

# **MAŠINE I UREĐAJI ZA PRERADU PLASTIKE**

- Upustvo za izradu projektbog zadatka-**

**Plastic Injection Machine**

**by**

**[www.mekanizmalar.com](http://www.mekanizmalar.com)**

# Tehničke karakteristike mašina

AUTOMATSKE UBRIZGAVALICE ZA INJEKCIONO PRESOVANJE PLASTOMERA – BELMATIK Belišće

Tehnički podaci	Merna jed.	100/50E	150/80E	250/130E	600/130E	1250/380E	5900/650P
<b>Jedinica za ubrizgavanje</b>							
Prečnik pužnog vijka	mm	35	40	45	60	75	100
Zapremina ubrizgavanja	cm <sup>3</sup>	81	125	199	495	1016	3298
Max masa ubrizg. (PS)	10 <sup>-3</sup> kg	74	113	180	447	917	2940
Spec.prit.ubrizgav.	bar	1370	1370	1400	1310	1245	1840
Brzina ubrizgavanja	cm <sup>3</sup> /s	71	91	119	224	326	2803 (454)
Odnos prečnika i dužine pužnog vijka	L/D	15	17	20	20	20	20,0
Hod pužnog vijka	mm	85	100	125	175	230	420
Br.okretaja puž.vijka	s <sup>-1</sup>	0,25–4,0	0,25–3	0,25–3,66	0,25–3,0	0,25–2,0	0,05–2,16
<b>Jedinica za zatvaranje kalupa</b>							
Sila zatvaranja kalupa	kN	490	785	1275	2255	3725	6500
Sila otvaranja kalupa	kN	19,3	24	40,4	63,5	103,4	715
Dimenzija nosača kalupa	mm	450x450	520x520	620x620	800x800	1000x1000	1300x1300
Hod pomoćnog nosača kal.	mm	265	320	380	520	680	900
Razmak između vodilica	mm	280x280	320x320	365x365	485x485	610x610	820
Max. debljina kalupa	mm	300	370	450	600	750	900
Min. debljina kalupa	mm	100	120	150	200	250	300
Max. hod. hidrauličnog izbacivača	mm	85	100	135	180	240	192
Min. hod. hidrauličnog izbacivača	mm	25	25	25	25	25	–

## Specifikacije mašine za injekciono presovanje SUN-150, 250

Model		SUN-150			
Item					
Screw diameter	STANDARD	mm	φ40	φ42	φ45
Screw diameter (Double Alloy)	PVC/UPVC/GF	mm			
Shot weight(PS)		g	220	243	279
		oz	7.9	8.7	9.8
Shot volume (Theoretical)		cm <sup>3</sup>	245	270	310
Injection pressure		kg/cm <sup>2</sup>	1960	1777	1548
Injection Rate		cm <sup>3</sup> /sec	111	122	140
Screw Speed		rpm	235		
Clamp Tonnage		Ton	150		
Toggle stroke		mm	350		
Min. Max. Mould Height		mm	110 - 485		
Space Between Tie Bars		mm	410 × 410		
Ejector stroke		mm	115		
Platen Size (L*W) (Approx)		mm	605 × 623.5		
Pump motor power		kw	15		
Heater power		kw	7		
Total wattage		kw	22		
Hydraulic system Max pressure		kg/cm <sup>2</sup>	140		
Hydraulic oil Reservoir		L	205		
Machine dimension(L*W*H)		m	4.5 × 1.2 × 1.6		
Net weight(Approx)		ton	4.8		
Model		SUN-250U			
Item					
Screw diameter		mm	φ55	φ60	φ65
Shot weight(PS)		g	716	835	1002
		oz	25.2	29.4	35.2
Shot size (Theoretical)		cc	570	664	796
Injection pressure		kg/cm <sup>2</sup>	1832	1540	1312
Injection Rate		cm <sup>3</sup> /sec	177	211	247
Screw Speed		rpm	140		
Clamp Tonnage		Ton	250		
Toggle stroke		mm	430		
Min. Max. Mould Height		mm	150 - 675		
Space Between Tie Bars		mm	510 × 510		
Ejector stroke		mm	150		
Pump motor power		kw	22		
Heater power		kw	6.5		
Total wattage		kw	28.5		
Hydraulic system Max pressure		kg/cm <sup>2</sup>	140		
Hydraulic oil Reservoir		L	340		
Machine dimension(L*W*H)		m	5.7 × 1.4 × 1.9		
Net weight(Approx)		ton	9		



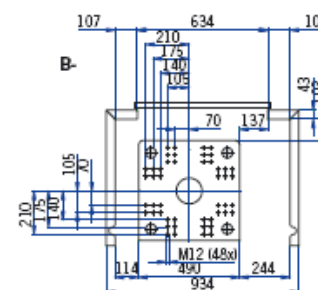
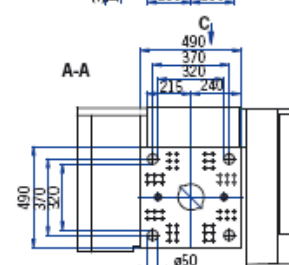
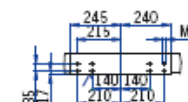
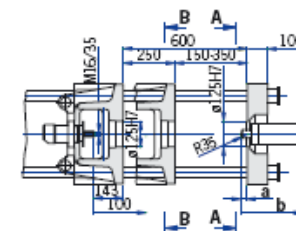
Clamping unit		TM 750/...
Clamping force	kN	750
Locking force	kN	825
Distance between tie bars	mm x mm	370 x 370
Platen dimensions	mm x mm	590 x 590
Mold height adjustable from ... to	mm	200 ... 400
Opening stroke	mm	330
Maximum daylight	mm	730
Ejector force	kN	26,4
Ejector stroke	mm	100

<sup>1</sup> according to Euromap 6  
<sup>2</sup> according to Battenfeld Standard

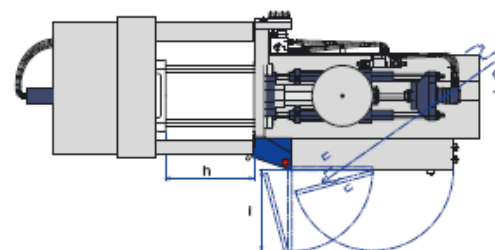
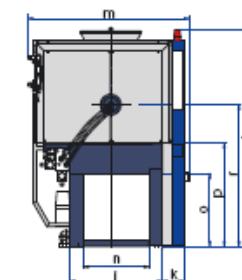
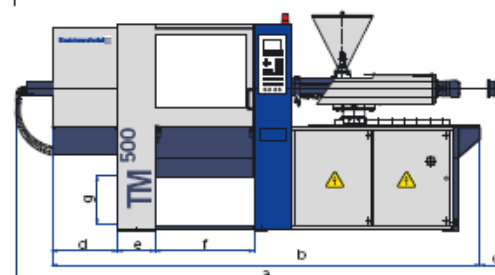
Injection unit		TM 750/130				TM 750/210			TM 750/350		
International size according Euromap <sup>1</sup>		130				210			350		
Screw diameter	mm	18	22	25	30	25	30	35	30	35	40
Specific injection pressure	bar	3000	2864	2218	1540	2940	2042	1500	2835	2083	1595
Theor. injection volume	cm <sup>3</sup>	28	41,8	61,4	88,4	73,6	106	144	123	169	220
Max. injection weight (PS)	g	25,5	38,0	55,9	80,4	67,0	96,5	131,0	111,9	153,8	200,2
Screw L/D ratio		20		22		22			22		
Max. screw speed (with increased hydraulics)	1/min	398 (477)				310 (372)			298 (397)		
Screw torque	Nm	238		357		490			621		
Recovery rate (PS) <sup>2</sup> (with increased hydraulics)	8/s	5,8 (7,0)	9,1 (10,9)	11,7 (14,1)	14,8 (17,7)	9,3 (11,1)	11,6 (13,9)	16 (19,2)	11,2 (14,9)	15,5 (20,6)	22,8 (30,3)
Nozzle stroke	mm	250				250			250		
Nozzle contact force	kN	59,4				86			86		
Screw stroke	mm	110		125		150			175		
Injection rate (with increased hydraulics)	cm <sup>3</sup> /s	40,9 (49,1)	61,1 (73,4)	78,9 (94,7)	114 (136)	59,5 (71,4)	85,7 (103)	117 (140)	74,1 (98,8)	101 (134)	132 (176)
Injection rate with accumulator (option)	cm <sup>3</sup> /s	65,4	97,8	126	182	119	171	233	148	202	263
Barrel heat capacity	kW	3,2	3,8	6,4	7,7	6,4	7,7	10,4	7,7	10,4	12,1
Number of temperature zones		1 + 3				1 + 3			1 + 3		
Drive output (with increased hydraulics)	kW	11 (15)				11 (15)			15 (18,5)		
Oil tank capacity	l	150				150			150		
Dry cycle time <sup>1</sup>	s	1,5				1,5			1,5		

### Mold clamping dimensions

TM		a	b
500/130	mm	30	250
500/210	mm	30	250



### Dimensions and weight



Dimensions in mm

TM	kg	a <sup>1</sup>	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	r
500/130	2300	3395	3060	90	347	310	690	450	600	665	610	182	1635	1180	445	600	850	1118
500/210	2500	3485	3060	180	347	310	690	450	600	665	610	182	1635	1180	445	600	850	1118

## Specifikacije mašine za injekciono presovanje FOMTEC FD-90C-IB

Model	Un it	B.SJ680 *1 (B)	B.SJ138 0*1 (B)	B.SJ108 0*1 (B)	B.SJ168 0*1 (B)	B.SJ218 0*1 (B)	B.SJ268 0*1 (B)	B.SJ368 0*1 (B)	B.SJ388 0*1 (B)
Screw Diameter	m	30	38	36	45	50	55	65	75
Screw L/D Ratio	L/ D	21	21.6	21	21	21	21	21	20.5
Shot size	C M <sup>3</sup>	88	227	165	358	152	653	1082	1599
Injection weight	g	80	206	150	326	411	595	993	1455
Injection rate	g/s	82	118	95	137	165	229	338	400
Plasticizing capacity	g/s	8.9	18.2	16	21.7	26.9	31.6	52.2	49.8
Injection pressure	Ma	184	172	183	169	178	169	182	156
Screw speed	r/ mi n	255	220	220	200	190	180	165	150
Clamp tonnage	KN	680	1380	1080	1980	2180	2680	3680	3880
Space between tie bars	m	310*310	410*410	375*375	460*460	515*515	575*575	660*660	720*720
Max.mold height	m	320	420	380	500	530	600	700	850
Min.mold height	m	120	150	150	180	200	230	350	280
Ejector stroke	m	75	110	100	130	130	140	150	180
Ejector tonnage	KN	33	33	33	45	71	71	126	126
Max.pump pressure	Ma	16	16	16	16	16	16	16	16
Pump motor power	kw	9	13	11	15	18.5	22	37	37
Heater power	kw	5.2	6.1	5.9	9.3	14	16	20.4	23.5
Machine dimensions (L*W*H)	m	3.9*1.0* 1.65	4.5*1.35* 1.75	4.2*1.3* .75	5.2*1.35* 1.9	5.2*1.62* 2.1	5.81*1.8* 2.1	7.5*1.9*2 .4	8.1*2.1*2 .9
Machine weight (approximate)	t	2.5	3.4	3.25	5	6.8	8.1		



