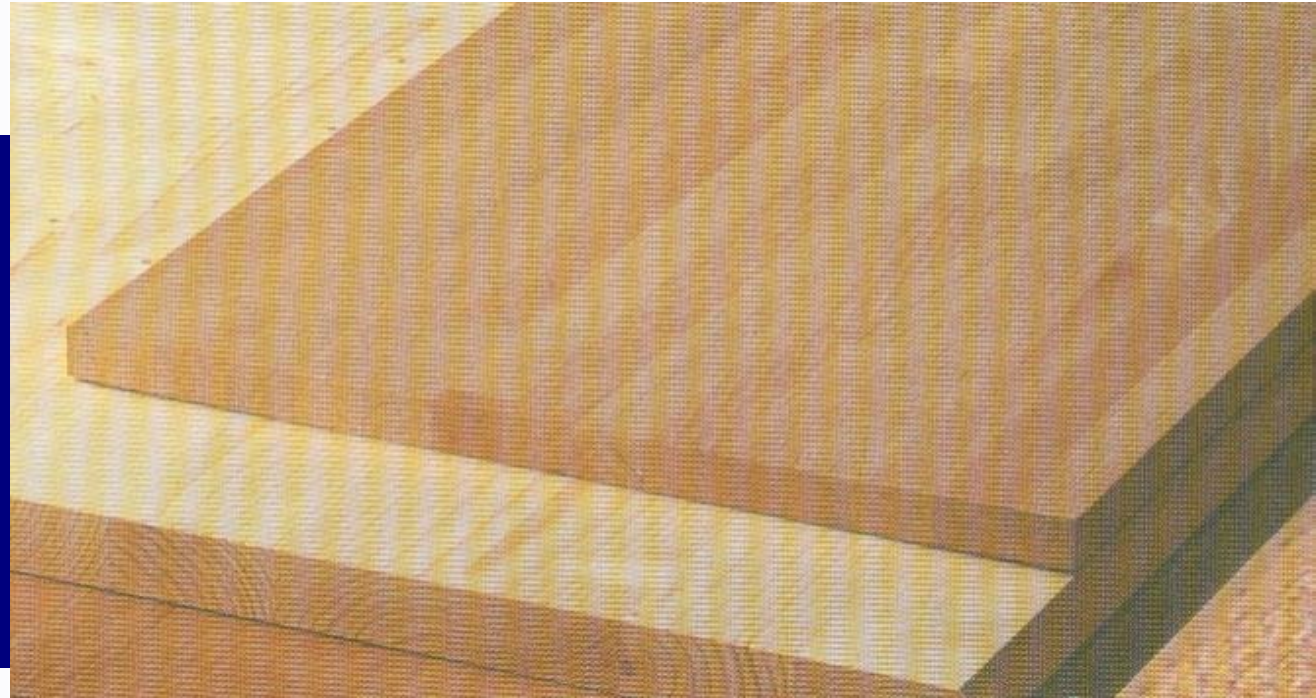
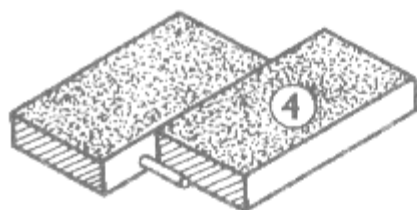
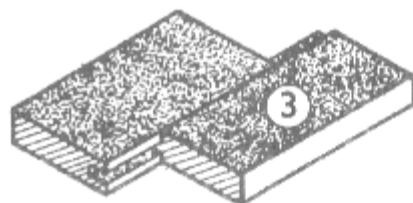
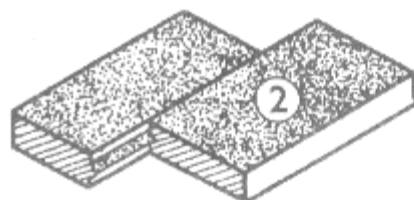
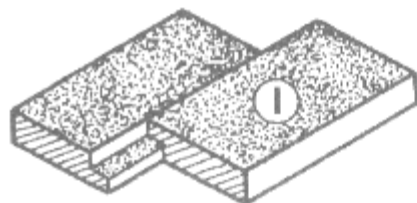




Nastavljanje gredica po širini



PRAVILA

- Širina gredice
- Širina lamela
- Površina lepljenja
- Način slaganja
- Krivljenje ploče
- Promena dimenzija ploče
- 200mm
- 80/100mm
- A!!
- Pravac godova
- Ukrućenje
- Tolerancija (RAL; EN)

1. Obrada sljubnica

Gruba
gredica

Izrada
bazne
površine

figovanje

VARIJANTA I



VARIJANTA II



VARIJANTA III



kontrola kvaliteta izrade

izbor gredica

nanošenje lepka

presovanje



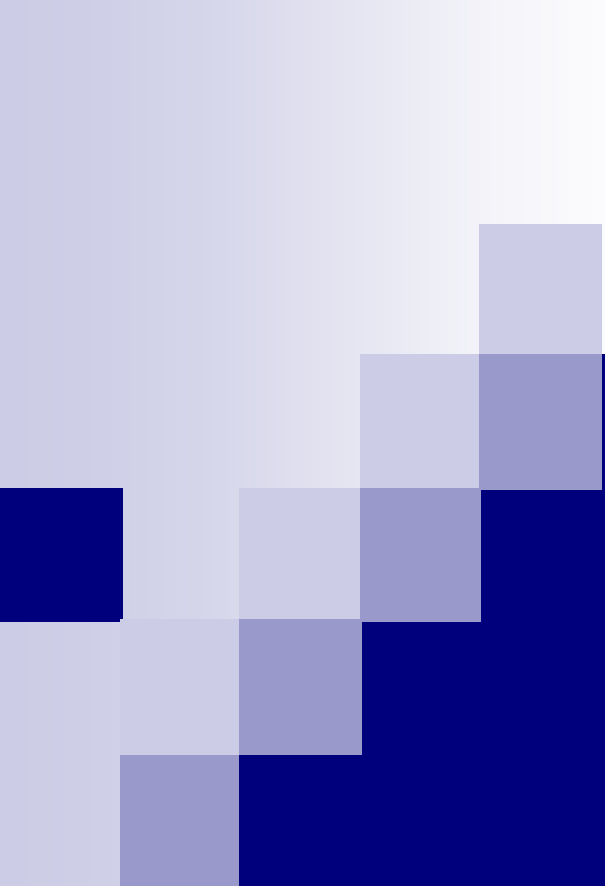
Egaliziranje debljine



dimenzionisanje B i L

Obrada sljubnica

mašina	varijanta obrade
Ravnalica	1
Fig mašina – Ledinek	1/2
Fig mašina – Weinig Super 4	3
Četvorostrana rendisaljka	3

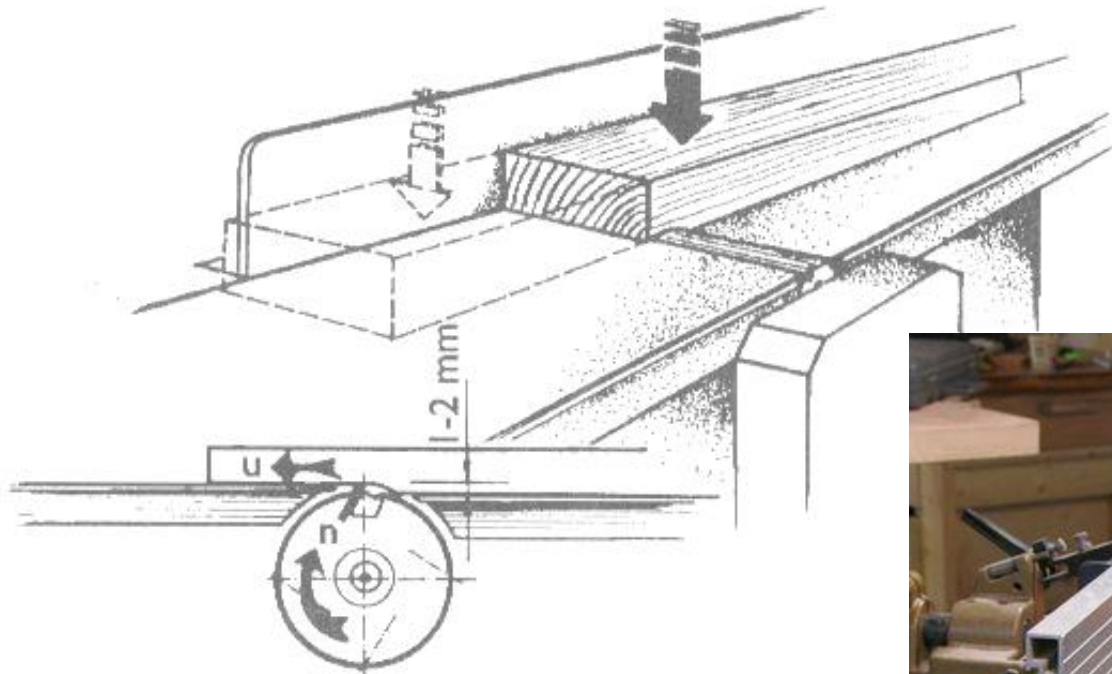


Varijanta 1

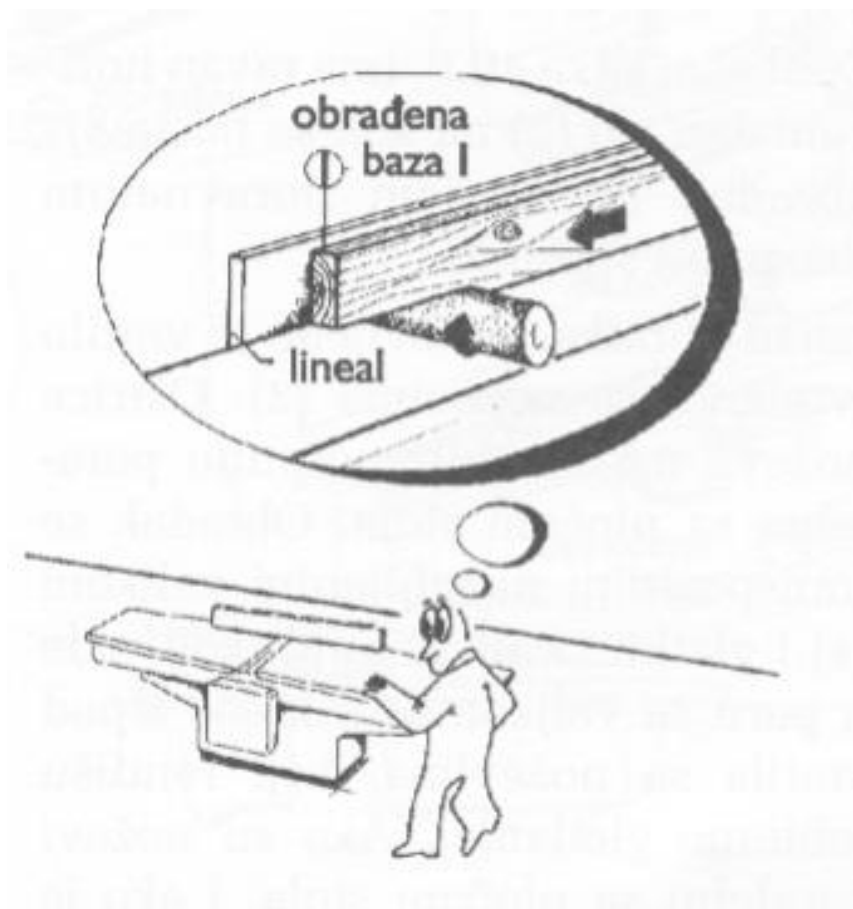
Obrada sljubnica

mašina	varijanta obrade
Ravnalica	1
Fig mašina – Ledinek	1/2
Fig mašina – Weinig Super 4	3
Četvorostrana rendisaljka	3

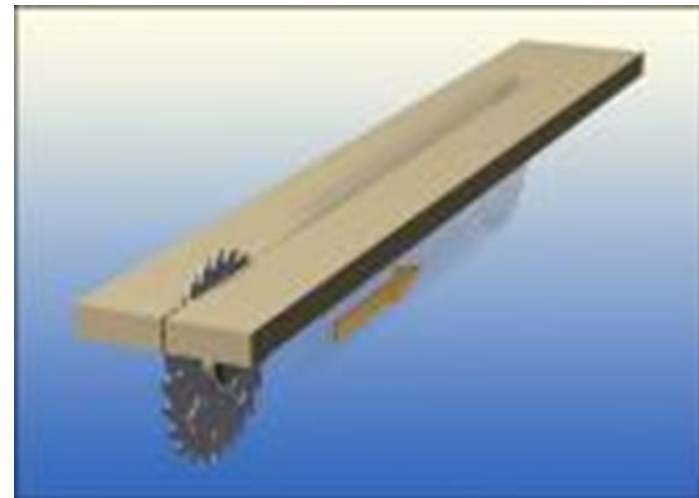
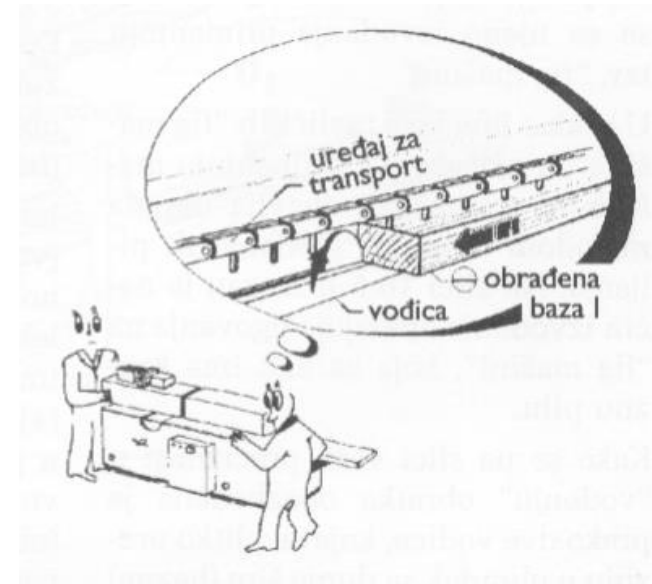
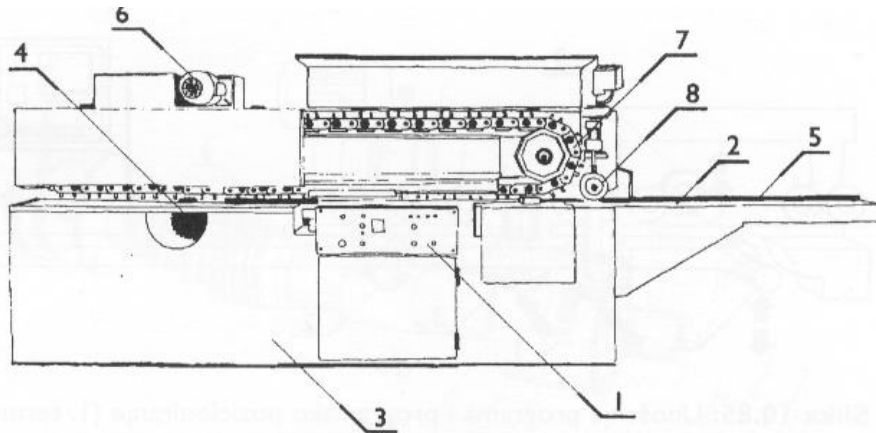
Izrada 1. bazne površine

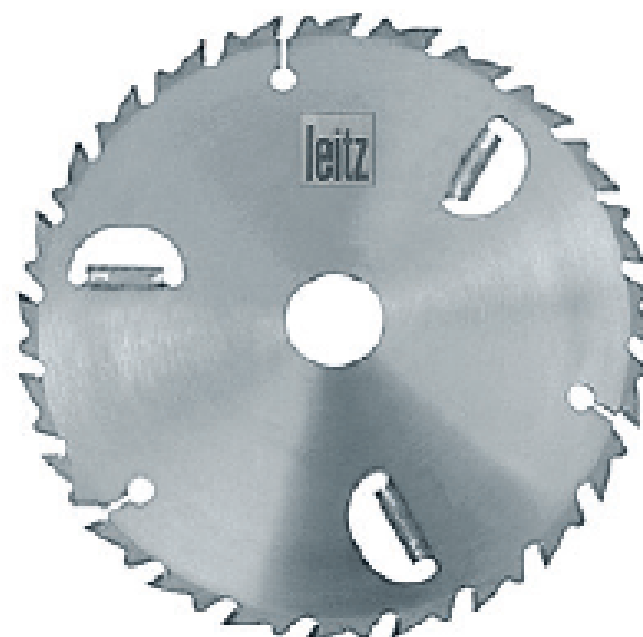


Obrada sljubnica na ravnalici



Obrada sljubnica na fig mašini - Ledinek





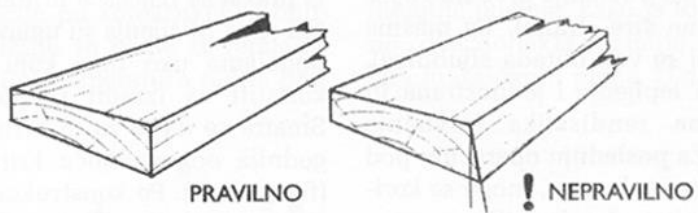
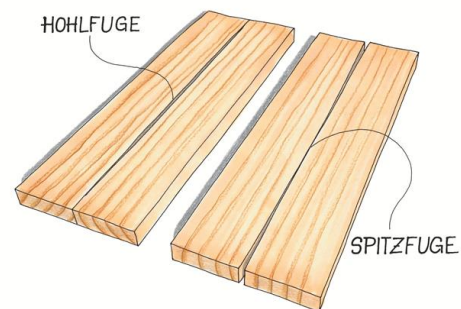
Kontrola kvaliteta obarde



PRAVILNO

! NEPRAVILNO

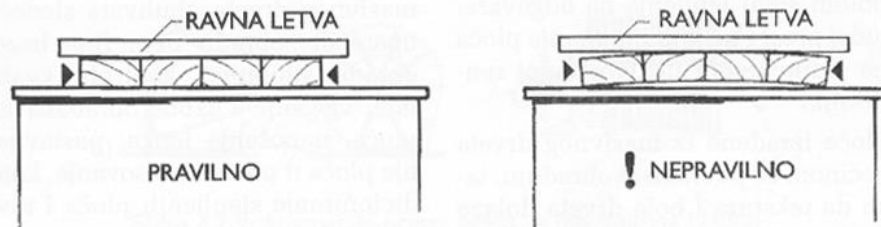
Slika 12.5: Obrada sljubnice (podužni izgled)



