are equal and the product starts to slide backwards. The limit of the inclination angle is reached when the back-up pressure of the accumulation is near to 0. When 80% of the admissible elevation is reached a warning will appear: *Elevation too high for accumulation.*

$$h_0 \leq 0.8 \cdot l_0 \cdot \mu_P$$

Please note that the defined limit is only valid for inclined conveyors with just one inclination over the whole length. It is not valid for Z-conveyors and conveyors with multiple inclinations and declinations.

Accumulation length should not exceed conveying length.

Configuration

Speed

Insert the speed in **m/min** (or ft/min), not in m/sec (or ft/sec)!

Admissible speeds of long conveyors:

Length	Max. speed
up to 15 m (45 ft)	50 m/min (150 ft/min)
15 - 25 m (45 - 75 ft)	30 m/min (90 ft/min)
over 25 m (75 ft)	15 m/min (45 ft/min)

Applications exceeding 50 m/min (150 ft/min) negatively affect the life expectancy of the belt. For speeds higher than 50 m/min always consult a Habasit specialist.

Polygon effect: Chain links moving around a sprocket cause the belt speed to vary. The rod travels on the pitch diameter of the sprocket, while the middle of the module moves through the smaller chordal radius. This polygon effect is also called **chordal action**. The magnitude of speed variation depends entirely on the number of sprocket teeth. The higher the number of teeth the smaller the speed variation.

[Speed factor](#)

Drive

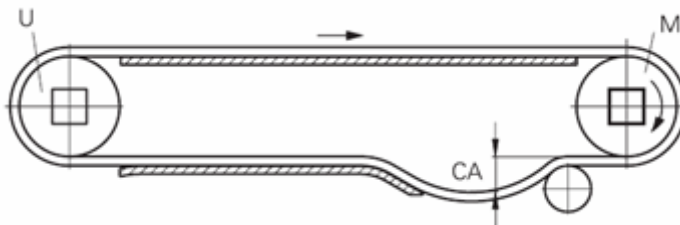
For all Modular belt applications soft start drive controls should be used. Sudden starts reduce the belt lifetime.

Common head drive

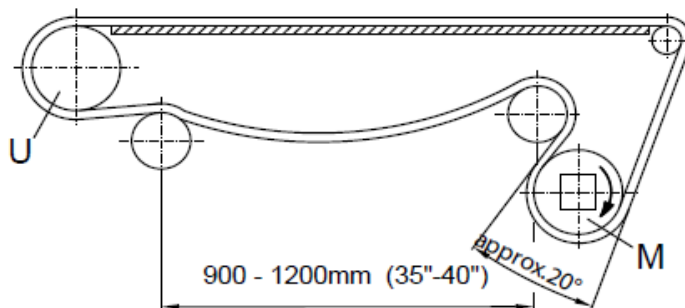
Slider support on return way, or rollers alternately.

Uni-directional drive

One motor (M) at conveyor end, pull action (driving sprockets pull the belt). Catenary sag (CA) only required on drive end. Belt wrap on drive sprockets 180-200°.



Lower head drive

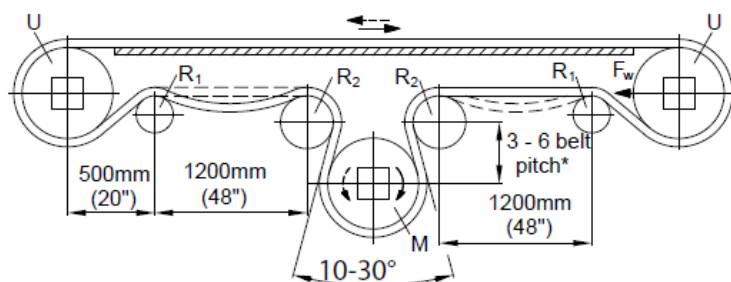


Bi-directional drive

Two motors (M), one at each conveyor end. Only one motor pulls, the other motor remains disengaged (clutch). Catenary sag (CA) at both conveyor ends (no drawing).

Bi-directional center drive

Only one motor (M) is placed in the middle of the belt return. This system works well for bi-directional conveyors. In case of high loads, a gravity take-up may be necessary for positive sprocket engagement. Optional solutions: pneumatic or spring-loaded tensioning devices.

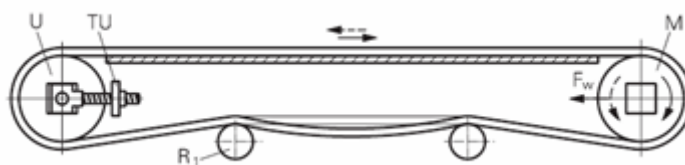


* Adjust distance shaft center to roller R2, for small sprockets 3 times and for large sprockets 6 times belt pitch is needed.

Belt wrap on drive sprockets 190 - 210°

Pusher drive

Pusher drives are not recommended. In this case the belt needs to be tensioned. The shaft load is doubled, wear increases, and the lifetime is reduced.



Frequent start/stop

Definition: Frequent start/stop = more than one start per hour

The service factor for frequent start/stop is based **on soft start drives**. Use soft start drive controls for all Modular belt applications. Sudden starts reduce the belt lifetime.

Temperature

Insert the temperature of the belt material near the drive. This temperature may be different from the temperature of the environment (heat transfer from product to belt, cooling effects, etc.).

[Temperature factor](#)

Low temperature applications

At very low temperatures (< -40 °C, -40 °F) sprocket engagement may be affected!

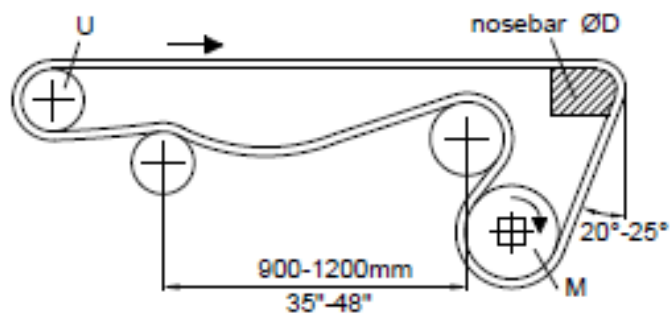
For maximum allowed temperatures refer to [Belt material](#).

Nosebar

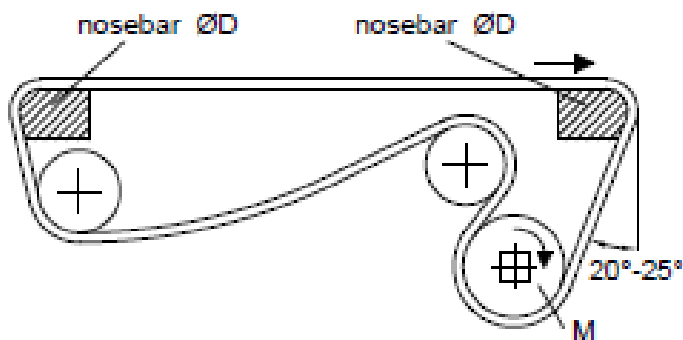
For nosebar applications consider:

- Static nosebars are applicable for Micropitch M0800 and Minipitch belts M1185, M1200, SM605, CM605 and HDS605 belts
- Avoid pusher drive; with 2 nosebars only center drive is possible.
- Z-conveyors with nosebar are not recommended.