[www.fomtec-group.com](http://www.fomtec-group.com)

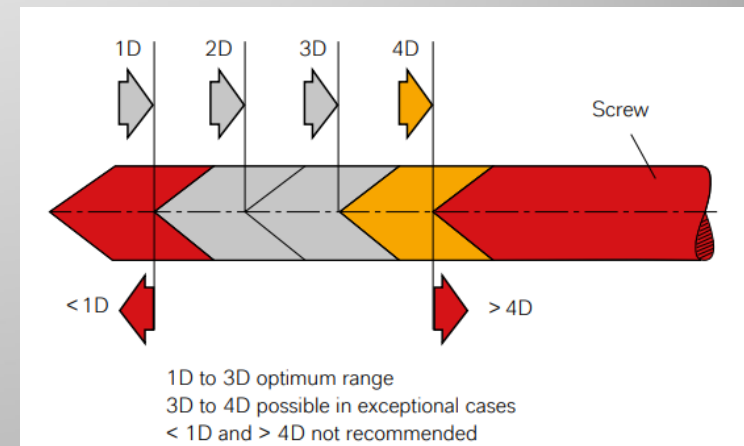
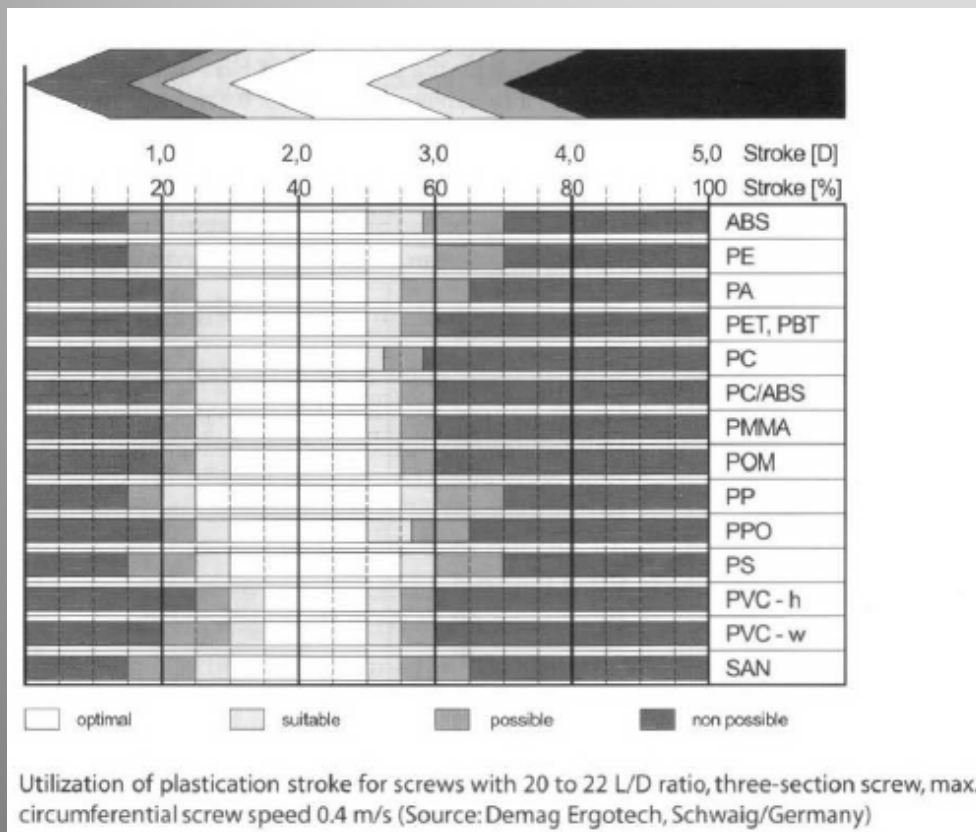
# ***HOD PUŽA, HOD UBRIZGAVANJA***

## ***Feeding stroke, screw stroke, stroke length***

*Proizvođači tehničke karakteristike mašina navode u odnosu na Polistiren (PS)!!!!*

### **Izbor optimalnog hoda puža ( $s_{opt}$ )**

- Hod puža se često izražava u odnosu na prečnik puža (D) - 1D, 2D, 3D, 4D
- Optimum 1D do 2D
- Sa povećanjem hoda puža povećava se količina gasnih uključaka u rastopu.
- Pri hodu puža  $l > 3D$  povećava se nehomogenost rastopa, degradacija materijala, optičke karakteristike opadaju.



$$LS5 = \frac{W \times 10}{A \times \rho \times \eta} + 5 \text{ mm} [0.2 \text{ in}]$$

W: Weight of product (g)  
 A: Sectional area of screw (cm<sup>2</sup>) [in<sup>2</sup>]  
 ρ: Specific weight (g/cm<sup>3</sup>) [oz/in<sup>3</sup>]  
 η: Injection efficiency  
 ρ×η: PS 0.92 [0.53]  
           PE 0.73 [0.42]  
           PP 0.71 [0.41]

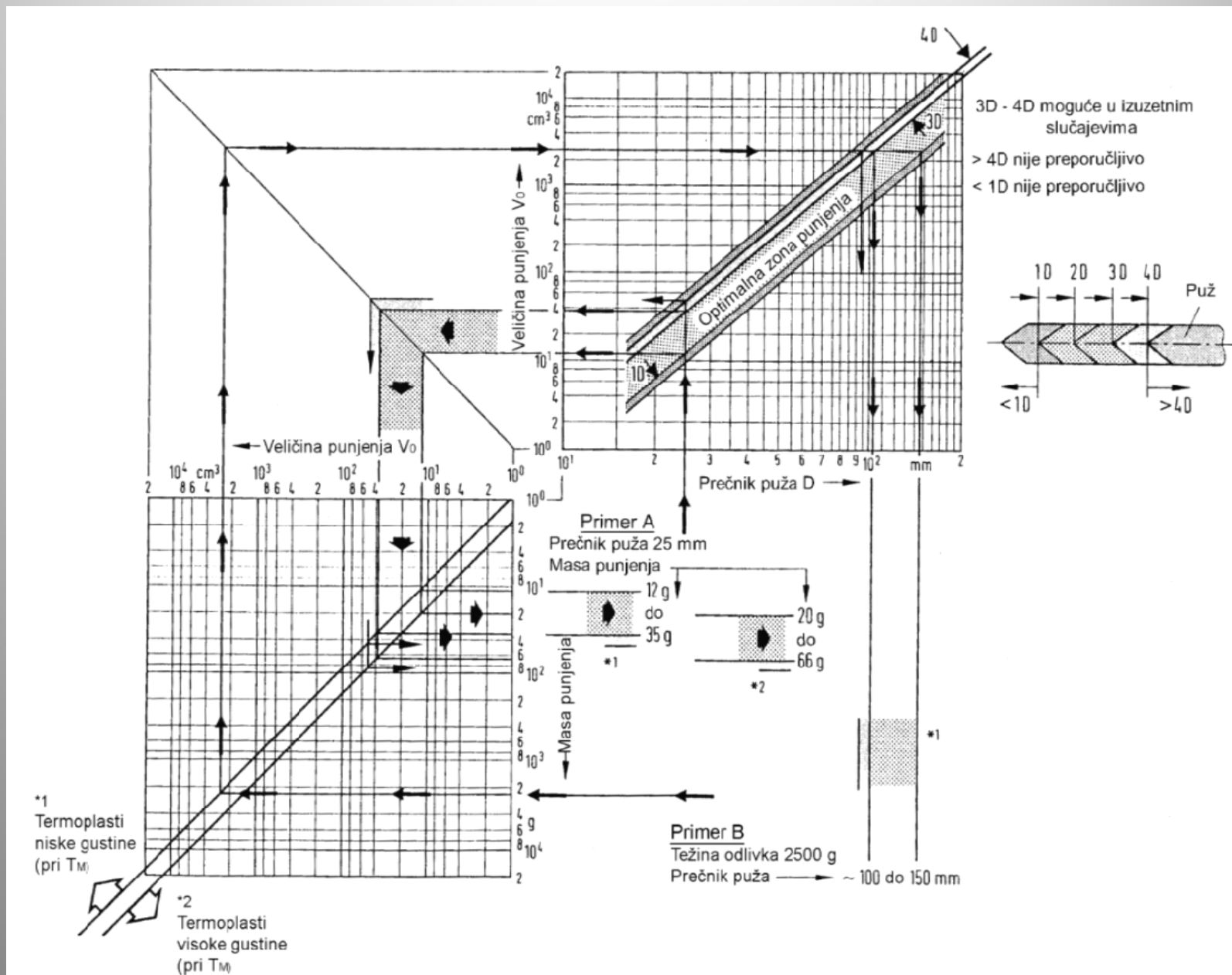
# ***HOD PUŽA, HOD UBRIZGAVANJA***

## ***Feeding stroke, screw stroke, stroke length***

Material	Feeding stroke as % of total stroke		Feeding stroke in relation to the screw diameter		
	Minimum	Maximum	Minimum	Maximum	Optimum
ABS	15	80	0.7	3.2	1.7 to 2.2
ASA	15	80	0.7	3.2	1.7 to 2.2
CA, CAB	15	75	0.7	3	1.6 to 2.1
PE	10	85	0.4	3.5	1.7 to 2.2
PP	10	80	0.5	3.2	1.7 to 2.2
PS	10	85	0.4	3.5	1.7 to 2.2
PMMA	20	75	1	3	1.5 to 2.0
PVC	20	75	1	3	1.5 to 2.0
PA	10	75	0.5	3	1.5 to 2.0
PC	20	70	1	2.7	1.3 to 1.9
PC blend	25	70	1.3	2.7	1.3 to 1.9
POM	20	75	1	3	1.7 to 2.2
PBT	15	75	0.7	3	1.7 to 2.2
PET	15	75	0.7	3	1.7 to 2.2
PEEK	25	65	1.3	2.7	1.5 to 1.9
PSU	20	75	1	3	1.7 to 2.2
SAN	15	80	0.8	3.2	1.7 to 2.2



# PREČNIK PUŽA (D) – screw diameter



## **ZAPREMINA - MASA (kapacitet) UBRIZGAVANJA** **Injection volume, injection capacity, metering volume (cm<sup>3</sup>)**

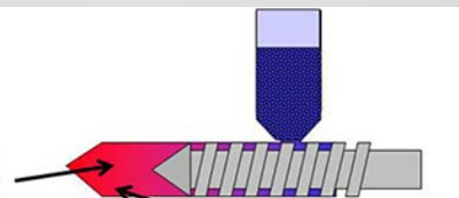
Teorijski zapremina ubrizgavanja je maksimalna količina rastopa koja se može ubrizgati u jednom ciklusu i izražava se uncama (oz) za američke mašine, odnosno cm<sup>3</sup> za evropske i azijske mašine!!!!

