

# Závitový dopravník

## Časť 10.

Prednáška

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Vedúci pracoviska: prof. Ing. Marián Peciar, PhD.

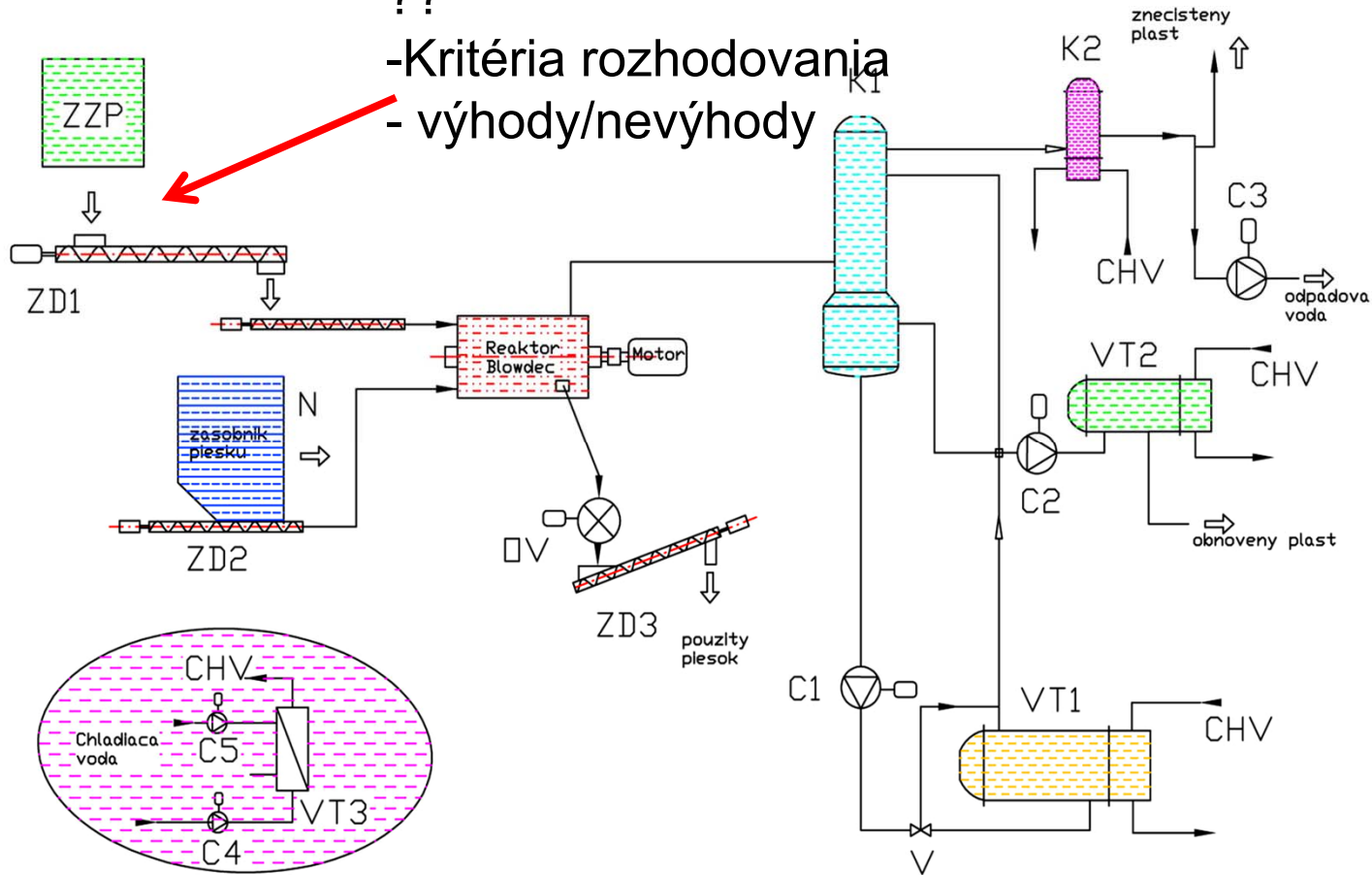
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Bratislava, marec-apríl  
2020

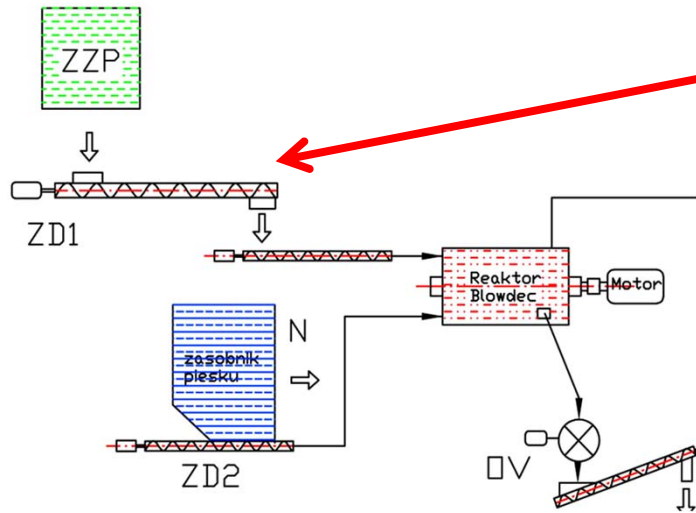
# Návrh zariadenia

Výber alebo návrh  
 ??

- Kritéria rozhodovania
- výhody/nevýhody



# Návrh zariadenia



Aký použijem spôsob dopravy

Je výber správny ?

Alternatívy ?



# Čo najpresnejšia špecifikácia

- Kapacita
- Dopravovaný materiál
- Prevádzkové podmienky /p,T/
- Obmedzenia ( procesné , konštrukčné )
- ?? prevádzkové skúsenosti
- maximálny zastavaný priestor
- MaR
- súvisiace aparáty
- atď' ....

# Dopravovaný materiál



-Charakterizácia materiálu .

- rozptyl charakteristických vlastností

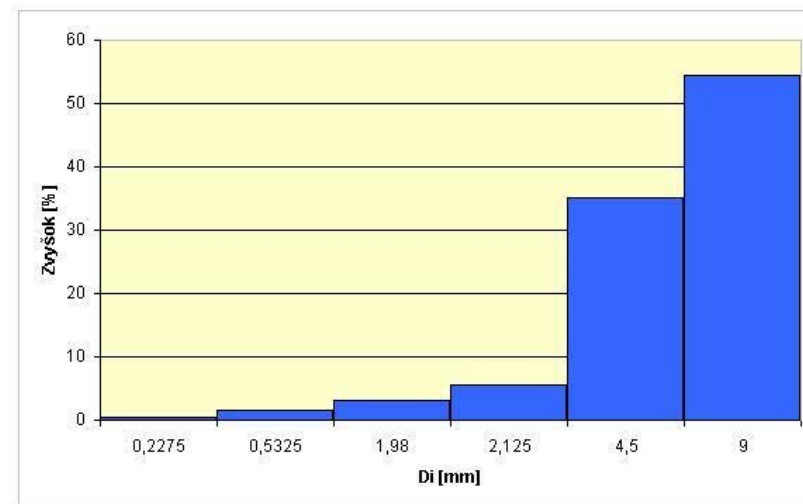
-Koľko informácií potrebujem ?

# Dopravovaný materiál

Zloženie zmesných plastov	
Druh plastu	hm %
HDPE	10
LDPE	38
PP	30
PS	15
PA	4
PMMA	1
PUR	2
PVC	0

- hustota

-Distribučná  
charakteristika



## Procesná časť návrhu - norma

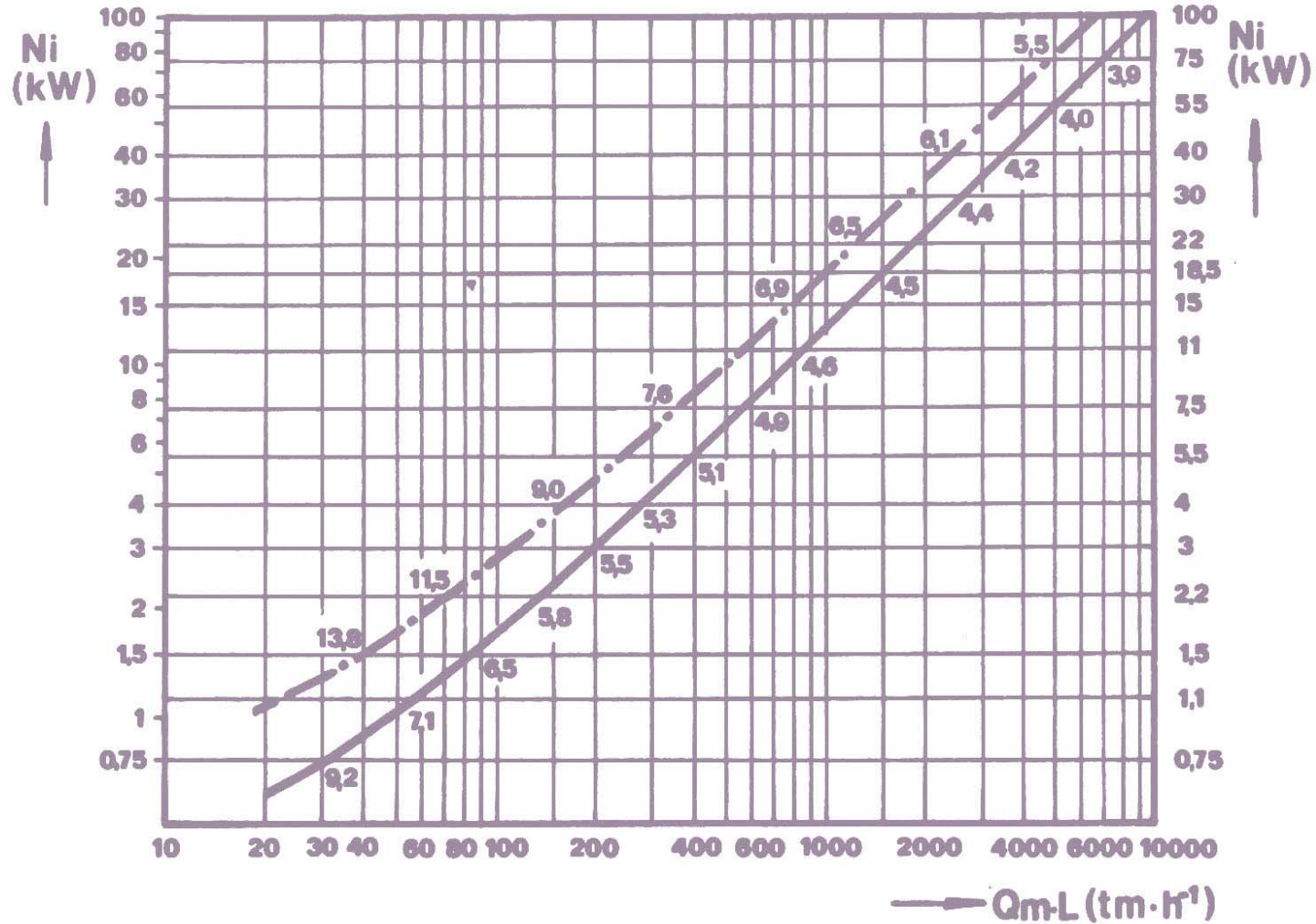
$$Q_v = 3600 \cdot \frac{\pi \cdot D^2}{4} \cdot D \cdot \psi \cdot n \cdot C_H$$

$$P = \frac{Q_v \cdot \rho_v \cdot g}{3600} \cdot (l_v \cdot w \pm h)$$

- $Q_v$  - dopravované množstvo [ $m^3 \cdot h^{-1}$ ],  
 $D$  - menovitý priemer závitovky [m],  
 $S$  - stúpanie závitovky [m],  
volíme  $s = D$ , pre menšie  $D$ , a  
 $s = 0,8 D$ , pre väčšie  $D$ ,  
 $\psi$  - súčiniteľ plnenia [1],  
 $n$  - otáčky závitovky [ $s^{-1}$ ],  
 $C_H$  - súčiniteľ znižujúci dopravované množstvo vzhľadom ku  
sklonu dopravníku pri doprave nahor [-],  
 $P$  - príkon dopravníku [W],  
 $\rho_v$  - objemová hmotnosť dopravovaného materiálu [ $kg \cdot m^{-3}$ ],  
 $l_v$  - vodorovná dopravná vzdialenosť [m],  
 $h$  - dopravná výška [m], (znamienko + platí pri doprave nahor,  
znamienko - pri doprave dole),  
 $w$  - celkový súčiniteľ odporu [-].



# Procesná časť návrhu - Prerovske strojarne





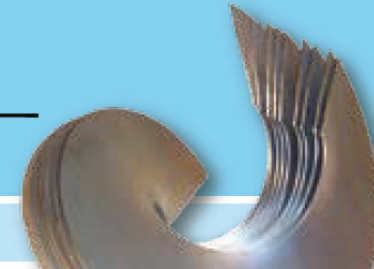
# Procesná časť návrhu - VAV

## Calculations for screw conveyors

belt speed in m per sec

$$v = \frac{\text{Screw diameter (in meters)} \times 3,14 \times \text{Rotations per minute}}{60}$$

v = speed in m per sec



## Calculations for screw conveyors

Capacity in kg per hour (Q)

$$Q = \frac{3,14 \times D^2}{4} \times s \times n \times sg \times i \times 60$$

Q = capacity in kg per hour

D = screw diameter in dm

s = pitch in dm

n = rotations per minute

sg = specific weight of the material (see table)

i = degree of trough filling



# Procesná časť návrhu - VAV

## Calculations for screw conveyors

Power in Kw (P)

$$P = \frac{Q \times L \times K}{407}$$

P = power in Kw

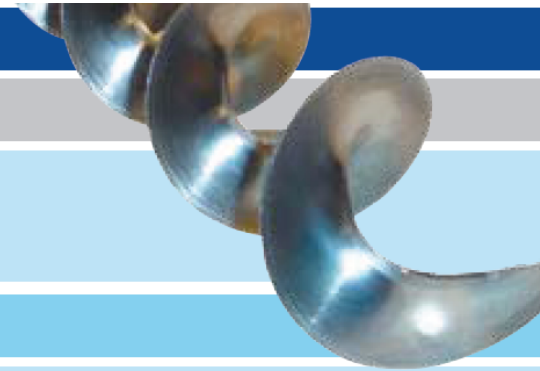
Q = capacity in 1000 kg per hour

L = conveyor screw length

K = friction coefficient

## Specific weight (in g)

product	sw	product	sw	product	sw
aloin	1,700	earth	1,600	peat	0,410
aluminum	2,800	egg powder	0,250	peat mulch	0,230
amaril	4,000			pit coal	0,860
anthracite	1,700	fish meal	0,900	potatoes, in bulk	0,800
asbestos	2,800	flax seed	0,720	pulp	1,100
ash	0,900	flower, loose	0,500		



## Procesná časť návrhu – C.E.M.A.

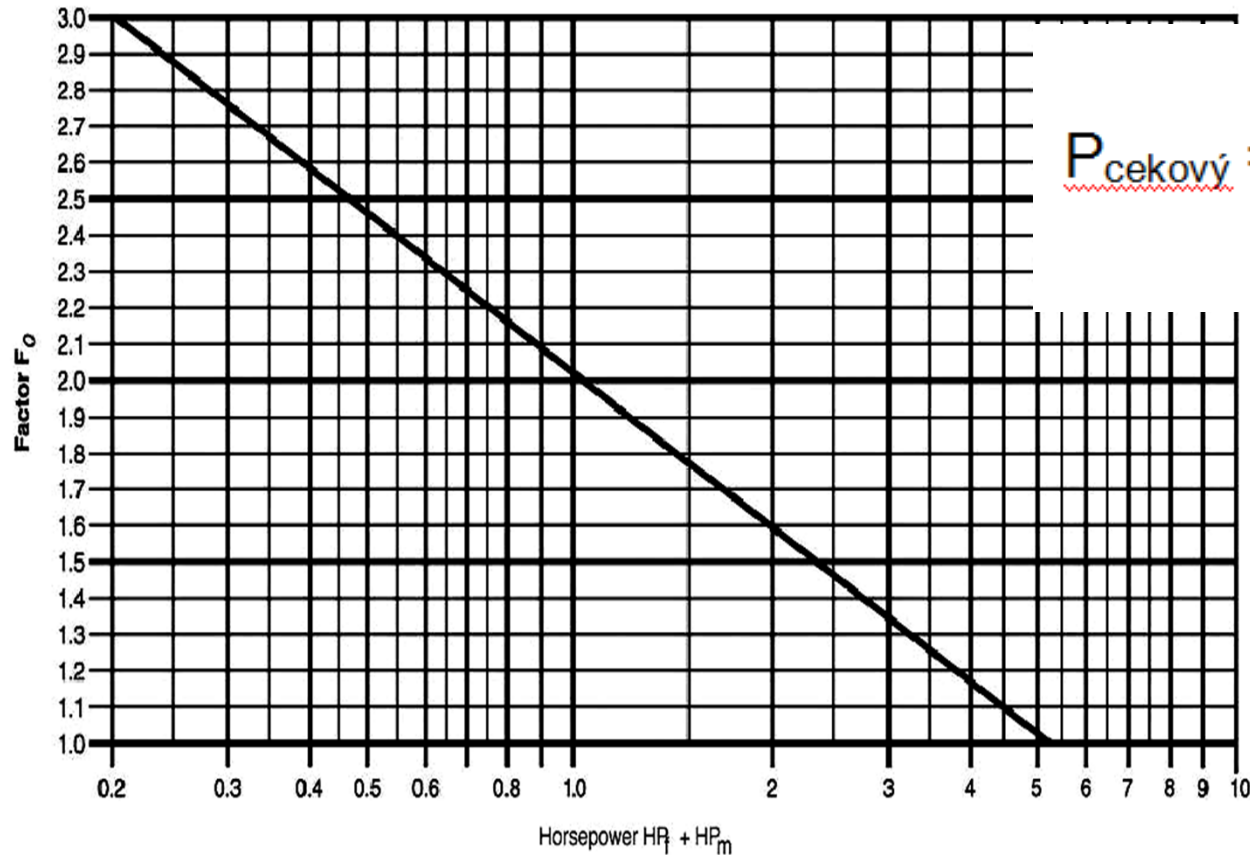
$$HP_f = \frac{L \cdot n \cdot F_d \cdot F_b}{1000000}$$

HP – f  
Samotný pohyb  
dopravníka

$$HP_m = \frac{C \cdot L \cdot W \cdot F_f \cdot F_m \cdot F_p}{1000000}$$

HP – m  
Potrebný výkon na  
dopravu materiálu

# Procesná časť návrhu – C.E.M.A.



$$P_{\text{cekový}} = \frac{(HP_f + HP_m) F_0}{e}$$

For values of  $HP_f + HP_m$  greater than 5.2,  $F_0$  is 1.0

Trace the value of  $(HP_f + HP_m)$  vertically to the diagonal line, then across to the left where the  $F_0$  value is listed.

