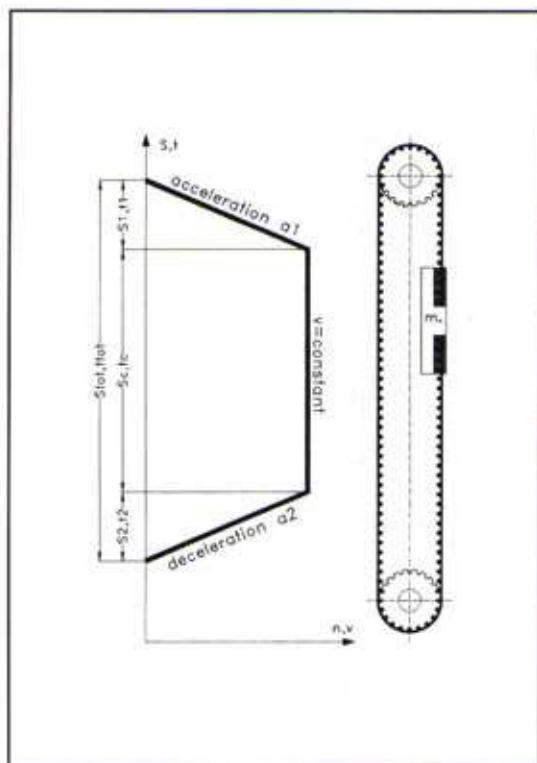


## POWER TRANSMISSION CALCULATION



As an example we show the study of a **Lifting Drive** with its principal data showed in the following boards:



### Machine Data

Belt length	$L_w = 4500 \text{ mm}$
Pitch diameter of the pulleys	$d_w = 75 \text{ mm}$
Mass of carriage	$m_c = 60 \text{ kg}$
Frictional force	$F_f = 50 \text{ N}$
Distance at constant $v$	$S_c = 1,8 \text{ m}$
Belt speed	$v = 3,0 \text{ m/s}$
Acceleration	$a_1 = 5,0 \text{ m/s}^2$
Deceleration	$a_2 = 5,0 \text{ m/s}^2$

First we calculate the effective pull (Peripheral Force) to be transmitted:

$$F_U = m_c \cdot a_1 + m_c \cdot g = 60 \cdot 5 + 60 \cdot 9,81 = 888,6 \text{ N}$$

Now we can select profile to be used:



From chart on page 39 we select **AT10**, width 25 mm



From page 13 (AT10 Pulley Data) we select the pulleys with the diameter near the diameter on specification: **AT10**  $d_e = 77,7 \text{ mm} = 25 \text{ teeth}$



The mass of pulleys  $m_p$  and the finished bore diameter  $d$  are  $m_p = 0,422 \text{ kg}$  and  $d = 20 \text{ mm}$  according to manufacture's specification



## POWER TRANSMISSION CALCULATION

The Mass of belt is:

$$m_b = p \cdot L_w = 0,15 \cdot 4,5 = 0,675 \text{ kg}$$



See page 43 for belt weight p

The Reduced Mass of the Pulleys is:

$$m_{pr} = [ (d_e^2 - d^2) \cdot \pi \cdot \rho \cdot B ] / ( 4 \cdot 10^6 ) = [ (6037,29 - 400) \cdot 3,14 \cdot 30 \cdot 2,7 ] / ( 4 \cdot 10^6 ) = 0,36 \text{ kg}$$

The Total Mass is:

$$m_{tot} = m_c + m_b + m_{pr} = 60 + 0,675 + 0,36 = 61 \text{ kg}$$

Now we can determine the **Maximum effective pull** (Max Peripheral Force) to be transmitted:

$$F_{Umax} = m_{tot} \cdot a_1 + m_c \cdot g + F_f = 61 \cdot 5 + 60 \cdot 9,81 + 50 = 944 \text{ N}$$

Now we determine the **Correct Belt Width** in accordance with the maximum effective pull:

$$b = ( F_{Umax} \cdot c_3 \cdot 10 ) / ( F_{Us} \cdot z_m ) = 944 \cdot 1,7 \cdot 10 / ( 55 \cdot 12 ) = 24,31 \text{ mm}$$



Factor  $c_3$  from table on page 37



$F_{Us}$  from charts on page 40

**Belt Installation Tension:**

$$F \geq F_{Umax} \quad 1000 \text{ N} > 944 \text{ N}$$

$$F_{max} = F + F_{Umax} = 1000 + 944 = 1944 \text{ N}$$



$F_v = 3660 \text{ N}$  See page 12 ( AT10 Belt Data )

$$F_v \geq F_{max} \cdot c_3 \quad 3660 \text{ N} > 1944 \cdot 1,7 = 3304 \text{ N}$$

**DESIGN CHOISE:**

**MEGADYNE PU OPEN END BELT 25 AT10 4500 LL**

## TOLERANCES AND WEIGTHS



### WIDTH AND THICKNESS TOLERANCES [mm]

TYPE	Tolerances for belt width	Tolerances for nominal thickness
T5	±0,5	±0,15
T10	±0,5	±0,30
T20	±1,0	±0,45
AT5	±0,5	±0,20
AT10	±0,5	±0,30
AT20	±1,0	±0,45

TYPE	Tolerances for belt width	Tolerances for nominal thickness
5M	±0,5	±0,20
8M	±0,5	±0,30
14M	±1,0	±0,45
XL	±0,5	±0,30
L	±0,5	±0,30
H	±0,5	±0,30
XH	±1,0	±0,50

### BELT WEIGTH [kg/m]

Type	Width [mm]										
	6	10	12	16	20	25	32	50	75	100	150
T5	0,015	0,025	0,030	0,040	0,050	0,065	0,080	0,130			
T10		0,053	0,054	0,072	0,106	0,133	0,144	0,256	0,398	0,530	
T20						0,200	0,250	0,400	0,600	0,800	
AT5	0,018	0,030	0,036	0,048	0,060	0,075	0,096	0,150			
AT10				0,097	0,125	0,150	0,190	0,300	0,450	0,600	0,900
AT20						0,270	0,350	0,550	0,800	1,100	1,600
	10	15	20	25	30	40	50	55	85	100	
5M	0,041	0,061		0,102			0,203				
8M	0,063	0,095	0,126		0,190		0,316		0,537	0,632	
14M				0,282		0,451		0,620	0,958	1,127	
XL	0,012	0,016	0,020								
L			0,025	0,030	0,045	0,060					
H				0,035	0,055	0,070	0,11	0,14	0,22	0,28	
XH							0,43	0,65	0,97	1,30	
	025	031	037	050	075	100	150	200	300	400	
Width [inch]											

### Measuring load in N for belt width

The length tolerances is ±0,8 mm/m per each type of belt to be checked with following measuring loads.

Type	Width [mm]										
	6	10	12	16	20	25	32	50	75	100	150
T5	10	20		30	35	45	60				
T10				45		70	85	135	205	270	
T20						135	170	270	400	550	
AT5		25		40		60	80				
AT10						135	170	270	400	550	810
AT20							430	650	975	1300	1950
	10	15	20	25	30	40	50	55	85	100	
5M	25	40		60			120				
8M	55	80	110		165		275		465	550	
14M				325		520		715	1105	1300	
XL	12,5	16	20								
L			20	30	45	60					
H				35	55	70	110	140	220	280	
XH							430	650	975	1300	
	025	031	037	050	075	100	150	200	300	400	
Width [inch]											