**Teoretski kapacitet ubrizgavanja (cm<sup>3</sup>) – ne zavisi od vrste materijala!!!!**

$$W_{teor} = \frac{D^2 \pi}{4} \cdot s$$

D – prečnik puža  
s – hod puža

MAXIMUM VOLUME OF THE BARREL = V



No	Material in Barrel	Sp Gr	Shot Capacity (gms)
1	GPPS	1.06	100
2	Nylon 6	1.15	108
3	Acetal	1.42	134
4	30% GF PBT	1.53	144
5	LDPE	0.92	87
6	PP	0.90	85

		Item	Unit	Machine ID					
Clamp unit	Clamp force	tf <sup>6</sup>		100					
	Clamp stroke	m		0.35					
	Ejector force	tf		3					
Injection unit	Injection unit			Injection Unit 1			Injection Unit 2		
	Injection capacity	cm <sup>3</sup>		38	78	130	78	162	254
	Shot volume (PS)	g		35	72	120	72	149	234
	Max. Inj. pressure	MPa		284	287	174	287	247	158
	Plasticizing capacity	g/s		6.1	11.1	23	11	23.1	33.3

### **Masa (kapacitet) ubrizgavanja (g) za PS - shot weight, shot capacity, shot size**

Masa (maksimalne) materijala koja se može ubrizgati u kalup u jednom ciklusu.

$$m_{PS} = \frac{W_{teor} * \rho_{PS}}{k}$$

$W_{teor}$  – teorijski kapacitet ubrizgavanja (cm<sup>3</sup>)

$k = 0,7 \div 0,8$

$\rho_{PS}$  - gustina polistirena (g/cm<sup>3</sup>)

# **ZAPREMINA - MASA (kapacitet) UBRIZGAVANJA**

## **Injection volume, injection capacity (cm<sup>3</sup>)**

- Maximum shot weight

$$Gs_{\max} = (D/2)^2 \times \pi \times s_{\max} \times \rho$$

$$s_{\max} = \text{installed feeding stroke}$$

- Maximum utilizable shot weight

$$Gs_{\max.\text{util.}} = (D/2)^2 \times \pi \times s_{3D} \times \rho$$

$$s_{3D} = \text{feeding stroke 3D}$$

- Optimum shot weight

$$Gs_{\text{opt}} = (D/2)^2 \times \pi \times s_{2D} \times \rho$$

$$s_{2D} = \text{feeding stroke 2D}$$

- Minimum (utilizable) shot weight

$$Gs_{\min} = (D/2)^2 \times \pi \times s_{1D} \times \rho$$

$$s_{1D} = \text{feeding stroke 1D}$$

$\rho$  density (specific gravity) of plastic material

Shot weight as function of screw diameter

Screw diameter [mm]	Shot weight for 3D stroke <sup>1</sup> [g]	Optimum shot weight <sup>1</sup> (tolerance ± 25 %) [g]	Minimum shot weight <sup>1</sup> [g]	Data sheets <sup>1</sup> [g]
18	11.9	8	4	20 to 25
20	16	11	5.5	24 to 27
25	31	21	11	39 to 55
30	54	36	18	84 to 108
40	128	85	42	158 to 220
50	250	167	83	315 to 420
60	433	289	145	590 to 820
70	687	458	229	940 to 1220
80	1025	683	342	1500 to 2120
100	2000	1333	667	3350 to 4420
120	3705	2470	1235	5700 to 7000
140	5496	3664	1832	7900 to 10,500
160	8200	5333	2667	11,600 to 16,000
180	11,680	7787	3894	19,000 to 22,950
200	16,020	10,680	5340	22,000 to 33,000
220	21,325	14,217	7108	28,000 to 41,000
250	31,280	20,853	10,427	44,500 to 61,000
300	43,970	29,300	14,650	58,000 to 80,000

<sup>1</sup> Expressed in terms of a density of 0.85 g/cm<sup>3</sup> (PS); manufacturers' data on specific gravity vary from 0.84 to 0.91 g/cm<sup>3</sup>

*Example:*

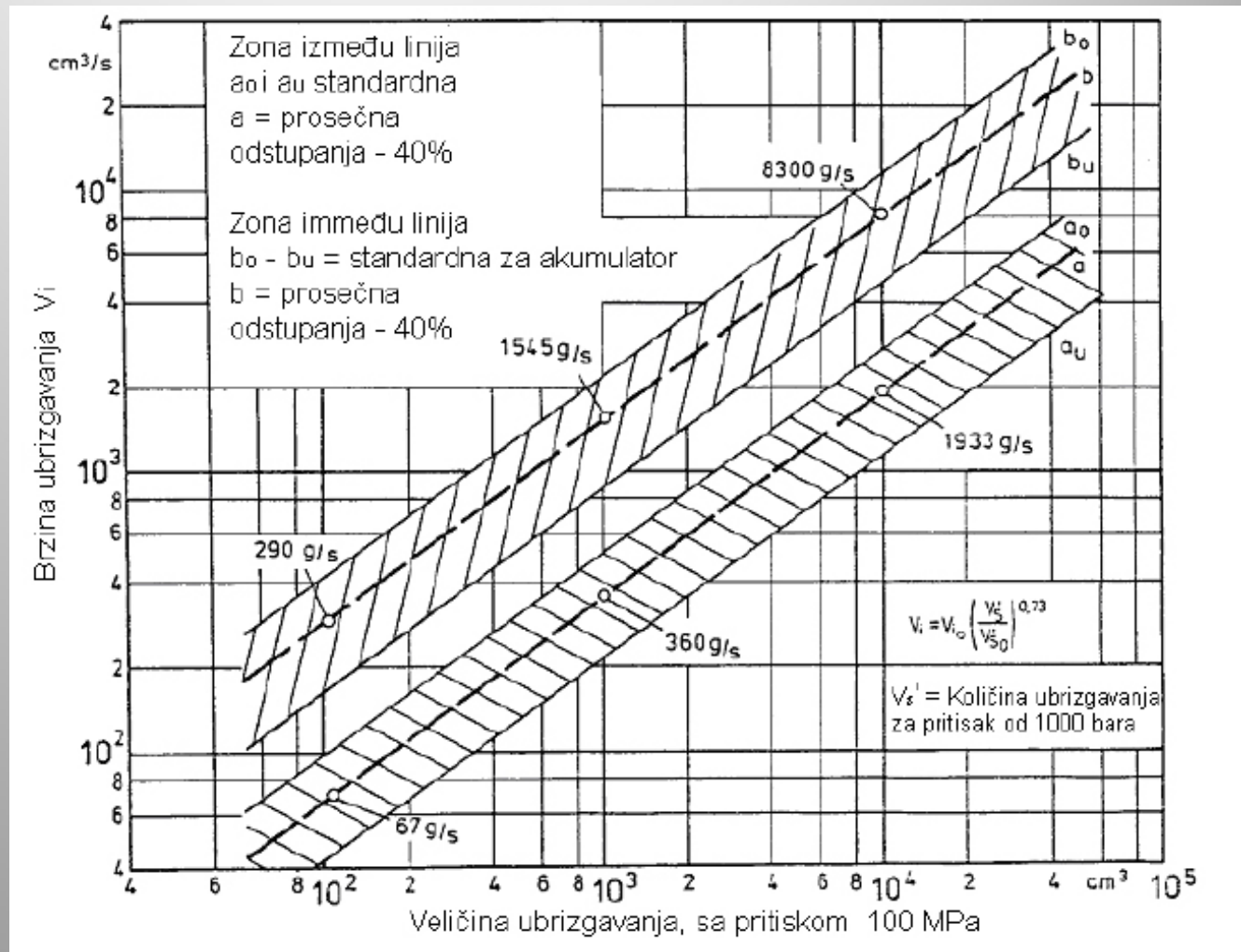
A PS molded part will weigh 1000 g. According to the data sheet value for the machine, this can be managed with a screw of 70 mm diameter (1200 g, and perhaps even by one of 65 mm diameter). To use a feeding stroke of 3D, the screw would need a diameter of 80 mm. For high-quality injection molding, the diameter would have to be 90 mm.