PRAVILNO

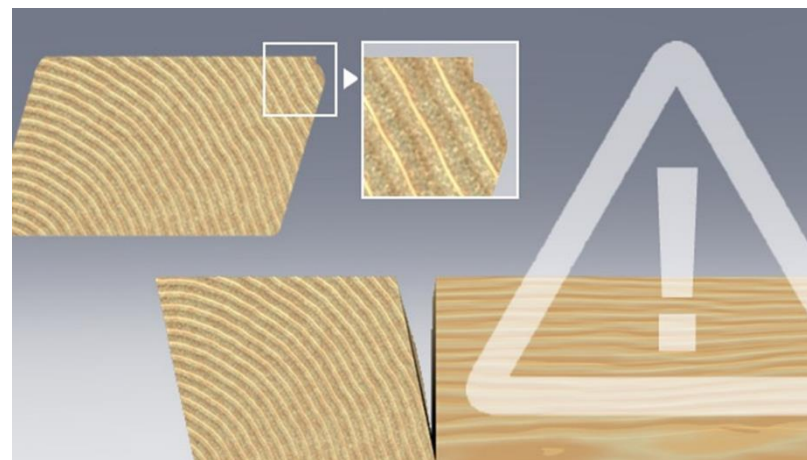
! NEPRAVILNO

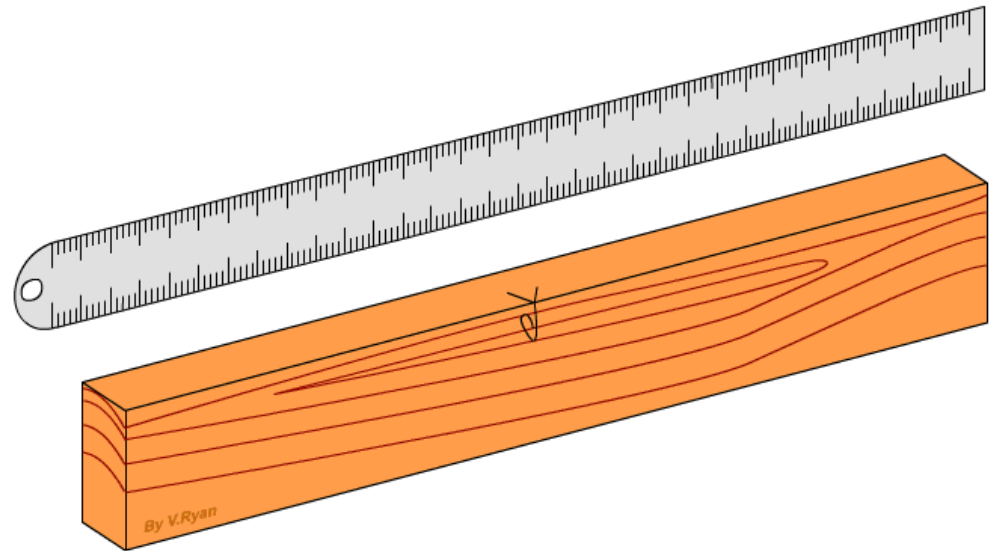
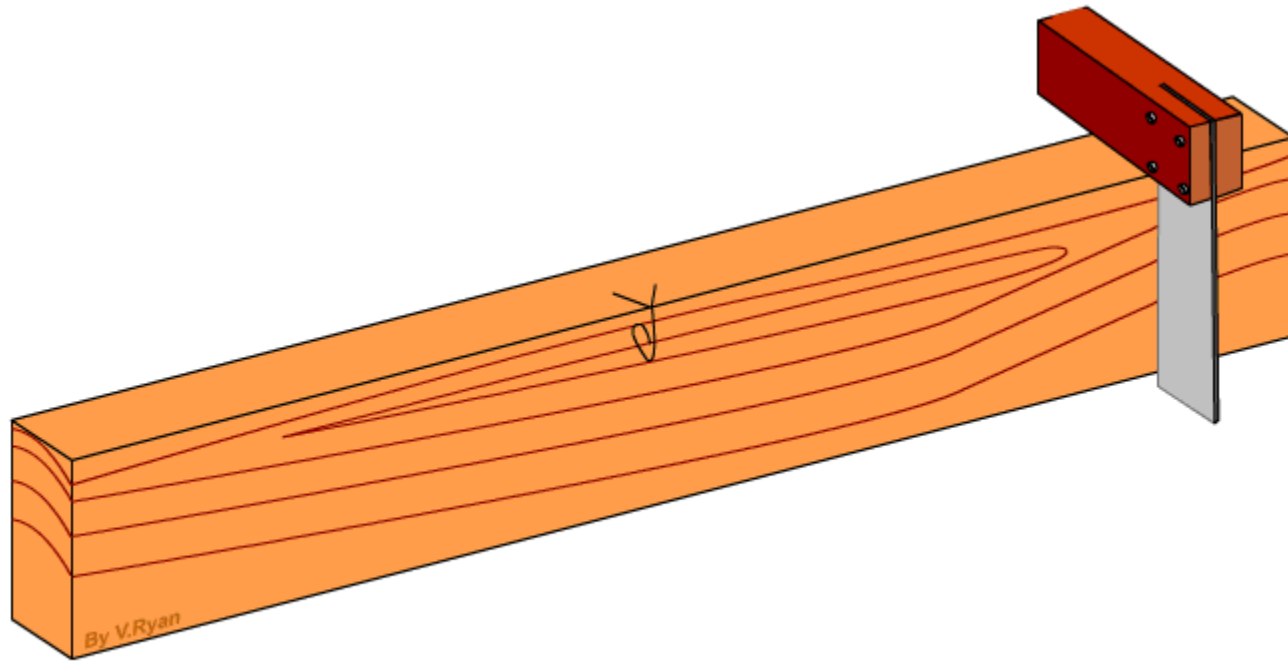
Slika 12.6: Obrada sljubnice (poprečni izgled)

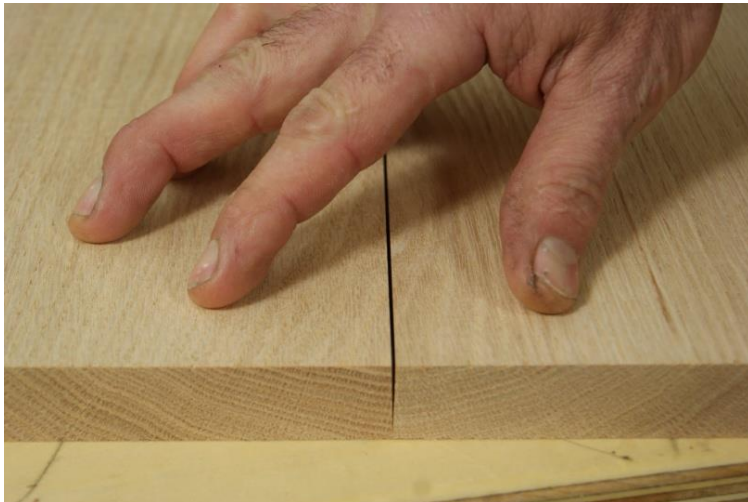


PRAVILNO

! NEPRAVILNO





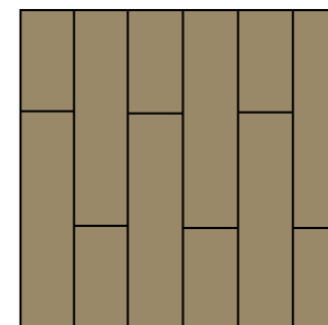
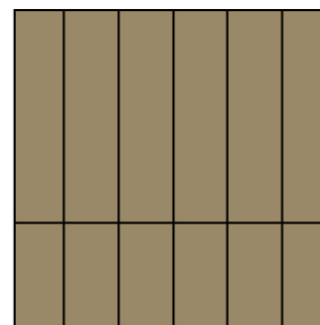
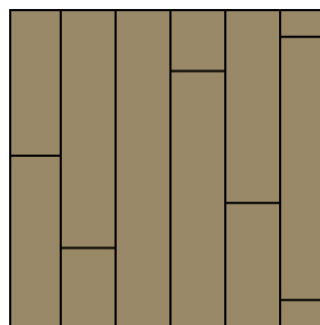
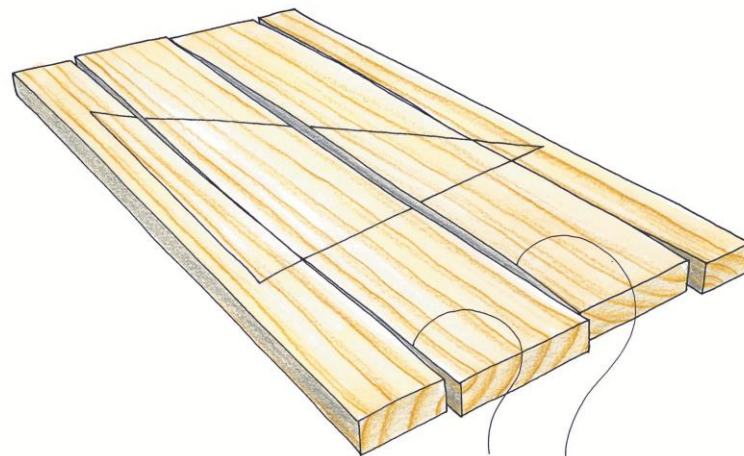
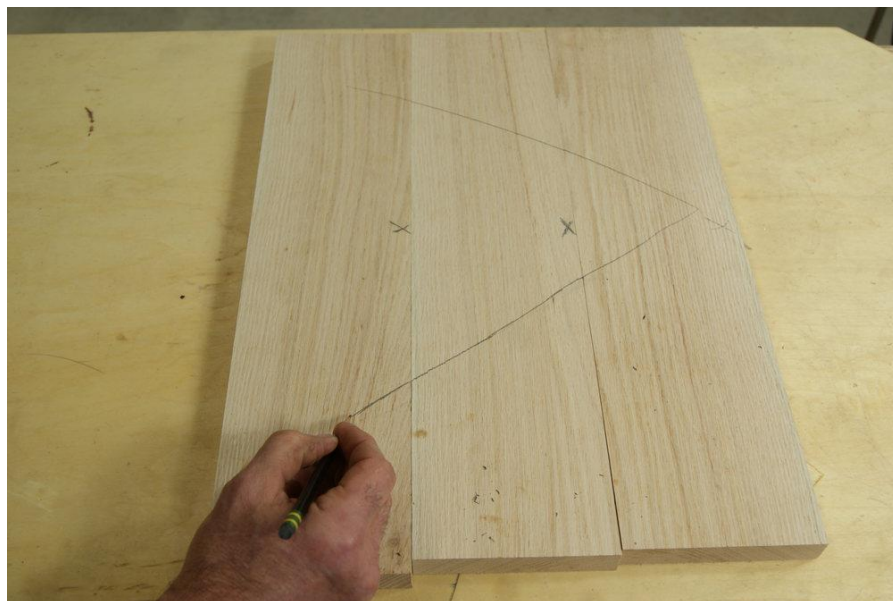


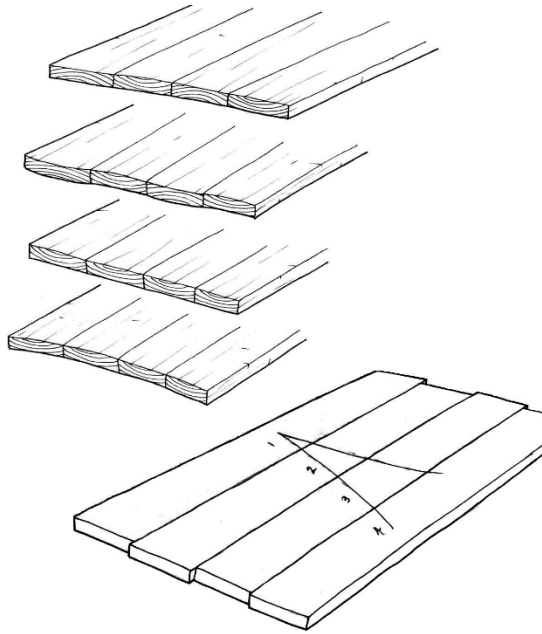
Izbor gredica

- Po dimenzijama
- Po boji i teksturi



Izbor gredica – slaganje gredica u tavan



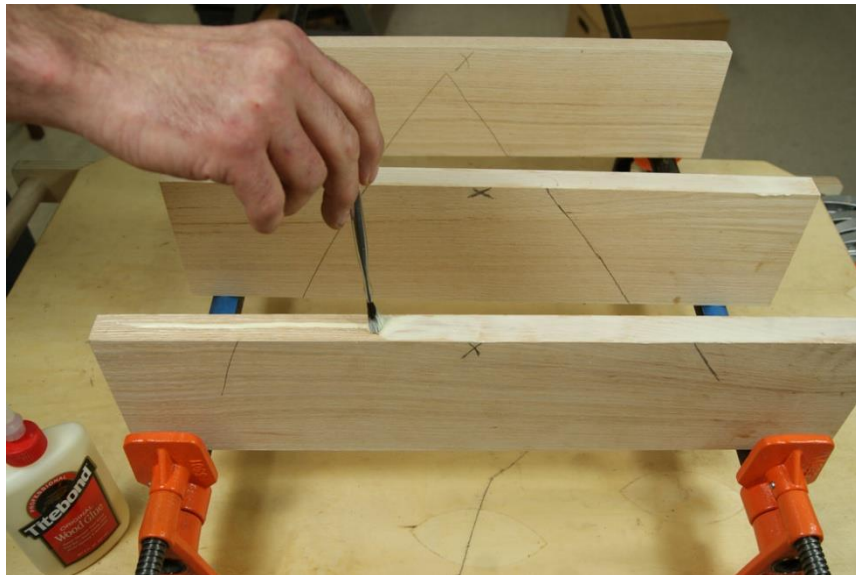


Nanošenje lepka

- Četka
- Valjak – ručni
- Nanosačica lepka

Nanošenje lepka

- Četkom



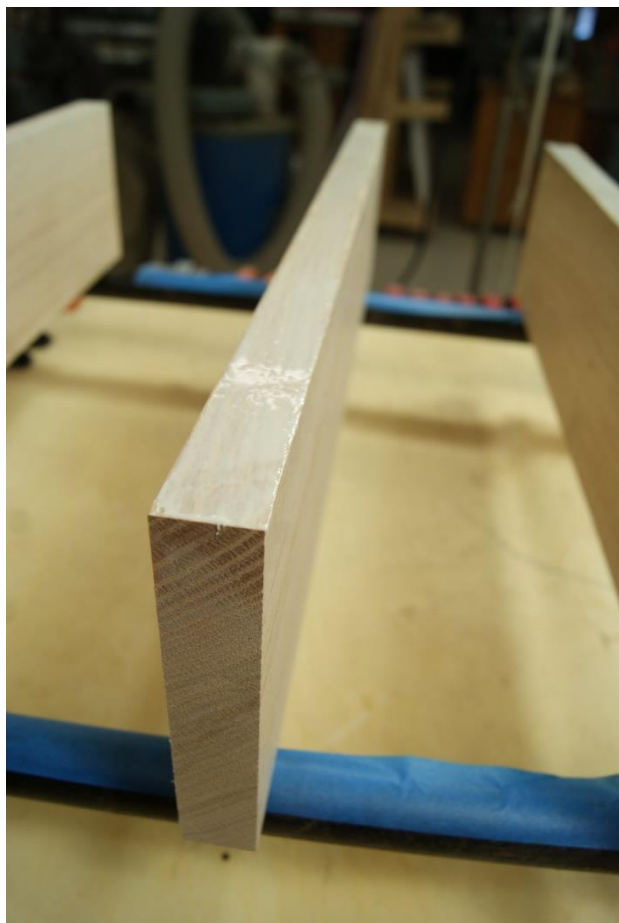
- Valjkom – ručnim







Kontrola okvašenosti površina



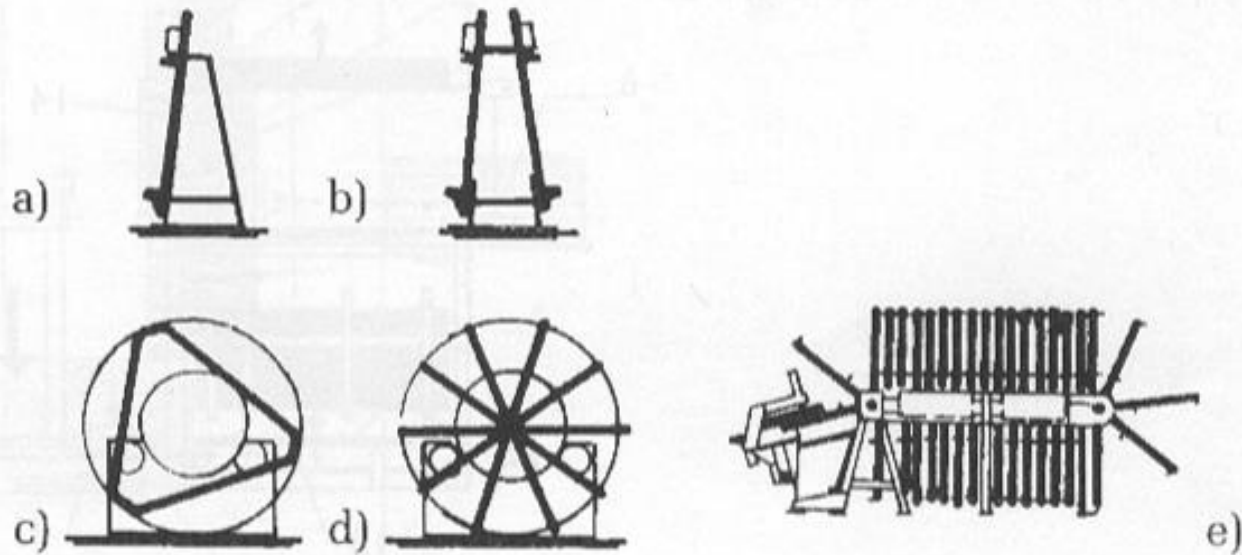
Lepkovi

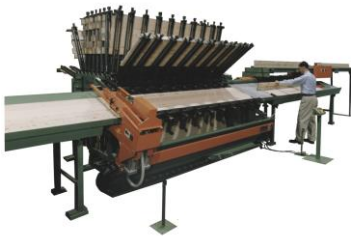
Vrsta lepka	varijanta obrade
Glutinski	1
PVA-c	1/2/3

Prese

Vrsta presa	varijanta obrade
ramovske	1/2/3
Tople prese	2/3
VF prese	2/3

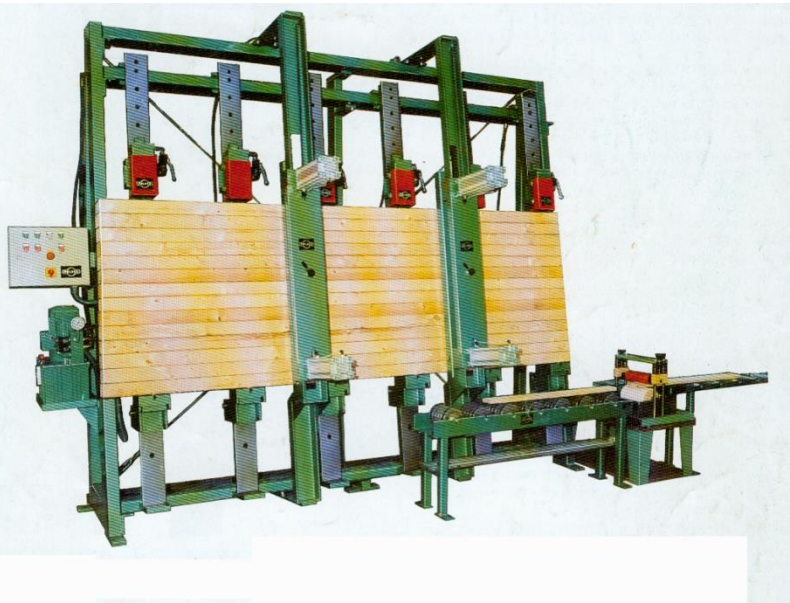
Ramovske prese





Ramovske prese

■ jednostrane

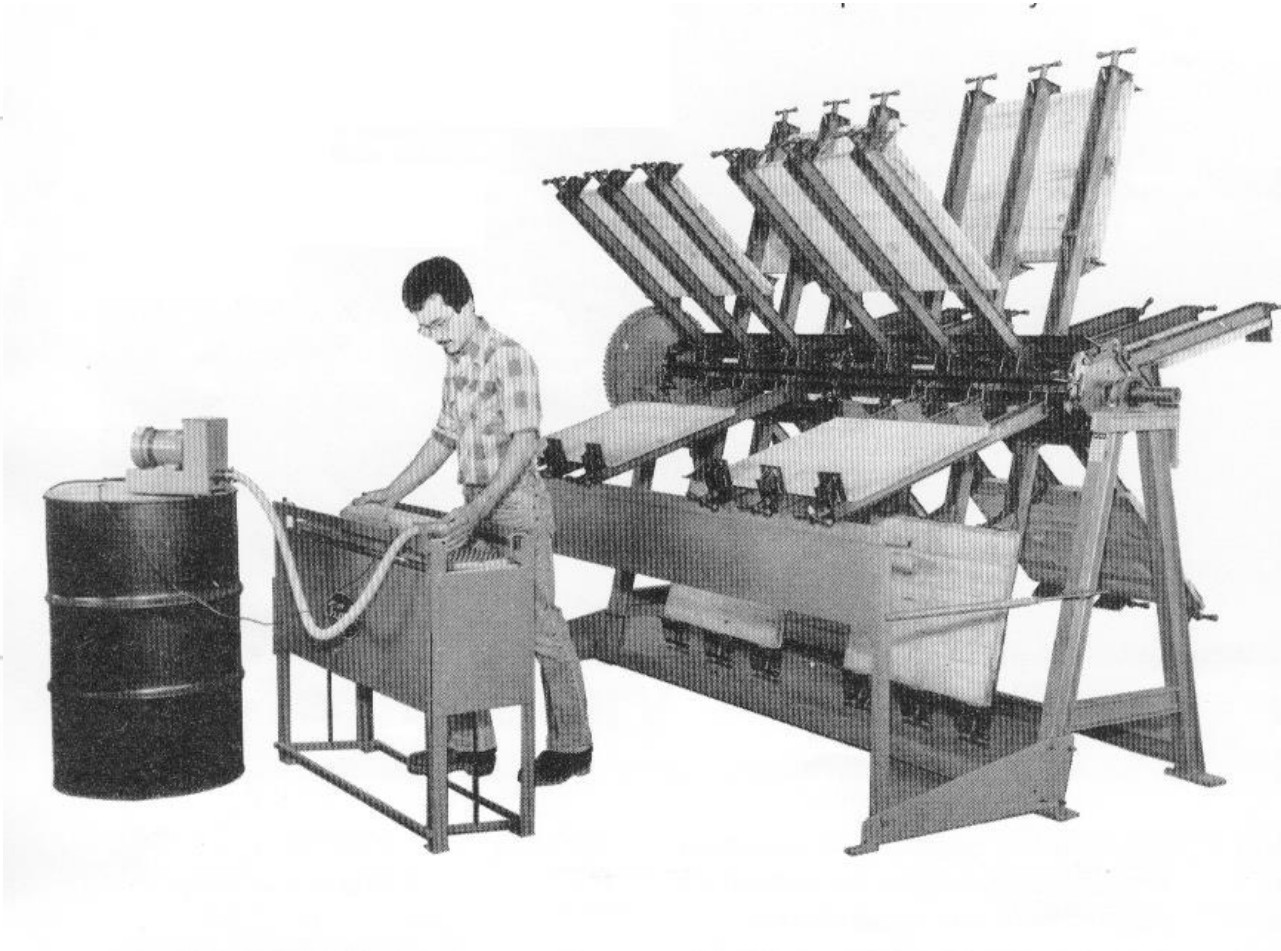
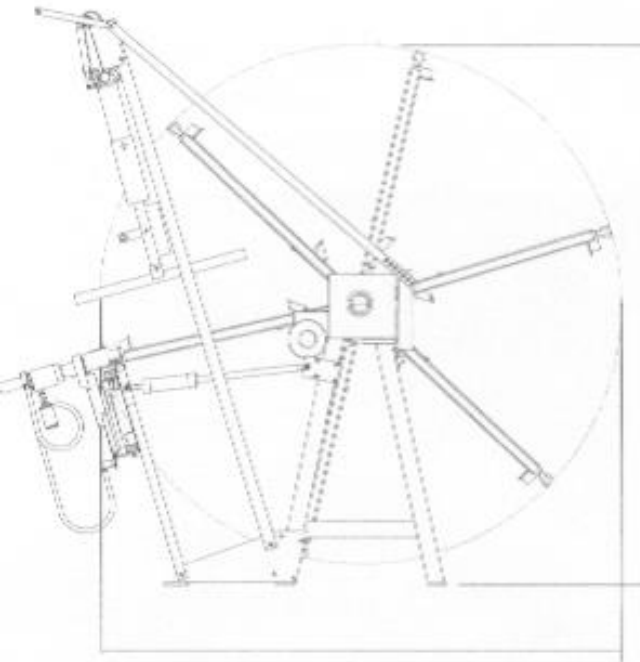