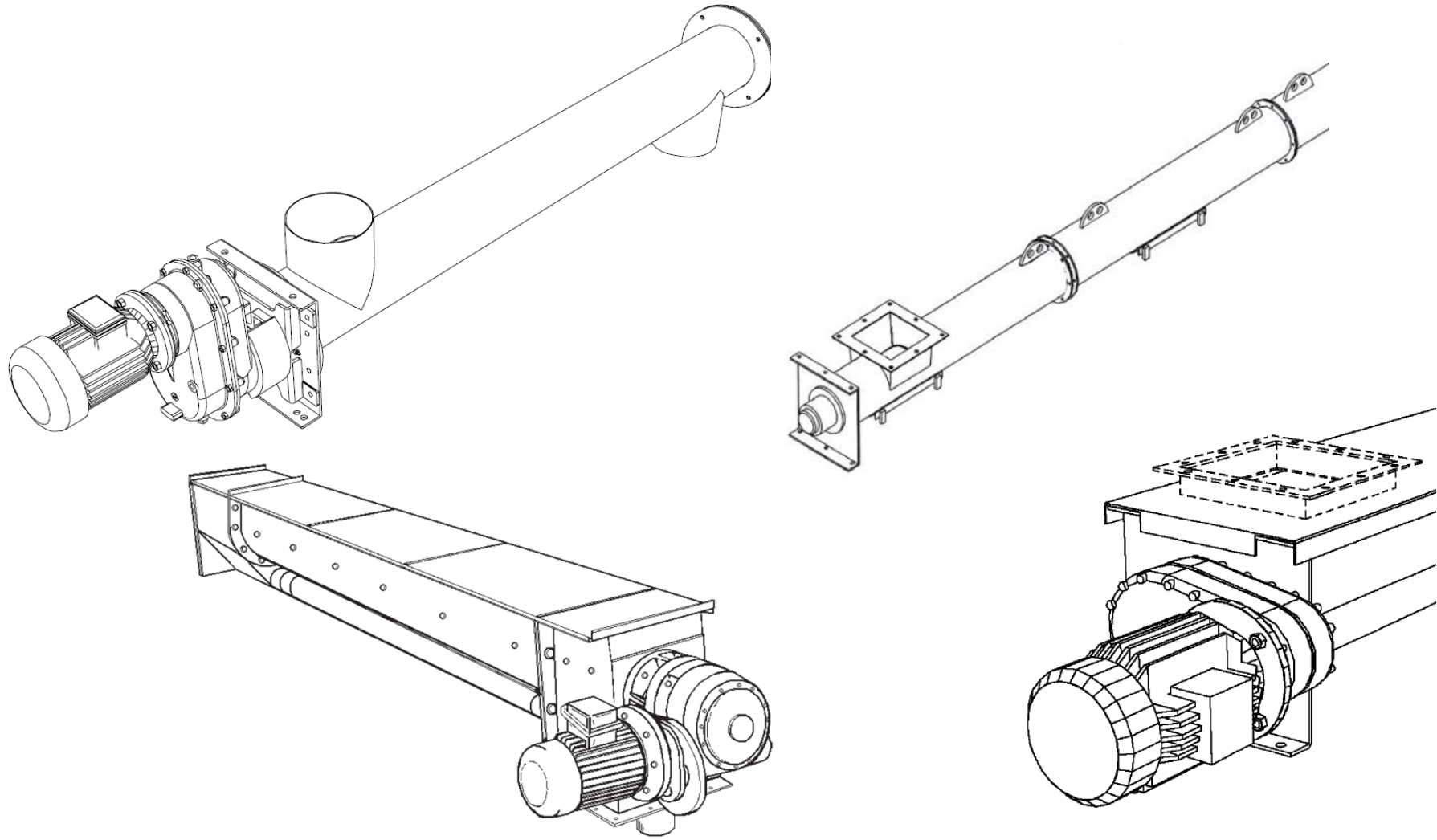
## Procesná časť návrhu

- Analýza jednotlivých návrhových metód
- Porovnanie jednotlivých výsledkov
- Výber
  
- Návrh výkonu pohonu

# Konštrukčná časť návrhu

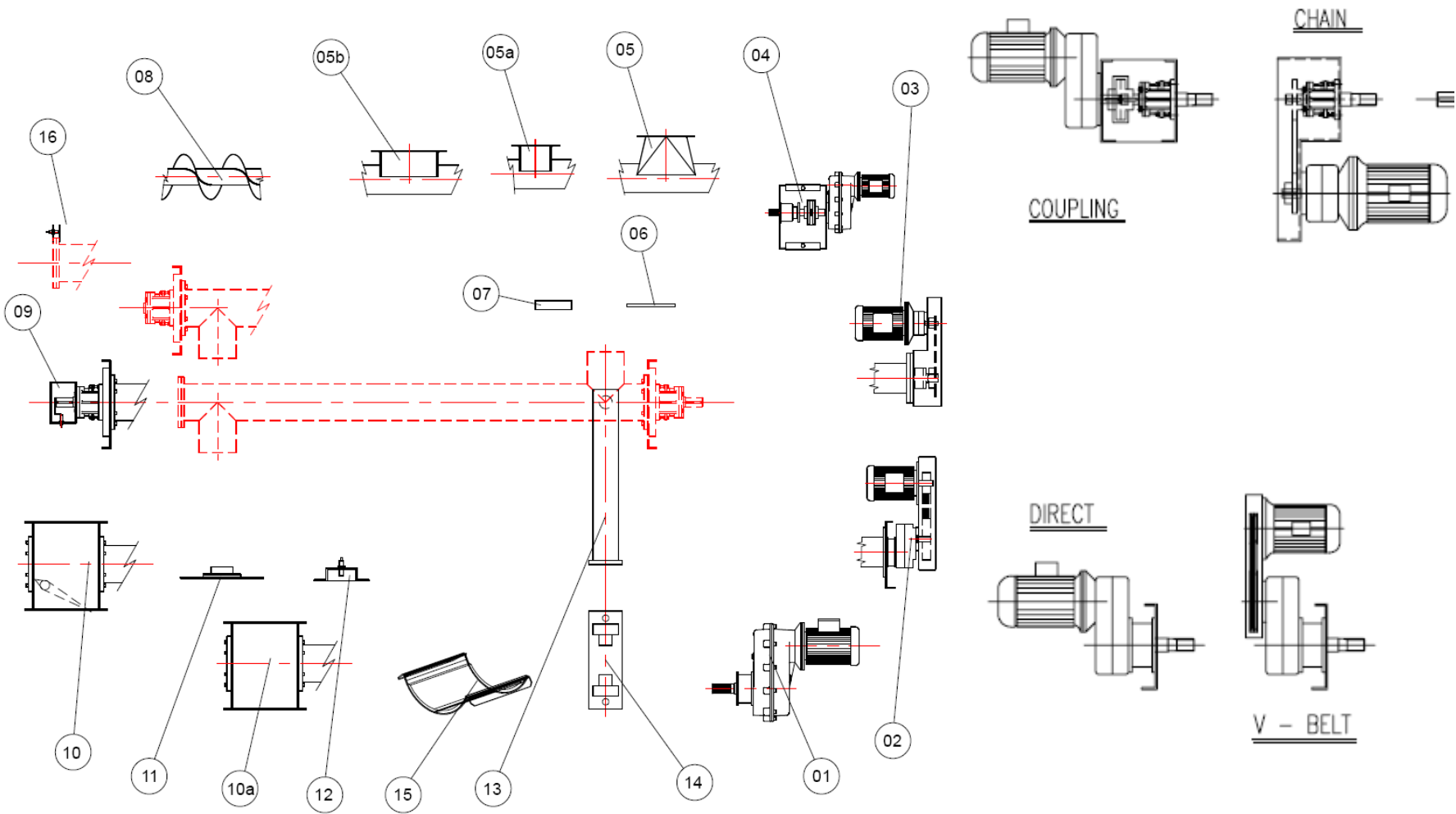
- Oboznámenie sa s alternatívami
- Hľadanie optimálneho riešenia
- Riešenie kritických detailov konštrukcie ( často krát až na základe prevádzkových skúseností )

# Konštrukčný návrh

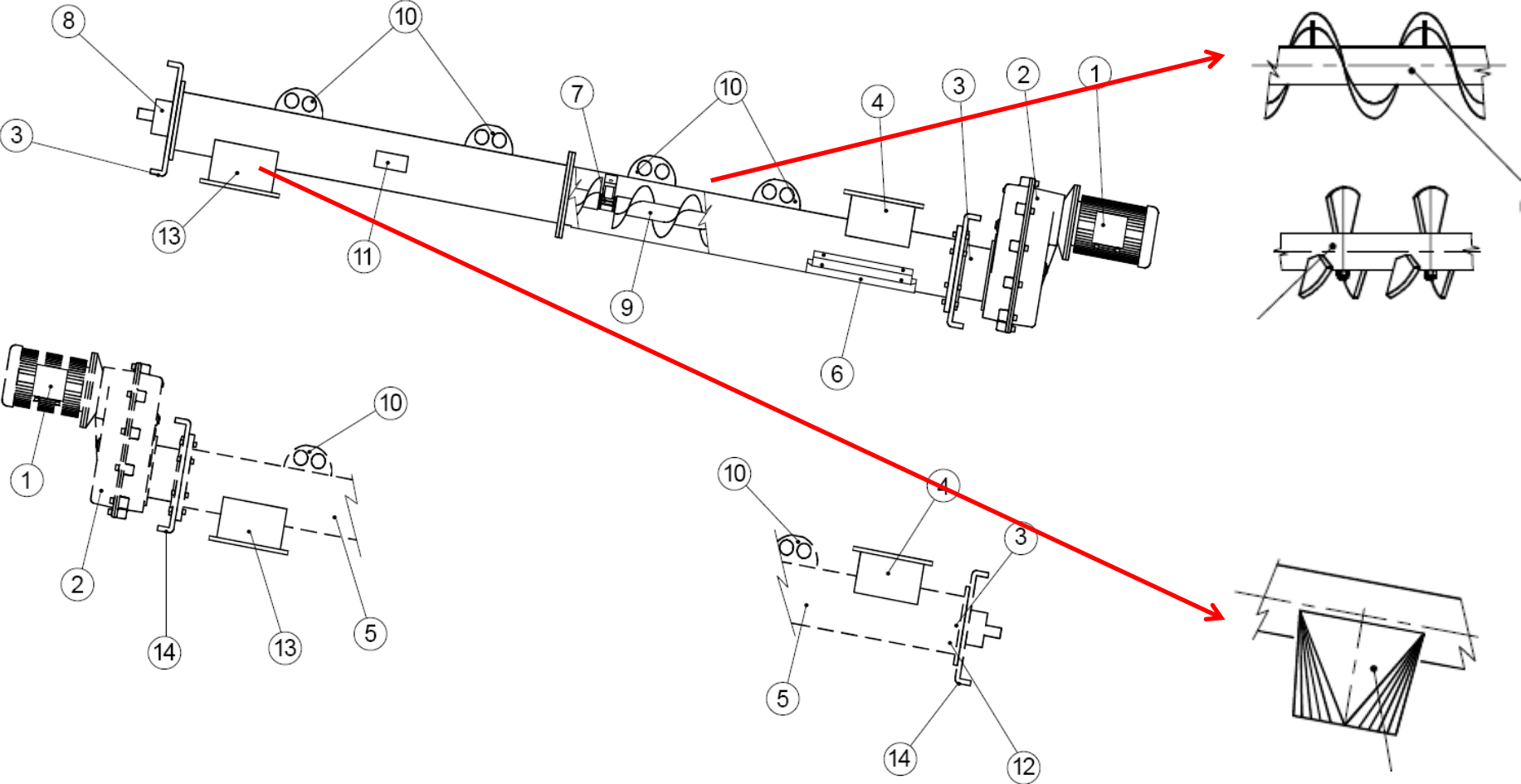




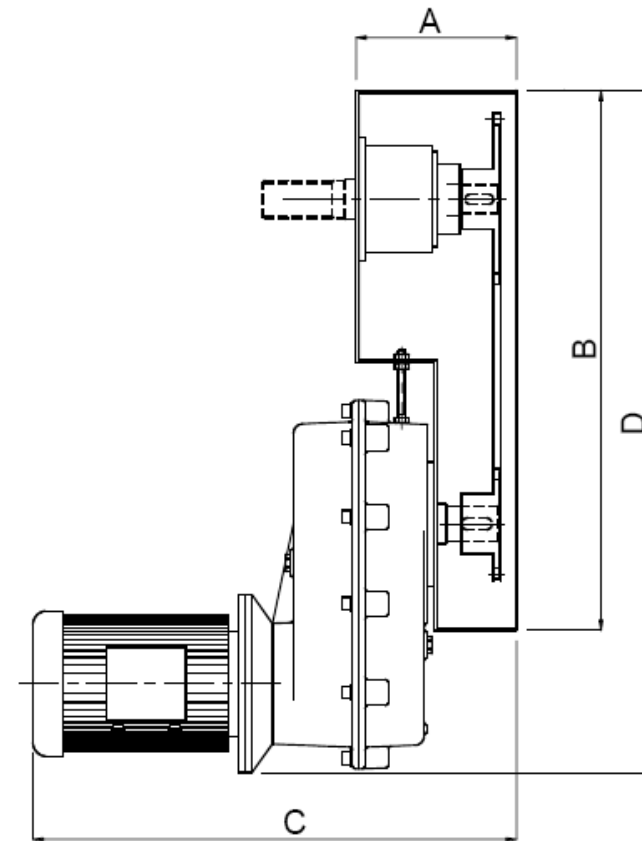
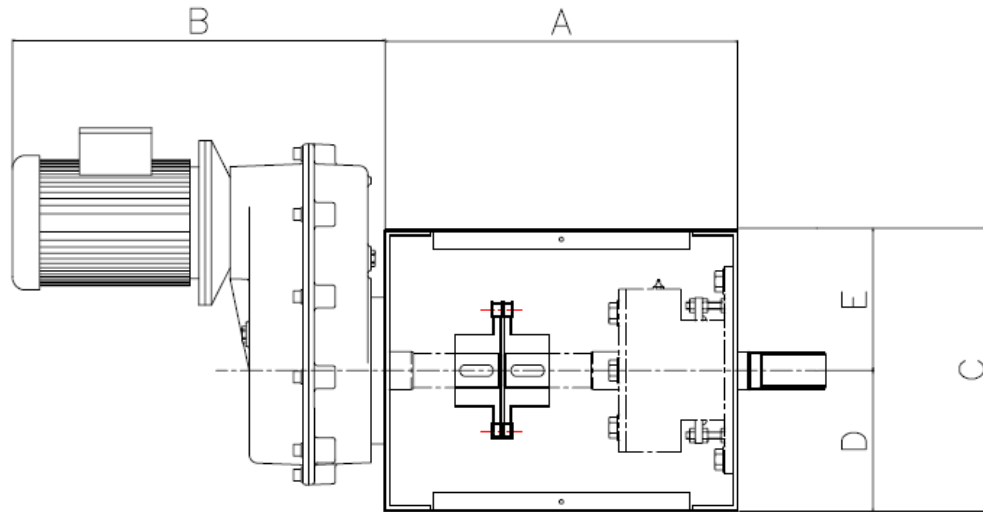
# Konštrukčný návrh – jednotlivé segmenty