## Brzina ubrizgavanja ( $v_i$ ) – Injection rate (g, cm<sup>3</sup>/sec)

**Brzina ubrizgavanja** – zapremina (masa) materijala koja se ubrizgava u jedinici vremena

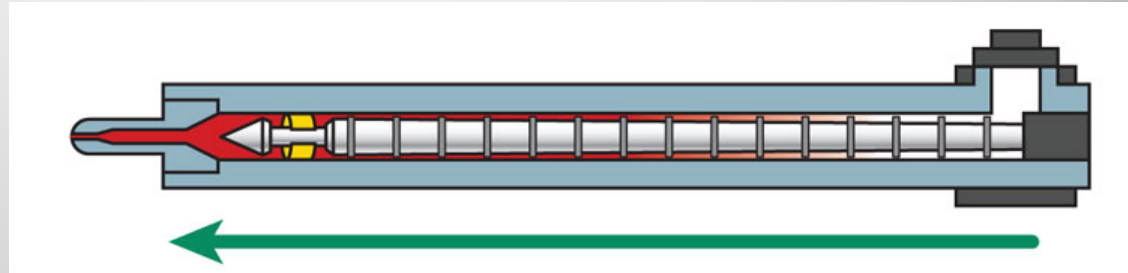
$$v_i = \frac{W_{st}}{t} = \frac{m_{st}}{t}$$

$$t = \frac{S}{v_p}$$



## AKSIJALNA BRZINA PUŽA ( $v_p$ ) (injection velocity/speed, screw-advance speed )

Range of molded parts	Injection speed [mm/s]
Technical parts, incl. thermosets and rubber	50 to 300
Thin-wall parts	301 to 600
Parts for packaging	500 to 1000



- kod konvencionalnih mašina je u dijapazonu 150 do 250 mm/s

# OBIMNA BRZINA PUŽA

## Screw speed/Circumferential speed

Brzina (obimna) puža i oblast primene

- Velika brzina tečenja rastopa (brzohodni puževi)  $v_c = 0.4 \div 1.5 \frac{m}{s}$   
(kod izrade tankozidnih otpresaka za pakovanje od PS, PE, PP)
- Srednja brzina tečenja (standardni puževi) - za inženjersku plastiku  $v_c = 0.2 \div 0.4 \frac{m}{s}$
- Mala brzina tečenja (sporohodni puževi) za termosete i elastomere  $v_c = 0.05 \div 0.02 \frac{m}{s}$

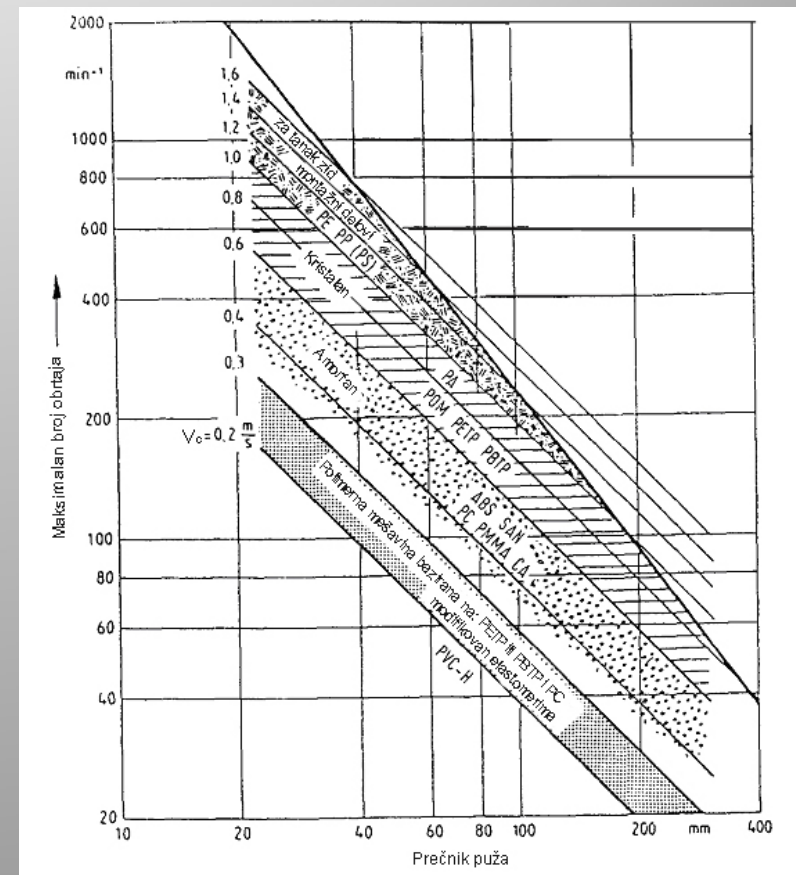
$$v_c = \frac{D \cdot \pi \cdot n_s}{60} [m/s]$$

$n_s$  - broj obrtaja puža

$D$  – prečnik puža (m)

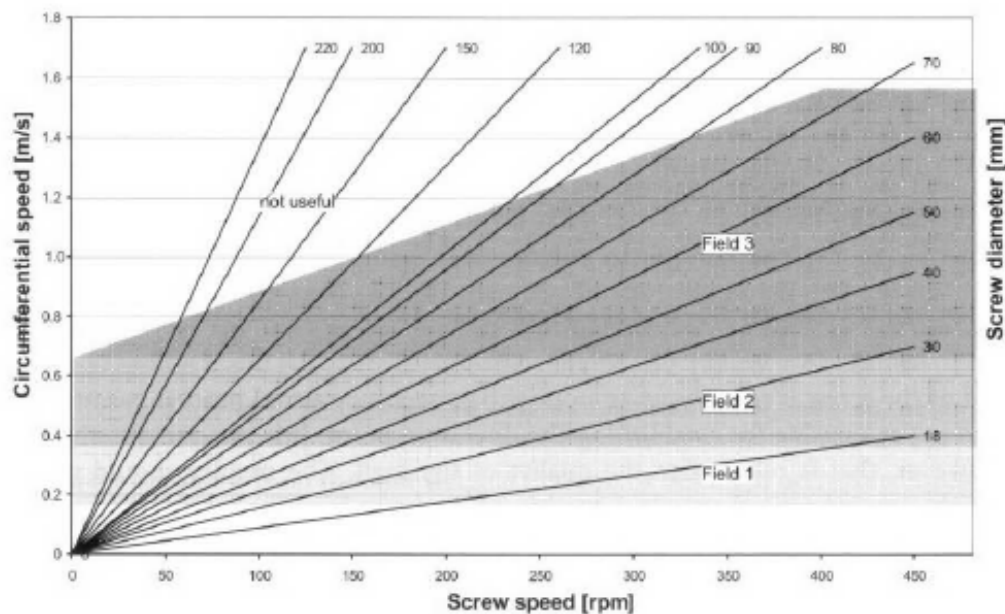
Povećanjem broja obrtaja puža.....

- Brža kompresija materijala
- Povećava se količina toplote generisana usled trenja
- Kraće je vreme zadržavanja materijala u cilindru, slabiji intenzitet topljenja



# OBIMNA BRZINA PUŽA

## Screw speed/Circumferential speed



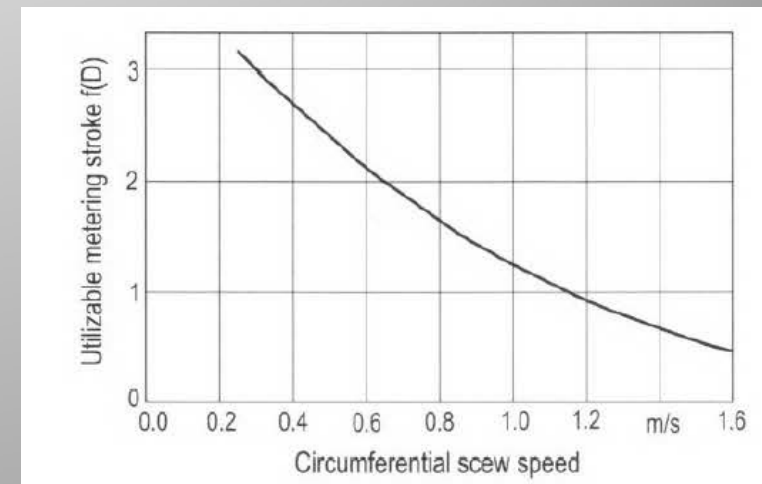
Relationship between screw speed [rpm] and circumferential speed [m/s] for a wide range of screw diameters in fields 1 to 3; field 1 for PVC, blended plastics, elastomers and thermosets; fields 1 and 2 for technical parts; field 3 for injection molding thin-wall parts (packaging).

**Table 2.2:** Melt temperature, residence time, and circumferential speed recommended for some engineering thermoplastics

Material	Melt temperature [°C]	Residence time in plastication unit [min]	Circumferential speed [m/s]
ABS	220	4	0.8
	220	10	0.3
	260	4	0.3
PC	280	4	0.8
	280	10	0.3
	320	4	0.3
PA 6	260	4	0.8
	260	10	0.3
	280	4	0.3
PA 66	270	4	0.8
	270	10	0.3
	300	4	0.3

Recommended circumferential screw speeds

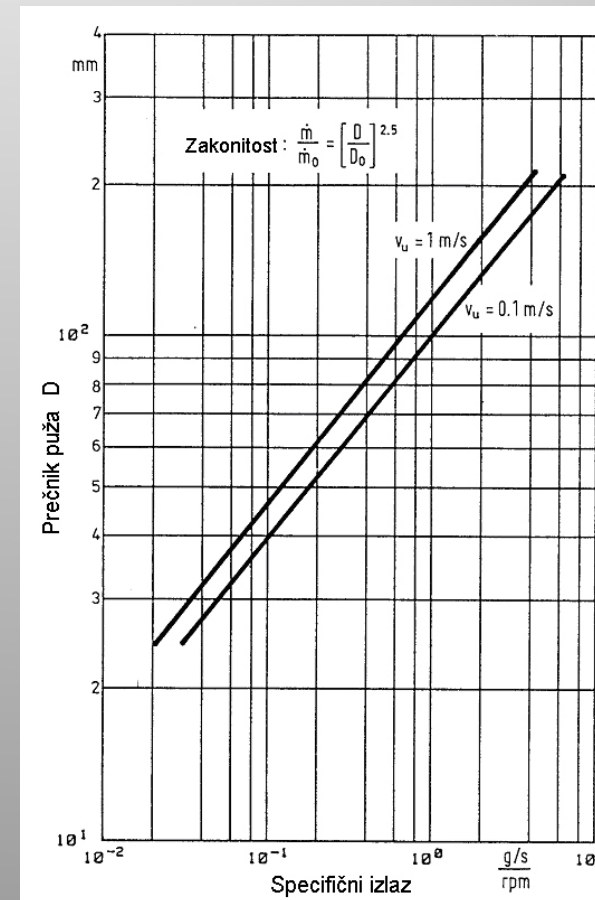
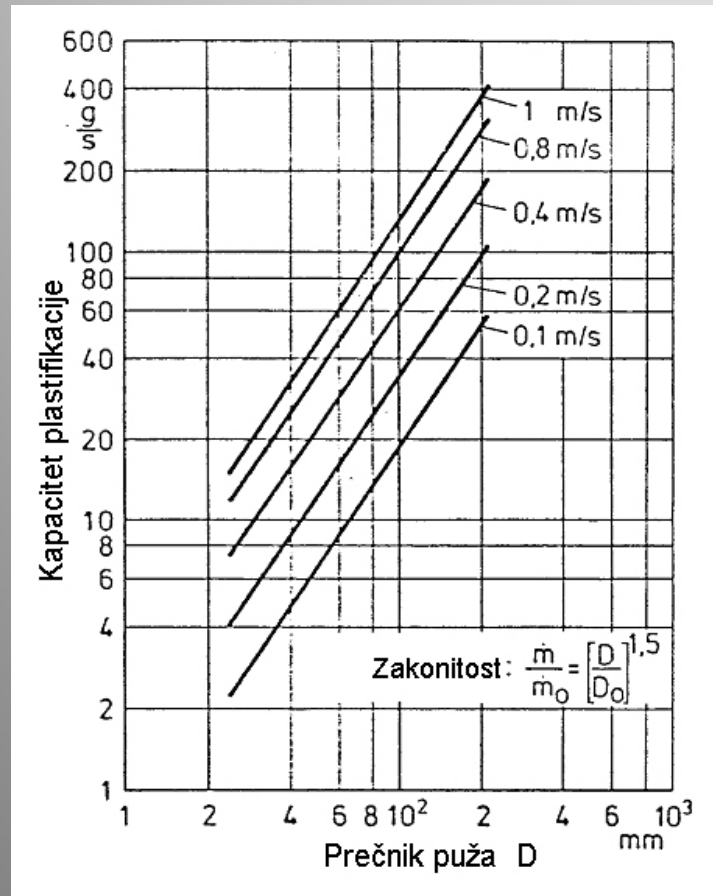
Material	High-quality injection molding $v_u$ [m/s]	Standard injection molding $v_u$ [m/s]	Thin-wall injection molding (packaging) $v_u$ [m/s]
Blended plastics, PVC	0.05 to 0.1	0.1 to 0.2	—
ABS, CAB, PC, SAN, PBT, PET, POM, PA, PPS, PEEK, PAI, PSU	0.05 to 0.15	0.2 to 0.4	—
PS, PE, PP	0.1 to 0.3	0.3 to 0.7	0.6 to 1.5