■ dvostrane

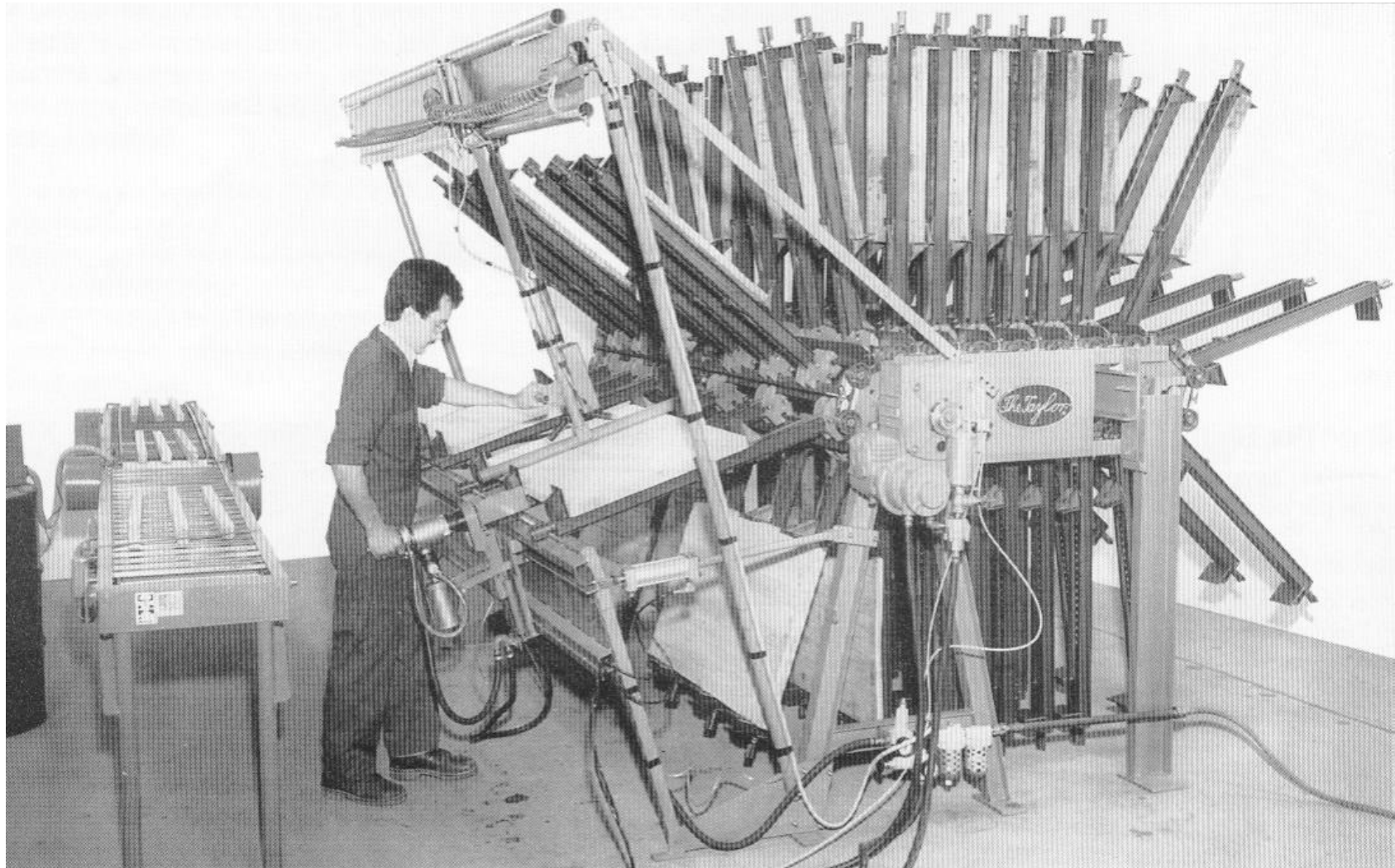




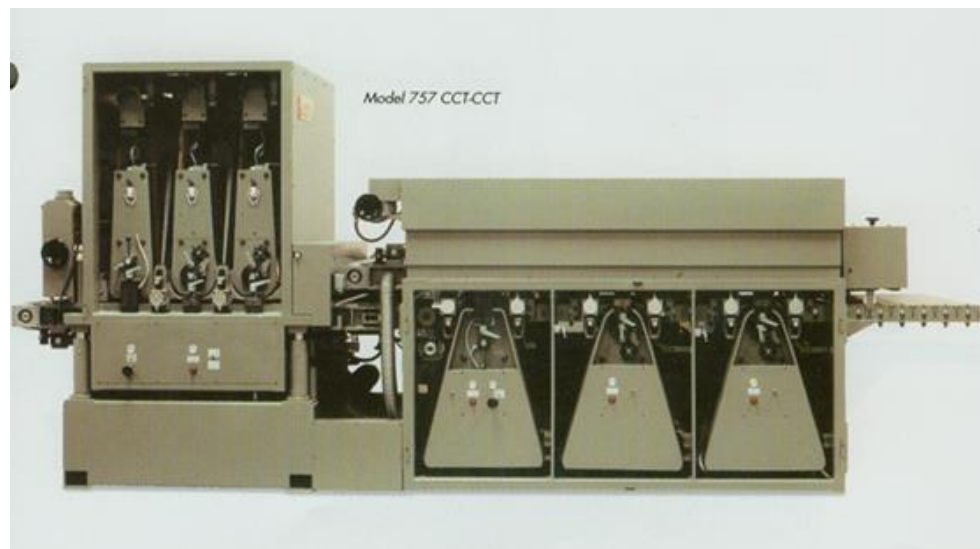
Ramovske prese - zvezdaste



Ramovske prese - konvejerne



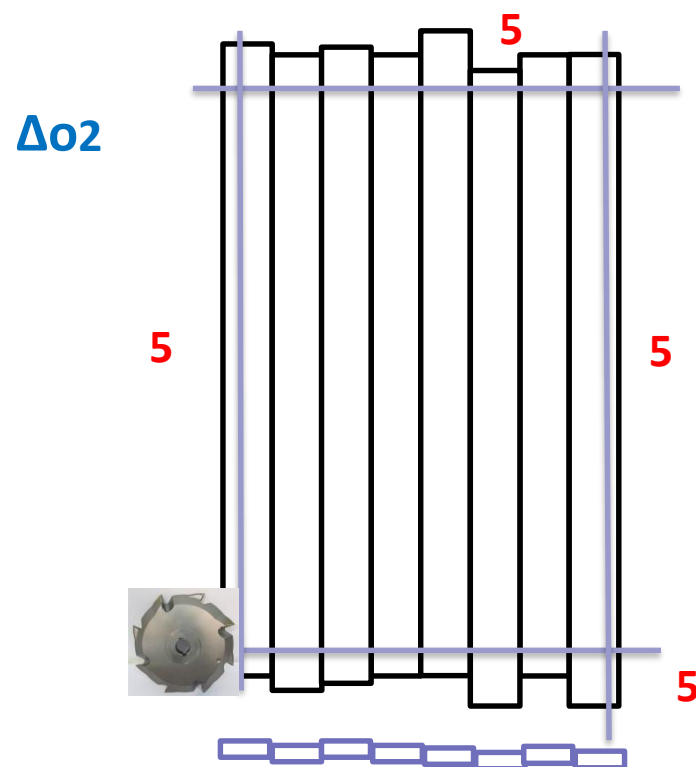
Egaliziranje debljine

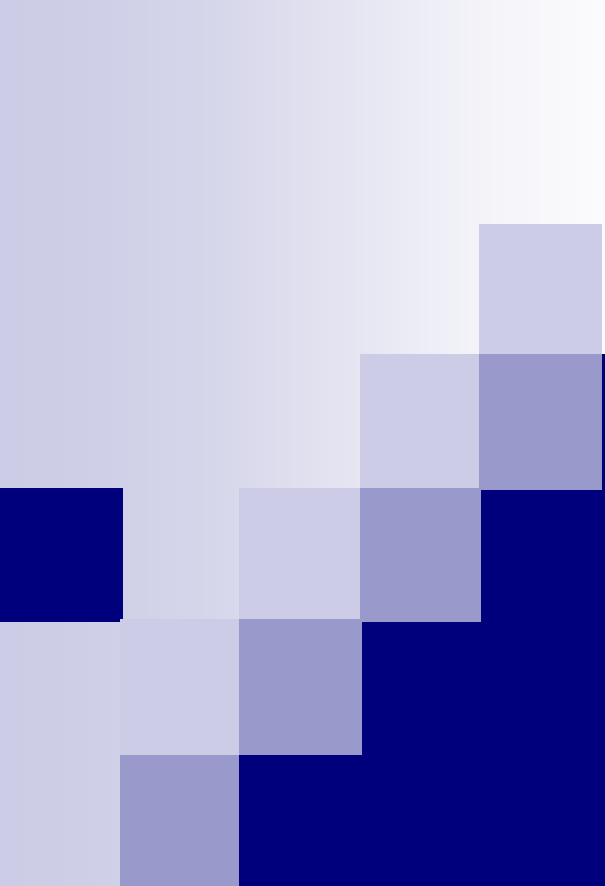


Dimenzionisanje B i L



nazivne mere (mm)			Δo_1	Δo_2	Δo_3	Krojene mere (mm)
D1'	L	1600	20	10		
	B	80	6	5		
	D	20	6	2		
D2"	L	1600	20	10		
	B	80	6	0		
	D	20	6	2		





Varijanta 2

1. Obrada sljubnica

Gruba
gredica

Izrada
bazne
površine

figovanje

VARIJANTA I



VARIJANTA II



VARIJANTA III



kontrola kvaliteta izrade

izbor gredica

nanošenje lepka

presovanje



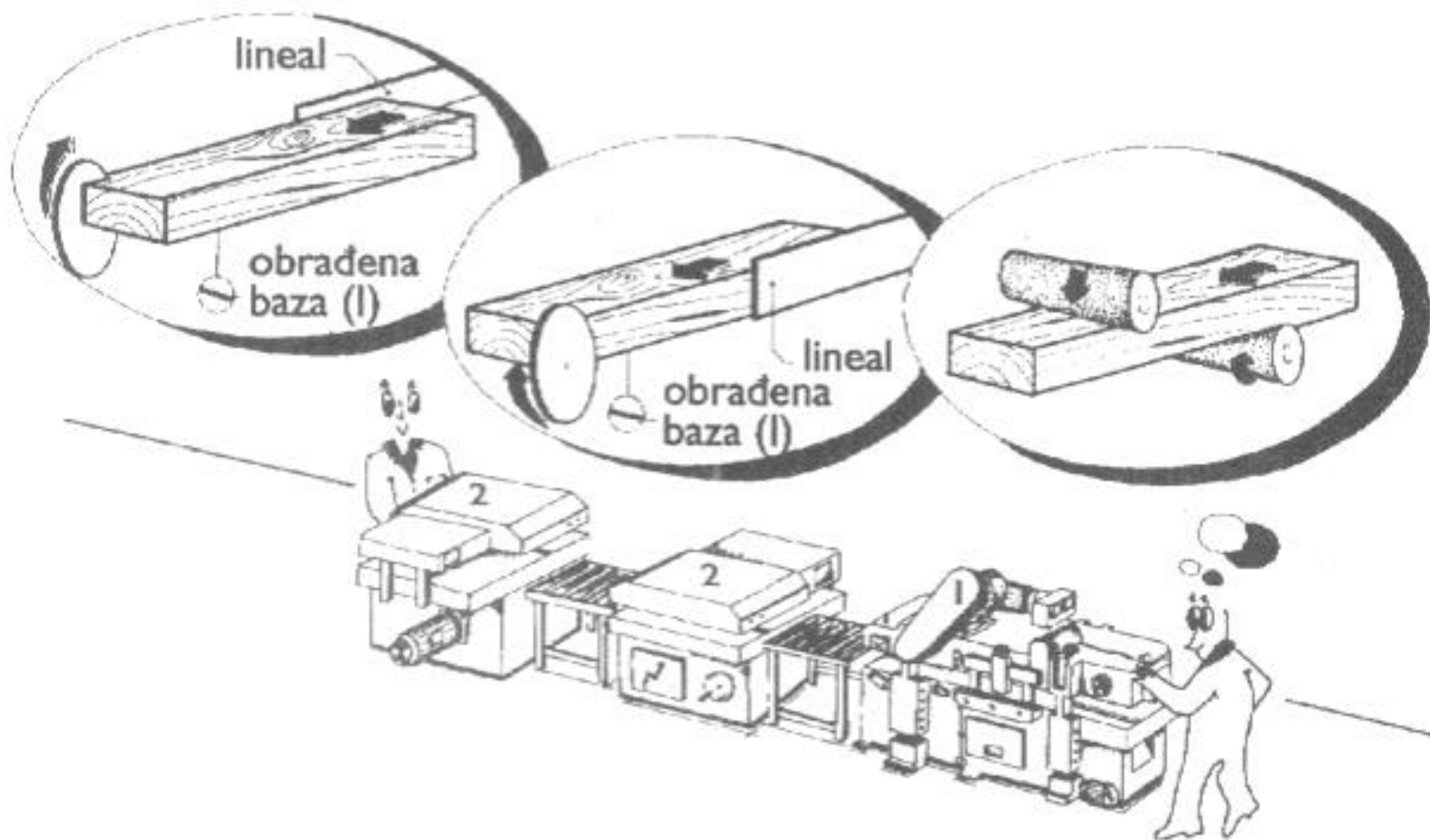
Egaliziranje debljine

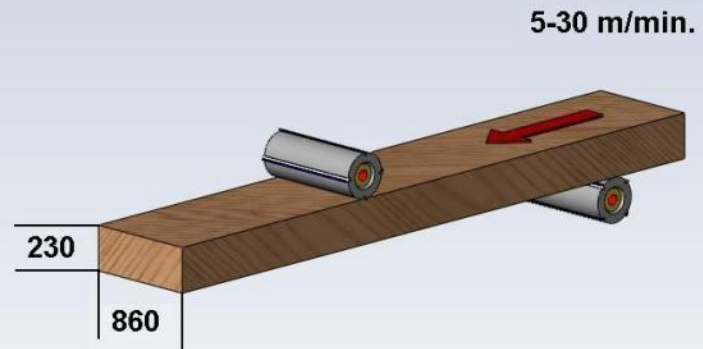


dimenzionisanje B i L

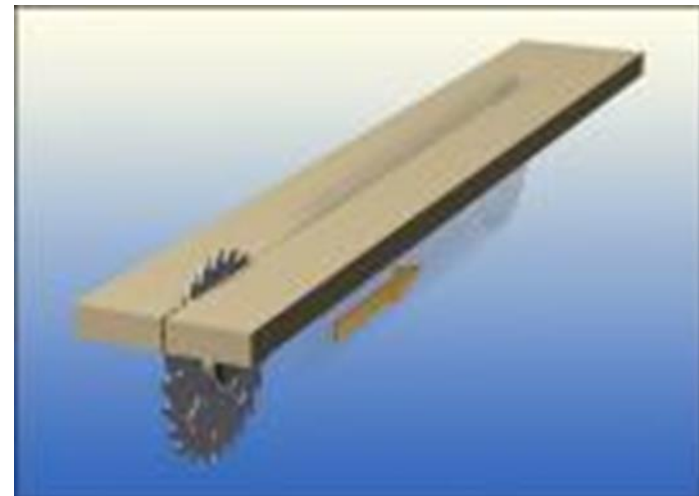
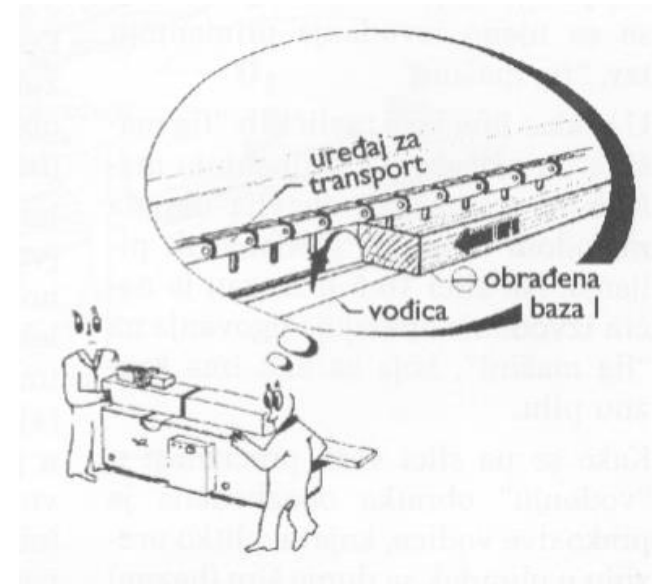
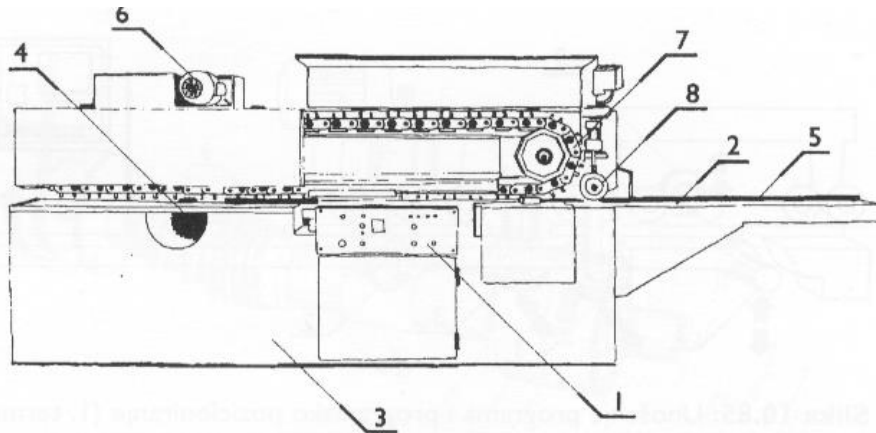
Obrada sljubnica

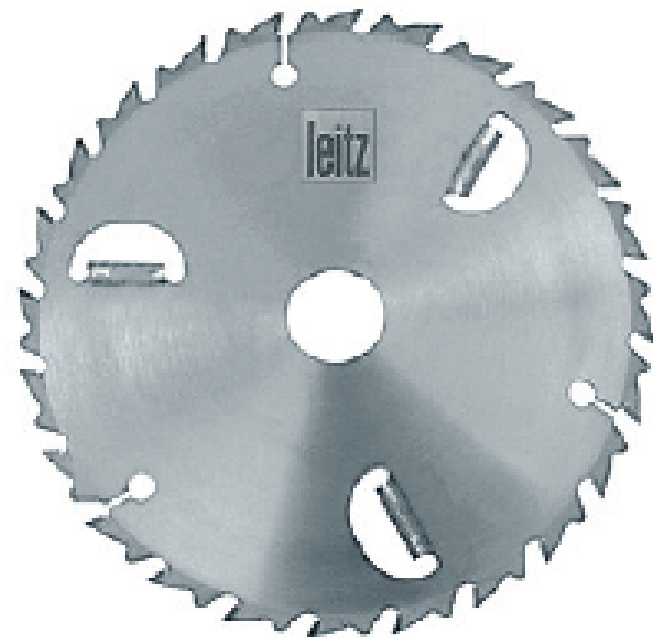
mašina	varijanta obrade
Ravnalica	1
Fig mašina – Ledinek	1/2
Fig mašina – Weinig Super 4	3
Četvorostrana rendisaljka	3