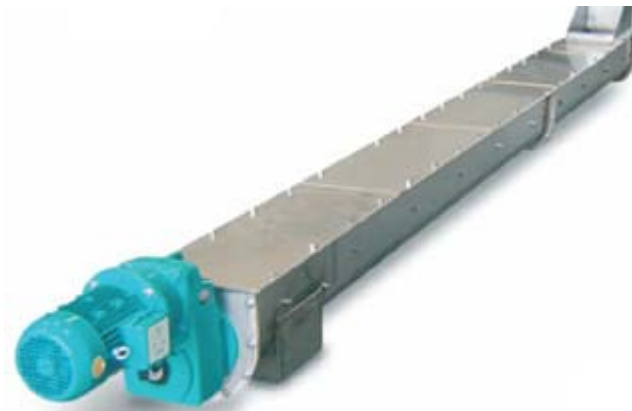
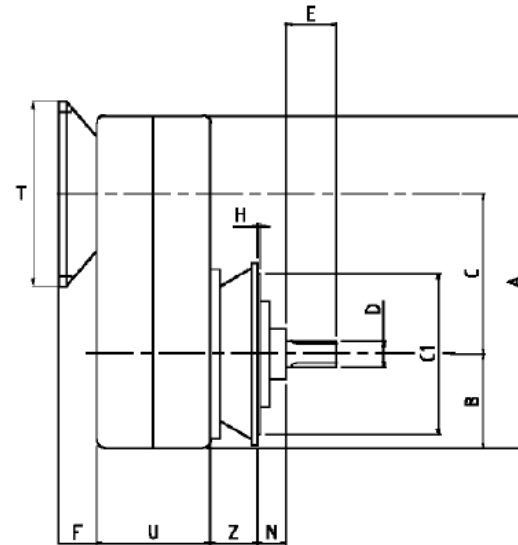
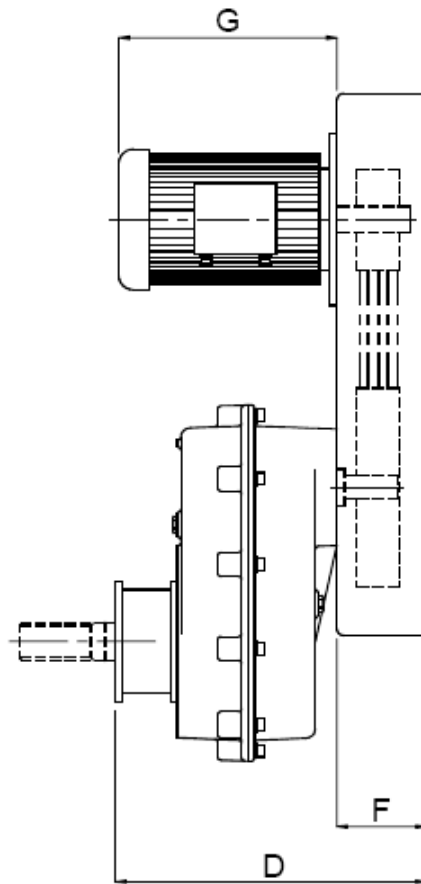
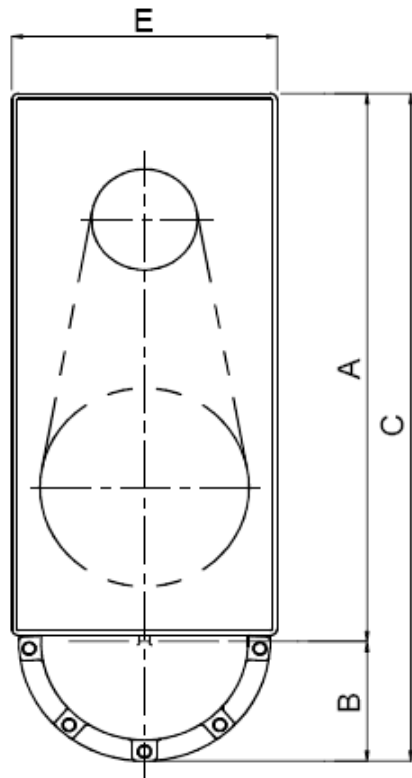
# Konštrukčný návrh – jednotlivé segmenty



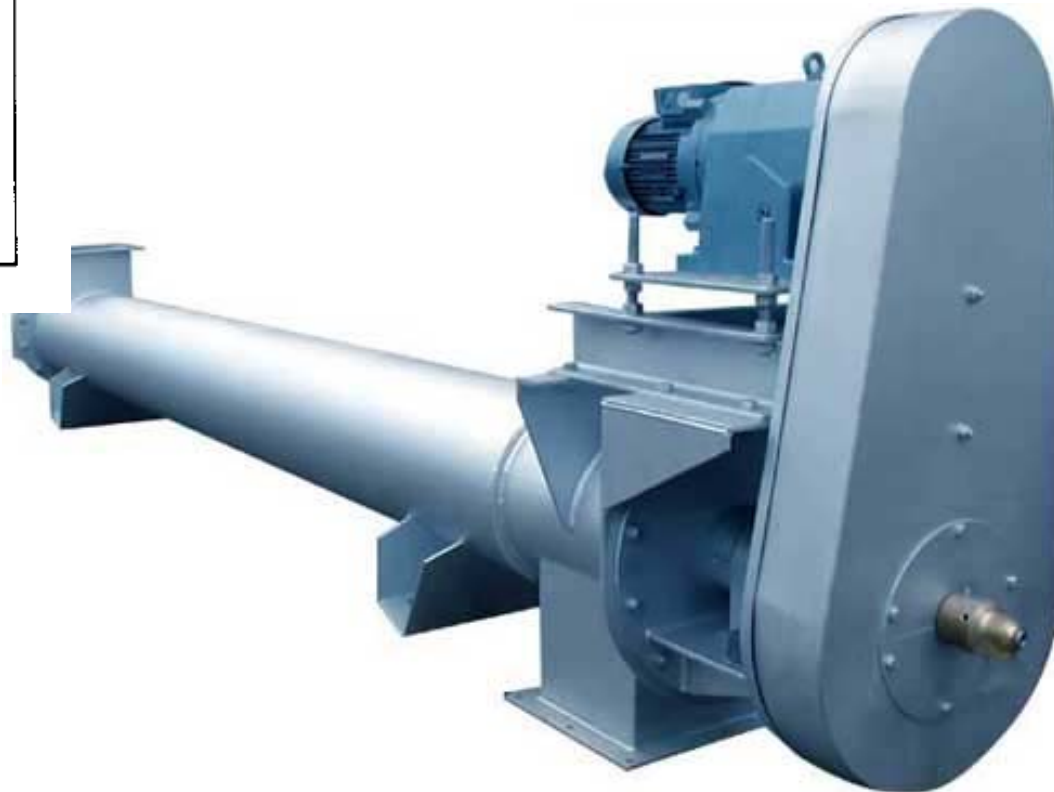
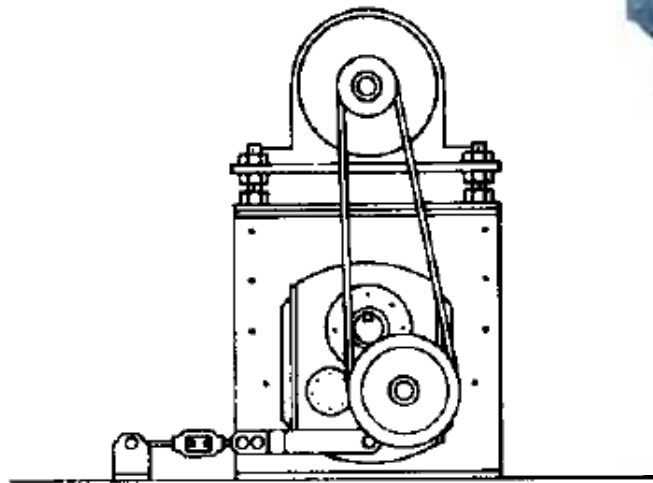
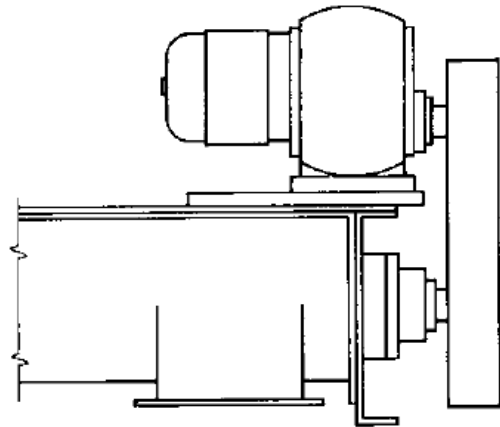
# Konštrukčný návrh- pohon



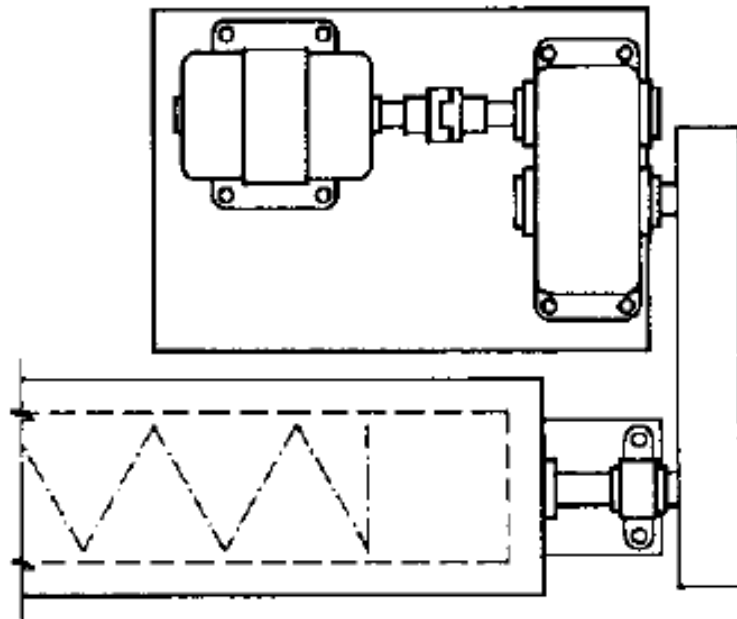
# Konštrukčný návrh- pohon



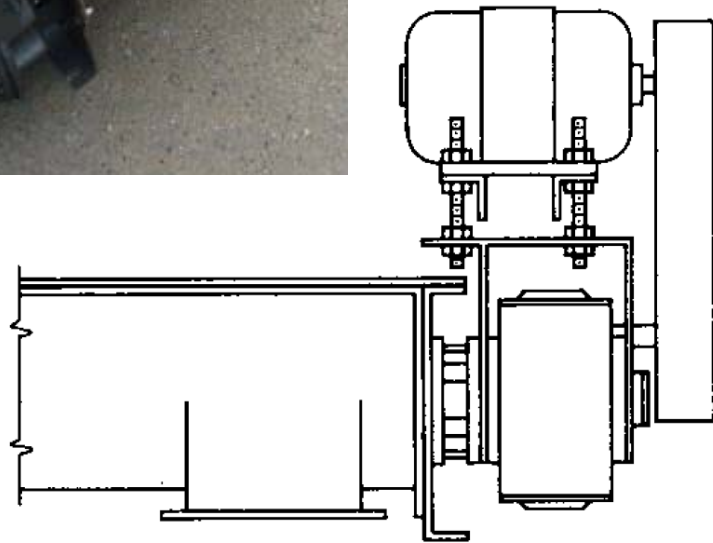
# Konštrukčná časť návrhu



# Konštrukčná časť návrhu



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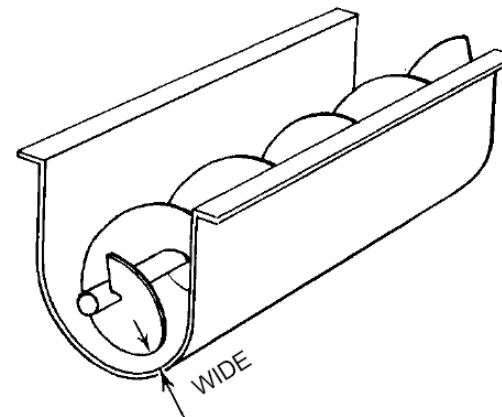
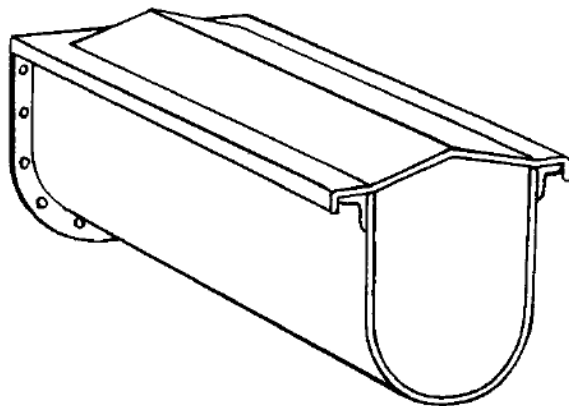
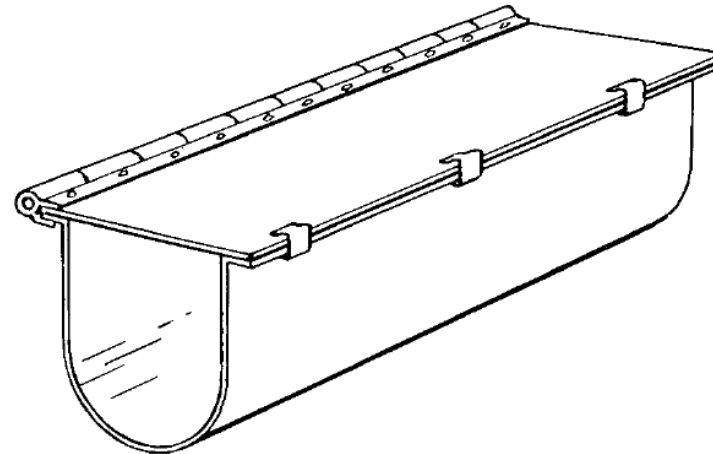
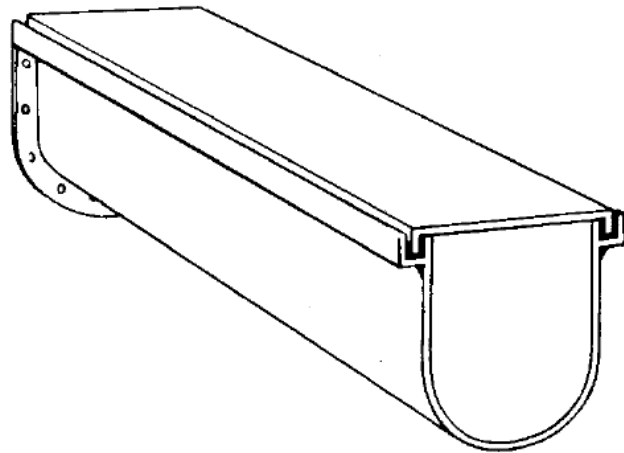




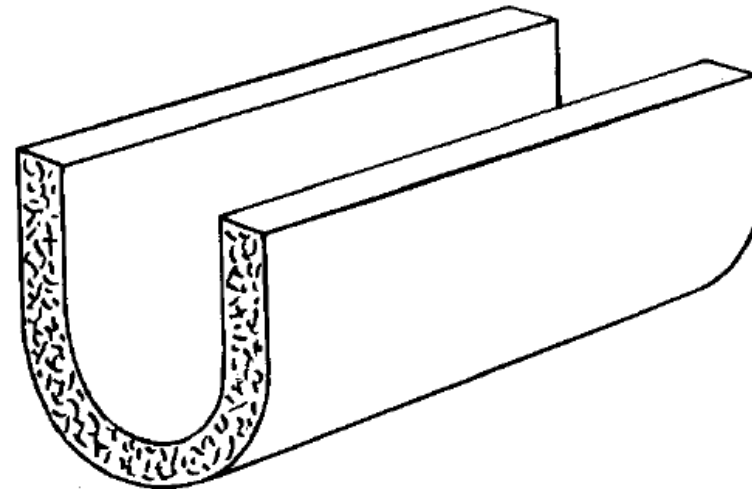
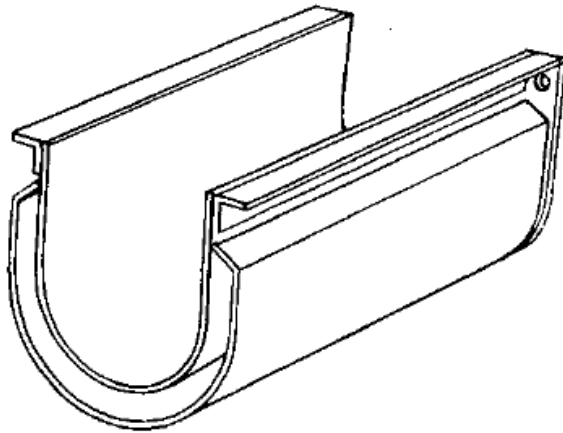
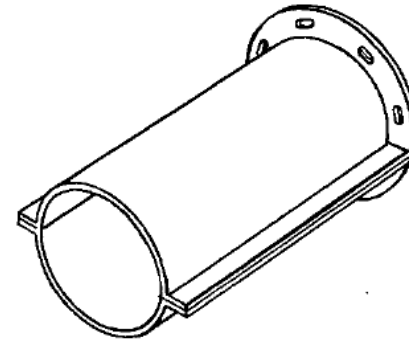
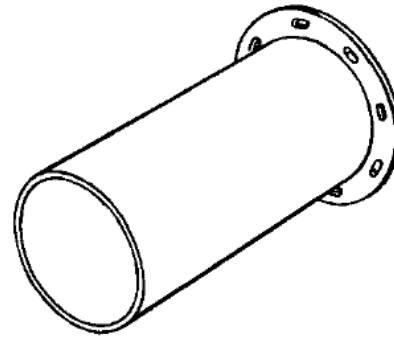
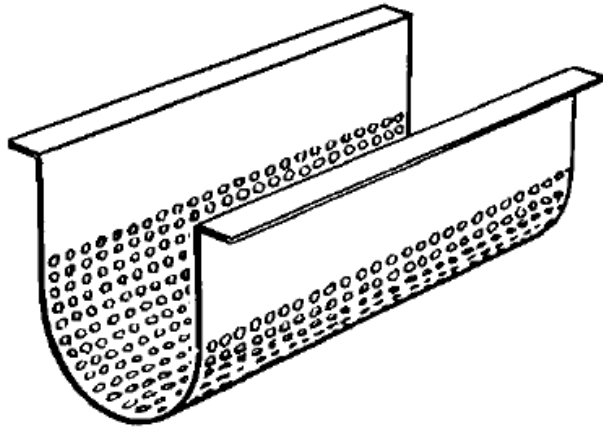
# Konštrukčná časť návrhu