# KAPACITET PLASTIFIKACIJE

## Plasticity capacity/recovery rate

- Količina materijala (plastike) koja se rastopi i homogenizuje u jedinici vremena (lb/hr, kg/hr, g/s).
- Zavisí od geometrije puža, obimne brzine, kontrapritiska, konstrukcije nepovratnih ventila i hoda puža.
- Kapacitet plastifikacije može se dobiti kao količnik mase otpreska i vremena punjenja. Ova karakteristika nije stabilna jer zavisí i od vrste polimera!





# KAPACITET PLASTIFIKACIJE

## Plasticizing capacity/recovery rate

Machine manufacturer	Screw diameter [mm]	Screw speed [rpm]	Screw circumferential speed <sup>1</sup> [m/s]	Plasticizing flow rate [g/s]
A	80	180	0.75	90
B	80	170	0.72	95.5
C	80	310	1.3	91
C	80	220	0.92	109
D	80	150	0.62	390
E	80	150	0.62	80
F	80	230	0.96	82
G	80	207	0.87	85
G	80	207	0.87	94.5
G	40	395	0.83	27.5
G	40	390	0.82	30
I	40	520	1.09	33
J	40	400	0.84	17.5
J	40	290	0.61	23
J	40	405	0.85	36
J	40	350	0.73	22
K	65	170	0.58	67
K	70	170	0.62	67
K	80	170	0.71	67

# OBRTNI MOMENT NA PUŽU

## Proračun obrtnog momenta

$$T_x = T_o \cdot (D_x / D_o)^{2.7}$$

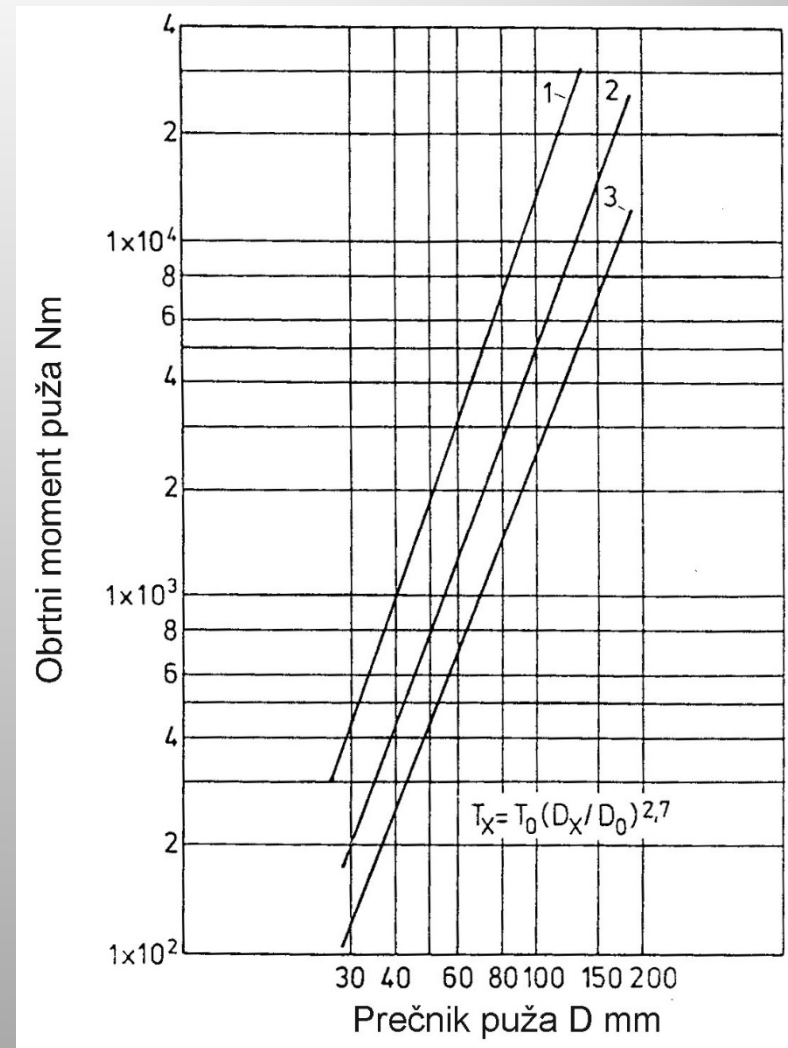
## Snaga potrebna za obrtanje puža

$$N_s = C \cdot n_s \cdot T_s \text{ [kW]}$$

$C = 0,001$ -faktor konverzije

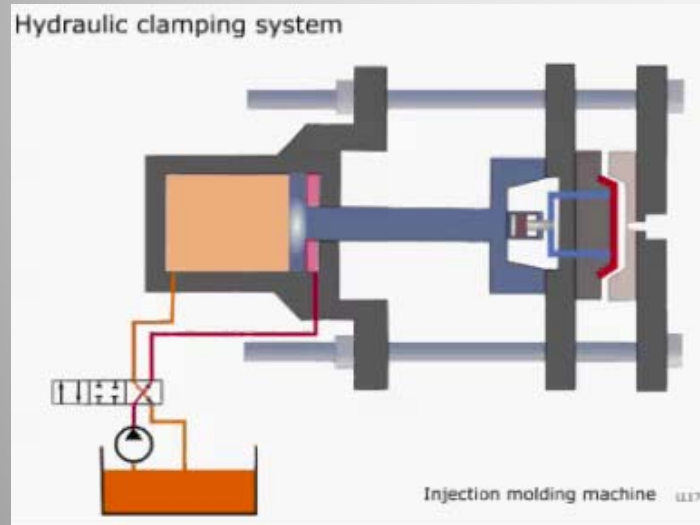
$n_s \text{ [s}^{-1}\text{]}$  – broj obrtaja puža u sekundi