Obrada sljubnica na fig mašini - Ledinek





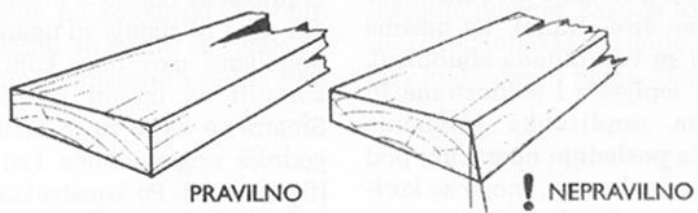
Kontrola kvaliteta obarde



PRAVILNO

! NEPRAVILNO

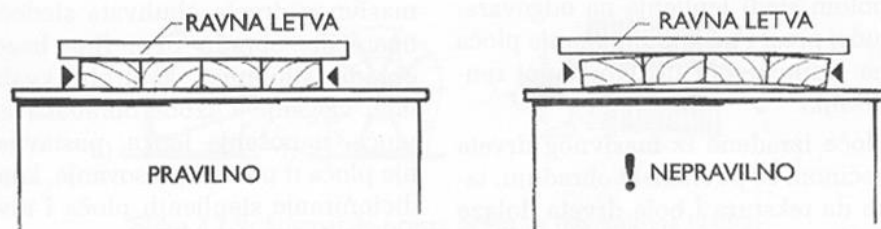
Slika 12.5: Obrada sljubnice (podužni izgled)



PRAVILNO

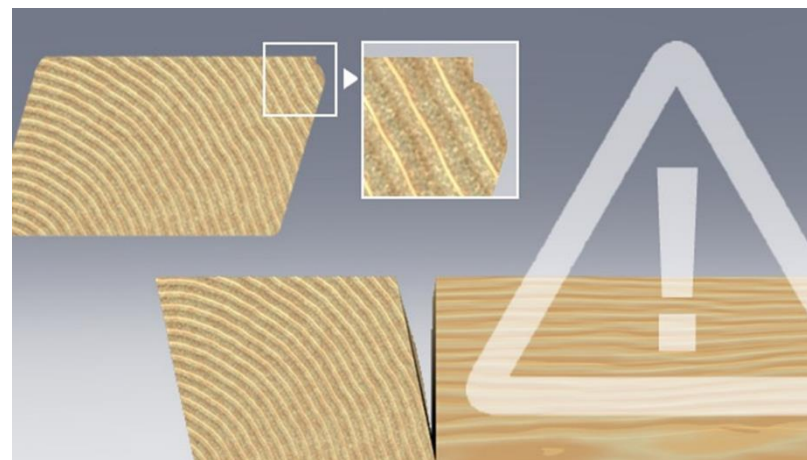
! NEPRAVILNO

Slika 12.6: Obrada sljubnice (poprečni izgled)



PRAVILNO

! NEPRAVILNO

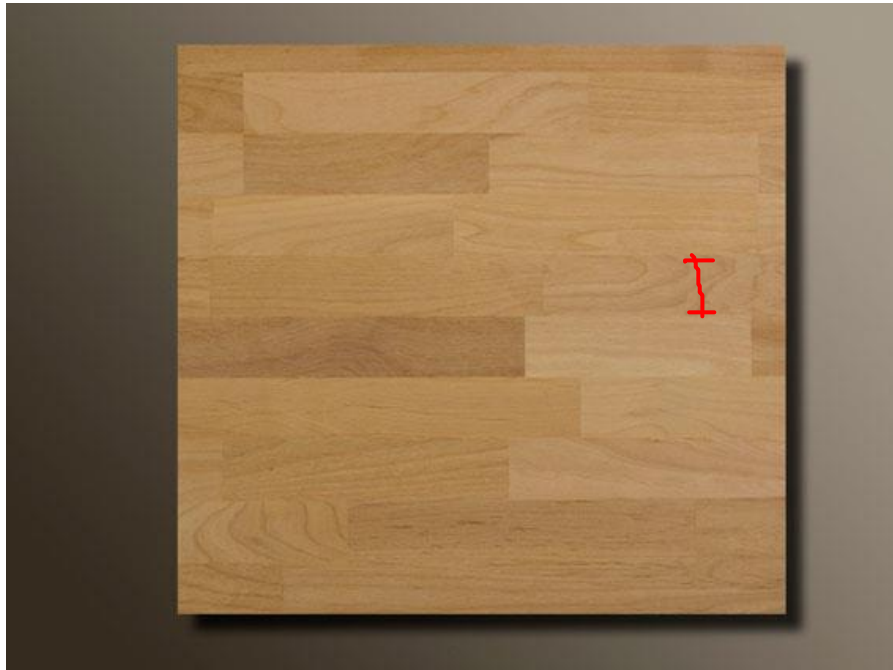


Kontrola kvaliteta obarde

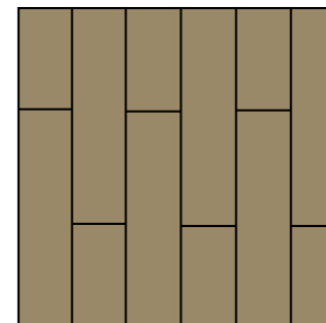
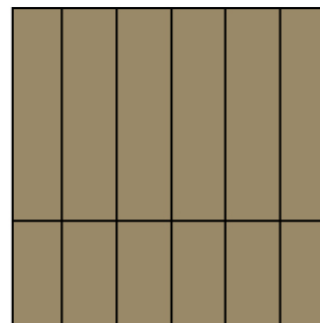
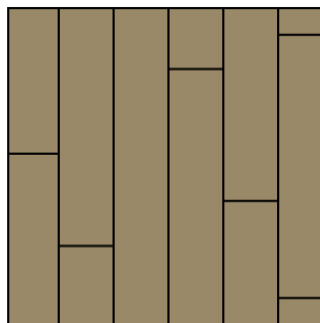
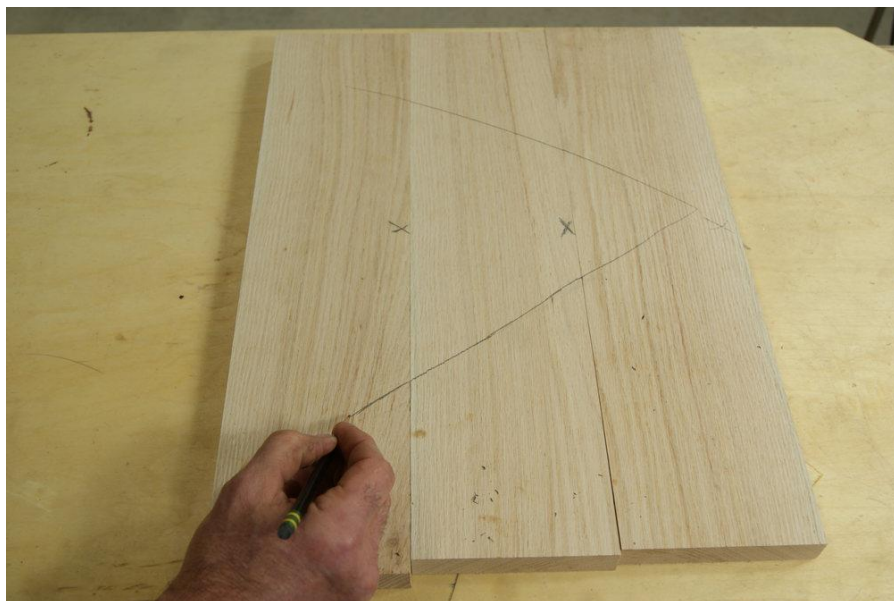


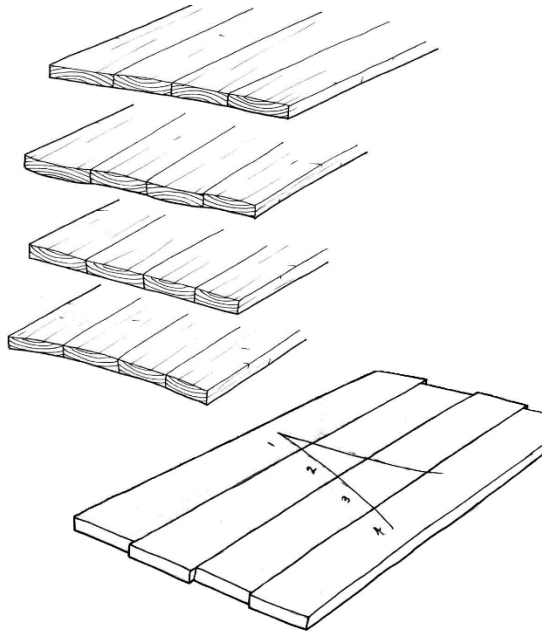
Izbor gredica

- Po dimenzijama
- Po boji i teksturi



Izbor gredica – slaganje gredica u tavan

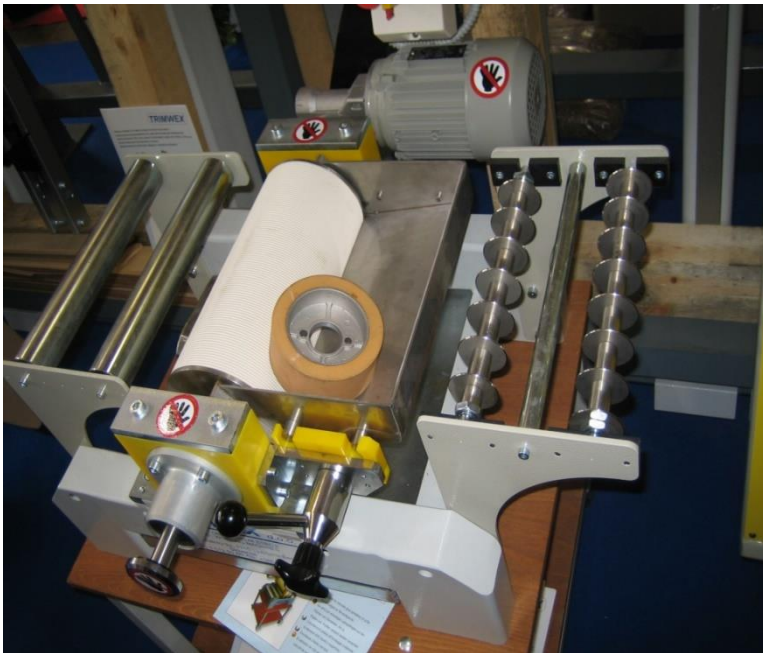


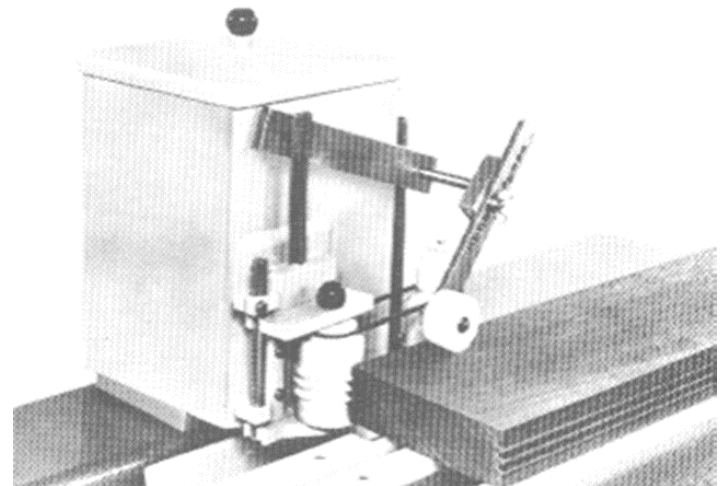
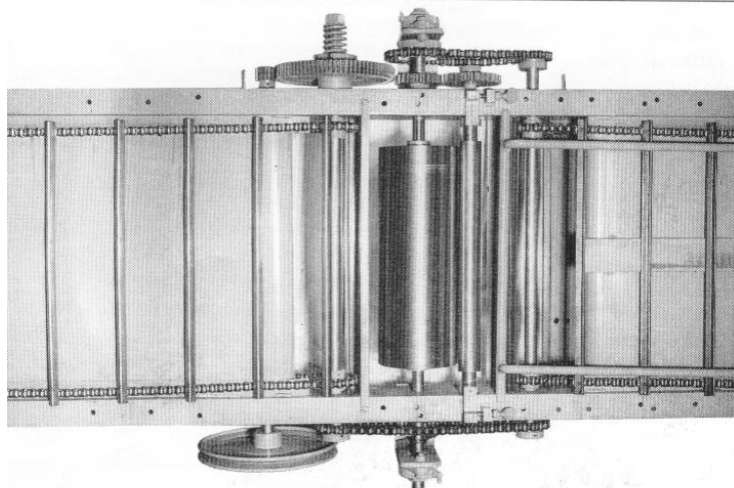
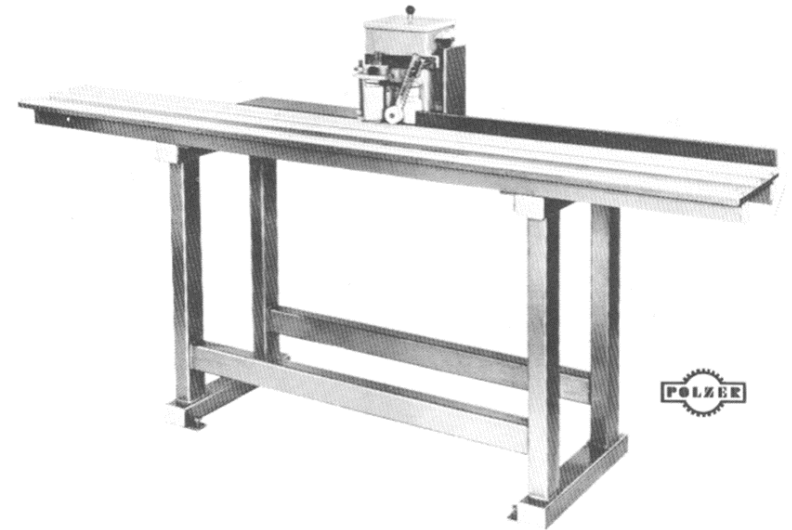
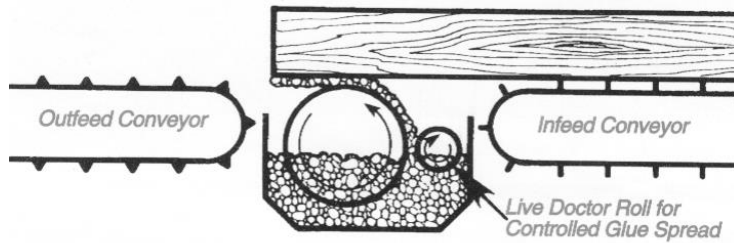
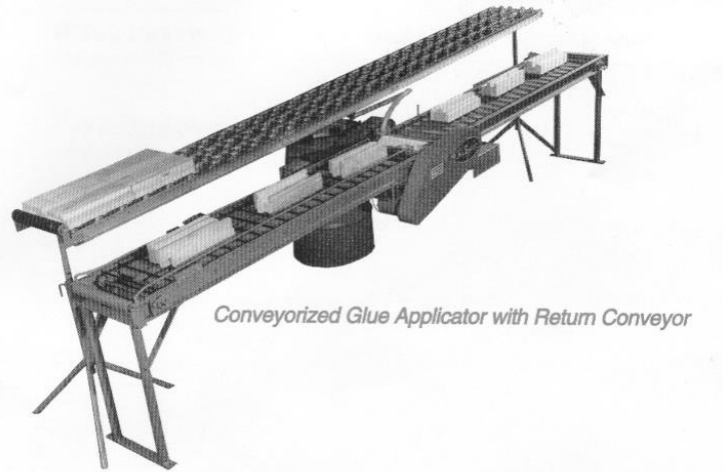


Nanošenje lepka

- Četka
- Valjak – ručni
- **Nanosačica lepka**

Nanošenje lepka – nanosačice lepka





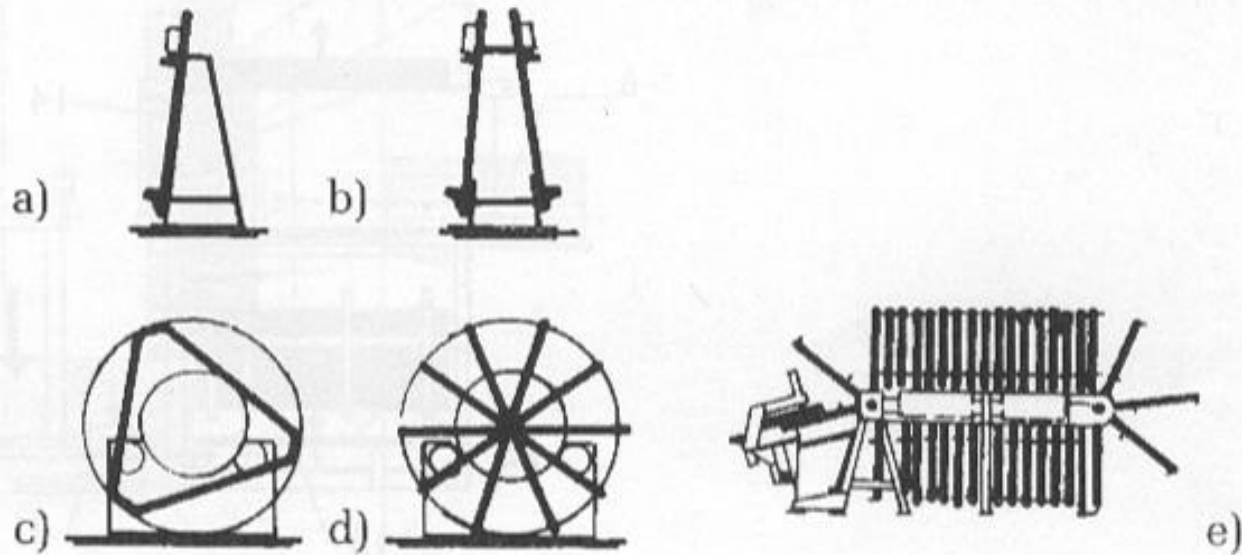
Lepkovi

Vrsta lepka	varijanta obrade
Glutinski	1
PVA-c	1/2/3

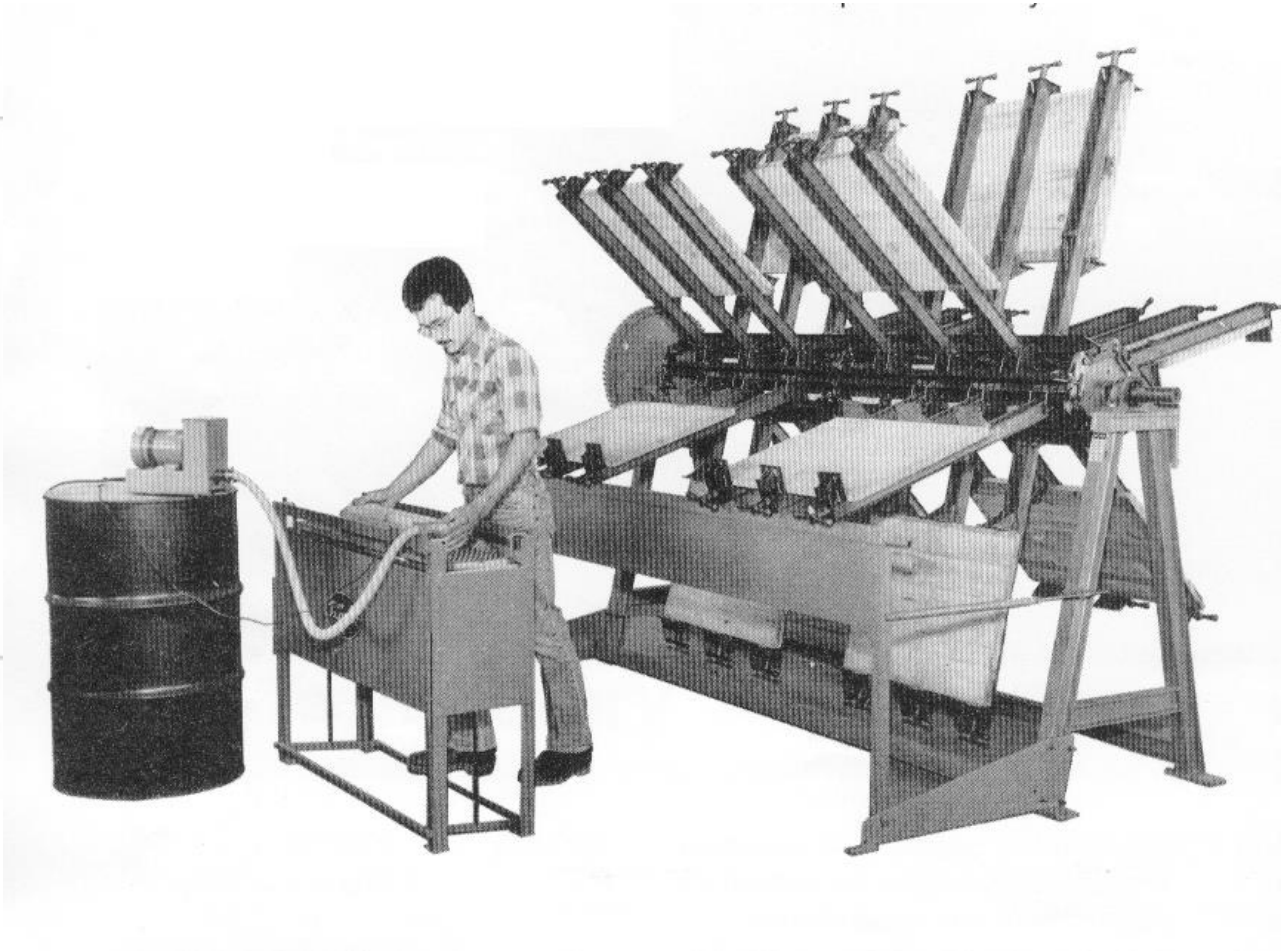
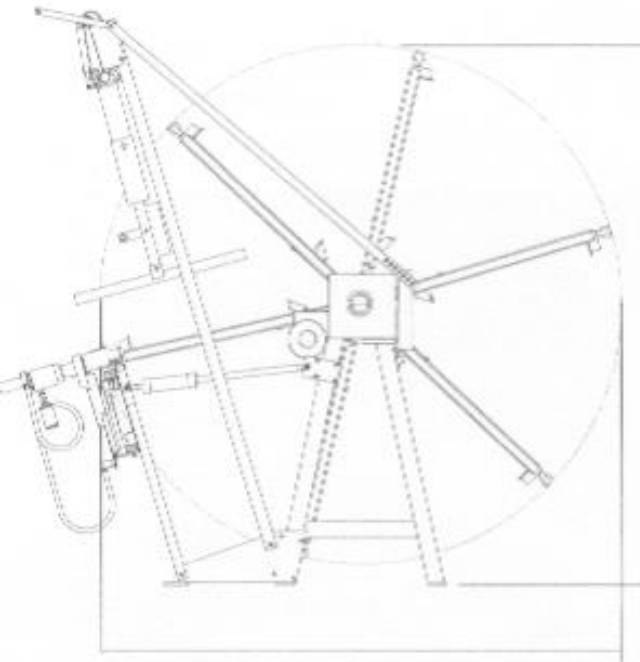
Prese