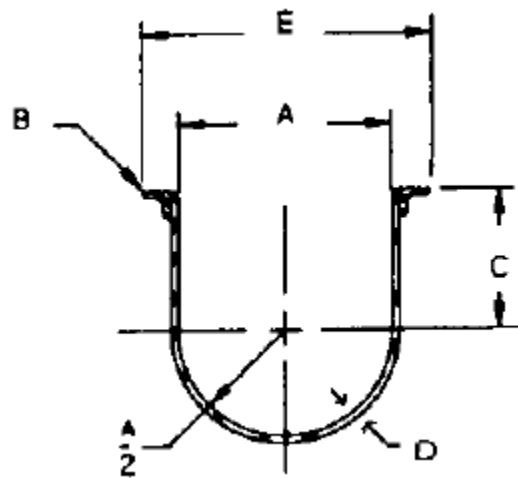
# Konštrukčný návrh- žľab / rúra



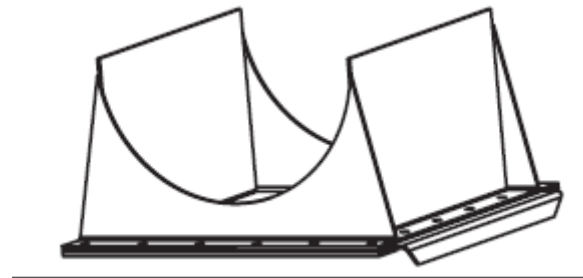
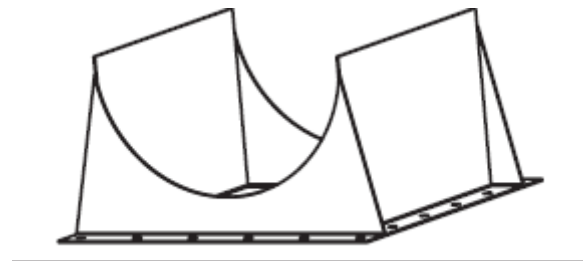
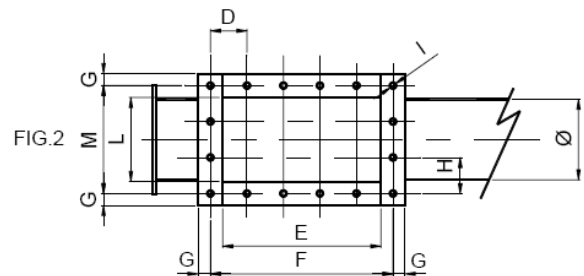
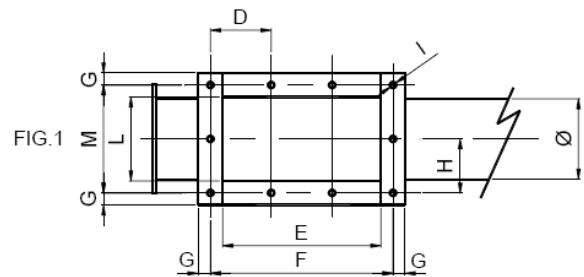
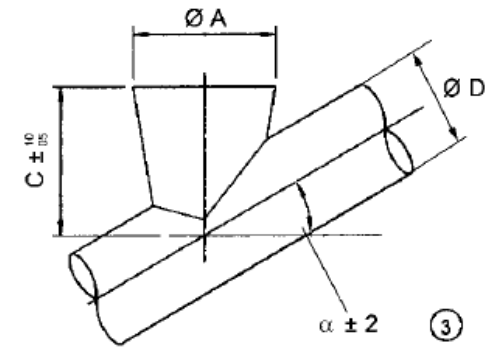
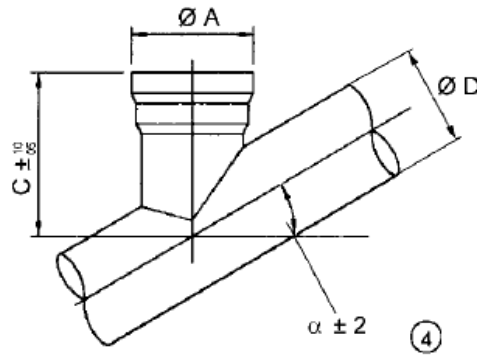
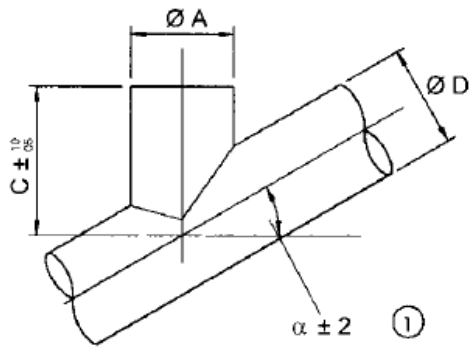
# Konštrukčný návrh- žľab / rúra



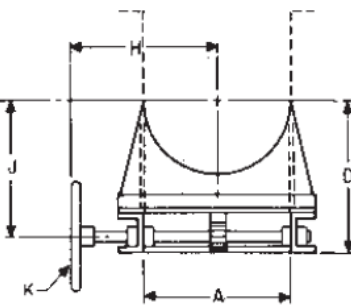
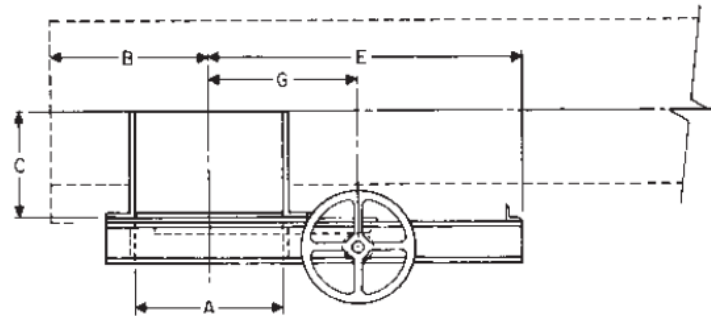
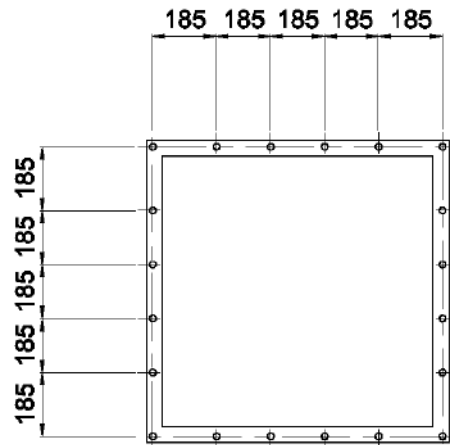
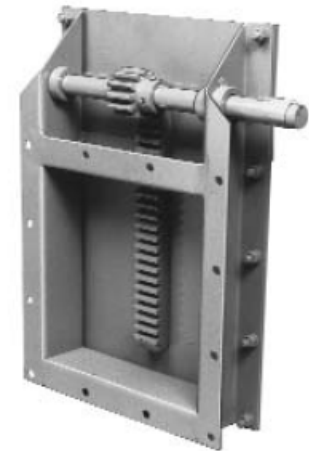
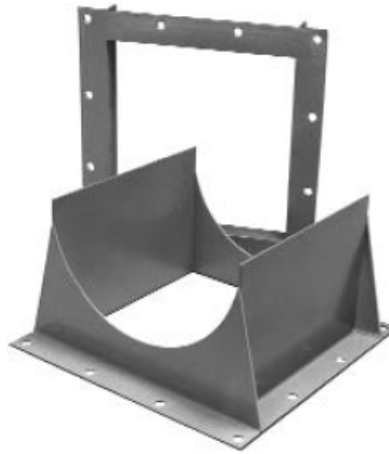
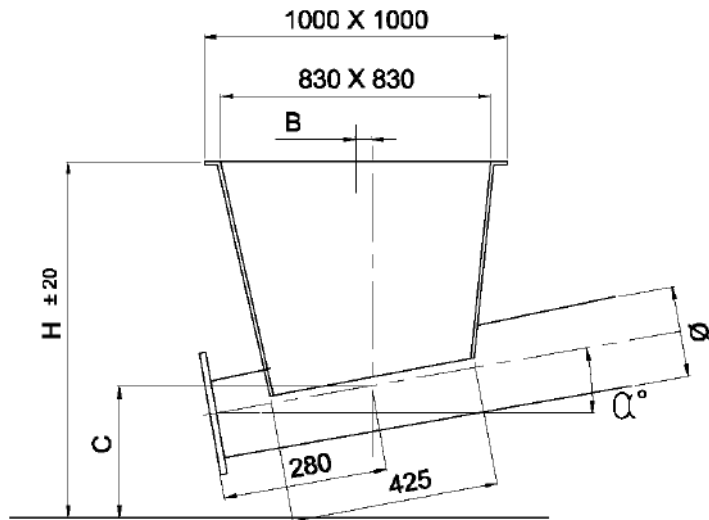
# Konštrukčná časť návrhu



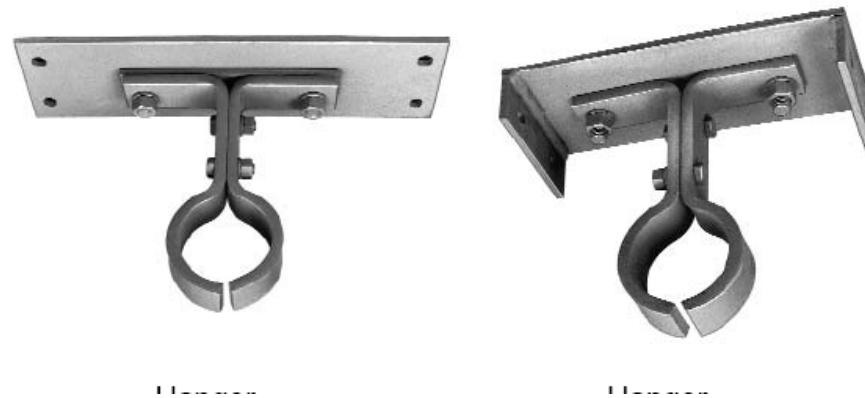
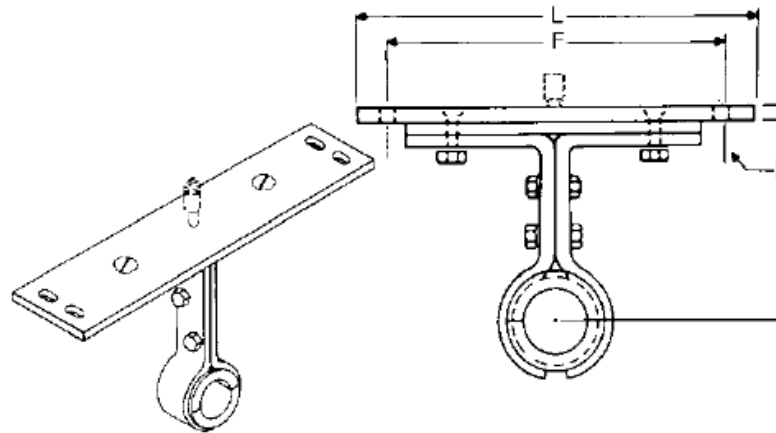
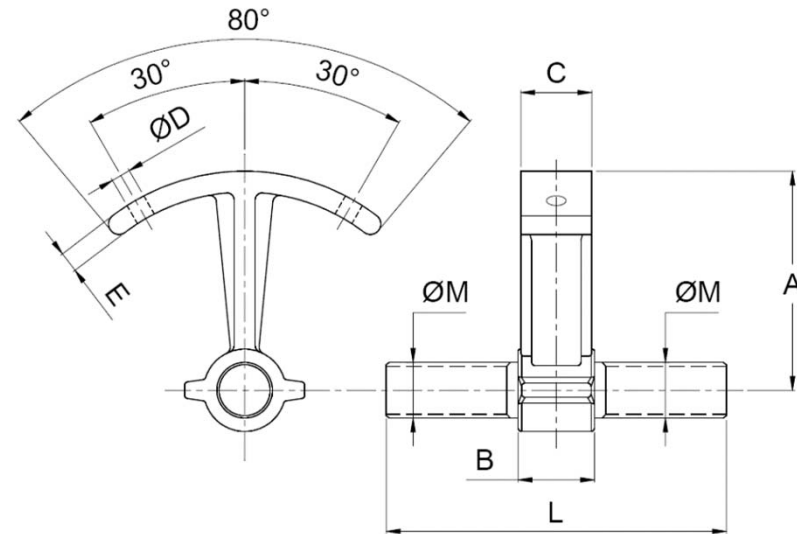
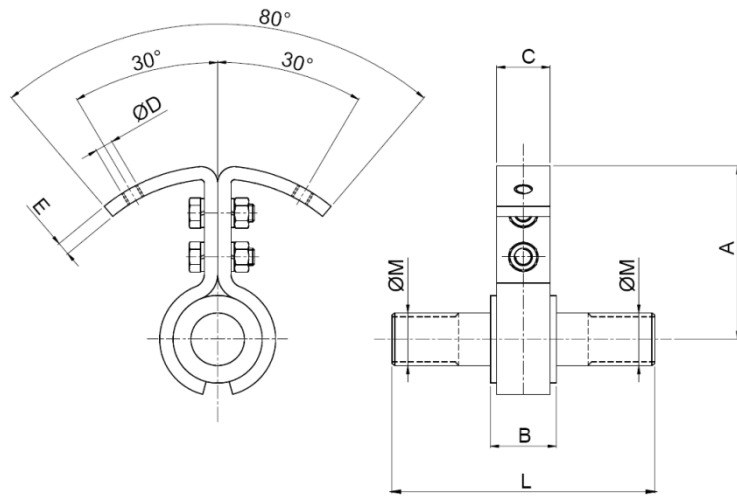
# Konštrukčný návrh- vstupné/výstupné hrdlo



# Konštrukčný návrh- vstupné/výstupné hrdlo

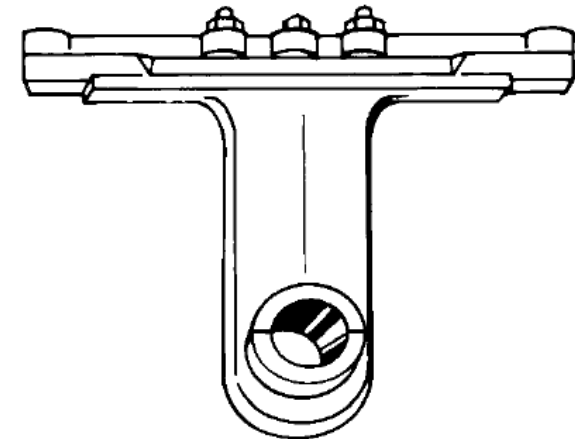
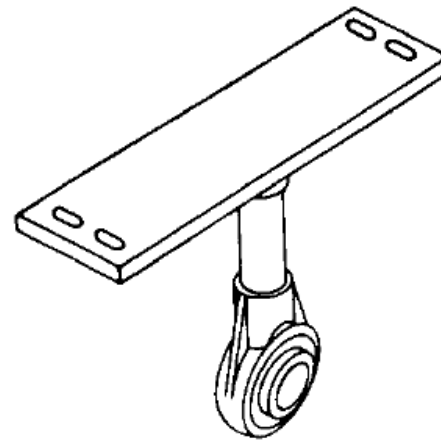
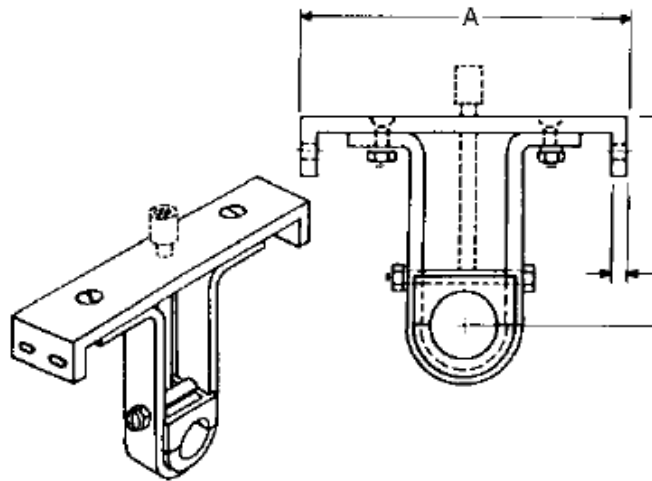