Example: Nosebar on head only



Example: Nosebars on both conveyor ends (head and tail)



Tensioning motor (brake motor)

A tensioning motor is recommended for long conveyors, especially people-movers, to minimize belt speed variation and the risk of slip stick.

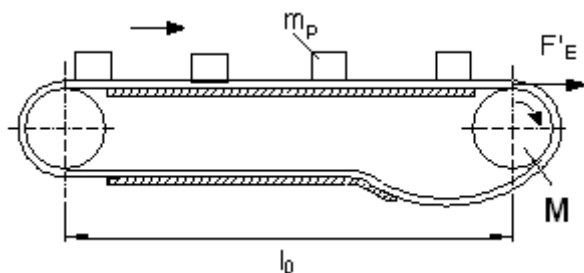
The tension force increases the belt tensile force and is considered therefore for admissible tensile force utilized, shaft deflection, sprocket number, torque and motor power.

We recommend using 10% -15% of the adjusted belt strength for the brake force.

Note: brake force cannot be applied on belts with radius run.

Load

Conveyed load



The conveyed load m_p has to be inserted in **kg/m² (lb/sq-ft)**.

If the total conveyed load on the belt is known, please open the sub menu by clicking on the  button. Insert the total load in the respective box (kg or lb).

If the load per meter (load per foot) of belt length is known, please open the sub menu by clicking on the  button. Insert the load kg/m (lb/ft) in the respective box.

Note: For radius applications the radius section must be defined in the sub menu Radius before a load conversion calculation.

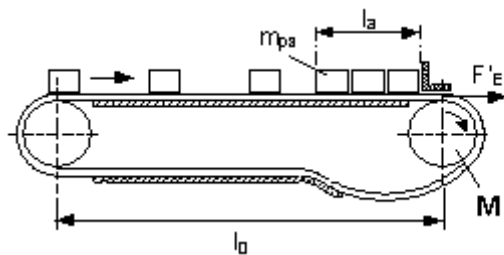
Accumulation load

The accumulation load m_{pa} has to be inserted in **kg/m² (lb/sq-ft)**.

If the total accumulated load on the belt is known, please open the pop-up window by clicking on the  button. Insert the total load in the respective box (**kg or lb**).

Take into account the density of the accumulated product on the belt, which is normally higher than the conveyed load.

If the load per meter (load per foot) of belt length is known, please open the pop-up window by clicking on the  button. Insert the load kg/m (lb/ft) in the respective box.



Condition/Friction

Condition

Due to the fact that the calculations strongly depend on the coefficient of friction, this has to be defined carefully according to the application. Please choose values on the safe side (higher end).

The effective friction values may be 2-3 times higher than the value evaluated by tests in the laboratory. In case of uncertainty we recommend that you evaluate the effective value on site.

Condition-based coefficients of friction

Regular conditions: Typical industrial and generally clean conditions

Tough conditions: Dirty industrial or abrasive applications, e.g. applications where sugar, starch, sand, or sticky contaminants are involved

Friction belt - slider support

Due to the fact that the calculations strongly depend on the coefficient of friction, this has to be defined carefully according to the application. Please choose values on the safe side (higher end).

The effective friction values may be 2-3 times higher than the value evaluated by tests in the laboratory. In case of uncertainty we recommend that you evaluate the effective value on site.

Condition-based coefficients of friction

Regular conditions: Typical industrial and generally clean conditions

Tough conditions: Dirty industrial or abrasive applications, e.g. applications where sugar, starch, sand, or sticky contaminants are involved

Regular conditions										
Belt material	Conditions	TP40-EC	PE40-EC (PE-UHMW ESD)	TP40	PE40 (PE-UHMW)	PE03 (PE-HD)	PA6C-LF (Lub.PA)	PET	Steel	Hardwood
Polypropylene PP, PP+AS, PP+DE, PP+HW, PP+XA	dry	0.22	-	0.16	0.23	0.19	0.29	-	0.31	0.39
	wet (water)	0.22	-	0.16	0.23	0.17	not recom.	-	0.29	not recom.
Polyethylene PE, PE+DE	dry	-	-	0.25	0.31	not recom.	0.21	0.28	0.15	0.16
	wet (water)	-	-	0.24	0.31	not recom.	not recom.	0.26	0.15	not recom.
Polyoxymethylene POM (Acetal AC) POM+AS, POM+UV, POM+DE, POM+IM, POM+JM, POM+UVC, POM+JA	dry	0.22	0.22	0.17	0.23	0.19	0.20	-	0.31	0.20
	wet (water)	0.22	0.22	0.15	0.15	0.12	not recom.	-	0.28	not recom.
Polyamide PA, PA+US	dry	-	-	-	0.31	0.31	0.27	-	0.37	0.19
	wet (water)	-	-	-	not recom.	not recom.	not recom.	-	not recom.	not recom.
Polyamid reinforced PA+HT, PA+GF,PA+HN	dry	-	-	-	0.21	0.23	0.24	-	0.37	0.19
	wet (water)	-	-	-	not recom.	not recom.	not recom.	-	not recom.	not recom.
Super High Temperature ST	dry	-	-	-	not recom.	not recom.	not recom.	-	0.50	not recom.
	wet (water)	-	-	-	not recom.	not recom.	not recom.	-	0.50	not recom.
Flame retardant Polybutylenterephthalat PBT,PBT+FR	dry	-	-	-	0.17	0.15	0.15	-	0.27	0.30
	wet (water)	-	-	-	0.17	0.15	not recom.	-	0.27	not recom.
Flame retardant Polypropylene PP+FR	dry	-	0.27	0.25	0.27	0.29	0.26	-	0.41	0.39
	wet (water)	-	0.25	0.23	0.27	0.29	not recom.	-	0.35	not recom.
Submersible Polypropylen PP+GR, PP+GH	dry	-	-	0.20	0.23	0.23	0.26	-	0.30	0.36
	wet (water)	-	-	0.20	0.23	0.23	not recom.	-	0.30	not recom.
Electrically conductiv Polyoxymethylene POM+EC	dry	0.21	0.24	-	-	-	-	-	0.40	-
	wet (water)	0.21	0.23	-	-	-	not recom.	-	0.25	not recom.
Low friction Polyoxymethylene POM+LF, POM+UF	dry	-	-	0.16	0.20	0.19	0.18	-	0.22	0.20
	wet (water)	-	-	0.15	0.15	0.12	not recom.	-	0.17	not recom.
Wear resistant Polyoxymethylene POM+PK	dry	-	0.21	0.20	0.25	0.24	0.30	-	0.28	-
	wet (water)	-	0.20	0.15	0.15	0.15	not recom.	-	0.17	not recom.
Electrically conductive Polypropylene PP+EC	dry	0.21	0.21	-	-	-	-	-	0.36	-
	wet (water)	0.21	0.20	-	-	-	not recom.	-	0.25	not recom.
Electrically conductive and flame-retardant Polypropylene PP+FC	dry	0.21	0.29	-	-	-	-	-	0.47	-
	wet (water)	0.21	0.25	-	-	-	not recom.	-	0.35	not recom.
Impact resistant Polyamide PA+IM	dry	-	-	-	0.48	0.48	0.40	-	0.50	0.50
	wet (water)	-	-	-	0.30	0.30	0.30	-	0.30	not recom.
X-Ray detectable POM POM+DX	dry	-	-	0.20	0.34	-	-	0.41	0.60	-
	wet (water)	-	-	0.20	0.34	-	-	0.41	0.50	-