Vrsta presa	varijanta obrade
ramovske	1/2/3
VF prese	2/3

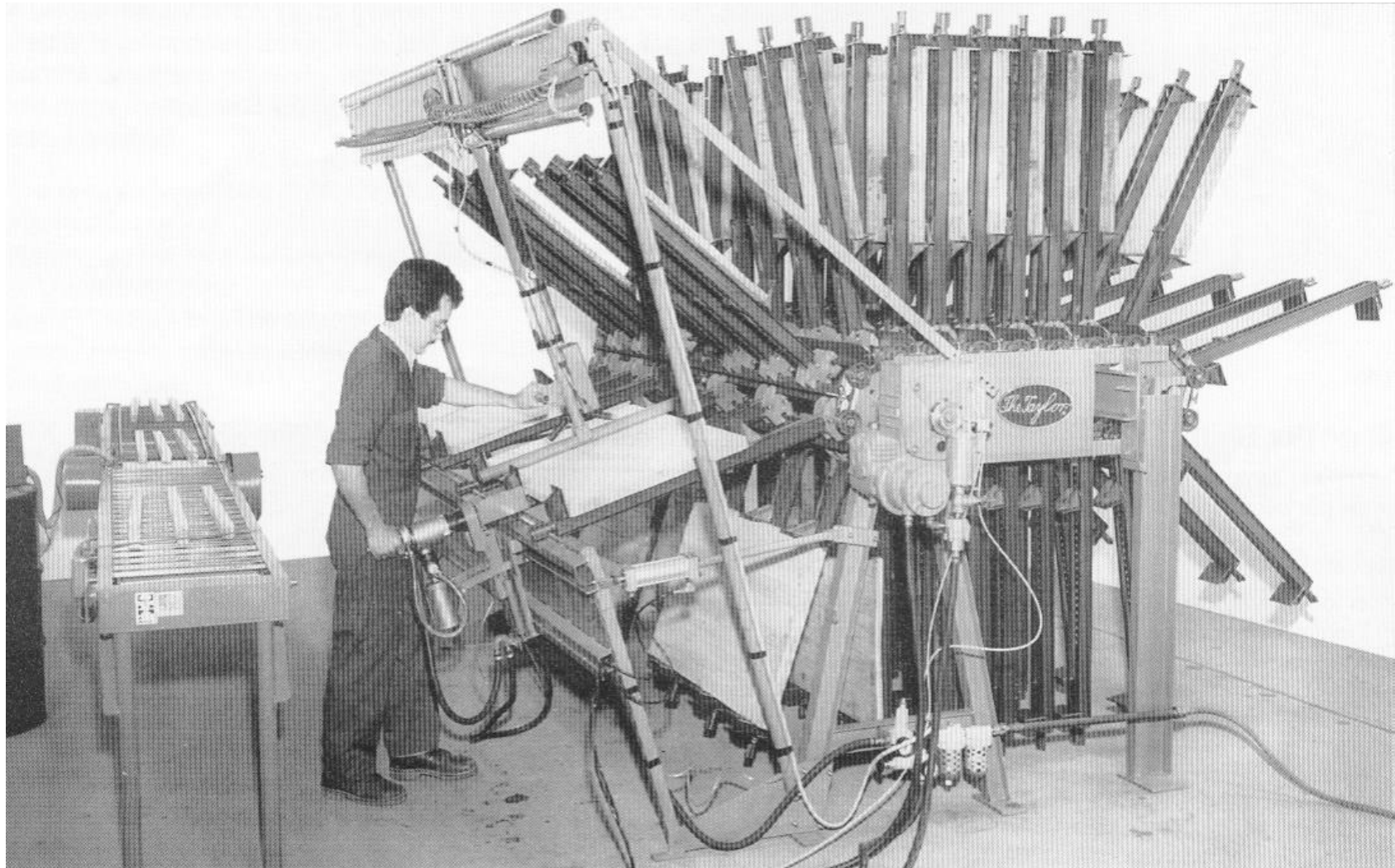
Ramovske prese



Ramovske prese - zvezdaste



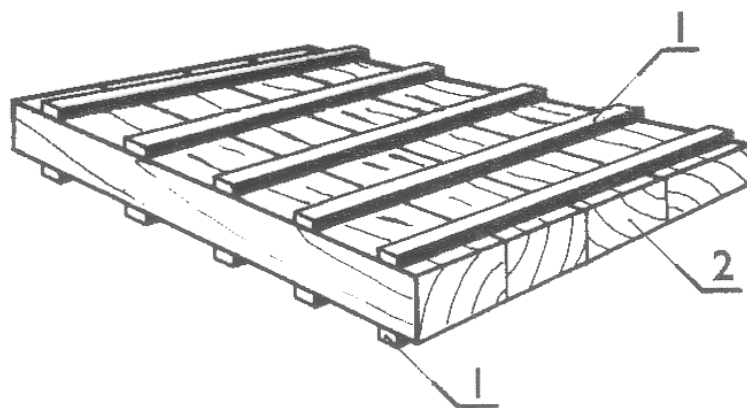
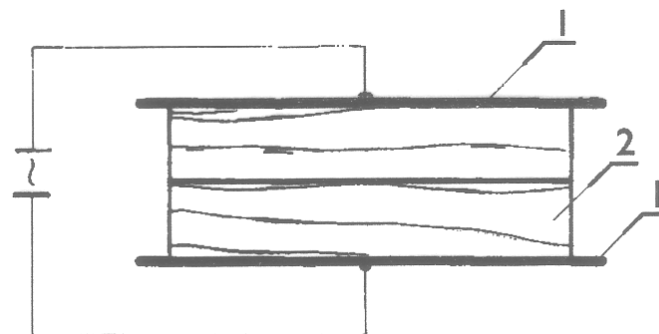
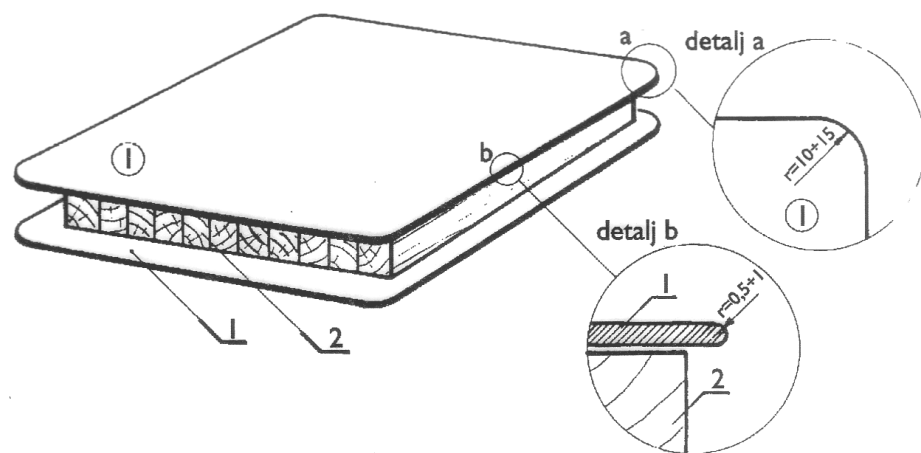
Ramovske prese - konvejerne



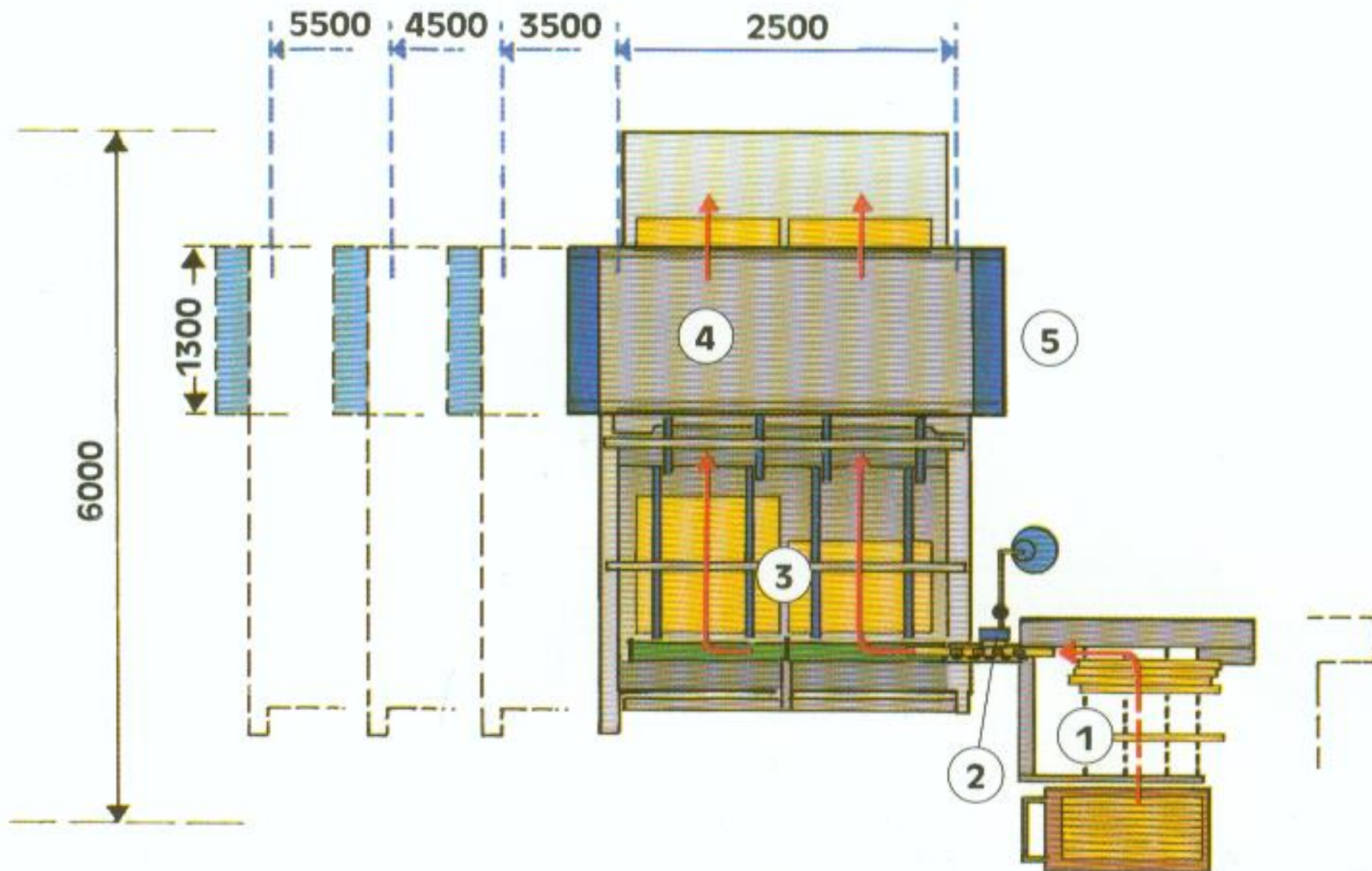
VF prese



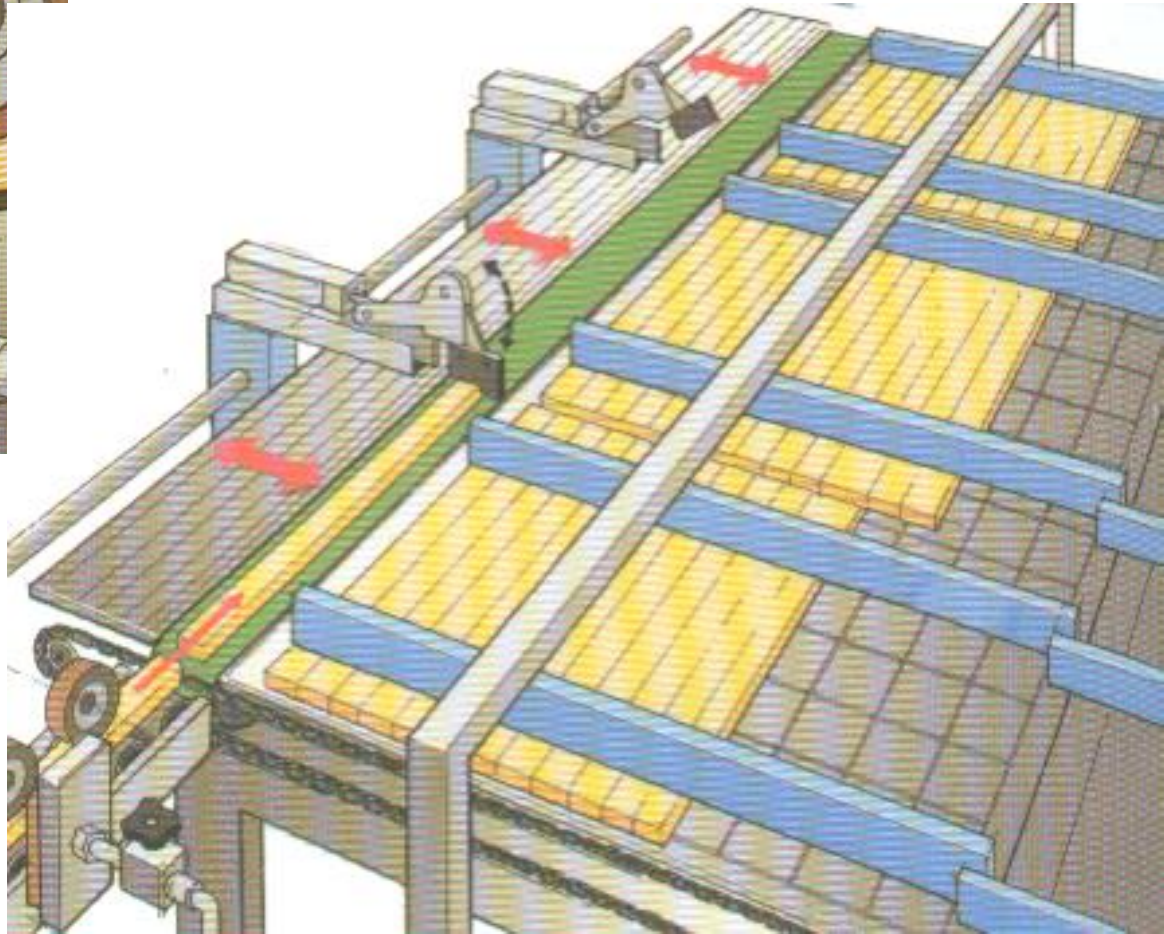
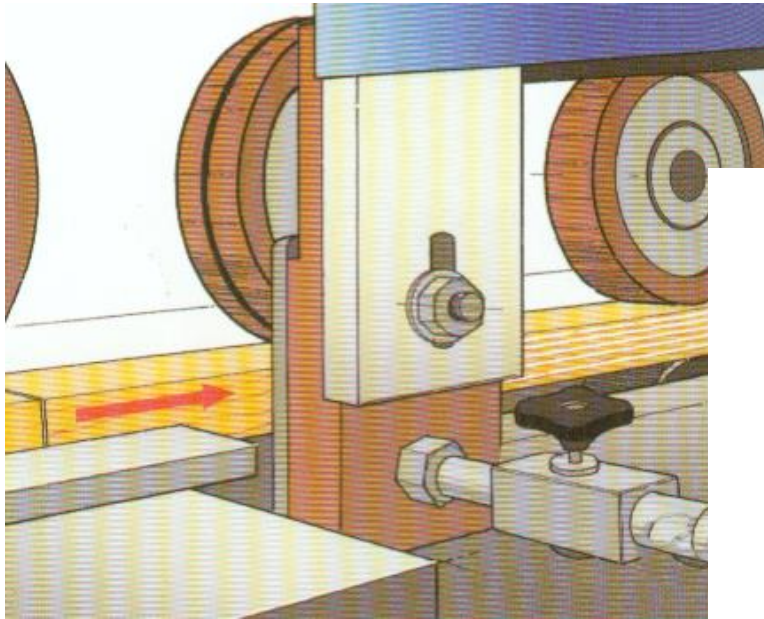
VF generator