# Konštrukčný návrh- vodiace ložisko

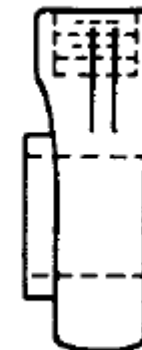
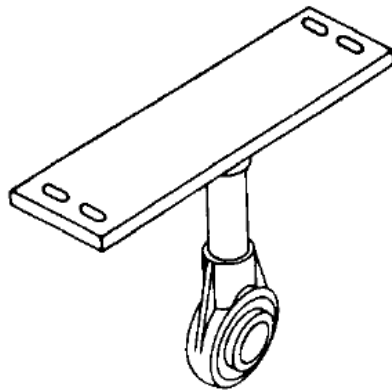
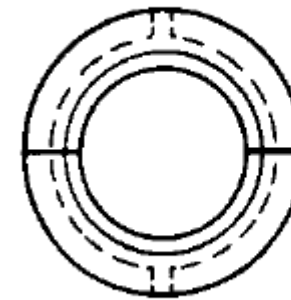
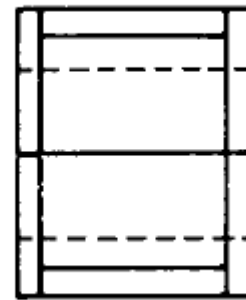
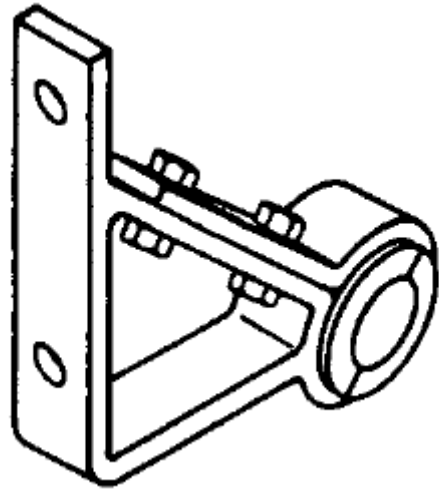




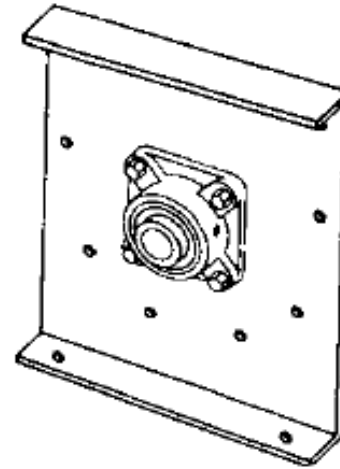
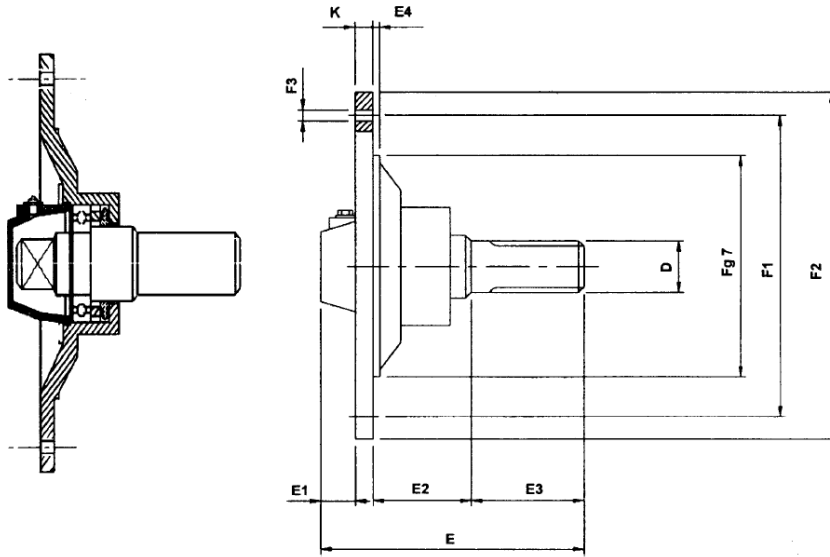
# Konštrukčný návrh- vodiace ložisko



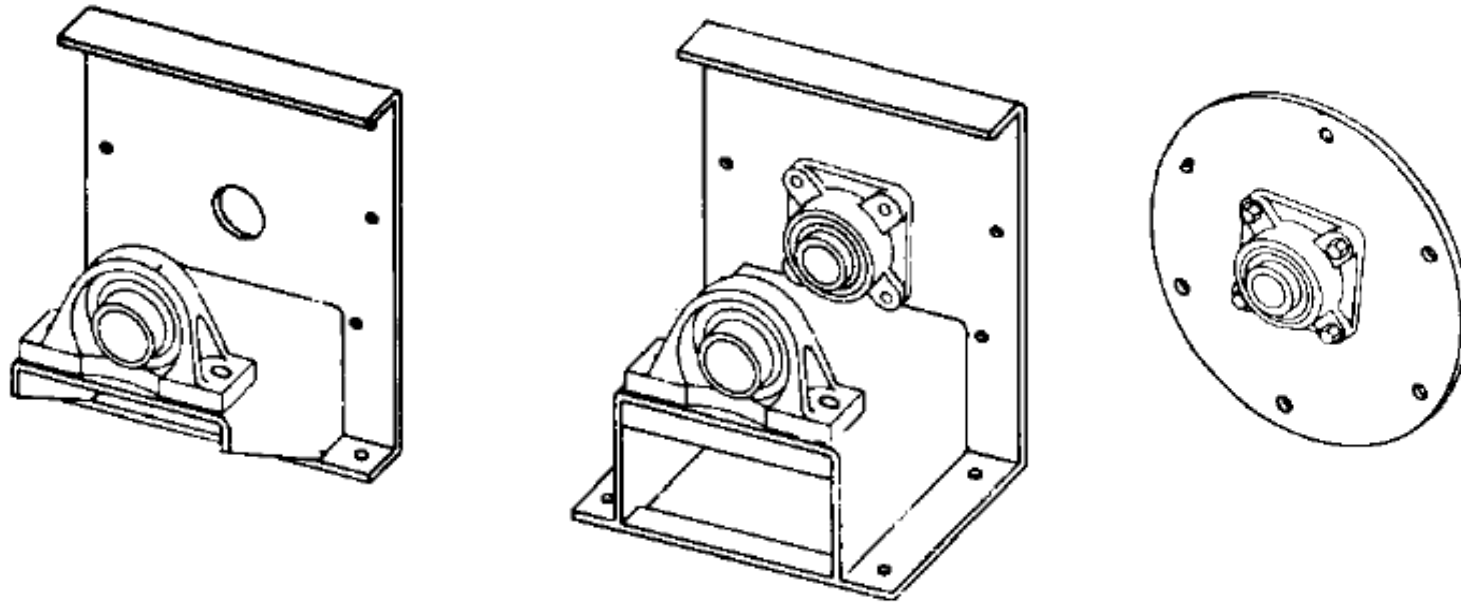
# Konštrukčný návrh- vodiace ložisko



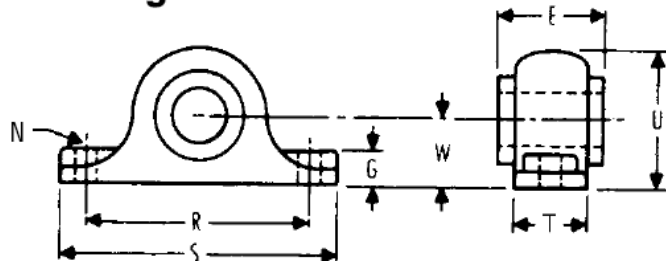
# Konštrukčný návrh- koncové ložisko



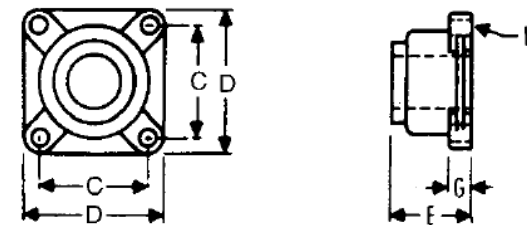
# Konštrukčný návrh- koncové ložisko



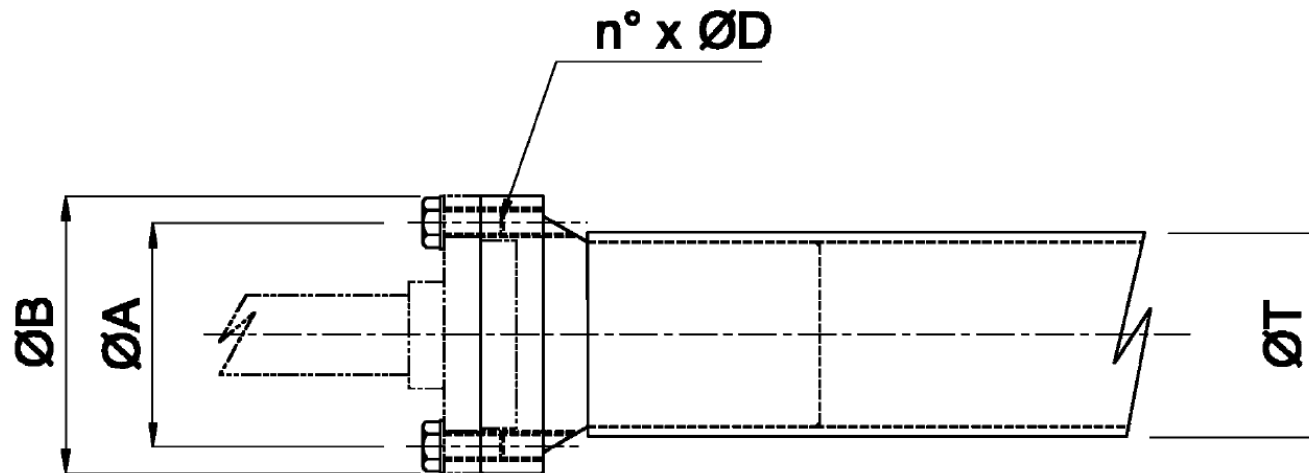
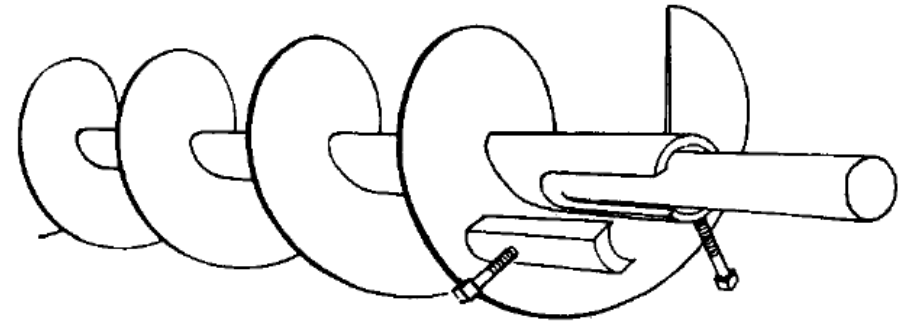
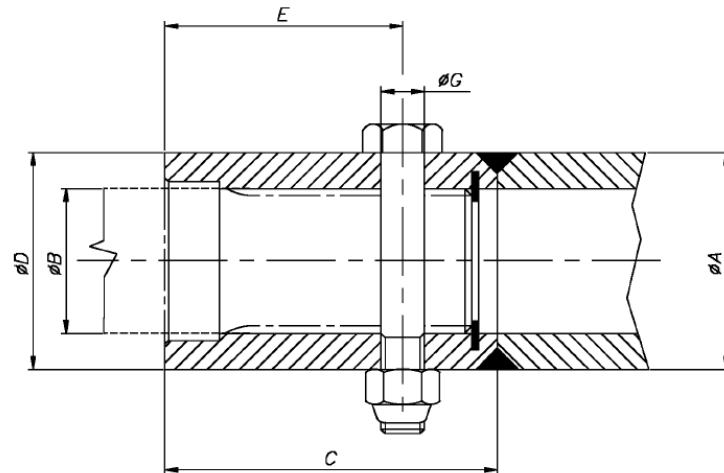
**Roller Bearing Pillow Block**



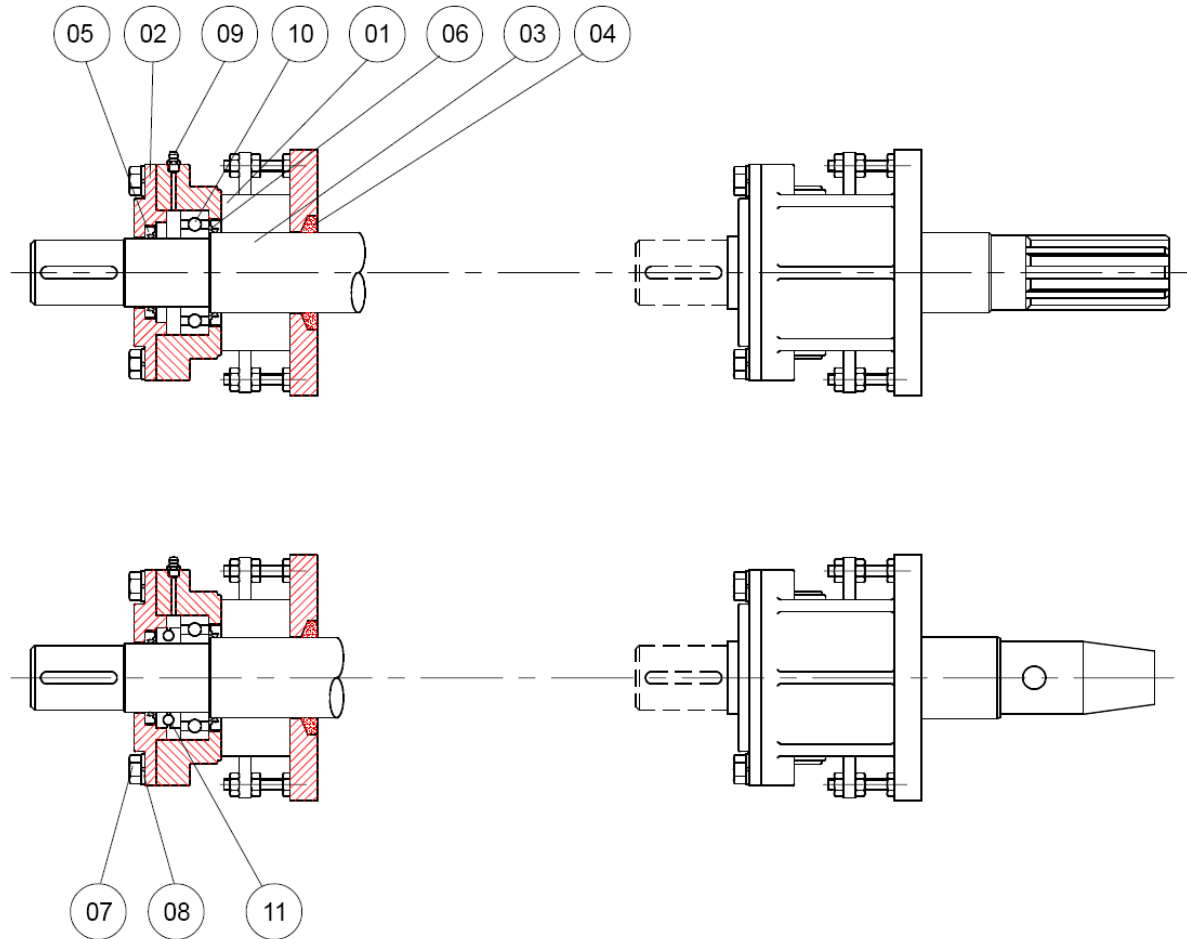
**Roller Bearing Flange Unit**



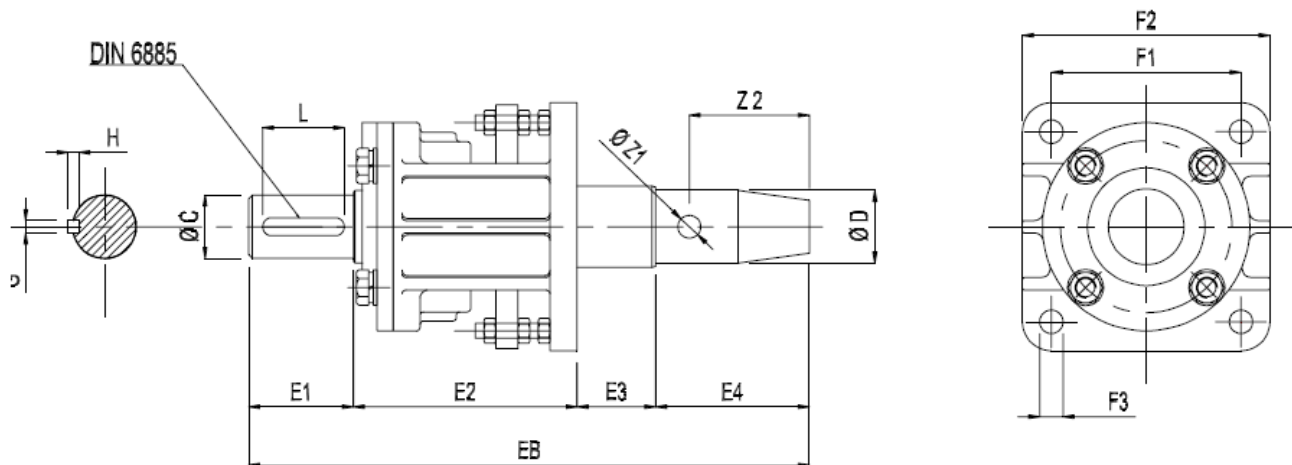
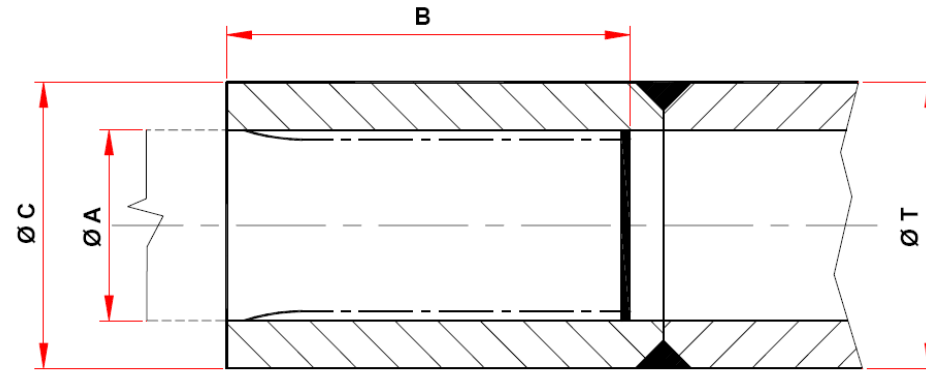
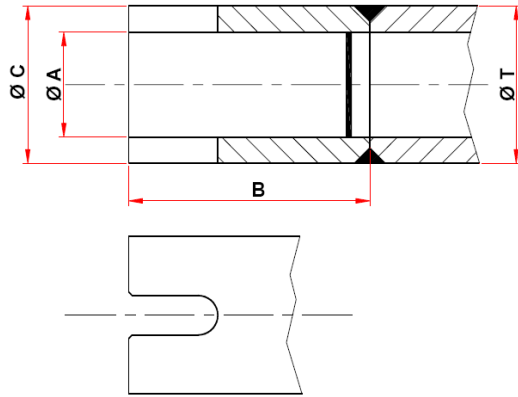
# Konštrukčný návrh – spojenie pohon/závitovka



