

**Exercise 5.1**

In a mine it is arranged a bucket elevator and a belt conveyor (view figure 1) for transport of coal from A to B. Such material, transported by the elevator, is placed on the belt by means of a feeder. The known data is:

- Coal density:  $0.8 \text{ t/m}^3$ .
- Not classified material with maximum grain size of 200 mm.
- Bucket elevator:
  - Low speed centrifugal discharge.
  - Travelling speed: 2.3 m/s.
  - Bucket elevator capacity: 14 litres.
  - Fill in bucket coefficient: 0.7.
  - Bucket depth: 258 mm.
- Belt conveyor:
  - Inclination angle:  $0^\circ$ .
  - Distance between centres (L): 300 m.
  - Belt quality: Normal.

It is asked:

1. Point out in the figure the most important bucket elevator parts.
2. Show the most important components of the belt conveyor.
3. Material flux transported by the bucket elevator.
4. Calculate the speed at which the material has to be fed in the belt conveyor so that the belt transport is continuous. Justify your answer. The geometric value C is 325.
5. If we already have an engine of 3.5 kw. ¿Can this engine be used to move the belt? Transmission ratio is 0.85.

Material	Standard belt width (mm)										
	400	500	650	800	1000	1200	1400	1600	1800	2000	2200
Classified, maximum grain size(mm).	50	75	125	175	250	350	400	450	550	600	600
Not classified, maximum size grain (mm)	100	150	200	300	400	500	600	650	700	750	750

**Table1: Standard belt width (mm)**

Distance between idlers (m)		Belt width (mm)										
$l_1$	$l_2 \leq L/100$	400	500	650	800	1000	1200	1400	1600	1800	2000	2200
1.0	2.0	11	13	17	28	37	52	69	82	108	128	145
1.25	2.5	10	12	15	25	33	48	62	75	96	115	131
1.5	3.0	10	11	14	23	31	45	58	70	89	107	121

**Table 2: Mobile components weight per metre (kg/m)**

Belt width (mm)	400	500	650	800	1000	1200	1400	1600	1800	2000	2200
Diameter $\Phi$ (mm)	51	51	63	89	89	89	108	108	133	133	133
Weight $W_1 = W_2$ (kg)	3	3.5	5.5	11	13	15	22	25	39	43	47

**Table 3: Diameter and carrying and return idlers weight**

<b>L (m)</b>	<30	<80	<100	>100
<b>L<sub>0</sub> (m)</b>	50	70	80	100

**Table 4 Loss coefficient (L<sub>0</sub>)**

High quality (low internal friction)	0.017
Normal quality	0.020
Unfavourable operation conditions-overload	0.023-0.030

**Table 5: Friction coefficient of mobile components (C)**