$T_s$  – obrtni moment puža

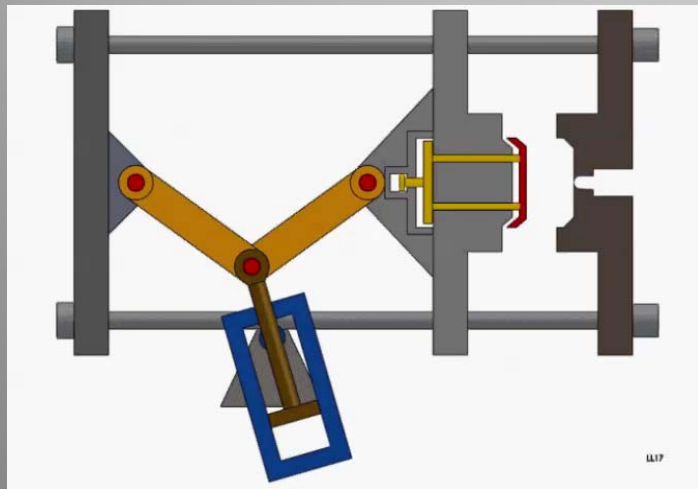


1: Termoseti, 2: Termoplasti, 3: PS i PE

# SISTEM ZA ZATVARANJE

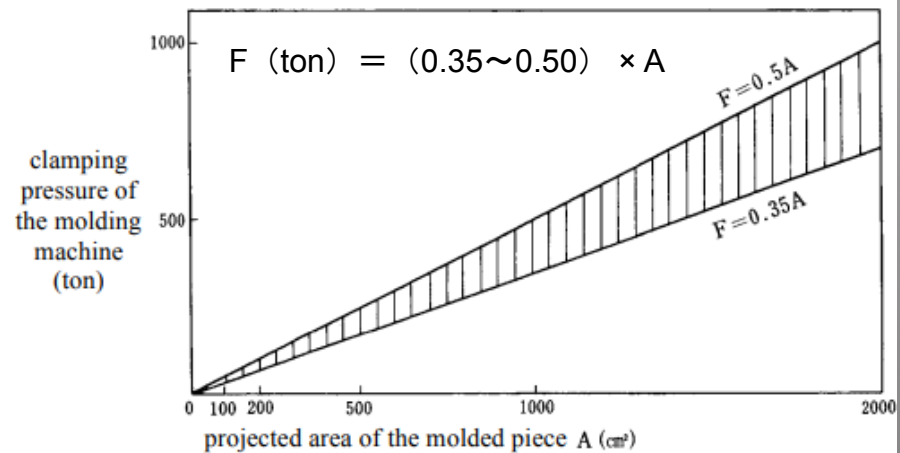
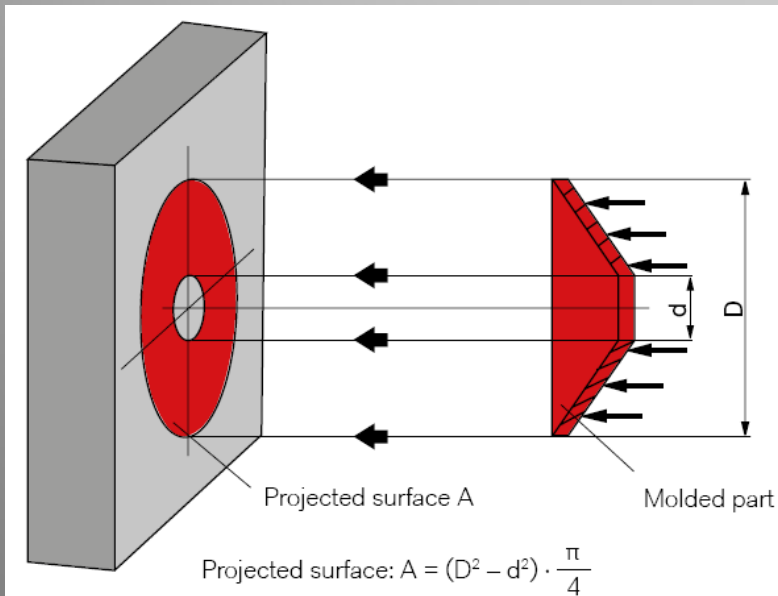
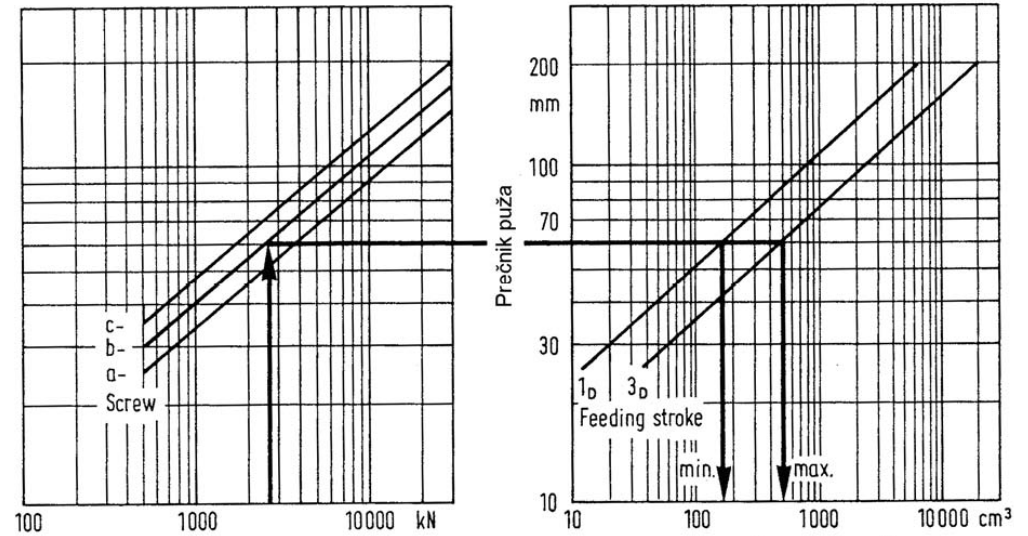
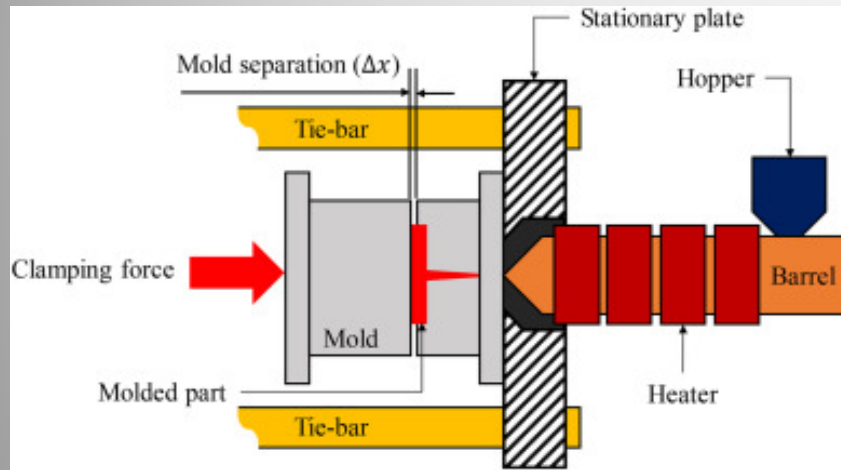


Hidraulični

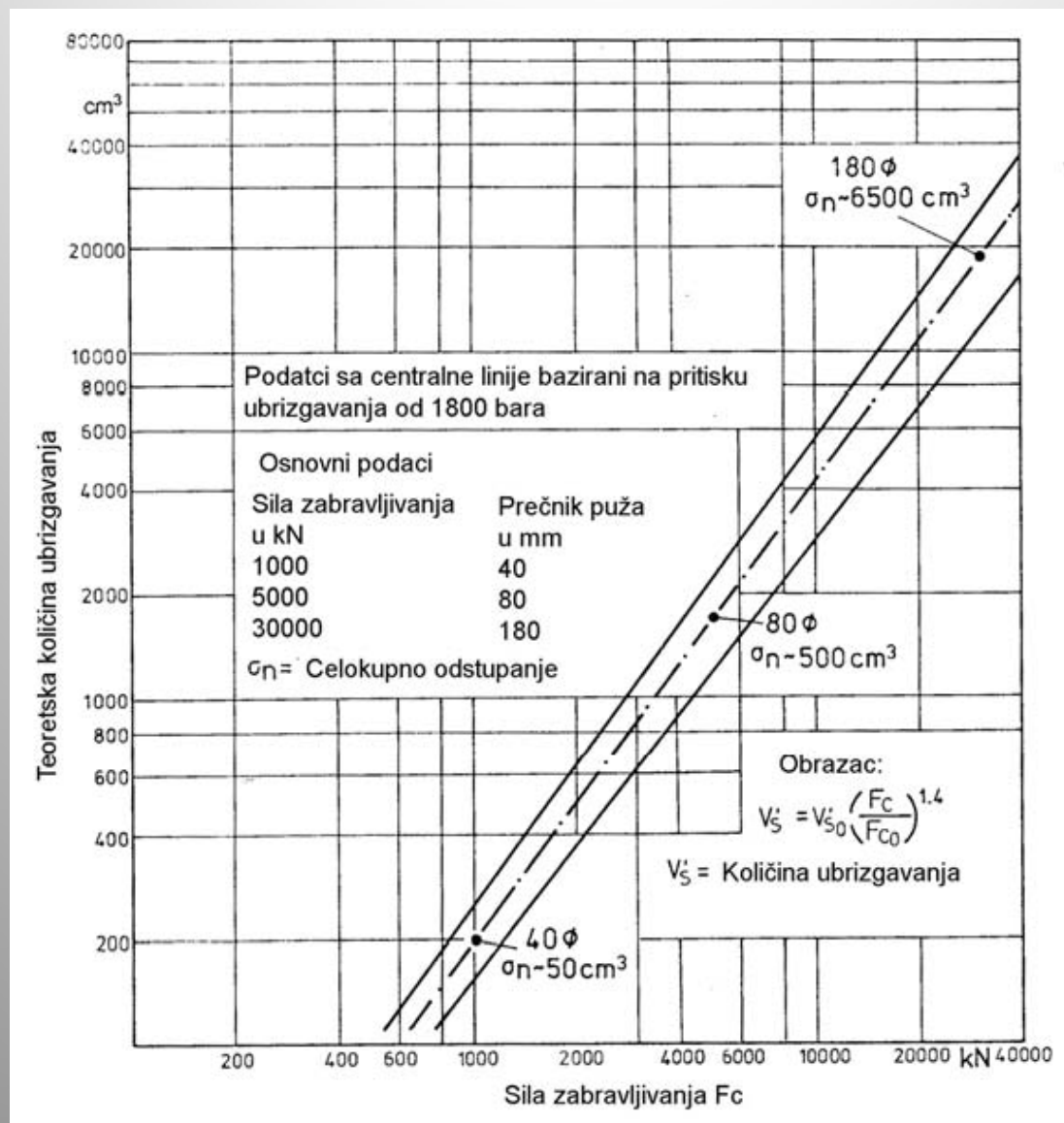


Mehanički

# SILA ZATVARANJA (Fz) – clamping force (t, kN)



# SILA ZATVARANJA (Fz) – clamping force (t, kN)



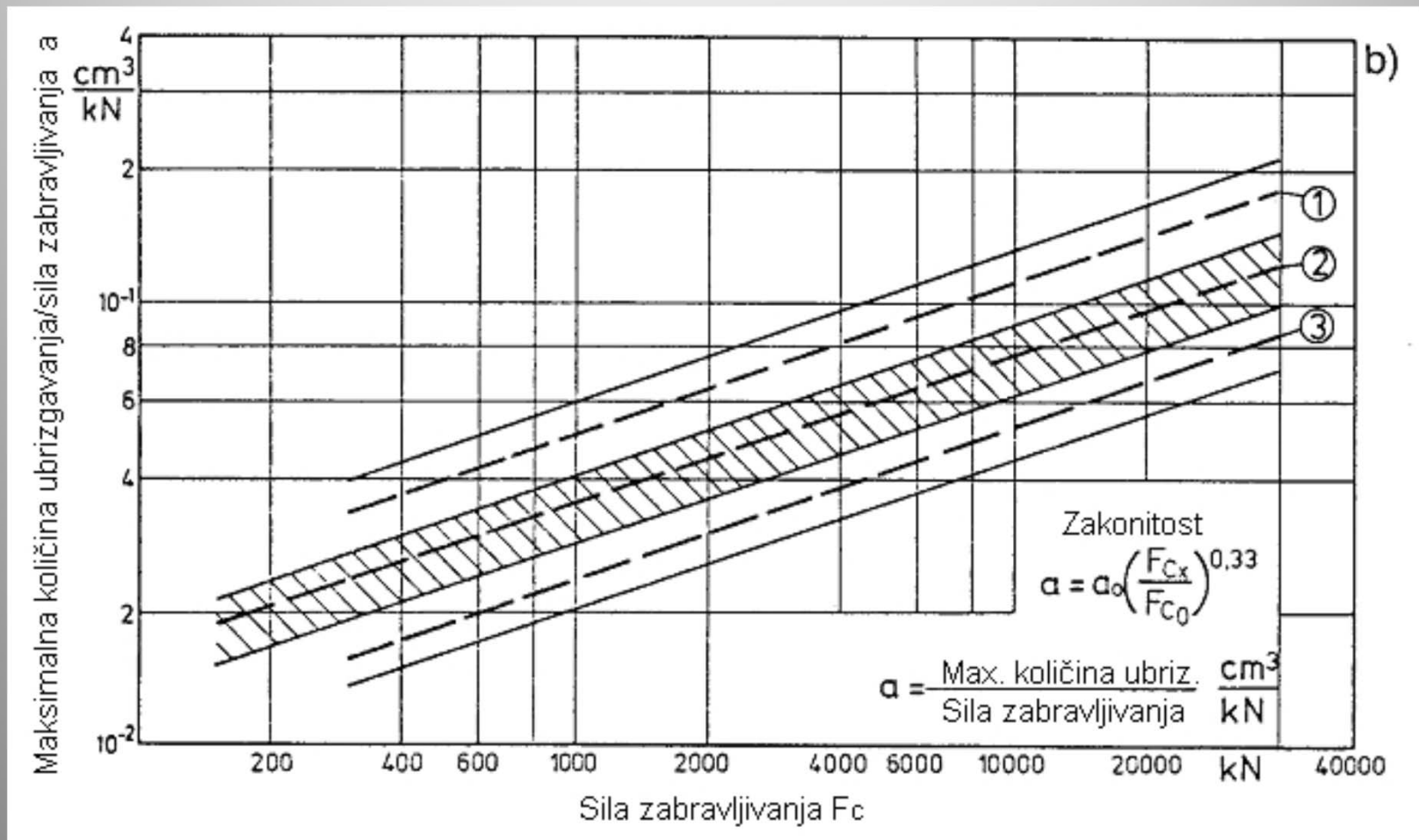
Izračunavanje kapaciteta ubrizgavanja nasuprot sile zabavljanja.