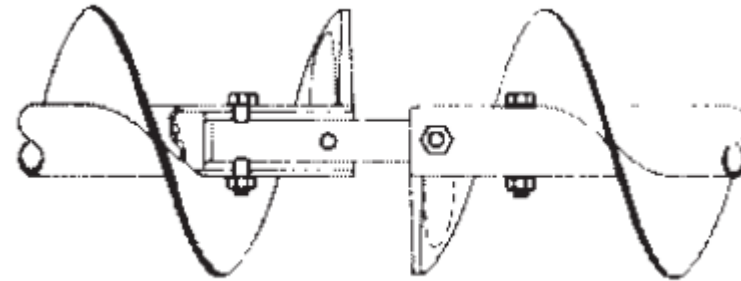
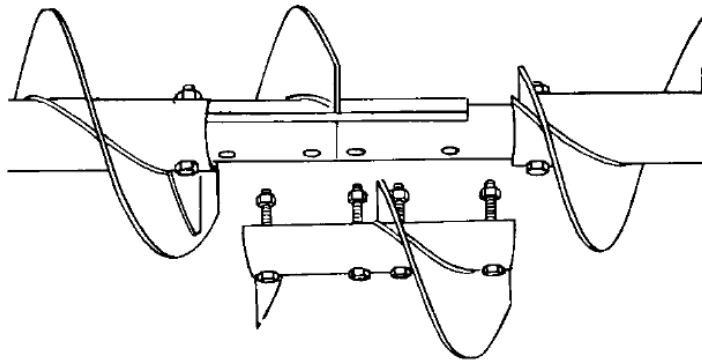
# Konštrukčný návrh - spojenie pohon/závitovka



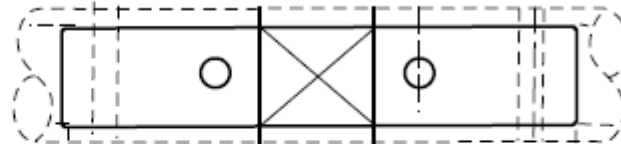
# Konštrukčný návrh – spojenie pohon/závitovka



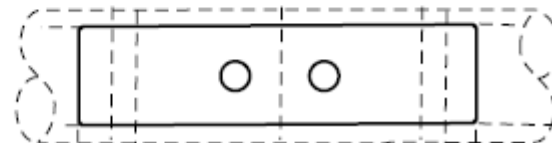
# Konštrukčný návrh – spojenie závit./závit.



COUPLING

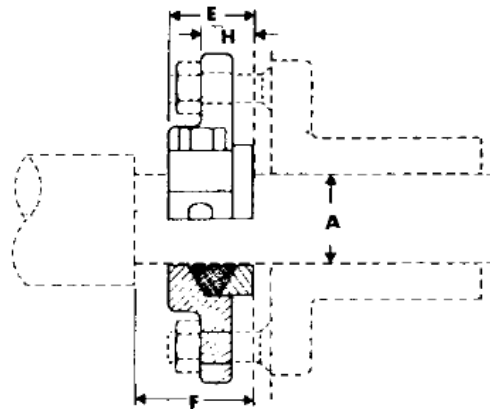
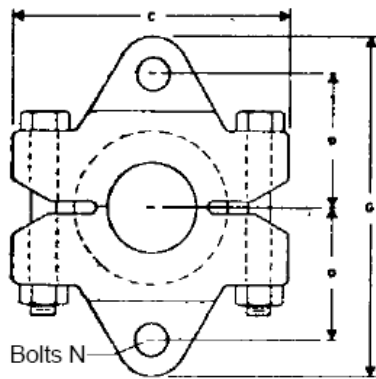
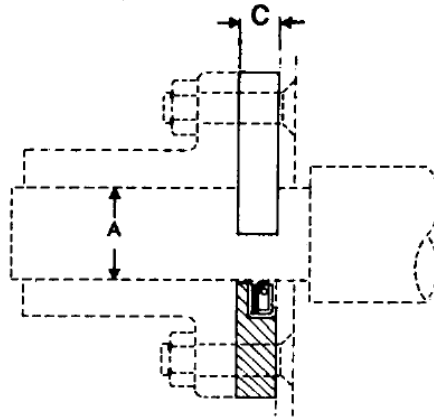
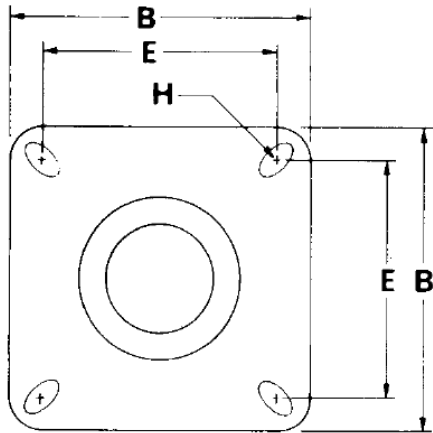