Tough conditions										
Belt material	Conditions	TP40-EC	PE40-EC (PE- UHMW ESD)	TP40	PE40 (PE-UHMW)	PE03 (PE-HD)	PA6C-LF (Lub.PA)	PET	Steel	Hardwood
Polypropylene PP, PP+AS, PP+DE, PP+HW, PP+XA	dry	0.33	-	0.24	0.35	0.29	0.44	-	0.47	0.59
	wet (water)	0.33	-	0.24	0.35	0.26	not recom.	-	0.44	not recom.
Polyethylene PE, PE+DE	dry	-	-	0.38	0.47	not recom.	0.32	0.42	0.23	0.24
	wet (water)	-	-	0.36	0.47	not recom.	not recom.	0.39	0.23	not recom.
Polyoxymethylene POM (Acetal AC) POM+AS, POM+UV, POM+DE, POM+IM, POM+JM, POM+UVC, POM+JA	dry	0.33	0.33	0.26	0.35	0.29	0.30	-	0.40	0.30
	wet (water)	0.33	0.33	0.23	0.23	0.18	not recom.	-	0.40	not recom.
Polyamide PA, PA+US	dry	-	-	-	0.47	0.47	0.41	-	0.40	0.29
	wet (water)	-	-	-	not recom.	not recom.	not recom.	-	not recom.	not recom.
Polyamid reinforced PA+HT, PA+GF, PA+HN	dry	-	-	-	0.32	0.34	0.36	-	0.36	0.29
	wet (water)	-	-	-	not recom.	not recom.	not recom.	-	not recom.	not recom.
Super High Temperature ST	dry	-	-	-	not recom.	not recom.	not recom.	-	0.75	not recom.
	wet (water)	-	-	-	not recom.	not recom.	not recom.	-	0.75	not recom.
Flame retardant Polybutylenterephthalat PBT, PBT+FR	dry	-	-	-	0.25	0.23	0.23	-	0.41	0.45
	wet (water)	-	-	-	0.25	0.23	not recom.	-	0.41	not recom.
Flame retardant Polypropylene PP+FR	dry	-	0.41	0.38	0.41	0.43	0.38	-	0.41	0.59
	wet (water)	-	0.38	0.35	0.41	0.43	not recom.	-	0.41	not recom.
Submersible Polypropylen PP+GR, PP+GH	dry	-	-	0.30	0.34	0.34	0.38	-	0.45	0.54
	wet (water)	-	-	0.30	0.34	0.34	not recom.	-	0.45	not recom.
Electrically conductiv Polyoxymethylene POM+EC	dry	0.32	0.36	-	-	-	-	-	0.67	-
	wet (water)	0.32	0.32	-	-	-	not recom.	-	0.42	not recom.
Low friction Polyoxymethylene POM+LF, POM+UF	dry	-	-	0.24	0.33	0.32	0.30	-	0.37	0.33
	wet (water)	-	-	0.23	0.25	0.20	not recom.	-	0.28	not recom.
Wear resistant Polyoxymethylene POM+PK	dry	-	0.32	-	0.42	0.40	0.50	-	0.47	-
	wet (water)	-	0.31	-	0.25	0.25	not recom.	-	0.28	not recom.
Electrically conductive Polypropylene PP+EC	dry	0.32	0.32	-	-	-	-	-	0.60	-
	wet (water)	0.32	0.31	-	-	-	not recom.	-	0.42	not recom.
Electrically conductive and flame-retardant Polypropylene PP+FC	dry	0.32	0.43	-	-	-	-	-	0.67	-
	wet (water)	0.32	0.40	-	-	-	not recom.	-	0.42	not recom.
Impact resistant Polyamide PA+IM	dry	-	-	-	0.80	0.80	0.67	-	0.83	0.83
	wet (water)	-	-	-	0.50	0.50	0.50	-	0.50	not recom.
X-Ray detectable POM POM+DX	dry	-	-	0.30	0.51	-	-	0.62	0.90	-
	wet (water)	-	-	0.30	0.51	-	-	0.62	0.75	-

Friction belt - products

Due to the fact that the calculations strongly depend on the coefficient of friction, this has to be defined carefully according to the application. Please choose values on the safe side (higher end).

The effective friction values may be 2-3 times higher than the value evaluated by tests in the laboratory. In case of uncertainty we recommend that you evaluate the effective value on site.

Condition-based coefficients of friction

Regular conditions: Typical industrial and generally clean conditions

Tough conditions: Dirty industrial or abrasive applications, e.g. applications where sugar, starch, sand, or sticky contaminants are involved

Regular conditions						
Belt material	Conditions	Glass	Metal	Plastic(PET)	Cardboard	Roller Tops
Polypropylene PP, PP+AS, PP+DE, PP+HW, PP+XA	dry	0.29	0.48	0.26	0.33	0.075
	wet (water)	0.26	0.45	0.23	not recom.	0.075
Polyethylene PE, PE+DE	dry	0.15	0.2	0.15	0.23	-
	wet (water)	0.12	0.17	0.12	not recom.	-
Polyoxymethylene POM (Acetal AC) POM+AS, POM+UV, POM+DE, POM+IM, POM+JM, POM+UVC, POM+JA	dry	0.23	0.3	0.27	0.3	0.075
	wet (water)	0.2	0.27	0.23	not recom.	0.075
Polyamide PA, PA+US, PA+HN	dry	0.26	0.29	0.18	0.26	0.075
	wet (water)	not recom.	not recom.	not recom.	not recom.	not recom.
Polyamid reinforced PA+HT, PA+GF	dry	0.2	0.3	0.2	0.3	-
	wet (water)	not recom.	not recom.	not recom.	not recom.	-
Super High Temperature ST	dry	0.18	0.35	0.2	0.32	-
	wet (water)	not recom.	not recom.	not recom.	not recom.	-
Flame retardant Polybutylenterephthalat PBT, PBT+FR	dry	0.21	0.27	0.18	0.26	-
	wet (water)	0.21	0.27	0.18	not recom.	-
Flame retardant Polypropylene PP+FR	dry	0.27	0.38	0.32	0.36	-
	wet (water)	0.29	0.29	0.25	not recom.	-
Submersible Polypropylen PP+GR, PP+GH	dry	0.32	0.48	0.29	0.42	-
	wet (water)	0.32	0.48	0.29	not recom.	-
Electrically conductiv Polyoxymethylene POM+EC	dry	0.3	0.4	0.3	0.36	0.075
	wet (water)	0.25	0.3	0.25	not recom.	0.075
Low friction Polyoxymethylene POM+LF, POM+UF	dry	0.2	0.25	0.2	0.25	0.075
	wet (water)	0.15	0.15	0.15	not recom.	0.075
Wear resistant Polyoxymethylene POM+PK	dry	0.18	0.22	0.18	0.24	0.075
	wet (water)	0.14	0.15	0.14	not recom.	0.075
Electrically conductive Polypropylene PP+EC	dry	0.35	0.4	0.35	0.36	0.075
	wet (water)	0.25	0.3	0.25	not recom.	0.075
Electrically conductive and flame-retardant Polypropylene PP+FC	dry	0.35	0.4	0.35	0.36	-
	wet (water)	0.25	0.3	0.25	not recom.	-
Impact resistant Polyamide PA+IM	dry	0.35	0.5	0.4	0.45	-
	wet (water)	0.25	0.3	0.25	not recom.	-
X-Ray detectable POM POM+DX	dry	-	0.60	0.41	-	-
	wet (water)	-	0.50	0.41	-	-