VF prese



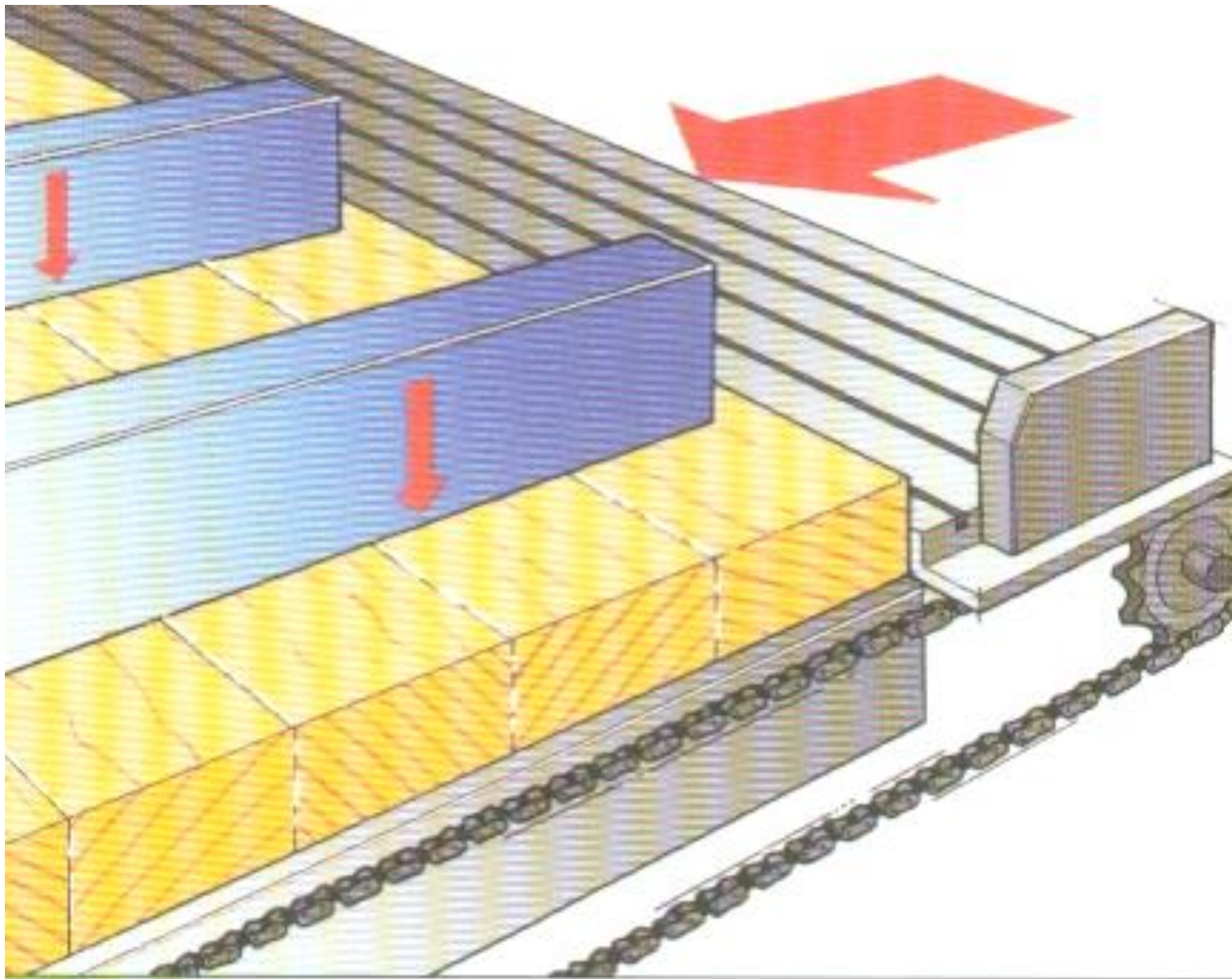
VF prese



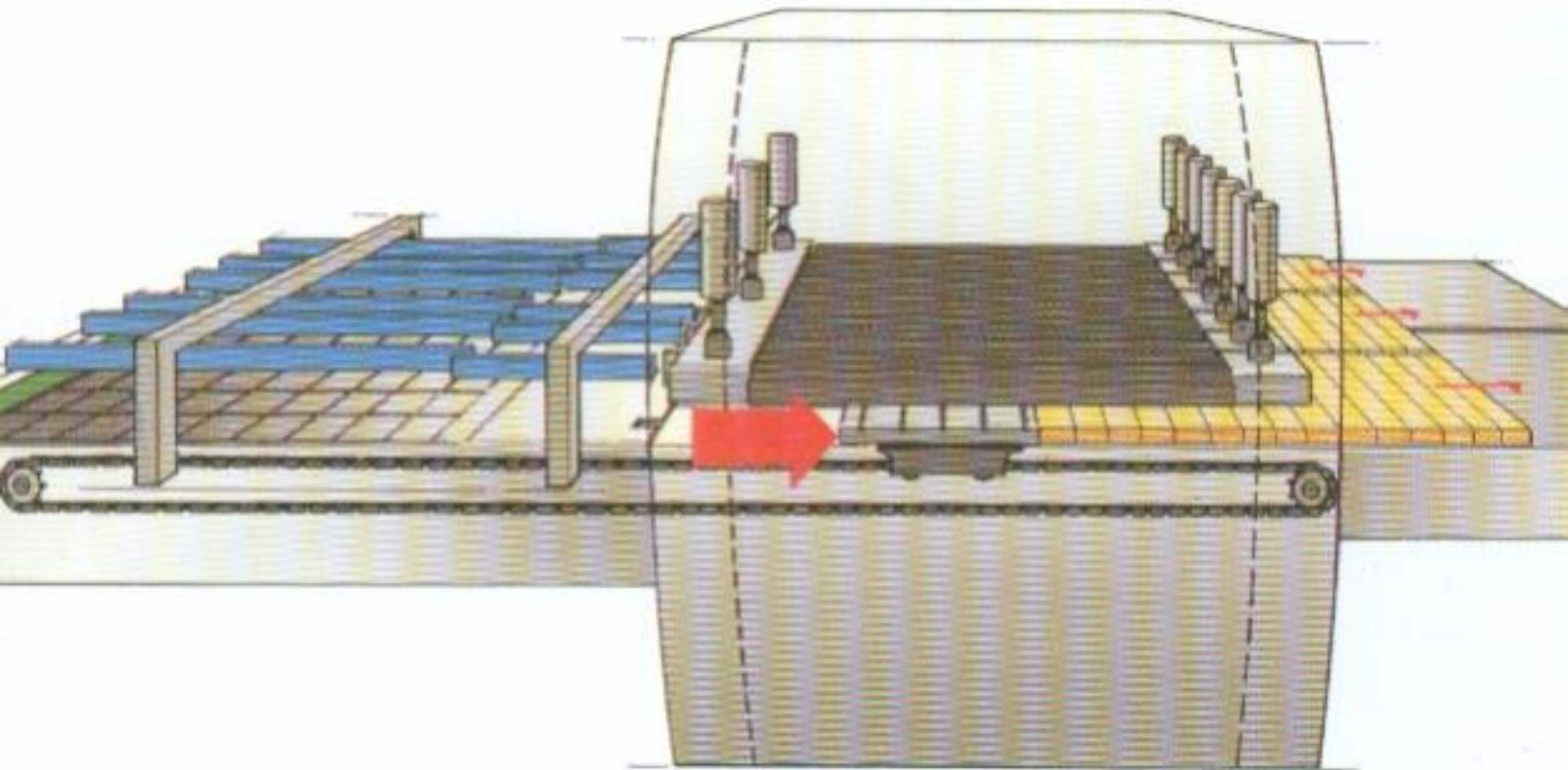
VF prese



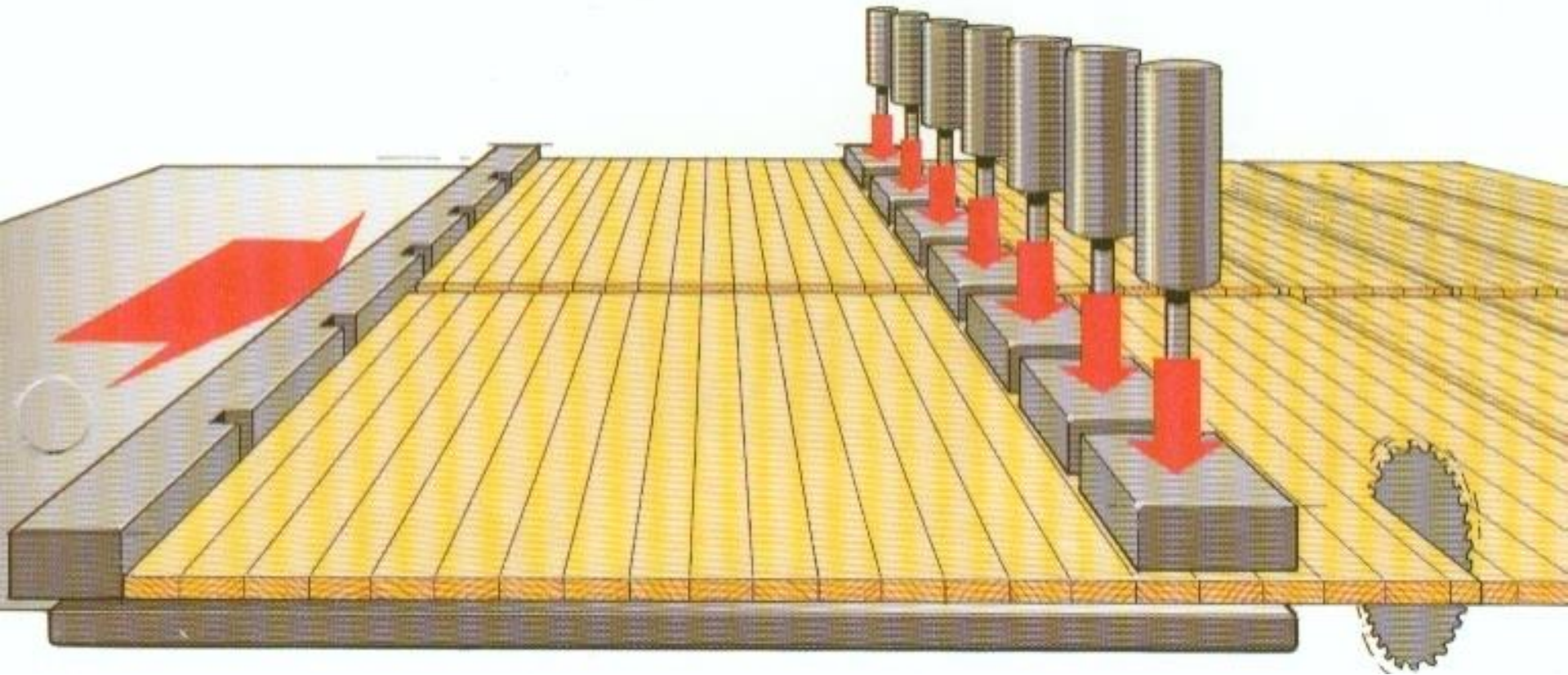
VF prese



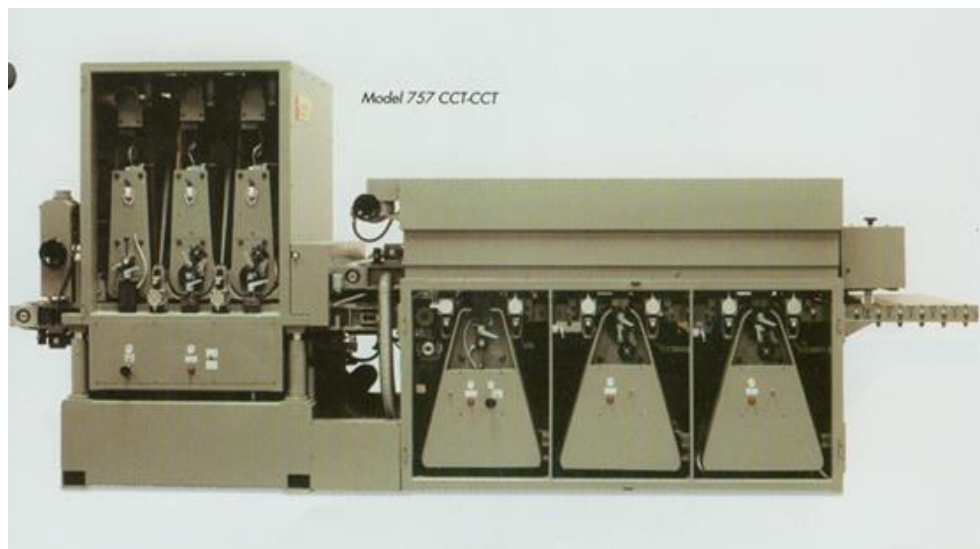
VF prese



VF prese



Egaliziranje debljine



Dimenzionisanje B i L

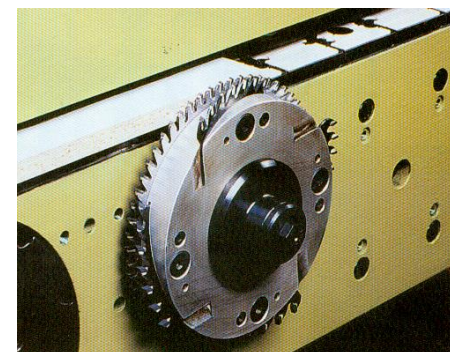
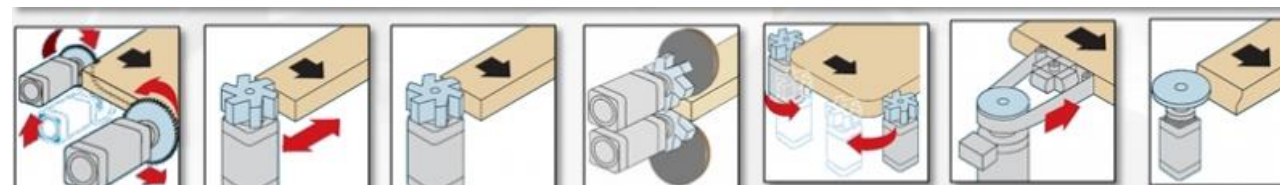
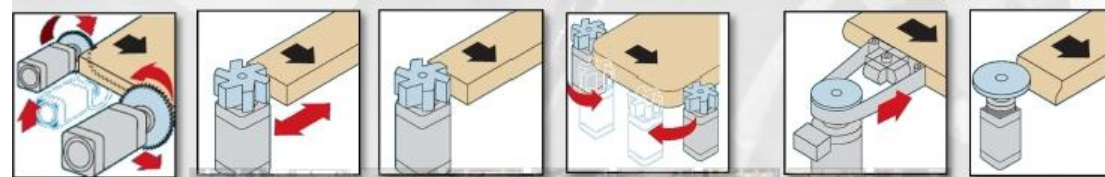
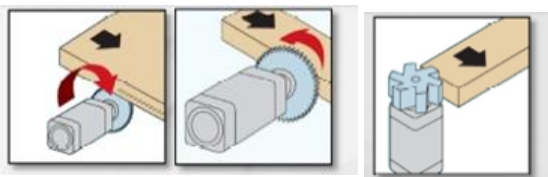
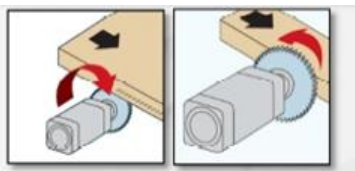


<https://youtu.be/ztt2Ar8du5I>
<https://youtu.be/IG6BdPf9nH4>
<https://youtu.be/9UwRklS60FE>

- Posluživanje: 2 radnika
- Br.vretna: 2+2 do 7+7
- $d = 30 / 40\text{mm}$
- $D_{kp} = 300 \div 350\text{mm}$
- $Div = 250 \div 400\text{mm}$
- $D_{gl} < 350\text{mm}$
- $h_{max} < 200\text{mm}$
- $n_{max} = 9000 \text{ o/min}$
- $u = 8 \div 24 \text{ m/min (mehanizovano)}$
- $E = \pm 3.55,5 \text{ kW (x br.vretna)}$

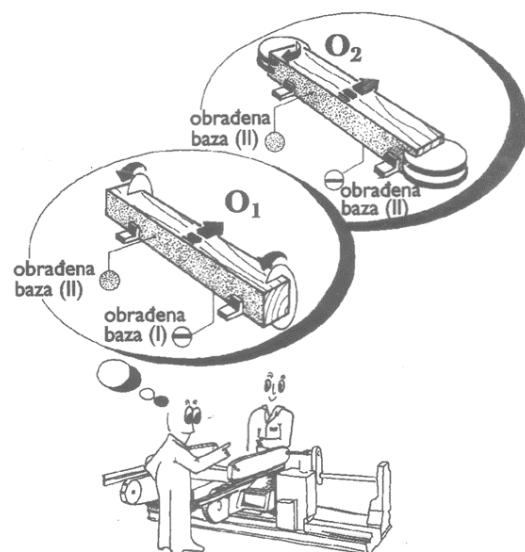
dvostrani profiler

- Kombinacije alata

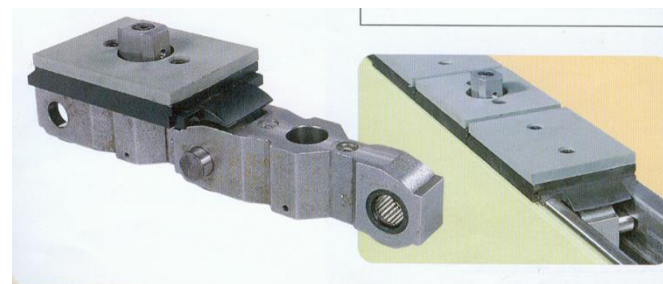
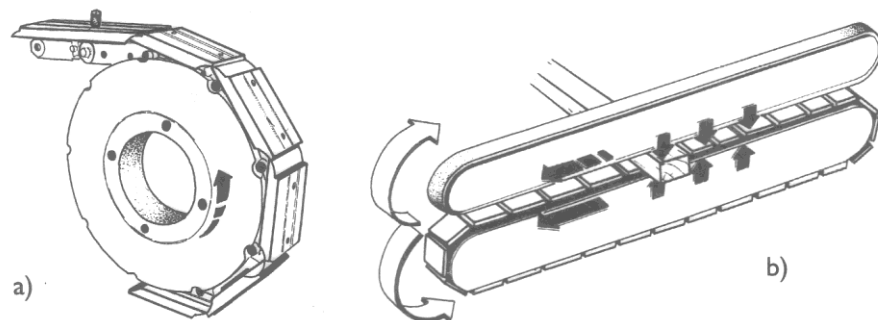


kinematika

Glavno kretanje

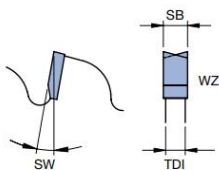
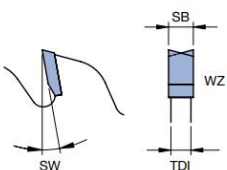


Pomoćno kretanje



alati

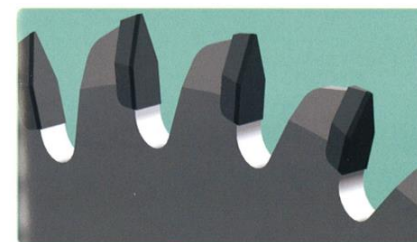
Kružne pile



predrezači

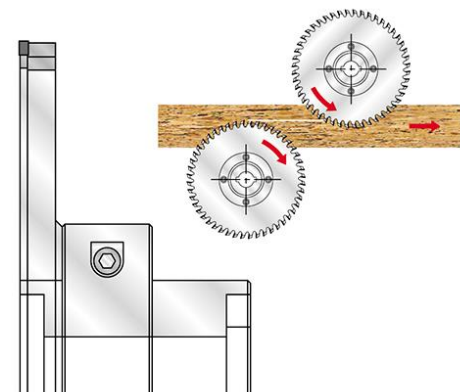


$D=125\div 200\text{mm}$
 $n=12.000\text{ o/min}$
 $b=2,8\div 4\text{mm}$



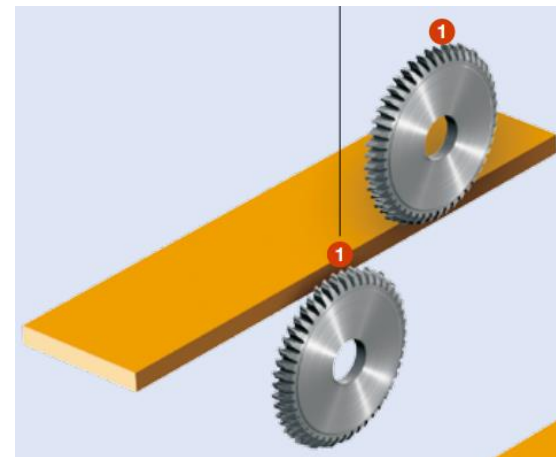
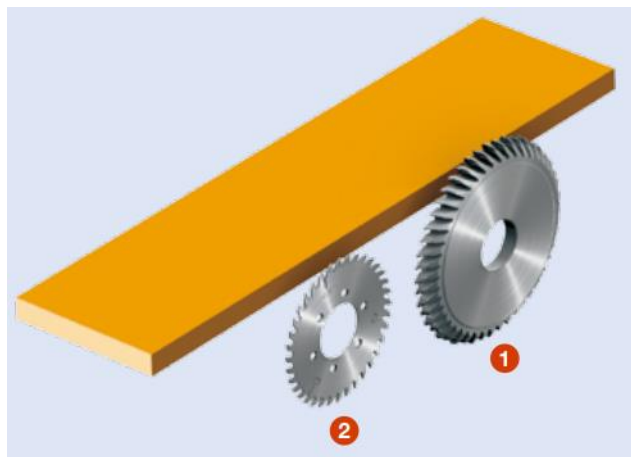
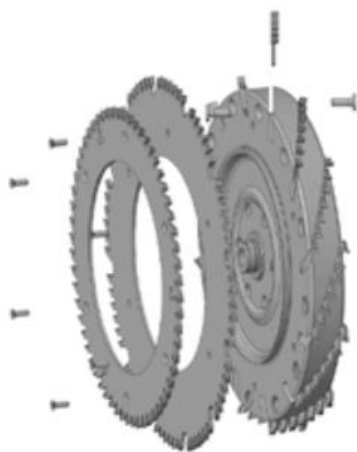
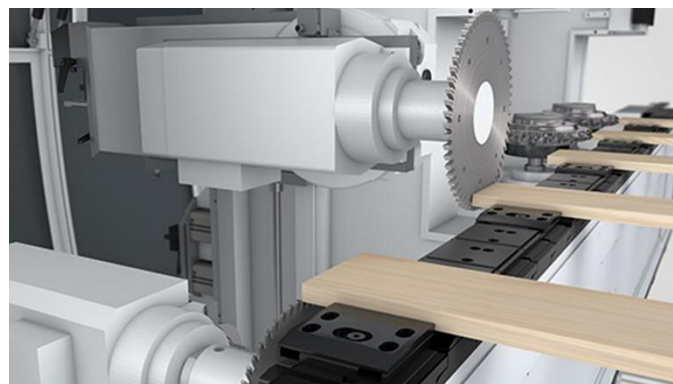
alati