CLOSE

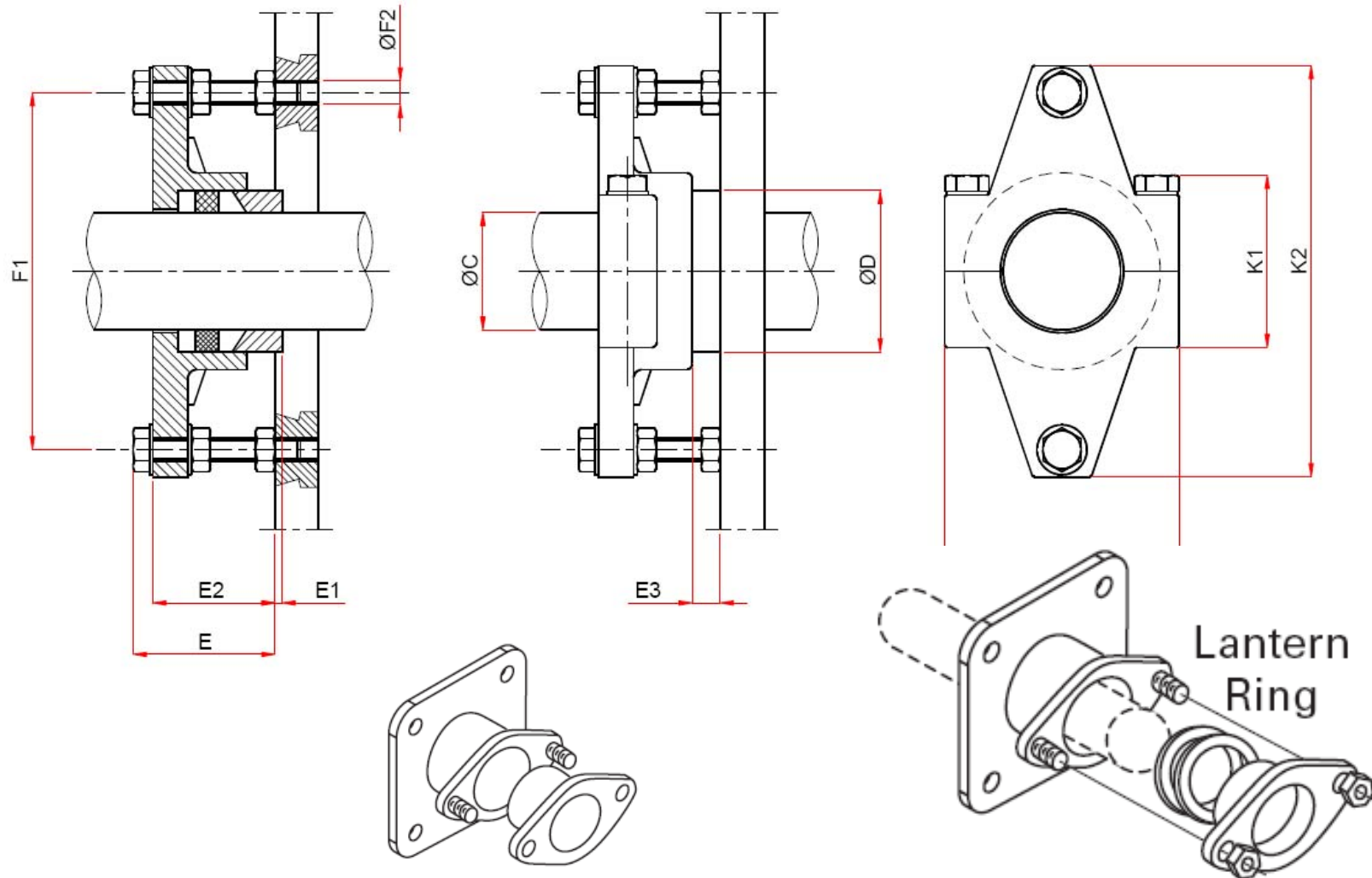




# Konštrukčný návrh - tesnenie

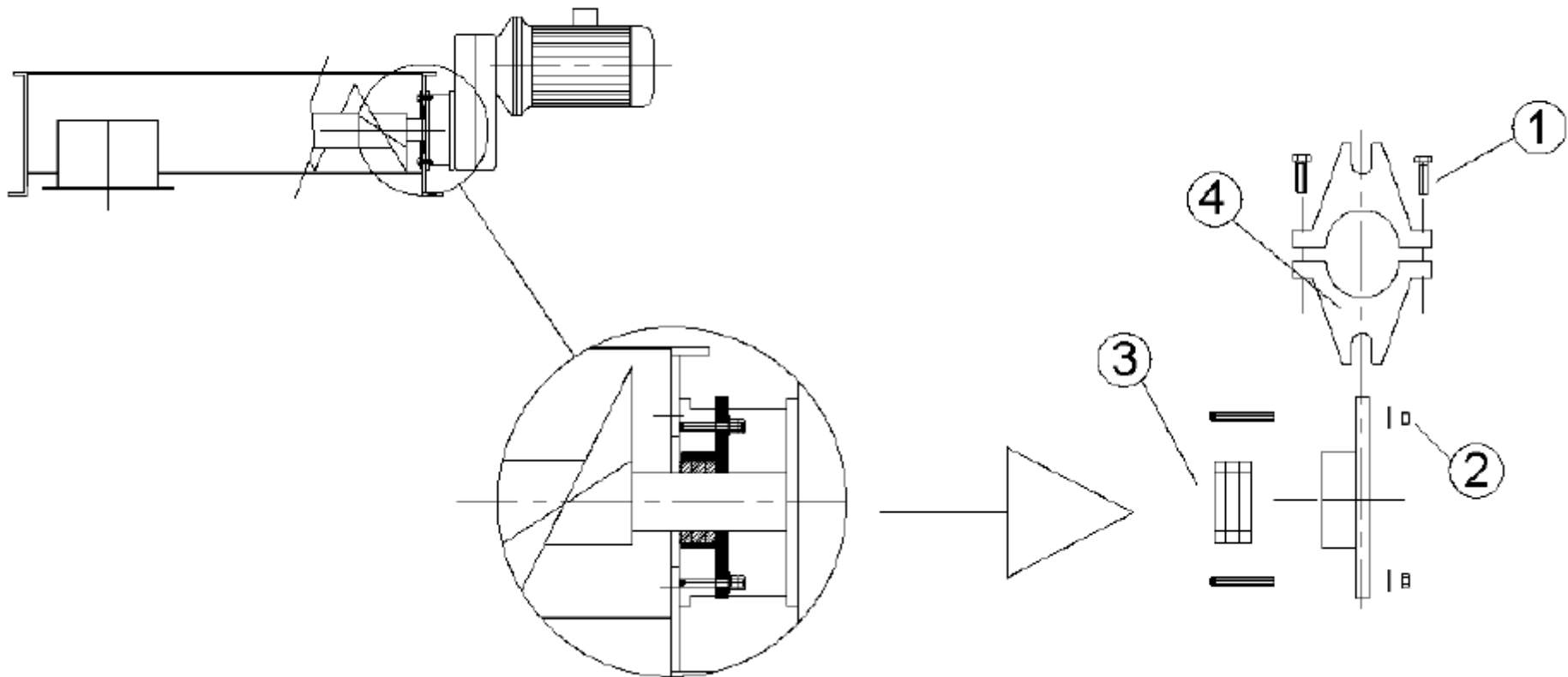


# Konštrukčný návrh - tesnenie

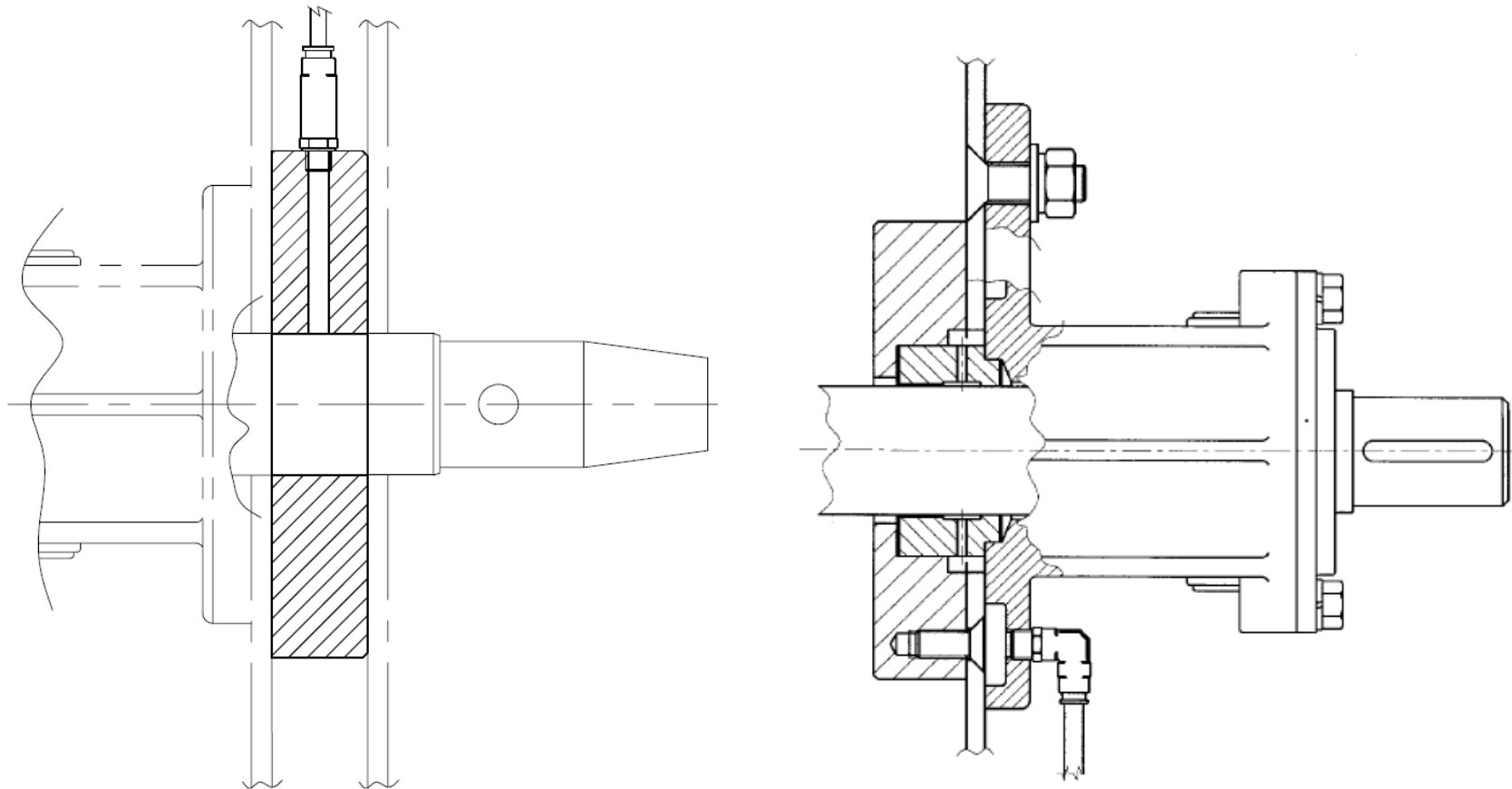


# Konštrukčný návrh - tesnenie

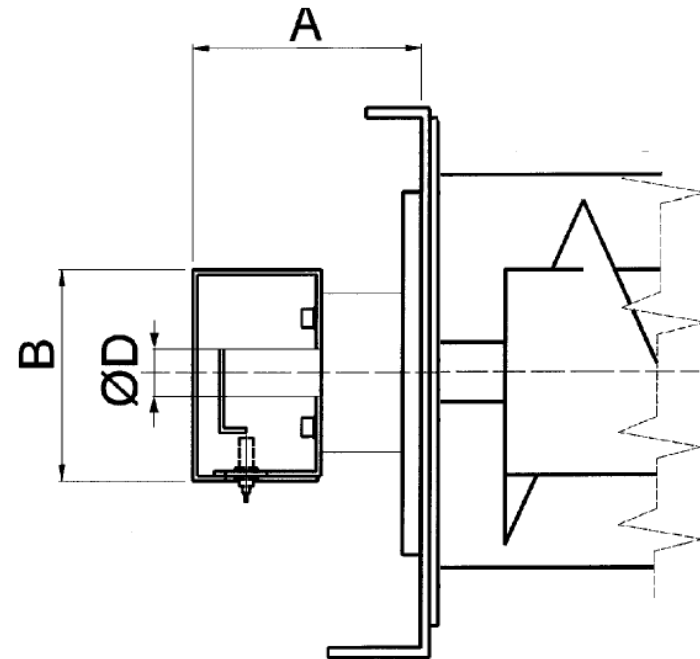
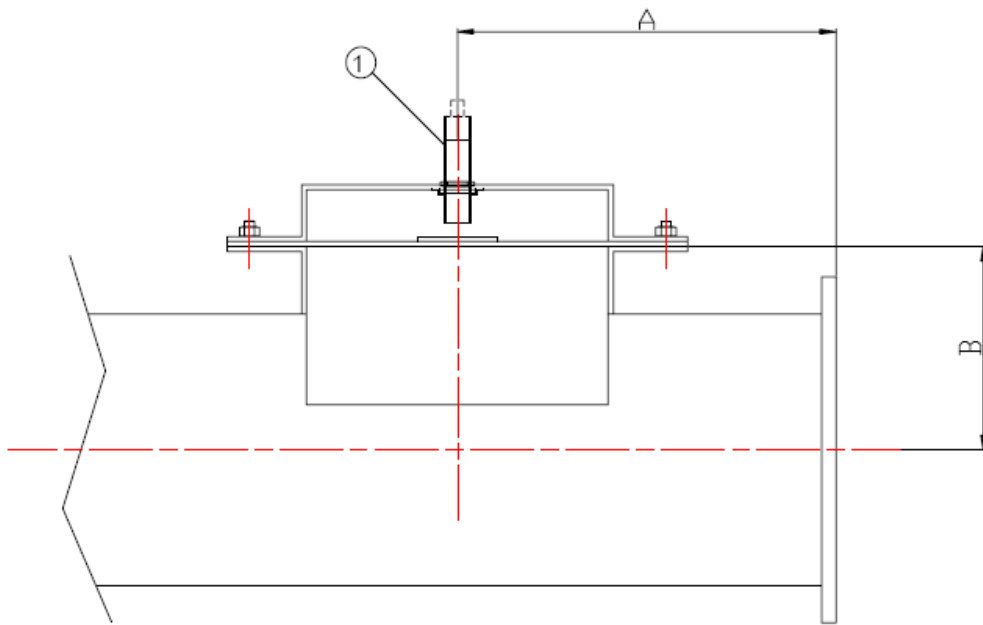
fig. 1



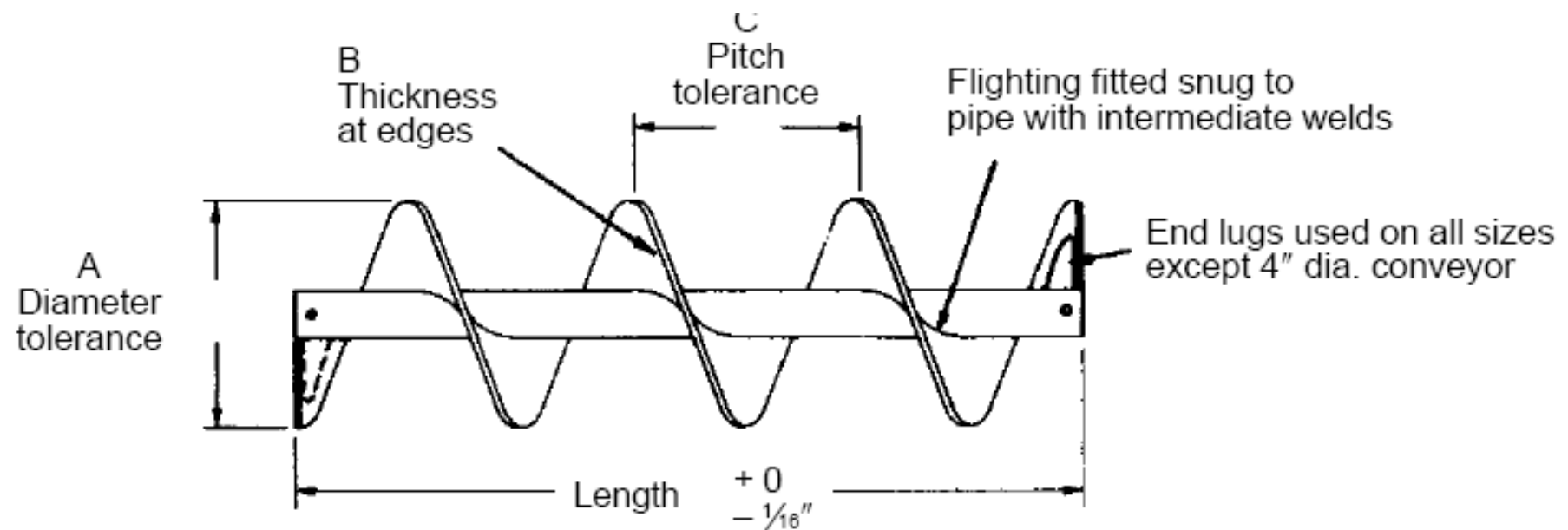
# Konštrukčný návrh - tesnenie



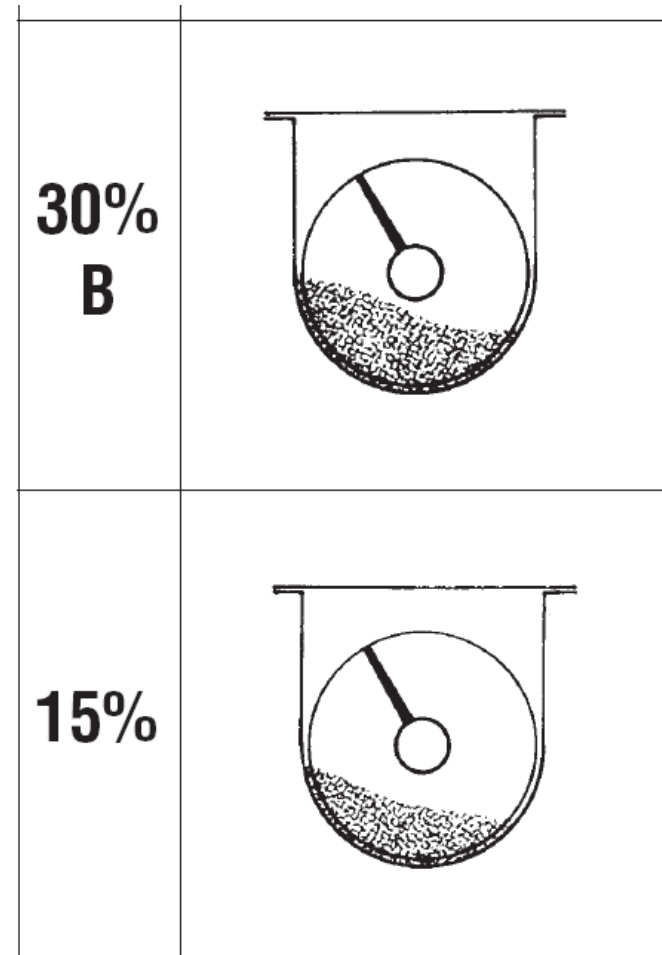
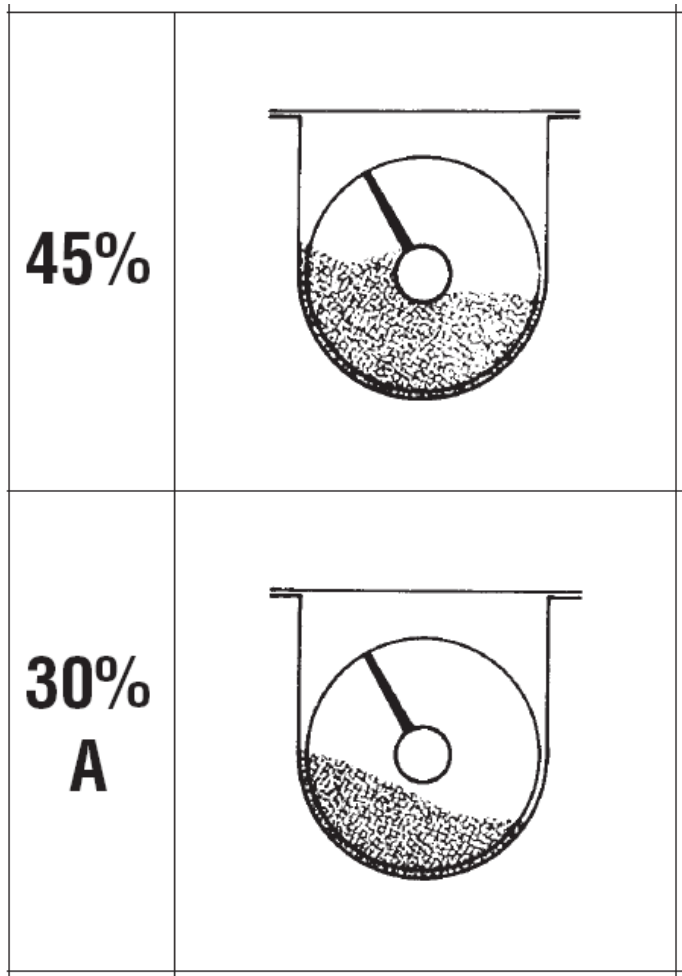
# Konštrukčný návrh- MaR



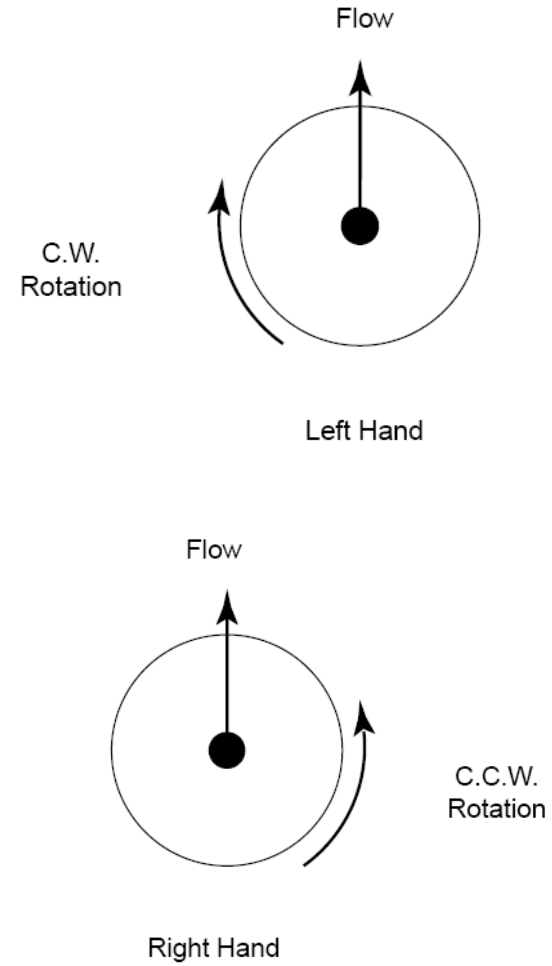
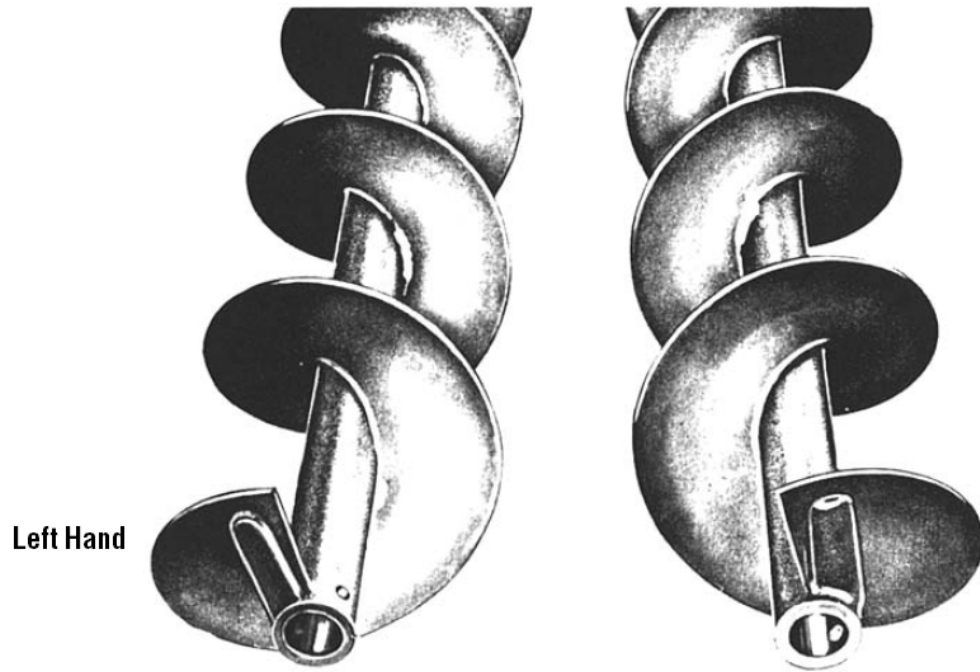
# Konštrukčný návrh - závitovka



# Konštrukčný návrh - závitovka



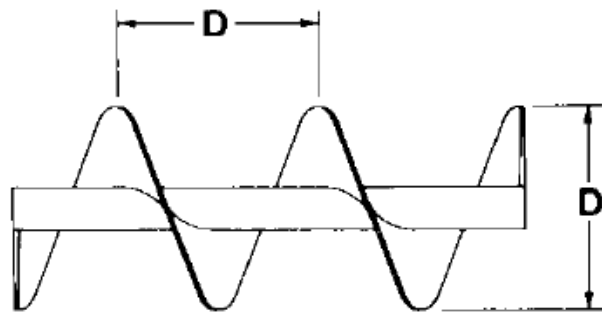
# Konštrukčný návrh - závitovka





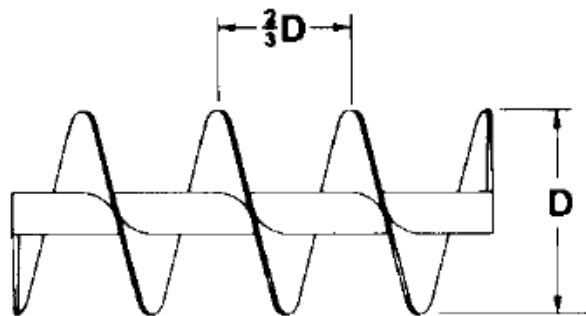
# Konštrukčný návrh - závitovka

## Standard Pitch, Single Flight



Conveyor screws with pitch equal to screw diameter are considered standard. They are suitable for a wide range of materials in most conventional applications.

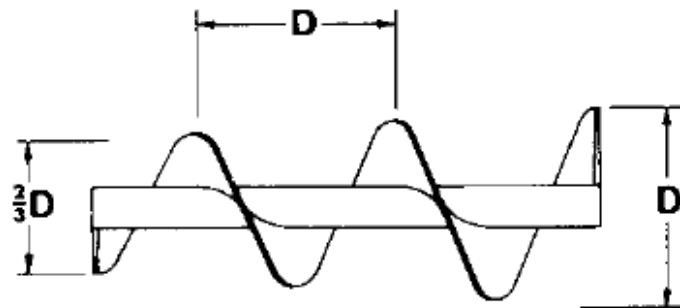
## Short Pitch, Single Flight



Flight pitch is reduced to  $\frac{2}{3}$  diameter. Recommended for inclined or vertical applications. Used in screw feeders. Shorter pitch retards flushing of materials which fluidize.