Tough conditions						
Belt material	Conditions	Glass	Metal	Plastic(PET)	Cardboard	Roller Tops
Polypropylene PP, PP+AS, PP+DE, PP+HW, PP+XA	dry	0.48	0.8	0.43	0.55	0.125
	wet (water)	0.43	0.75	0.38	not recom.	0.125
Polyethylene PE, PE+DE	dry	0.25	0.33	0.25	0.38	-
	wet (water)	0.2	0.28	0.2	not recom.	-
Polyoxymethylene POM (Acetal AC) POM+AS, POM+UV, POM+DE, POM+IM, POM+JM, POM+UVC, POM+JA	dry	0.38	0.5	0.45	0.5	0.125
	wet (water)	0.33	0.45	0.38	not recom.	0.125
Polyamide PA, PA+US, PA+HN	dry	0.43	0.48	0.3	0.43	0.125
	wet (water)	not recom.	not recom.	not recom.	not recom.	not recom.
Polyamid reinforced PA+HT, PA+GF	dry	0.33	0.5	0.33	0.5	-
	wet (water)	not recom.	not recom.	not recom.	not recom.	-
Super High Temperature ST	dry	0.3	0.58	0.33	0.53	-
	wet (water)	not recom.	not recom.	not recom.	not recom.	-
Flame retardant Polybutylenterephthalat PBT, PBT+FR	dry	0.35	0.45	0.3	0.43	-
	wet (water)	0.35	0.45	0.3	not recom.	-
Flame retardant Polypropylene PP+FR	dry	0.45	0.63	0.53	0.6	-
	wet (water)	0.48	0.48	0.5	not recom.	-
Submersible Polypropylen PP+GR, PP+GH	dry	0.53	0.8	0.48	0.7	-
	wet (water)	0.53	0.8	0.48	not recom.	-
Electrically conductiv Polyoxymethylene POM+EC	dry	0.5	0.67	0.5	0.6	0.13
	wet (water)	0.42	0.5	0.42	not recom.	0.13
Low friction Polyoxymethylene POM+LF, POM+UF	dry	0.33	0.42	0.33	0.42	0.13
	wet (water)	0.25	0.25	0.25	not recom.	0.13
Wear resistant Polyoxymethylene POM+PK	dry	0.3	0.37	0.3	0.4	0.13
	wet (water)	0.23	0.25	0.23	not recom.	0.13
Electrically conductive Polypropylene PP+EC	dry	0.58	0.67	0.58	0.6	0.13
	wet (water)	0.42	0.5	0.42	not recom.	0.13
Electrically conductive and flame-retardant Polypropylene PP+FC	dry	0.58	0.67	0.58	0.6	-
	wet (water)	0.42	0.5	0.42	not recom.	-
Impact resistant Polyamide PA+IM	dry	0.58	0.83	0.67	0.75	-
	wet (water)	0.42	0.5	0.42	not recom.	-
X-Ray detectable POM POM+DX	dry	-	0.90	0.62	-	-
	wet (water)	-	0.75	0.62	-	-

Roller Tops

The friction values for Roller Tops are only valid for Roller Top belts with longitudinal rollers (0°) and for LBP belts.

For belts with diagonal (45°) or transversal (90°) rollers, use friction values according to the product material table. Select the user-defined button in the friction window and type in the corresponding friction value.

Sprocket

Sprocket selection

For sprocket code explanation please consult sprocket product data sheet on:

<http://www.habasit.com/en/sprockets.htm>

Mark check boxes according to your interest to limit the sprocket choice.

Type of sprockets:
 S = molded sprocket
 M = molded sprocket for Reading sourcing products
 Z = split sprocket molded
 S-C1 = machined sprocket
 S-C2 = machined sprockets for Series M258X and S6400 (two row teeth)
 Z-C1 = machined split sprocket
 Z-B = Series 5000 hollow Hub type
 S-M2 = Series 5000 HyClean molded type
 Z-H = Multi hub molded type
 ST = molded sprockets made of ST (high temp.) material

Select appropriate size by clicking on the sprocket code.

Sprockets

☐ Standard Sprockets Only

☒ mm
 ☒ one-piece
 ☒ square

☐ inch
 ☐ split
 ☐ round

Code	Teeth	dp	Bore	Material	Type
M25S1100Q	11	91 mm	s 25-40	PA	S-C1
M25S1240Q	12	100 mm	s 40	PA	S-C2
M25S1240Q	12	100 mm	s 40	POM	S-C2
M25S1200Q	12	100 mm	s 25-50	PA	S-C2
M25S1200Q	12	100 mm	s 25-50	POM	S-C2
M25S1240Q	12	99 mm	s 40	POM	S
M25S1240Q	12	99 mm	s 40	PA	S
M25S1240Q	12	99 mm	s 40	PP	S

Shaft Size

Shaft Type

Wall Thickness

☒ Solid

☐ Tube

Journal Diameter

Cancel

OK

1. Molded sprockets have defined bore (shaft) size. Shaft size field is filled by the defined shaft size and can't be changed, field is gray.
1. Machined sprockets can have a bore (shaft) range. The shaft size field is open (white) and a required size (in range) can be entered.
2. Enter a journal diameter. This diameter is the connection to Motor and is usually slightly smaller than the shaft size.
3. In case the shaft is made of a tube, select Tube and enter wall thickness of the tube.

Sprocket spacing

The program will propose a number of sprockets per shaft. This number is dependent on provided geometrical sprocket placement, adjusted tensile force, admissible sprocket force, shaft type and size.

Admissible sprocket load

Admissible sprocket loads depend on sprocket type, sprocket size, shaft size and sprocket material, and are defined individually for each sprocket.