Isprekidana linija - prosečno. Evropske mašine, Wt - teoretska količina ubrizgavanja na 1000 bara (100MPa) pritiska

## SPECIFIČNI KAPACITET UBRIZGAVANJA ( $\text{cm}^3 / \text{kN}$ )

Specifični kapacitet predstavlja količnik zapreminskog kapaciteta i sile zatvaranja ( $F_z$ )

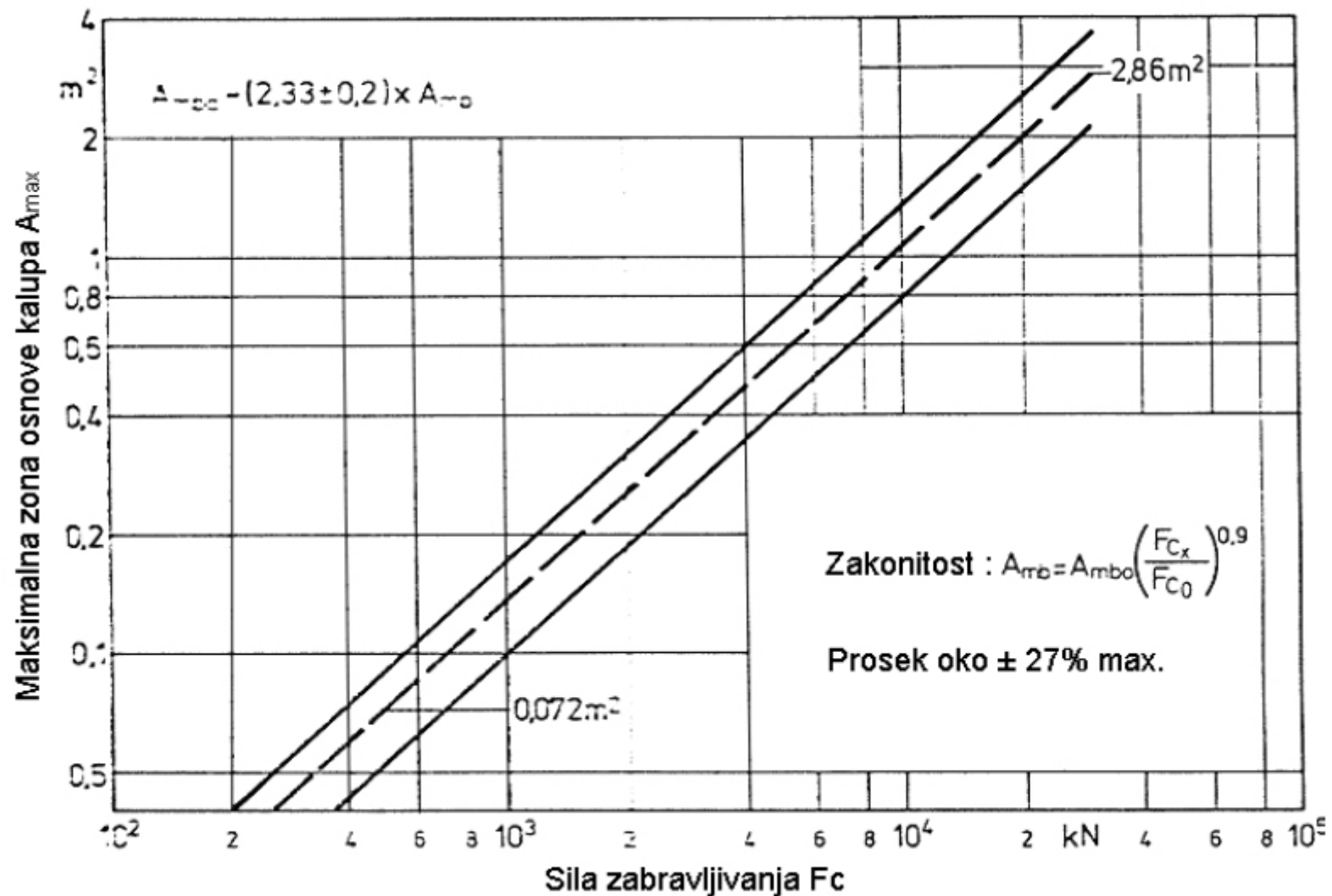
$$a = \frac{W_{teor}}{F_z}$$



2 – standardne mašine; 1,3 – specijalne mašine

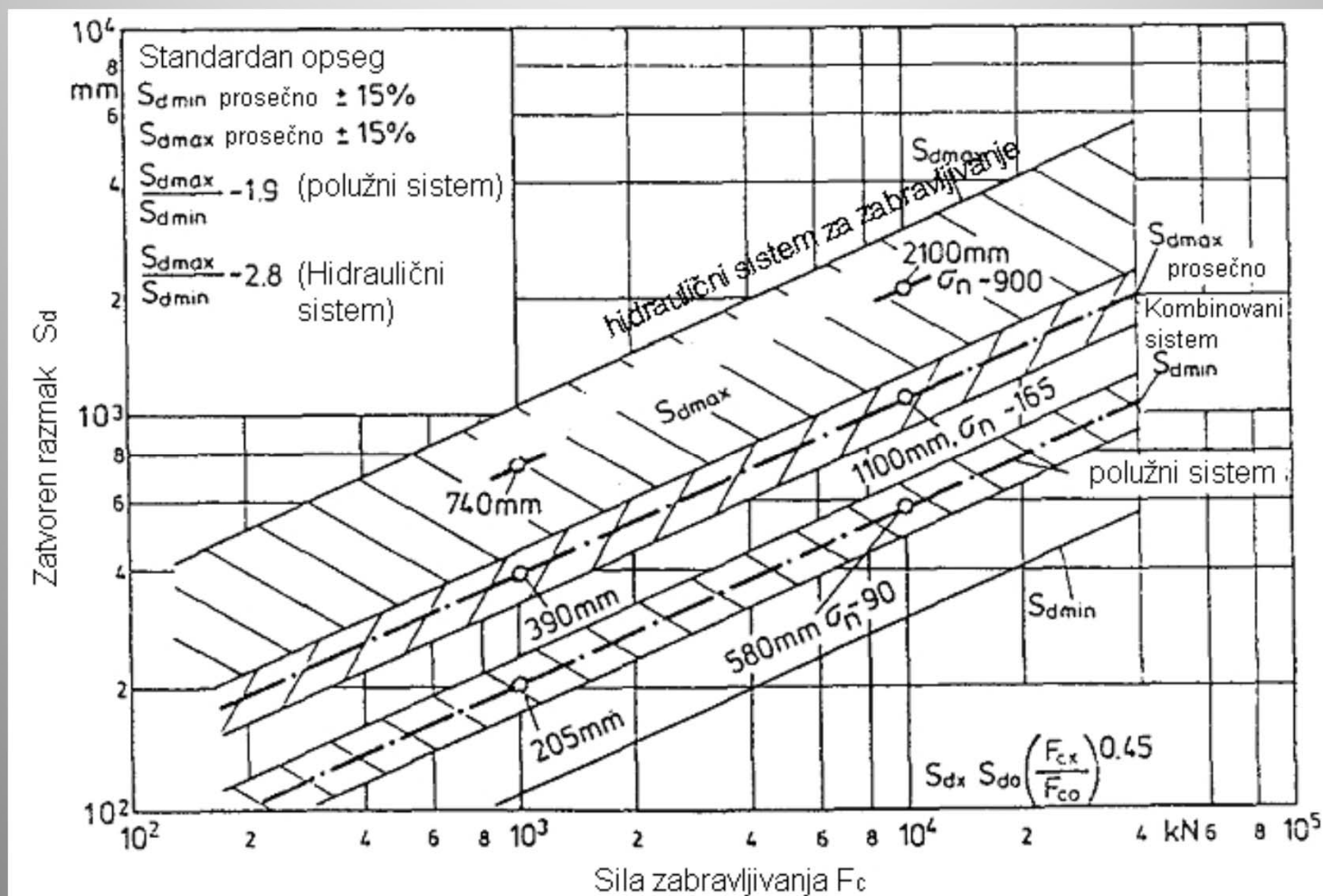
# MAKSIMALNA POVRŠINA OSNOVE ALATA (m<sup>2</sup>)