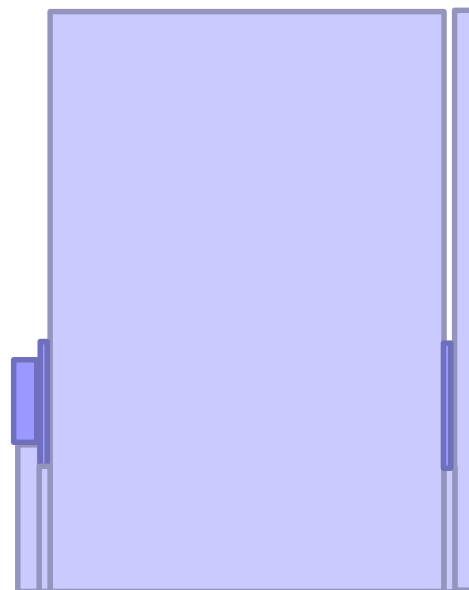
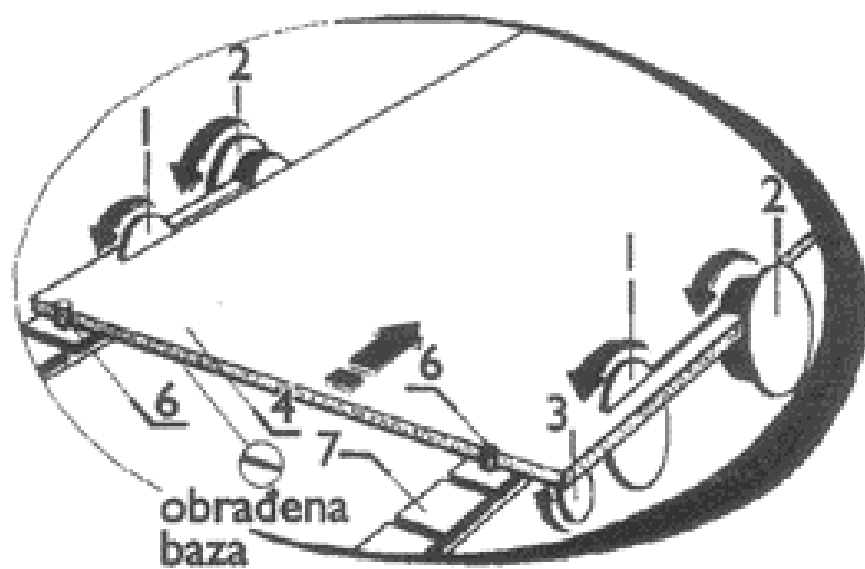
iverači



alati

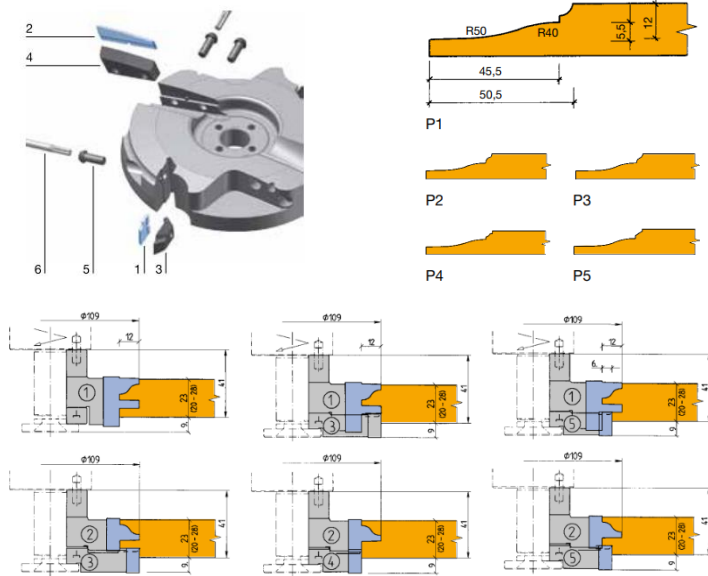
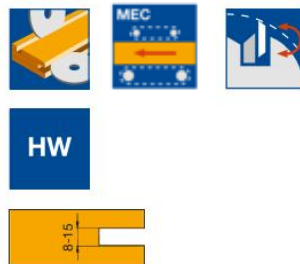
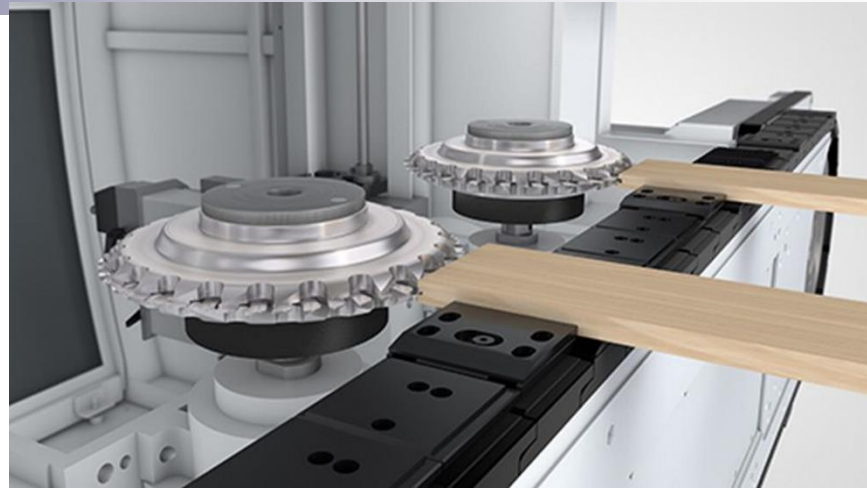
iverači





alati

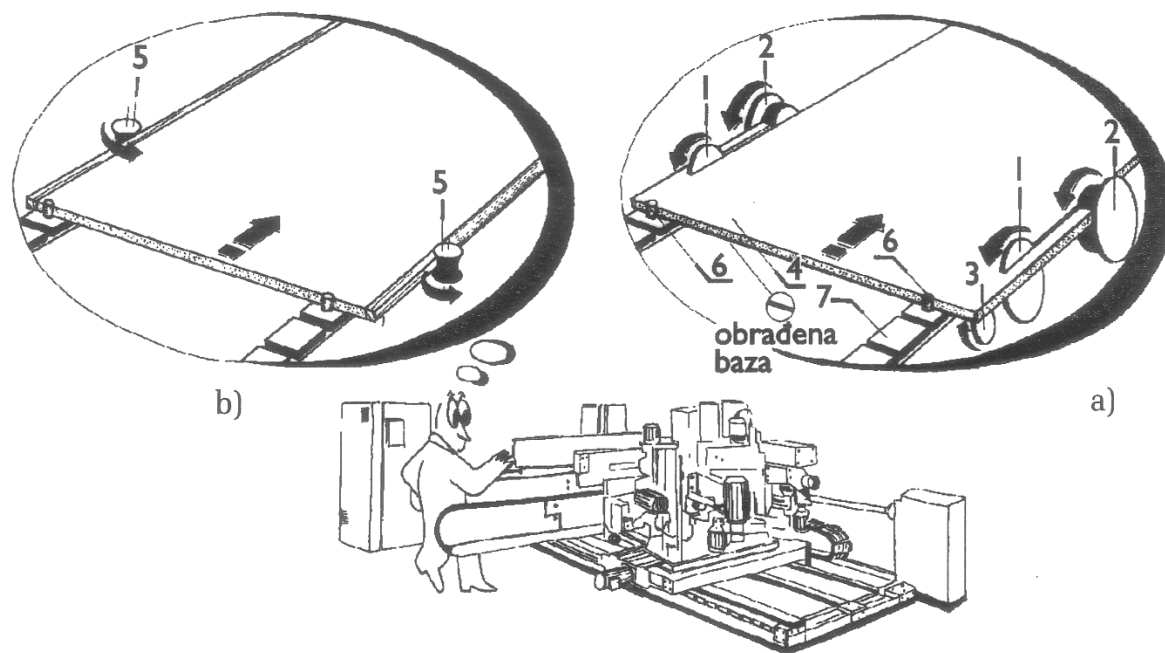
Glodala



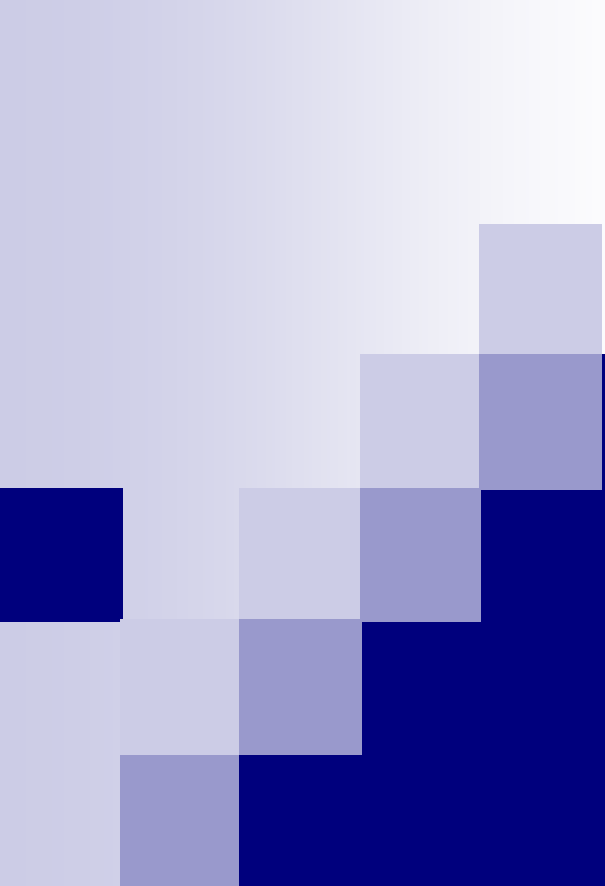
Režimi obrade

alat	D(mm)	a(mm)	n(o/min)	u(m/mim)
Predrezač	125÷200	<2	12.000	8÷24
iverač	300÷350	a=d	3.000	
k.pila	250÷300	a=d	3.000	
Glodalo	<200	$a=\Delta o_2/2$	6.000	
Glodalo	<350	$a=\Delta o_2/2$	6.000	

Redosled I broj prolaza







Varijanta 3

1. Obrada sljubnica

Gruba
gredica

Izrada
bazne
površine

figovanje

VARIJANTA I



VARIJANTA II



VARIJANTA III



kontrola kvaliteta izrade

izbor gredica

nanošenje lepka

presovanje



Egaliziranje debljine



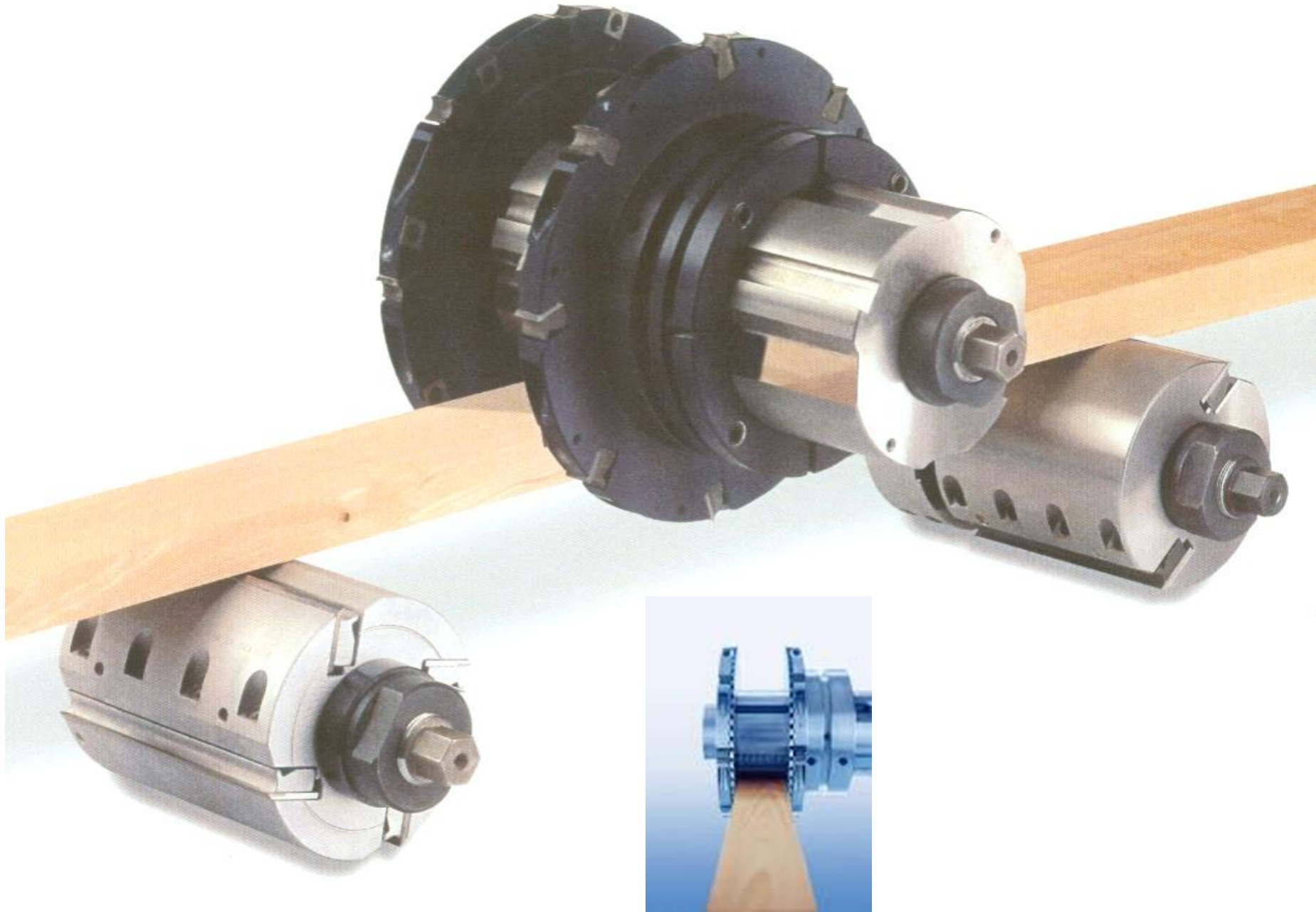
dimenzionisanje B i L

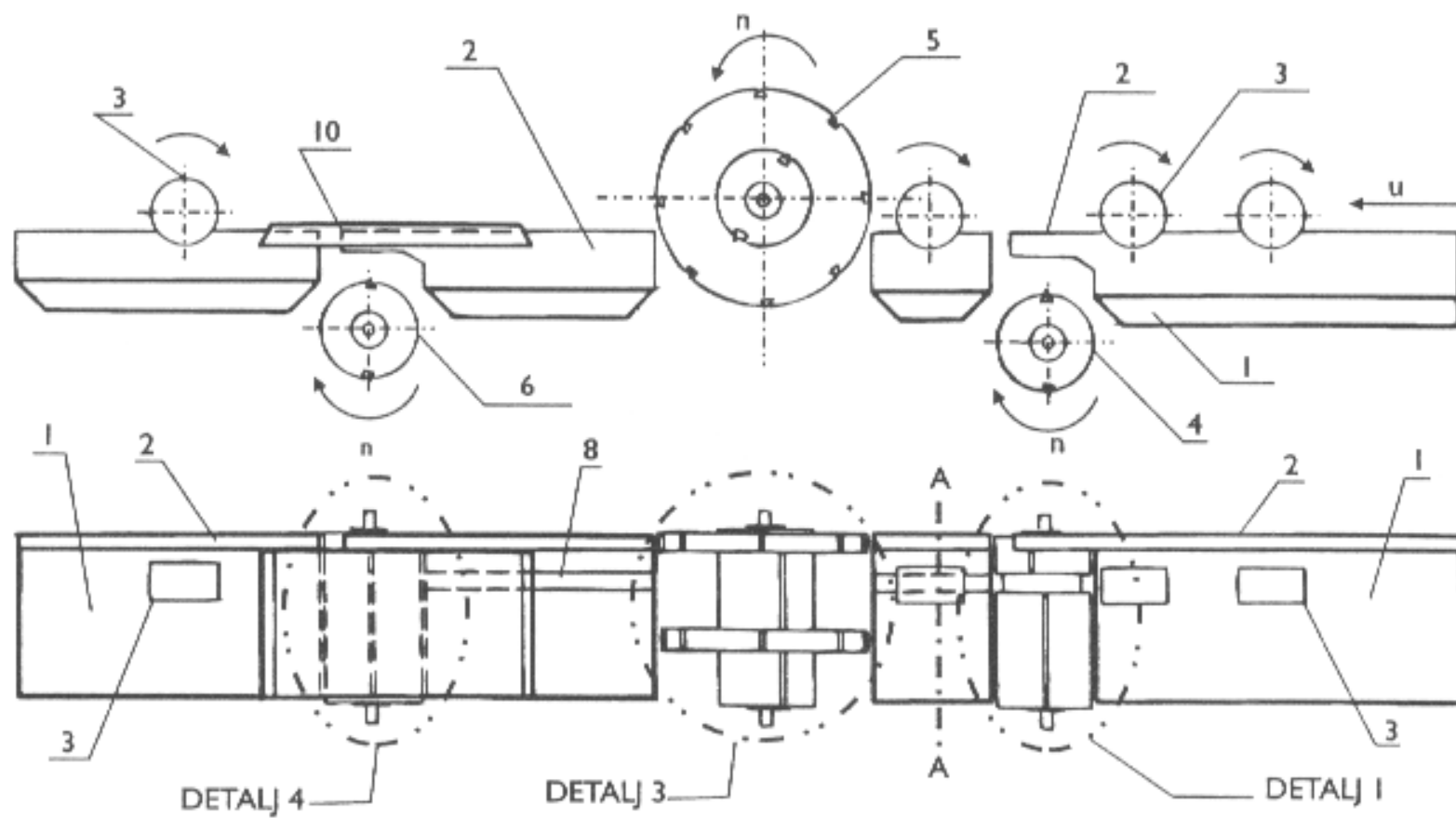
Obrada sljubnica

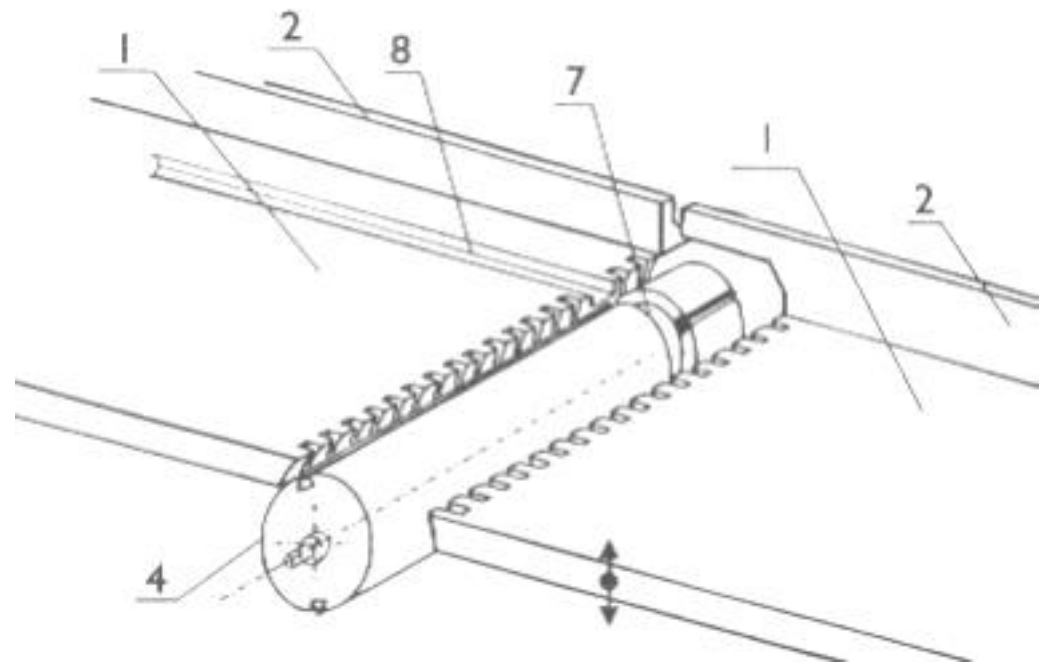
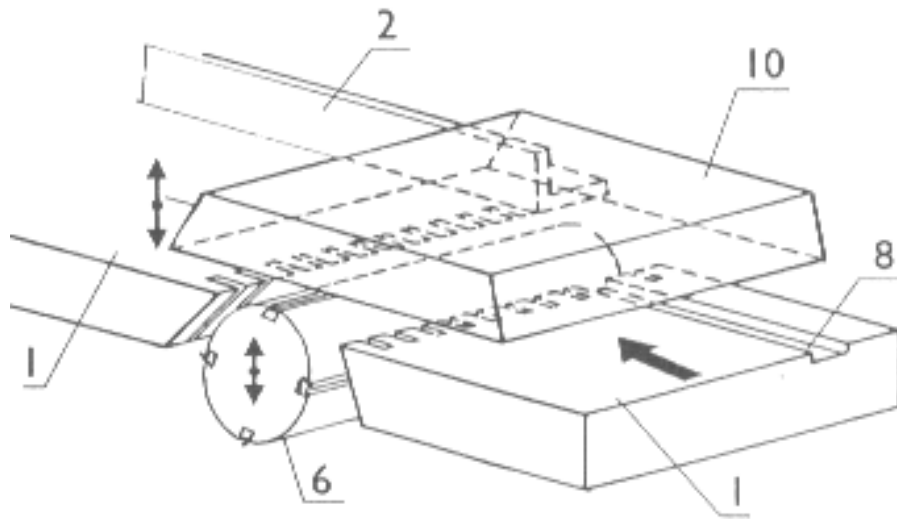
mašina	varijanta obrade
Ravnalica	1
Fig mašina – Ledinek	1/2
Fig mašina – Weinig Super 4	3
Četvorostrana rendisaljka	3