Large sprockets with small shaft bores may have lower admissible sprocket loads.

The compliance of admissible sprocket loads is taken into consideration in the LINK-SeleCalc program.

General rules:

Machined sprockets may have higher admissible loads than molded open window sprockets.

PP sprockets have 20% lower admissible loads than POM sprockets.

PA+HT and +ST sprockets have the same or higher admissible loads than standard POM sprockets.

Polyamide +HT and Super High Temperature belts should be used together with sprockets out of same material.

TPU sprockets are limited to 500 N for 0.5" and 1" belts and to 1000 N for 1.5", 2" and 2.5" belts.

Sprockets for round shafts can have lower admissible loads due to higher contact stress in key way.

Sprockets for belts with hold down tabs

	Min. number of teeth	Max. square Bore		Max. round Bore	
		mm	inch	mm	inch
Series with hold down tabs (H, T, ActivXchange)					
M1200	15	25	1	25	1 9/16
106	14	–	1	40	1 1/2
106	16	40	1,5	50	2
M2400	12	40	1,5	30	1
M2500	10	–	1	30	1 3/8
M2500	12	40	1,5	40	1 3/8
M2600	12	40	1,5	40	1 1/2
IS/CT610	9	–	–	–	1
IS/CT610	12	–	1	40	1 1/2
IS/CT610	15	40	1,5	40	1 15/16
PR612	10	–	1	40	1 1/2
PR612	13	40	1,5	50	2
M3840 side tabs only	10	40	1,5	–	–
M3800	12	60	2,5	–	–
IS615	7	–	1	40	1 1/2
IS615	9	40	1,5	40	1 15/16
IS620	6	–	1	–	1
IS620	8	40	1,5	40	1 15/16
Series with hold down devices (V-modules)					
M2500	12	40	1,5	40	1 3/8
M5000	8	40	1,5	–	–
M5000	10	60	2,5	–	–

Shaft type

You can select solid or tube shafts.

Please consider that it may be difficult to fix sprockets properly to tubes dependent on tube size tolerance. Joining the tubular drive shaft to the solid journal (shaft end for drive connection) is critical and needs to be well engineered to guarantee torque transmission. The calculation does not take into account shaft strength reduction due to welding or notches.

A common shaft design may also be a combination of a round shaft with a square tube which is shifted over the round shaft and joined by welding. In this case we recommend selecting a solid square shaft for calculation.

Wall thickness

Wall thickness is used for calculating the shaft deflection.

Journal diameter

The journal diameter is the diameter of the driven shaft end connected to the motor or gear shaft. It may be smaller than the shaft itself, but cannot be bigger. The selected journal diameter is validated by strength calculation, assuming a solid cylindrical journal. If the shaft is found to be insufficiently strong to transmit the torque, the display of the calculated torque value will turn red.

Shaft material

The following average values are used for the calculation of bending and torque:

Shaft material offered for selection (pop-up menu)	Modulus of elasticity E	Shearing strength	Possible material specifications
Carbon Steel	206'000 N/mm ²	60 N/mm ²	St 37-2 , KG-37
Stainless Steel (low strength)	195'000 N/mm ²	60 N/mm ²	X5CrNi18 10, AISI 316, 304
Stainless Steel (high strength)	195'000 N/mm ²	90 N/mm ²	X12CrNi 17 7, AISI 301
Aluminum	70'000 N/mm ²	40 N/mm ²	AlMg3, AA 5052

Belt properties

Belt weight

GripTop belts (e.g. M2520 GripTop): The indicated weight presumes a belt assembled from 100% grip modules (free belt edges). This weight can also remain unchanged for belts only partially assembled with grip modules (calculation on the safe side).

The additional weight increase for accessory modules like flights or side guards is not considered. In case of accessory modules used (i.e. flights) increase the belt load by 10% for modules every 10.row or 20% every 5.row etc.

Nominal strength

The nominal belt strength is set at approximately 30% of the breaking strength at standard conditions for temperature and humidity.

Nominal tensile strength for Radius belts

The nominal strength for Radius belts in curves increases with wider belts (bigger radius). Due to the smaller angle between the modules the forces are distributed over more links.

For very narrow belts, only the outermost link carries the load. In this case there is a constant nominal strength for a certain radius range until other links begin to carry loads and the nominal strength increases.

For Radius belts with long straight sections the critical stress may be in the straight section and not in the curve. In this case the admissible tensile strength and the adjusted tensile force is shown for the straight run in N/m (lb/ft). For wide radius belts (not MTW) the calculated adjusted tensile force is multiplied by 2, to take into account unequal force distribution after the curve.

The displayed admissible tensile force utilized is the higher value of the admissible forces utilized in the curve section 1 or of the admissible force utilized in the straight section 0.

Result: Factors

Service factor

The service factor C_s takes into account specific conveyor conditions (higher friction and stress due to backbending, nosebars, etc.).

The service factor takes into account the impact of stress conditions that reduce the belt life. Z-conveyors include all elevators with at least 1 backbend. The service factor for Z-conveyors considers additional friction in the backbend.

Operating condition Note: Drive with soft start is recommended and is mandatory for frequent start/stops and start-up with full load.	Standard straight belts				Service factor C_s		Radius belt curves with 90° (*)
	Standard head drive	Lower head drive	Pusher drive (uni- and bi-directional)	Center drive (uni- and bi-directional)	Minipitch with nosebar (**)	both ends	
Start-up prior to loading	1	1.1	1.4	1.2	1.6	2	1.6 (*)
Frequent start/stops during process (more than once per hour)	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2
Z-conveyors inclination <20°							
hold-down shoes only	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2
hold-down tabs	+ 0.3	+ 0.3	+ 0.3	+ 0.3	+ 0.3	+ 0.3	+ 0.3
inclination 20°–50°							
hold-down shoes only	+ 0.4	+ 0.4	+ 0.4	+ 0.4	+ 0.4	+ 0.4	+ 0.4
hold-down tabs	+ 0.6	+ 0.6	+ 0.6	+ 0.6	+ 0.6	+ 0.6	+ 0.6
inclination 50°–70°							
hold-down shoes only	+ 1.1	+ 1.1	+ 1.1	+ 1.1	+ 1.1	+ 1.1	+ 1.1
hold-down tabs	+ 1.4	+ 1.4	+ 1.4	+ 1.4	+ 1.4	+ 1.4	+ 1.4
inclination 70°–90°							
hold-down shoes only	+ 1.8	+ 1.8	+ 1.8	+ 1.8	+ 1.8	+ 1.8	+ 1.8
hold-down tabs	+ 2.2	+ 2.2	+ 2.2	+ 2.2	+ 2.2	+ 2.2	+ 2.2
Speed greater 30 m/min					+ 0.2	+ 0.2	+ 0.2

(*) The Radius belt service factor depends on the angle of the curve.