## Mold-Base Area



# MAX. RAZMAK (DAYLIGHT) IZMEĐU POKRETNE I NEPOKRETNE PLOČE U OTVORENOM I ZATVORENOM POLOŽAJU MEHANIZMA

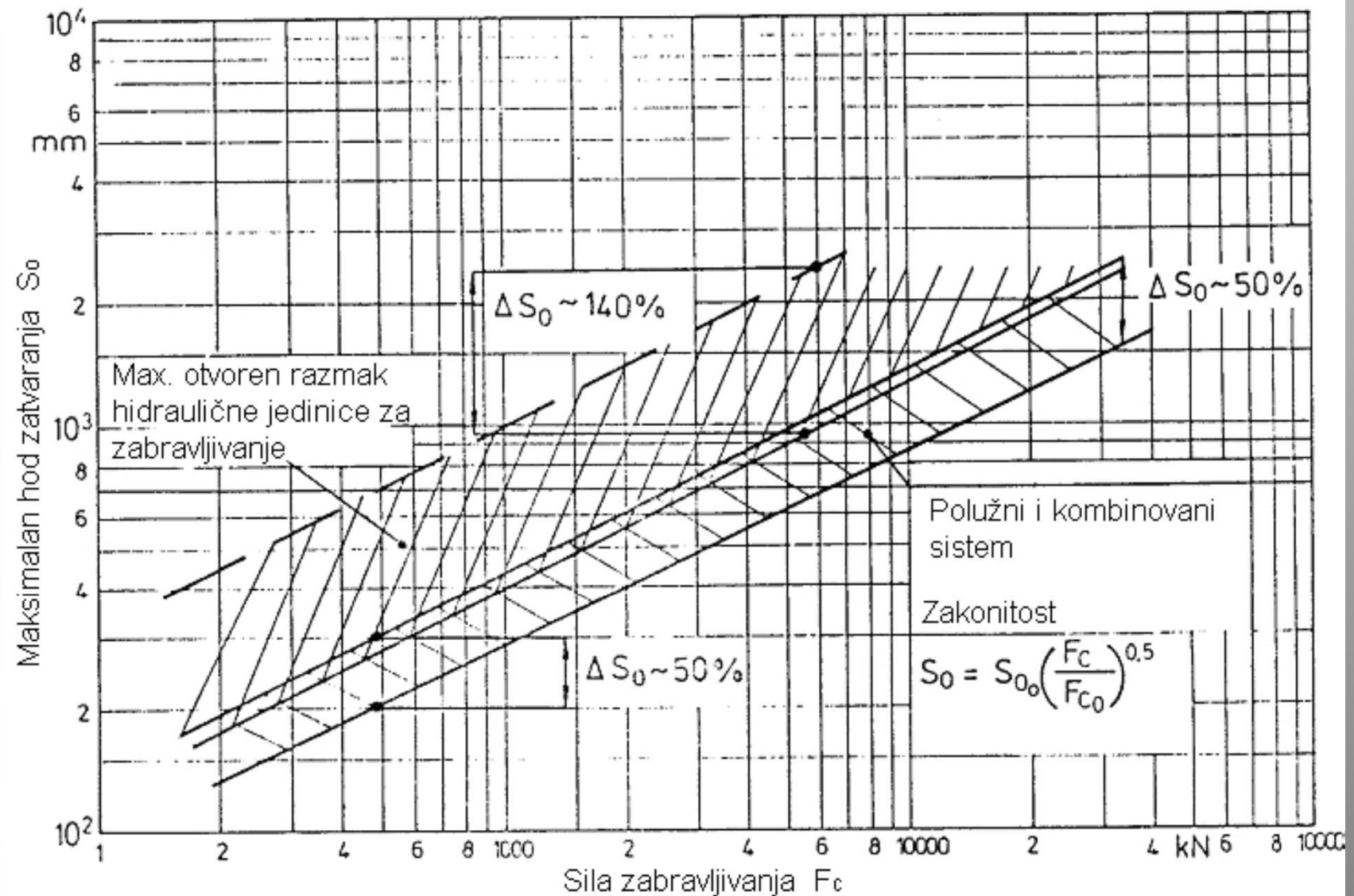
Razmak u zatvorenom položaju određuje minimalnu debljinu (visinu) zatvorenog alata!





# MAKSIMALNI HOD OTVARANJA

## Maximum clamp stroke



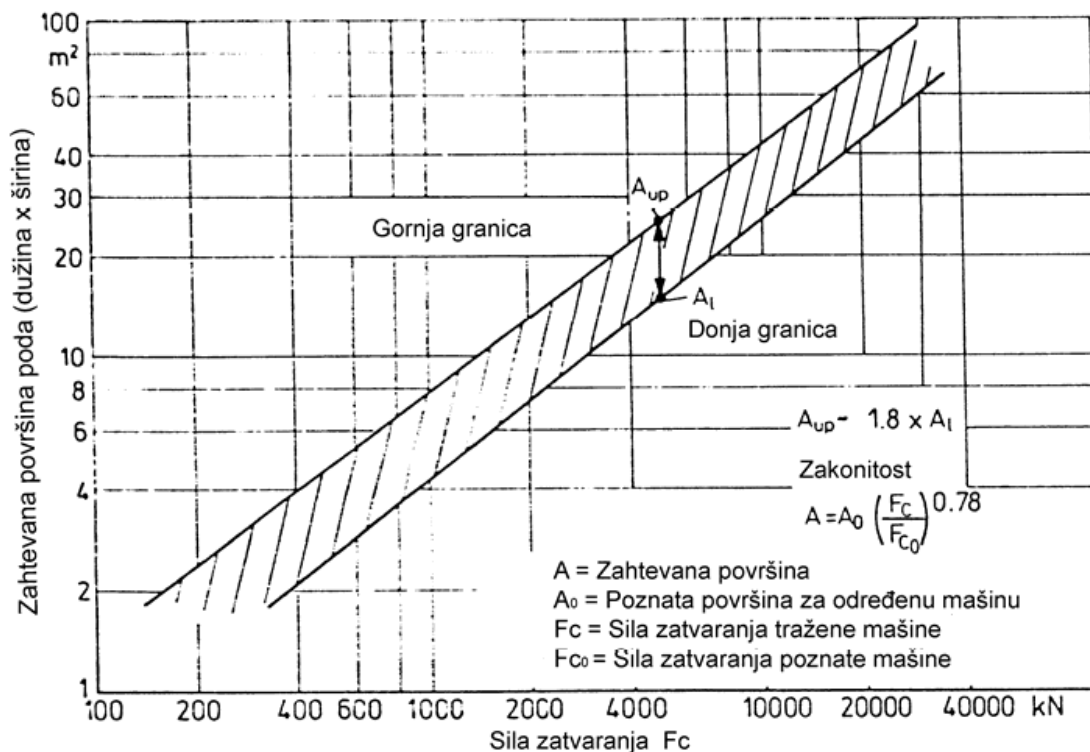
# SNAGA GREJAČA ZA PLASTIFIKACIJU (P<sub>gr</sub>)

## Heating capacity

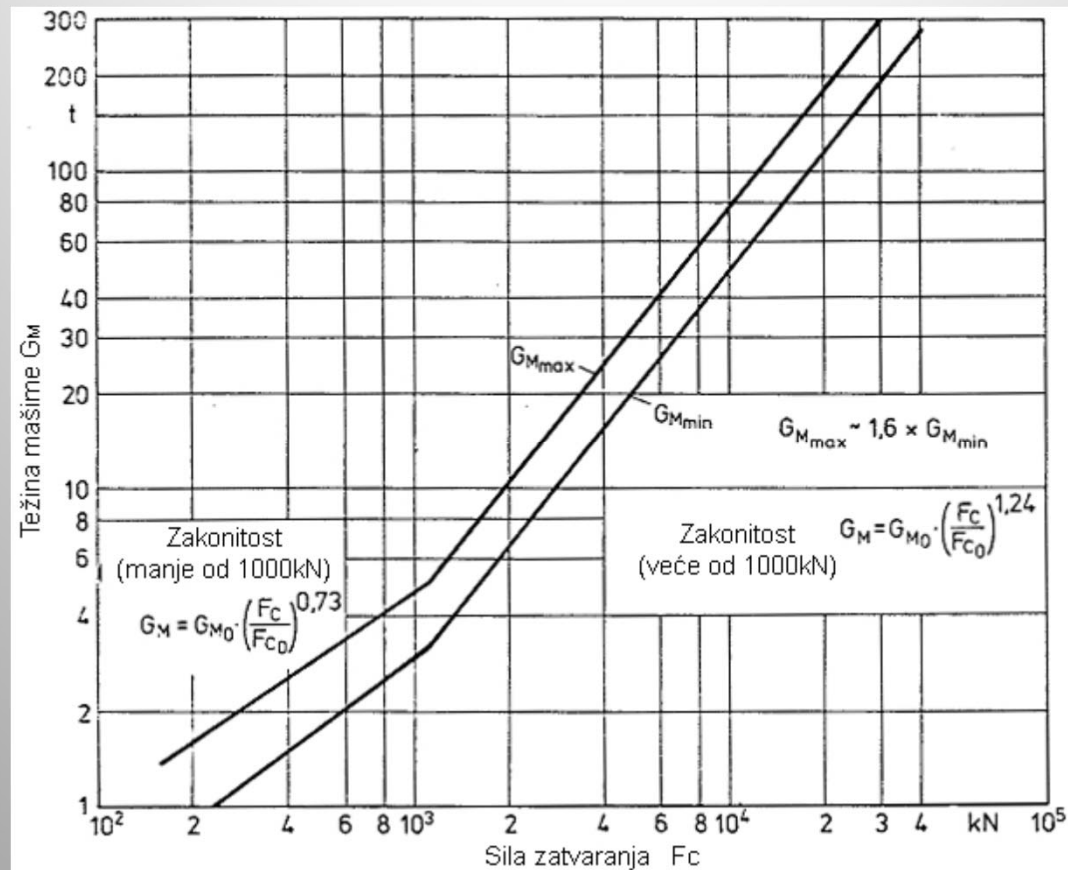
Za termoplaste  $04 \div 0,5 \frac{kW}{g \cdot s}$

## POVRŠINA PODA (m<sup>2</sup>)

### Floor space



# Ukupna masa mašine (t) Machine weight



Clamping force [kN]	Ratio of weight / clamping force (standard machines) [kg/kN]	Ratio of weight / clamping force (high-perform- ance machines) [kg/kN]	Ratio of weight / clamping force (two-platen machines) [kg/kN]	Ratio of weight / clamping force (tie-bar-less clamping unit) [kg/kN]
250 to 500	4 to 6.5	6 to 8	4 to 5	9 to 10
up to 1,000	5 to 6.5	6 to 8	5 to 6	9 to 10
up to 10,000	6.5 to 8	—	6.5 to 7.5	—
up to 40,000	8 to 10	—	6.5 to 7.5	—