# Konštrukčný návrh - závitovka

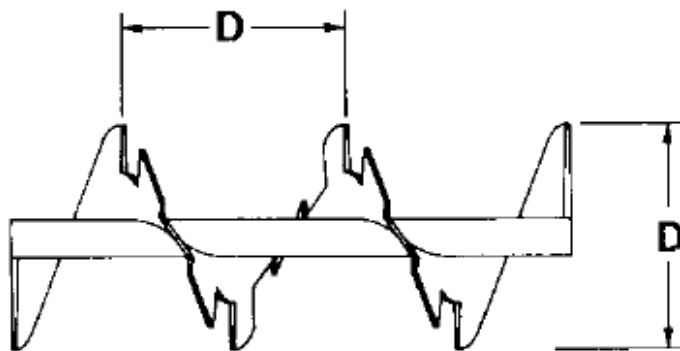
## Tapered, Standard Pitch, Single Flight



Screw flights increase from  $\frac{2}{3}$  full diameter. Used in screw feeders to provide uniform withdrawal of lumpy materials. Generally equivalent to and more economical than variable pitch.

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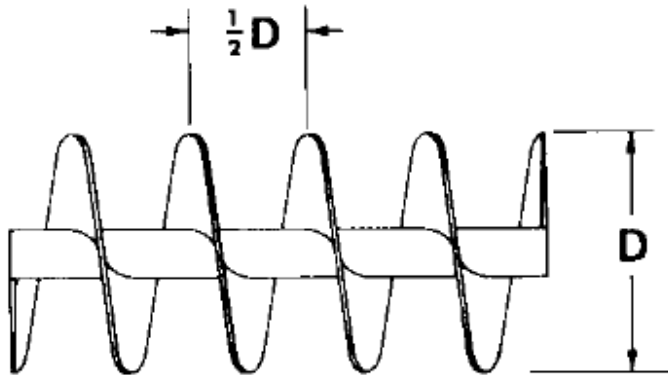
## Single Cut-Flight, Standard Pitch



Screws are notched at regular intervals at outer edge. Affords mixing action and agitation of material in transit. Useful for moving materials which tend to pack.

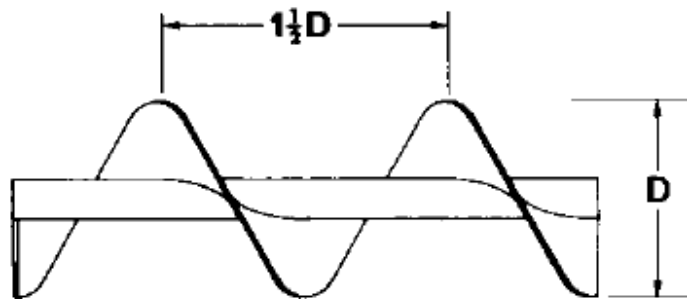
# Konštrukčný návrh - závitovka

## Half Pitch, Single Flight



Similar to short pitch, except pitch is reduced to  $\frac{1}{2}$  standard pitch. Useful for vertical or inclined applications, for screw feeders and for handling extremely fluid materials.

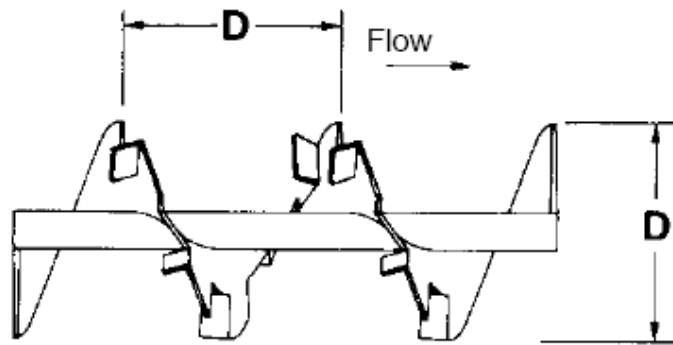
## Long Pitch, Single Flight



Pitch is equal to  $1\frac{1}{2}$  diameters. Useful for agitating fluid materials or for rapid movement of very free-flowing materials.

# Konštrukčný návrh - závitovka

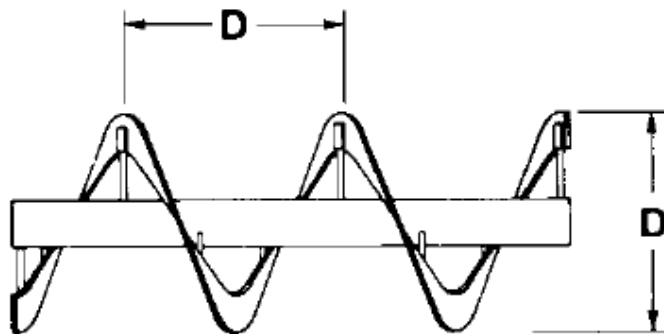
## Cut & Folded Flight, Standard Pitch



Folded flight segments lift and spill the material. Partially retarded flow provides thorough mixing action. Excellent for heating, cooling or aerating light substances.

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## Single Flight Ribbon

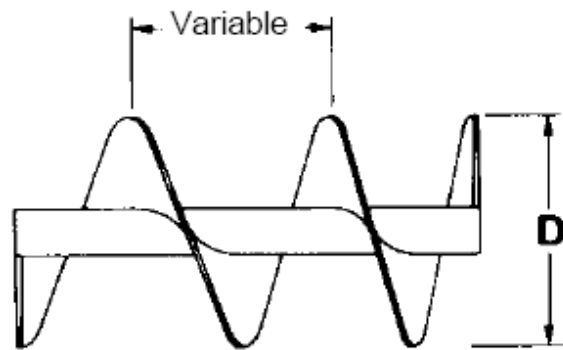


Excellent for conveying sticky or viscous materials. Open space between flighting and pipe eliminates collection and build-up of the material.

Available in post type or integral leg.

# Konštrukčný návrh - závitovka

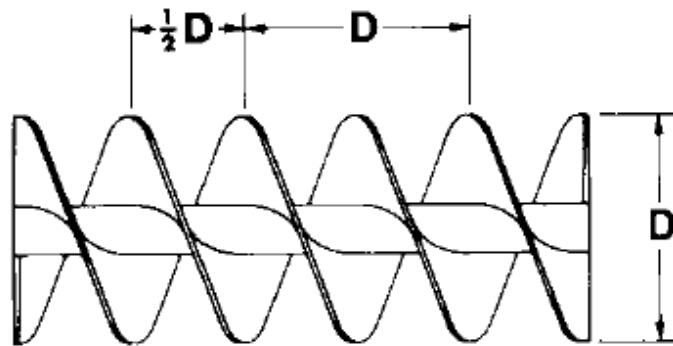
## Variable Pitch, Single Flight



Flights have increasing pitch and are used in screw feeders to provide uniform withdrawal of fine, free-flowing materials over the full length of the inlet opening.

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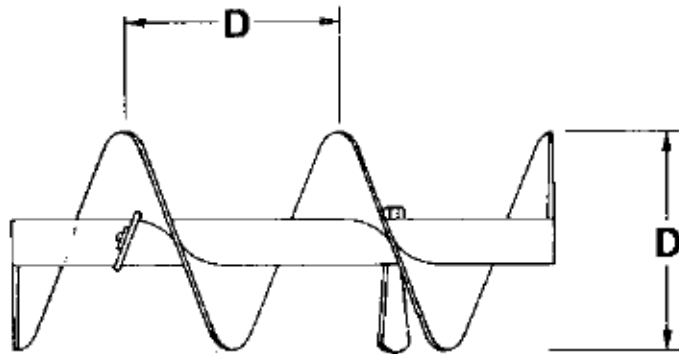
## Double Pitch, Single Flight



Double flight, standard pitch screws provide smooth, regular material flow and uniform movement of certain types of materials.

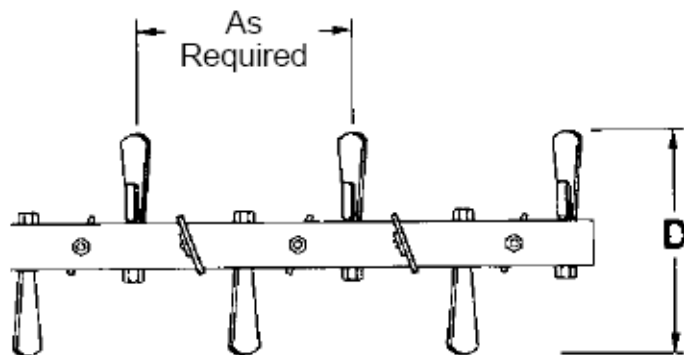
# Konštrukčný návrh - závitovka

## Standard Pitch with Paddles



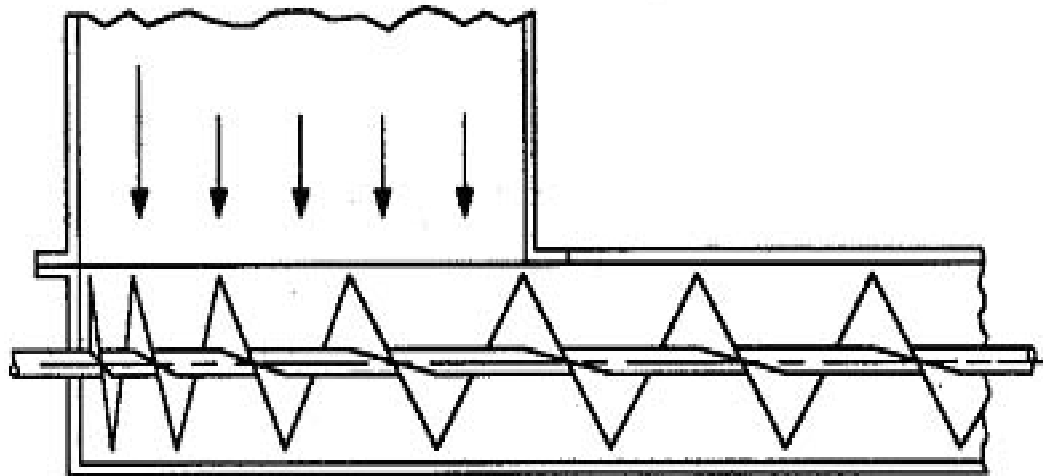
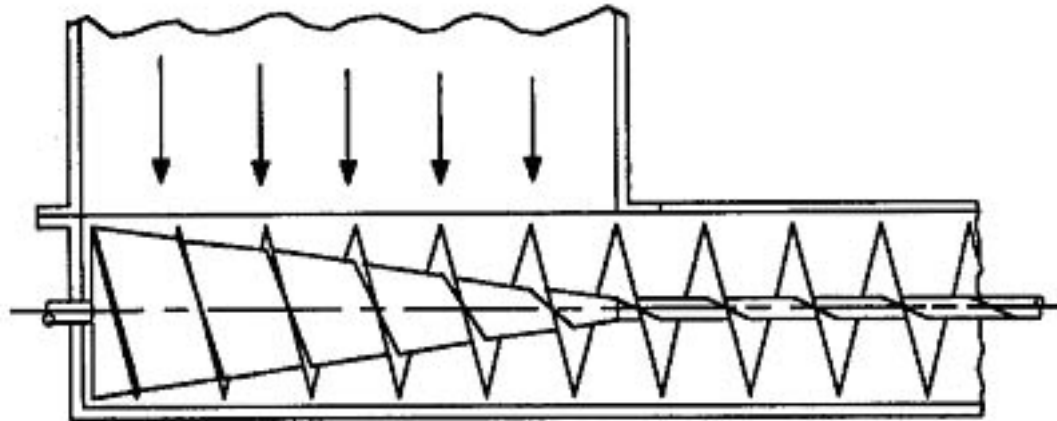
Adjustable paddles positioned between screw flights oppose flow to provide gentle but thorough mixing action.

## Paddle

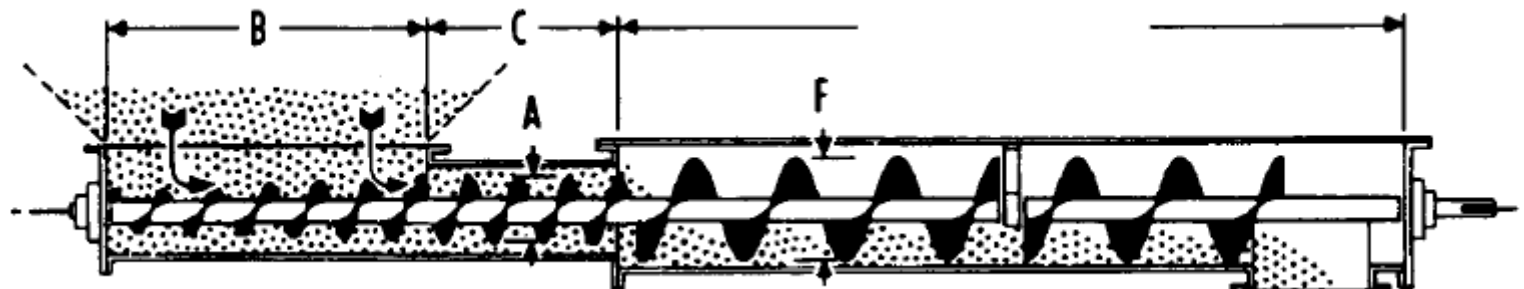
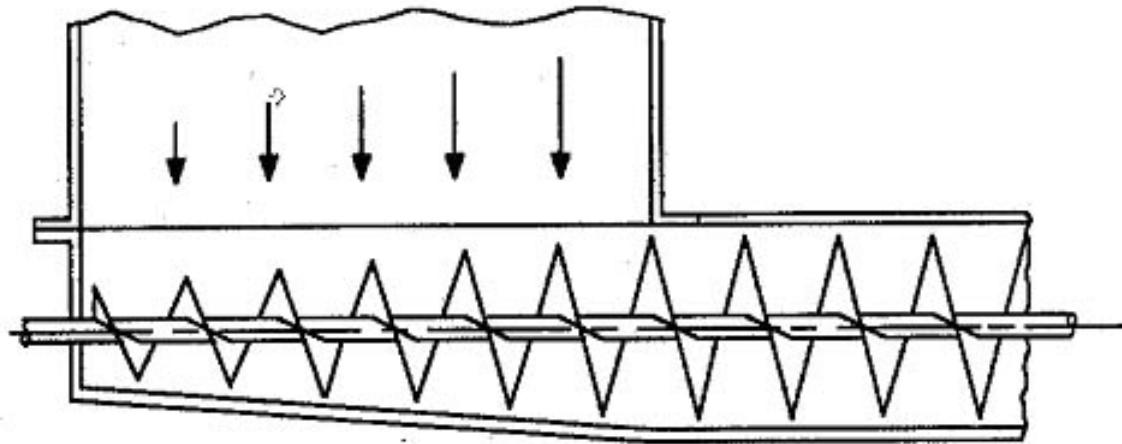


Adjustable paddles provide complete mixing action, and controlled material flow.

# Konštrukčný návrh - závitovka

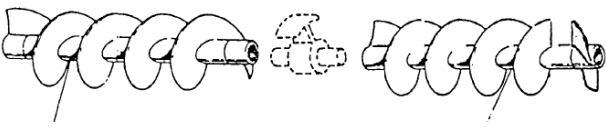
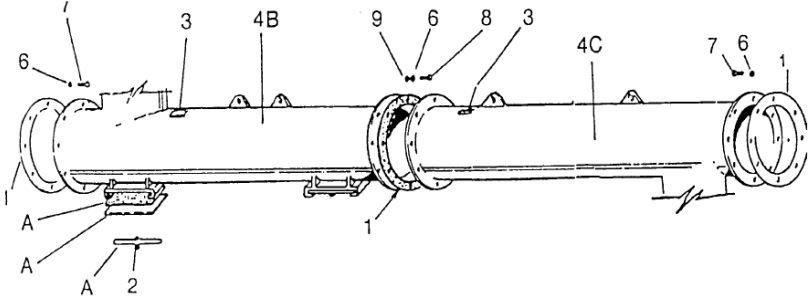
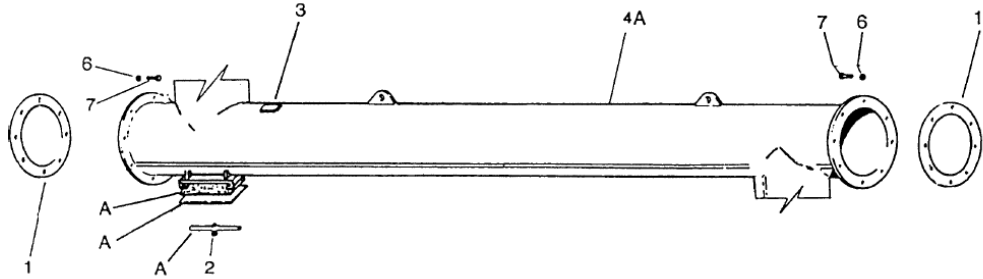


# Konštrukčný návrh - závitovka





# Konštrukčný návrh - závitovka



# Konštrukčný návrh