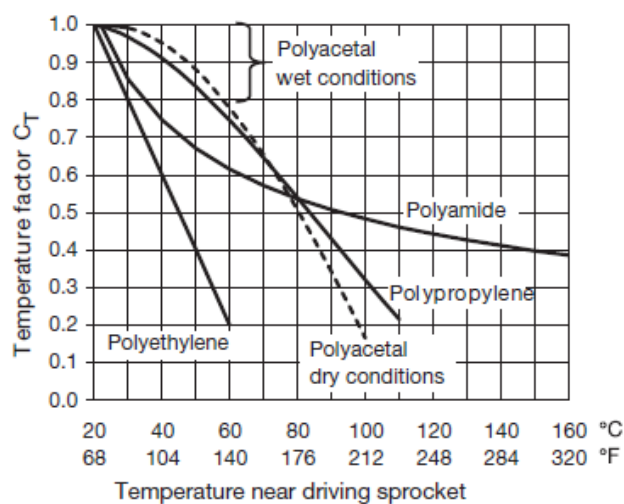
(**) Z-Conveyors with nosebar are not recommended

For more details refer to: [Conveyors with belt back bending](#)

Temperature factor

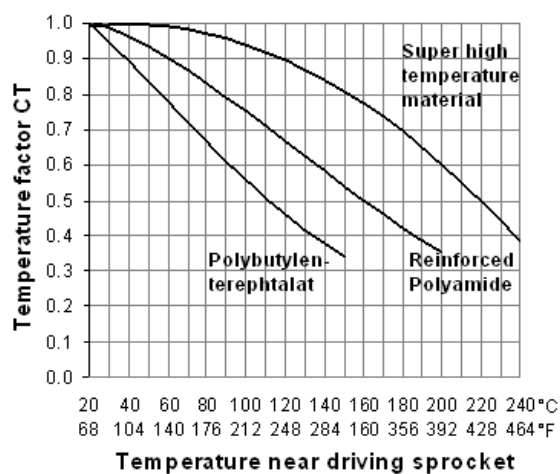
The temperature factor C_T takes into account the reduction in the belt strength at higher temperatures.

[Admissible tensile force utilized](#)



Temperature factor for special materials

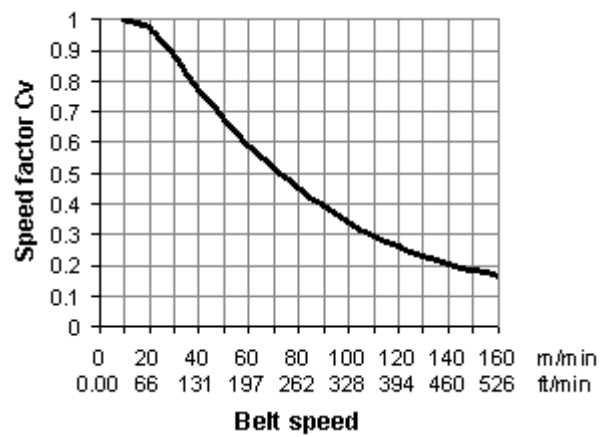
Special materials



Speed factor

The speed factor C_v takes into account the increased stresses on the belt at higher speeds due to dynamic forces and increased friction.

[Admissible tensile force utilized](#)



Result: Force

Effective tensile force

Effective tensile force (N/m or lb/ft) is calculated near the drive shaft, where it reaches its maximum.

Adjusted tensile force

Adjusted tensile force = effective tensile force multiplied by the **service factor Cs**. This factor takes into account the **operational conditions** such as:

- Conveyor system (elevator, radius, nosebar)
- Type of drive (head, center, pusher)
- Running conditions (frequent start/stop)

Admissible tensile force

Admissible tensile force = nominal tensile strength of the belt multiplied by the **temperature factor CT** and **speed factor Cv**. These factors take into account the **process conditions**.

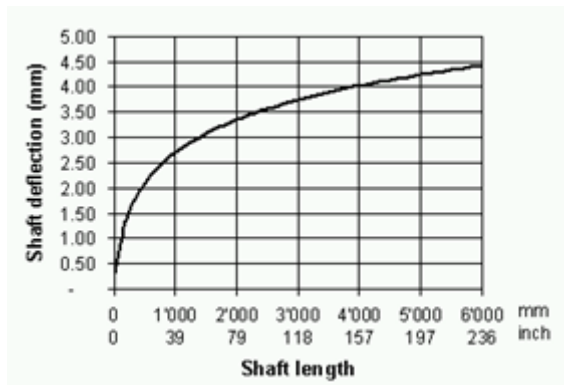
Admissible tensile force utilized

100% utilized tensile force is only acceptable for well defined and stable process and service conditions. The percentage of utilized tensile force cannot be $> 100\%$. Above 70% we recommend that you carefully study the conditions. Friction values in particular have a great influence on the calculation results!

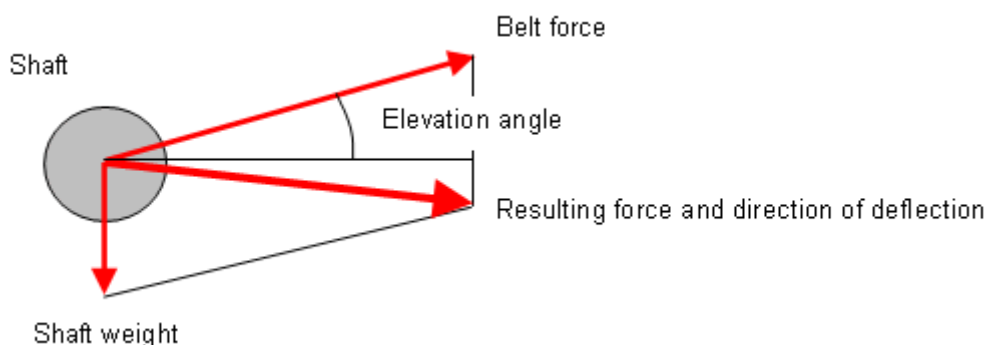
Result: Shaft deflection

Deflection / bearings - idling shaft head

The deflection is calculated for a shaft length which is 100 mm (4") longer than the belt width. The additional length allows a 50 mm (2") distance between the belt edge and the shaft bearings. The maximum shaft deflection allowed is dependent on the shaft length (belt width) and is typically between 2 for 450 mm (18") and 4 for 4000 mm (158") shaft lengths. The allowable deflection is primarily a functional limit and is in most cases below the strength limit of the shaft material. It limits the distortion of the belt and guarantees proper sprocket engagement. It also takes into account an acceptable straightness of the belt at the conveyor end to allow proper product transfer.



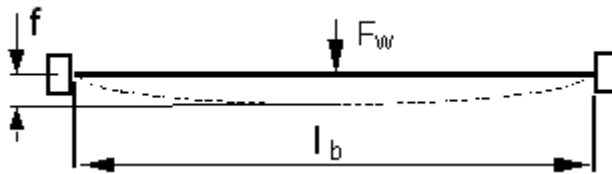
The calculation considers the weight of the shaft. The maximum value of the deflection is displayed. The direction of the deflection is dependent on the conveyor elevation, shaft weight and shaft force, and is not displayed.



The required number of bearings is calculated based on the admissible shaft deflection, after all the necessary input data have been entered.

For the center drive, the load on the idling shaft is doubled (belt tension on transport and return side). Therefore the deflection of the idling shaft prior to the drive shaft is bigger than that of the drive shaft. The second idling shaft takes half the load. In case of bi-directional drives both idling shafts are alternately double loaded.

Bi-directional pusher drive, which is not recommended, has high shaft loads due to the necessary pre-tensioning of the belt. The highest load is on the drive shaft ($3.2 \times$ belt force) and the lowest load is on the idling shaft ($2.2 \times$ belt force).

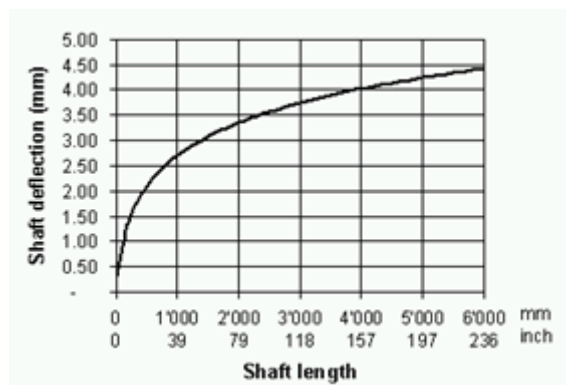


Manual adjustment of bearing numbers

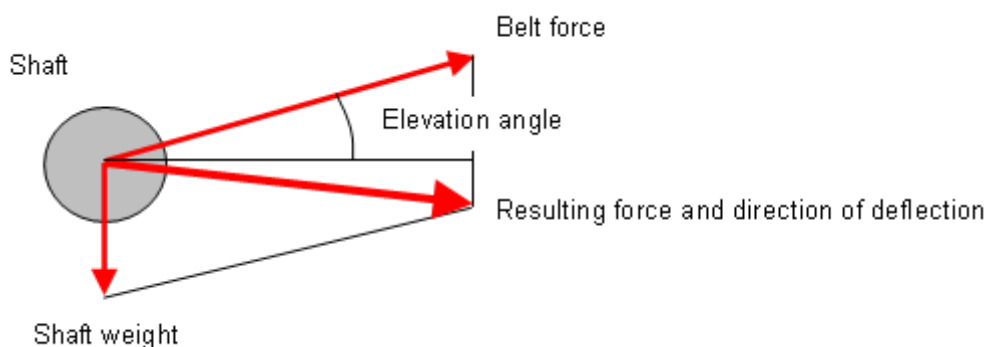
The calculated number of bearings can be manually adjusted (arrow-buttons). Increasing the number of bearings will reduce the shaft deflection accordingly. This may be of interest in cases where precise product transfer is required. Reduction of the number of bearings is not recommended. In such cases, please contact Habasit Application Support.

Deflection / bearings - idling shaft tail

The deflection is calculated for a shaft length which is 100 mm (4") longer than the belt width. The additional length allows a 50 mm (2") distance between the belt edge and the shaft bearings. The maximum shaft deflection allowed is dependent on the shaft length (belt width) and is typically between 2 for 450 mm (18") and 4 for 4000 mm (158") shaft lengths. The allowable deflection is primarily a functional limit and is in most cases below the strength limit of the shaft material. It limits the distortion of the belt and guarantees proper sprocket engagement. It also takes into account an acceptable straightness of the belt at the conveyor end to allow proper product transfer.



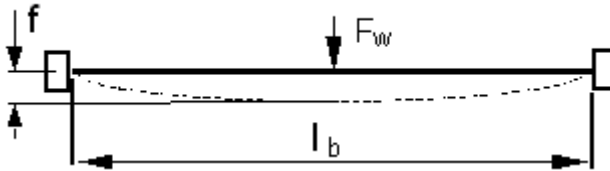
The calculation considers the weight of the shaft. The maximum value of the deflection is displayed. The direction of the deflection is dependent on the conveyor elevation, shaft weight and shaft force, and is not displayed.



The required number of bearings is calculated based on the admissible shaft deflection, after all necessary input data have been entered.

For the center drive the load on the idling shaft is doubled (belt tension on transport and return side). Therefore the deflection of the idling shaft prior to the drive shaft is bigger than that of the drive shaft. The second idling shaft takes half the load. In case of bi-directional drives both idling shafts are alternately double loaded.

Bi-directional pusher drive, which is not recommended, has high shaft loads due to the necessary pre-tensioning of the belt. The highest load is on the drive shaft ($3.2 \times$ belt force) and the lowest load is on the idling shaft ($2.2 \times$ belt force).

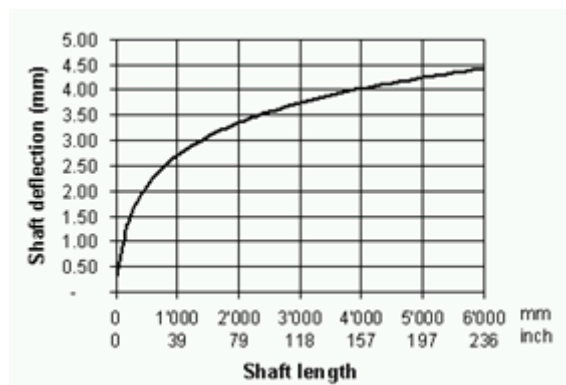


Manual adjustment of bearing numbers

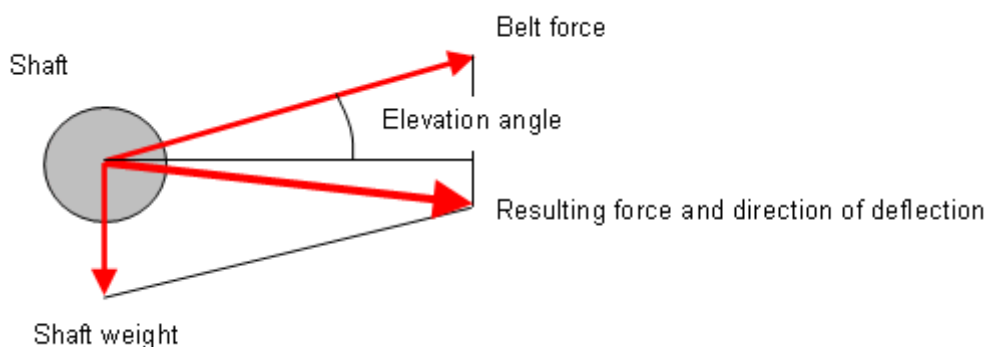
The calculated number of bearings can be manually adjusted (arrow-buttons). Increasing the number of bearings will reduce the shaft deflection accordingly. This may be of interest in cases where precise product transfer is required. Reduction of the number of bearings is not recommended. In such cases please contact Habasit Application Support.

Deflection / bearings - drive shaft

The deflection is calculated for a shaft length which is 100 mm (4") longer than the belt width. The additional length allows a 50 mm (2") distance between the belt edge and the shaft bearings. The maximum shaft deflection allowed is dependent on the shaft length (belt width) and is typically between 2 for 450 mm (18") and 4 for 4000 mm (158") shaft lengths. The allowable deflection is primarily a functional limit and is in most cases below the strength limit of the shaft material. It limits the distortion of the belt and guarantees proper sprocket engagement. It also takes into account an acceptable straightness of the belt at the conveyor end to allow proper product transfer.



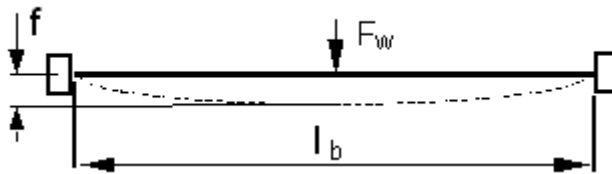
The calculation considers the weight of the shaft. The maximum value of the deflection is displayed. The direction of the deflection is dependent on the conveyor elevation, shaft weight and shaft force, and is not displayed.



The required number of bearings is calculated based on the admissible shaft deflection, after all necessary input data have been entered.

For the center drive the load on the idling shaft is doubled (belt tension on transport and return side). Therefore the deflection of the idling shaft prior to the drive shaft is bigger than that of the drive shaft. The second idling shaft takes half the load. In case of bi-directional drives both idling shafts are alternately double loaded.

Bi-directional pusher drive, which is not recommended, has high shaft loads due to necessary pre-tensioning of the belt. The highest load is on the drive shaft ($3.2 \times$ belt force) and the lowest load is on the idling shaft ($2.2 \times$ belt force).



Manual adjustment of bearing numbers

The calculated number of bearings can be manually adjusted (arrow-buttons). Increasing the number of bearings will reduce the shaft deflection accordingly. This may be of interest in cases where precise product transfer is required. Reduction of the number of bearings is not recommended. In such cases please contact Habasit Application Support.

Result: Number of Sprockets

Number of sprockets on drive shaft

The sprocket number on every shaft is calculated according to the shaft load and may differ for the drive shaft and idling shafts. The difference increases with the belt width and load. The minimum sprocket number depends on the maximum allowed sprocket distances and belt width. The maximum sprocket number depends on the minimum possible sprocket distance.

Additionally, the required sprocket load according to the sprocket number is compared with the admissible sprocket load. If the required sprocket load is higher than the admissible sprocket load, the following advice will appear in the info line:

Sprocket load too high. Use bigger shaft or other sprocket type.

Higher sprocket numbers are calculated due to lower admissible sprocket loads when PP or TPU sprockets are selected.

For admissible sprocket loads refer to: [sprocket selection](#)

Number of sprockets on idling shaft head

The sprocket number on every shaft is calculated according to the shaft load and may differ for the drive shaft and idling shafts. The difference increases with the belt width and load. The minimum sprocket number depends on the maximum allowed sprocket distances and belt width. The maximum sprocket number depends on the minimum possible sprocket distance.

Additionally, the required sprocket load according to the sprocket number is compared with the admissible sprocket load. If the required sprocket load is higher than the admissible sprocket load, the following advice will appear in the info line:

Sprocket load too high. Use bigger shaft or other sprocket type.

Higher sprocket numbers are calculated due to lower admissible sprocket loads when PP or TPU sprockets are selected.

For admissible sprocket loads refer to: [sprocket selection](#)

Number of sprockets on idling shaft tail

The sprocket number on every shaft is calculated according to the shaft load and may differ for the drive shaft and idling shafts. The difference increases with the belt width and load. The minimum sprocket number depends on the maximum allowed sprocket distances and belt width. The maximum sprocket number depends on the minimum possible sprocket distance.

Additionally, the required sprocket load according to the sprocket number is compared with the admissible sprocket load. If the required sprocket load is higher than the admissible sprocket load, the following advice will appear in the info line:

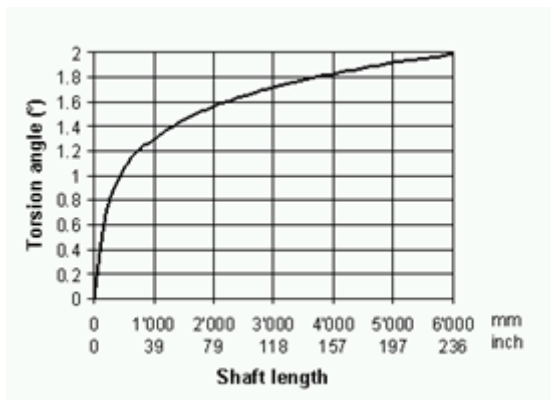
Sprocket load too high. Use bigger shaft or other sprocket type.

Higher sprocket numbers are calculated due to lower admissible sprocket loads when PP or TPU sprockets are selected.

For admissible sprocket loads refer to: [sprocket selection](#)

Result: Torsion angle of drive shaft

Excessive shaft torsion may result if small shaft diameters are applied by using 3 or more bearings on one shaft. The calculated torsion angle represents the theoretical torsion of the shaft on its full length, assuming sprockets positioned at each shaft end and the remaining sprockets equally distributed over its full length. The allowable torsion is primarily a functional limit and is in most cases below the strength limit of the shaft material. Depending on the belt stiffness, the torsion angle is in reality smaller. It is important to consider that a twisted shaft will not allow equal torque transmission over the belt width. The bigger the calculated torsion angle the higher the load on the outermost sprocket near the drive. In addition, excessive torsion will raise the risk of sprocket disengagement. In order to protect the sprockets and belt from excessive load concentration on the drive side, the torsion angle should be limited. The calculated torsion is validated. Typical limits are 1° for 450 mm (18") up to 1.8° for 4000 mm (158"). As soon as the torsion angle exceeds the limit the indicated value will turn red.



Result: Torque (journal diameter)

The calculated torque is compared with the admissible torque for the selected journal diameter (end of drive shaft connected to the motor- or gear shaft). If the calculated torque is bigger than the admissible journal torque, the torque value displayed will turn red.

Please note that no strength calculation is made for the shaft itself (solid or tube). It is the responsibility of the machine producer to calculate the specific shaft size. This is of particular importance if tubes are used with welded journals at the drive end.

Result: Required shaft power

The displayed value "Required power on drive shaft" relates to the friction forces belt/guides and belt/product and indicates the power needed at the sprocket shaft considering a high efficiency η for the shaft bearings.

Required motor power

Since several machine components may be installed between the motor and the drive shaft of a conveyor, the energy loss of those elements (gear boxes, transmissions, etc.) has to be considered when specifying the required motor power. Due to its 90° in/out gear shape worm gears are regularly used. But such gears can have a very low efficiency η that requires more motor power. Depending on these losses in the drive system, **drive efficiency η even lower than 50% is possible!**

Please contact your drive system supplier to specify the motor power required.



Contact

You can reach a Habasit expert at the following e-mail address:

selecalc@habasit.com