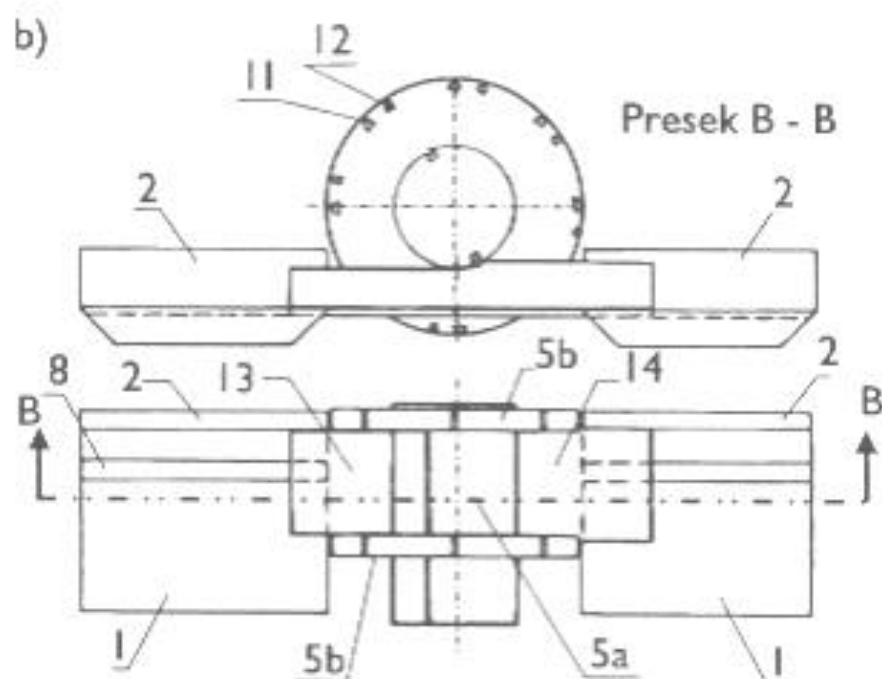
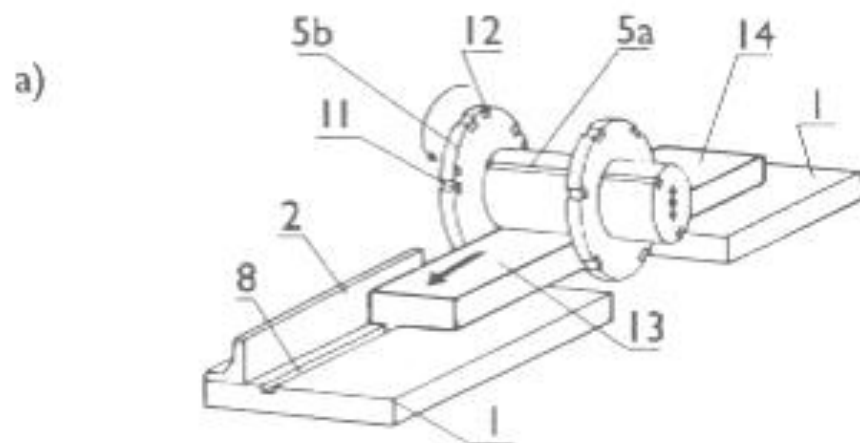
Obrada sljubnica na fig mašini Weinig – super 4

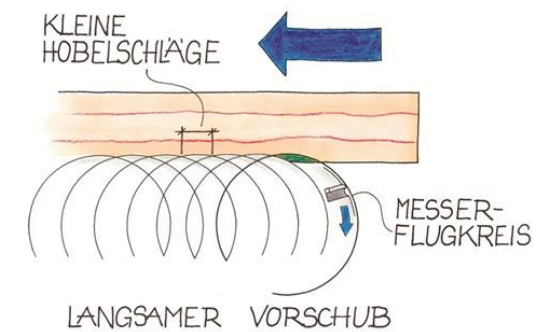
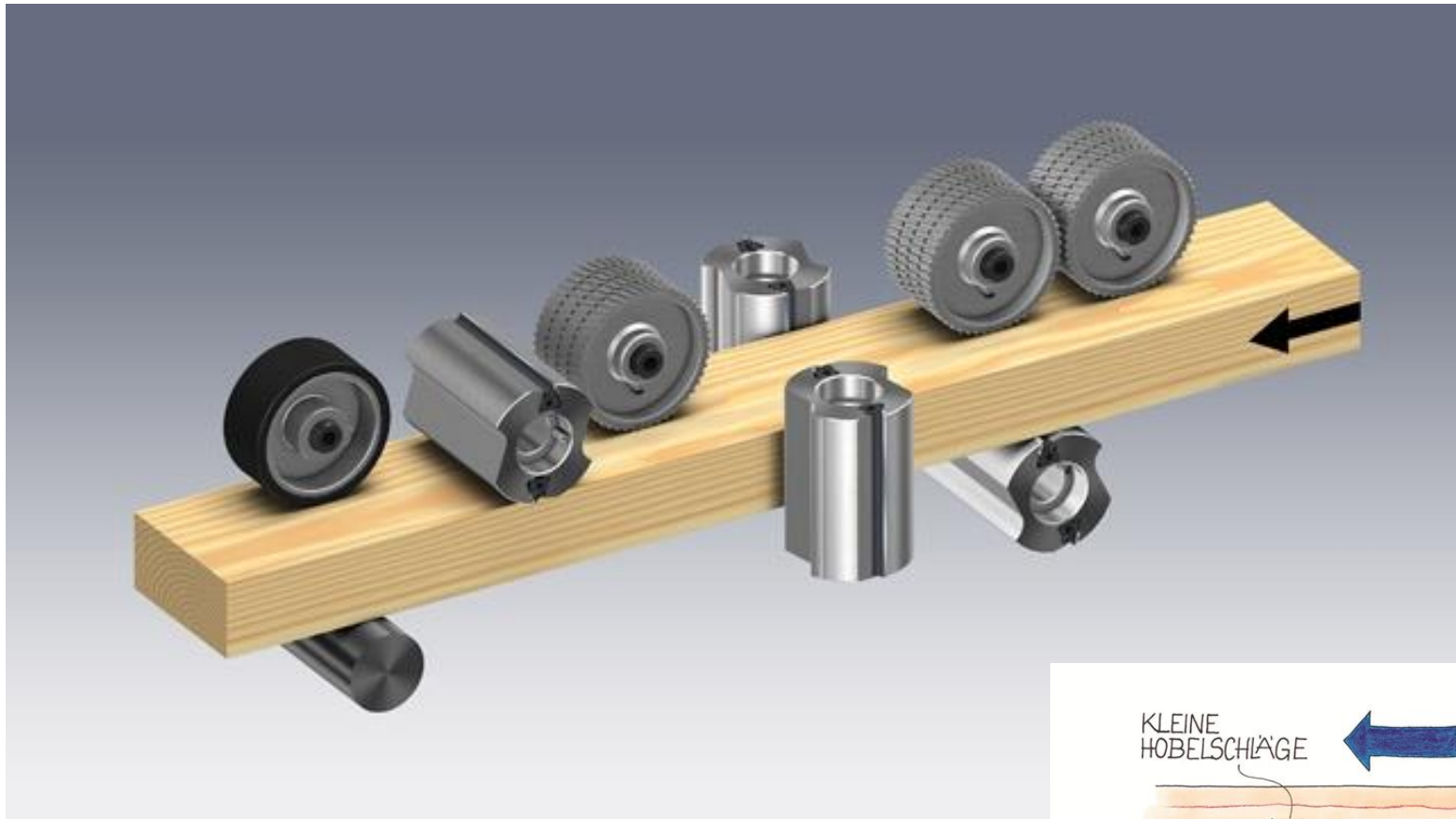


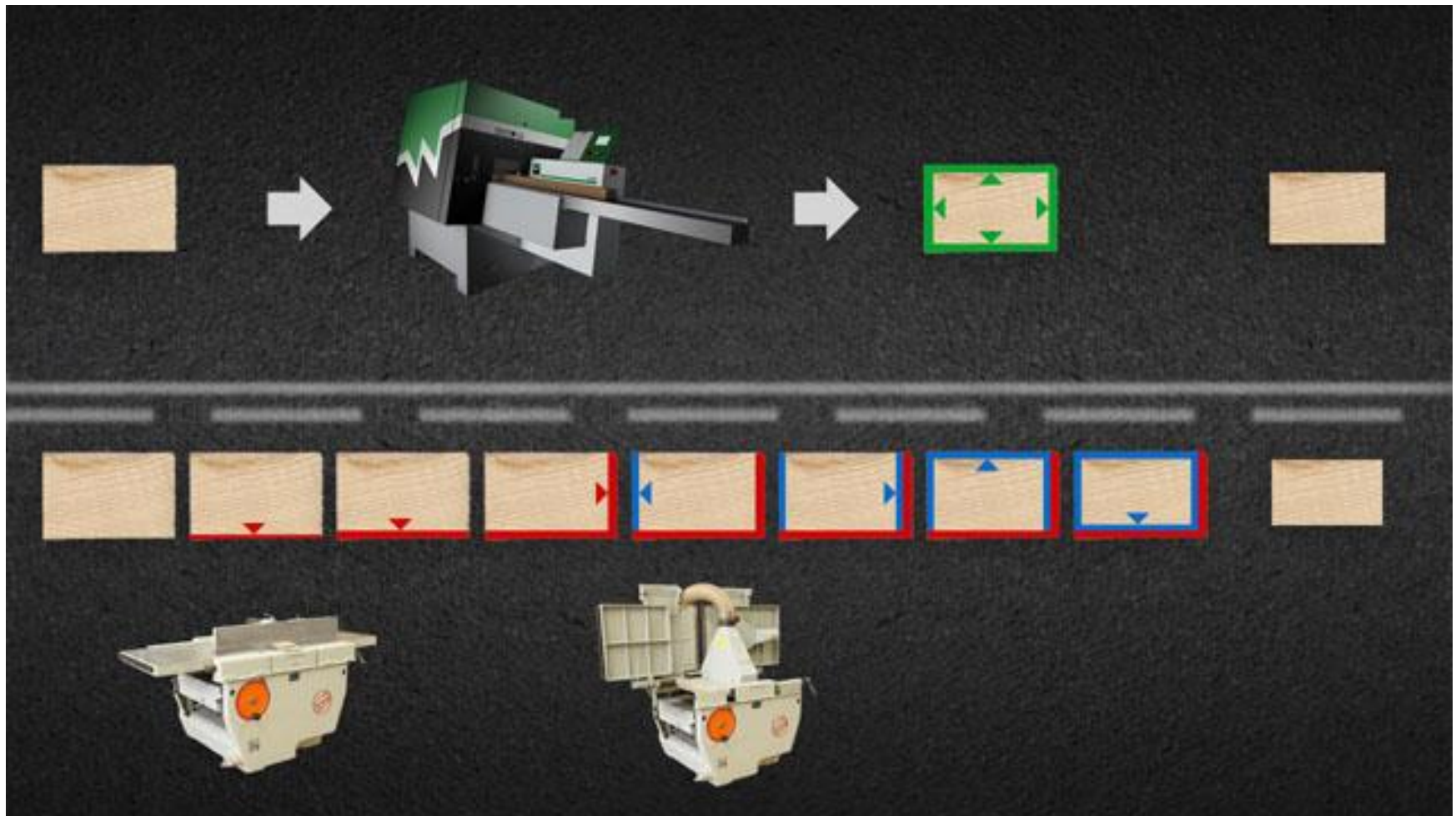


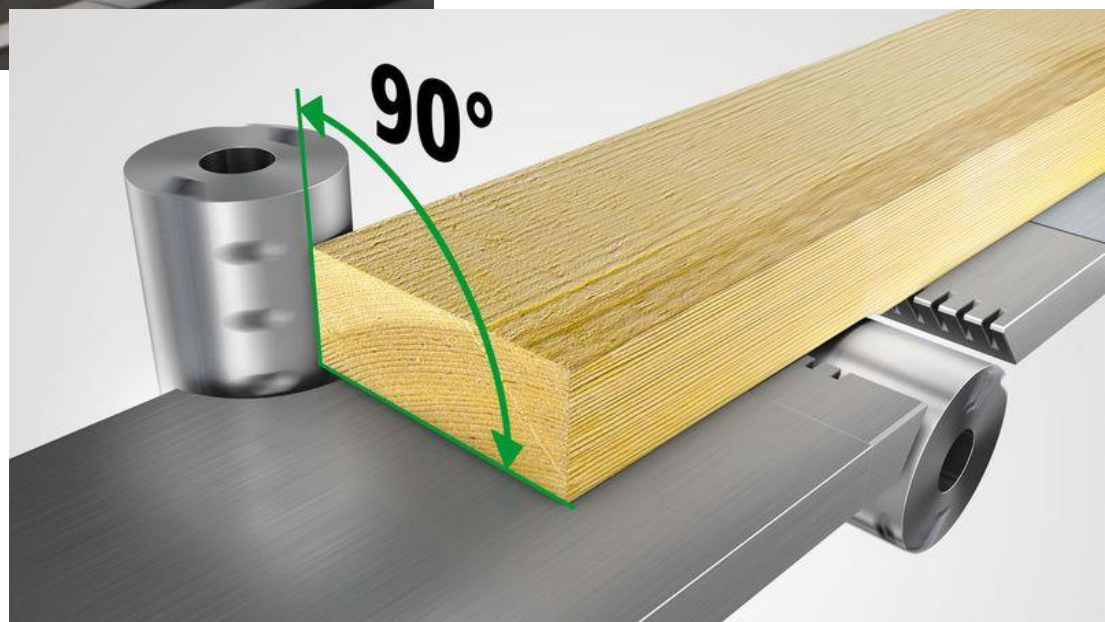
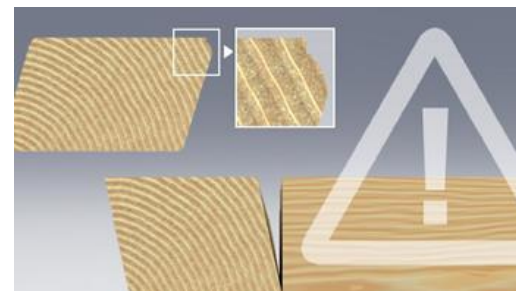


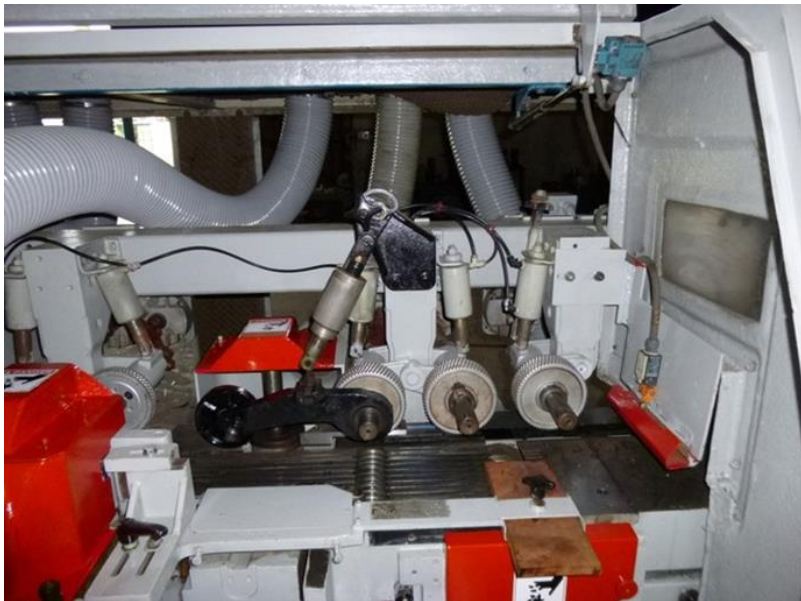












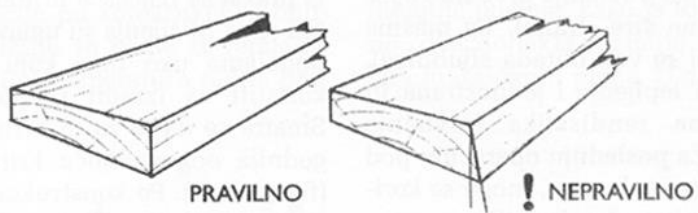
Kontrola kvaliteta obarde



PRAVILNO

! NEPRAVILNO

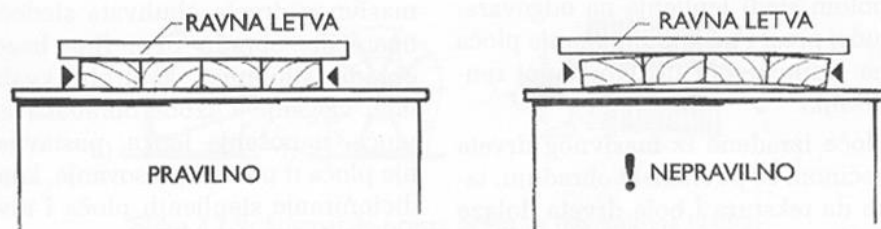
Slika 12.5: Obrada sljubnice (podužni izgled)



PRAVILNO

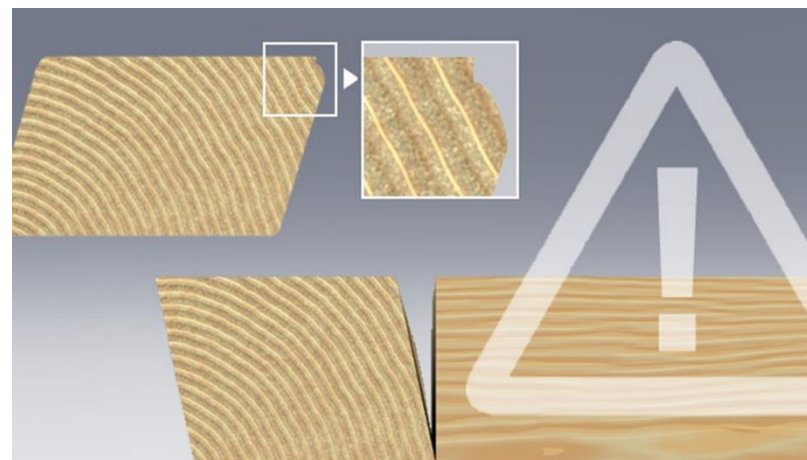
! NEPRAVILNO

Slika 12.6: Obrada sljubnice (poprečni izgled)



PRAVILNO

! NEPRAVILNO

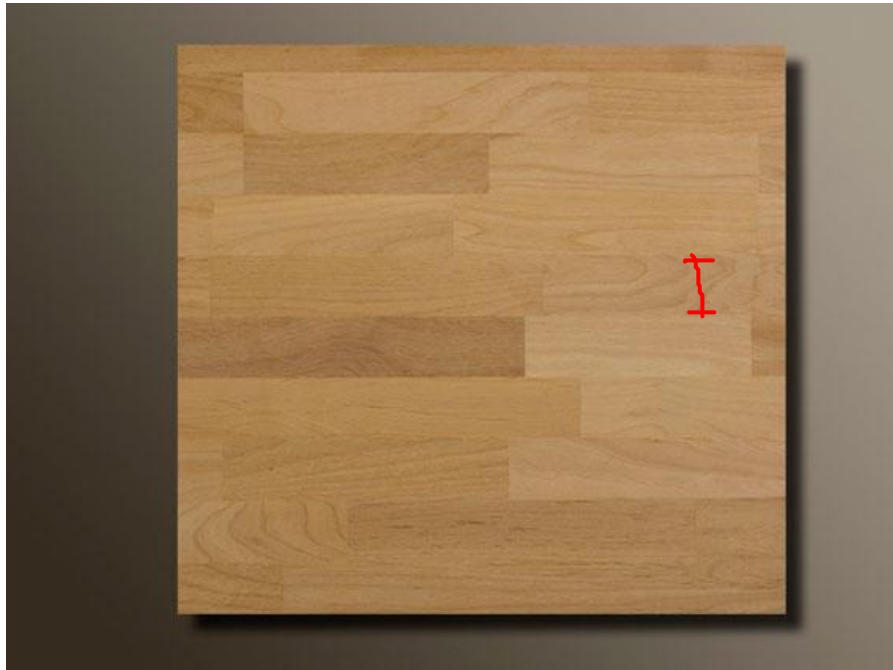


Kontrola kvaliteta obarde

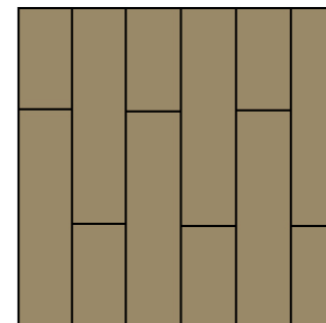
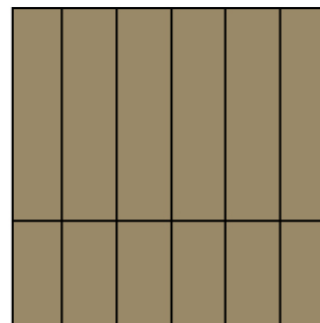
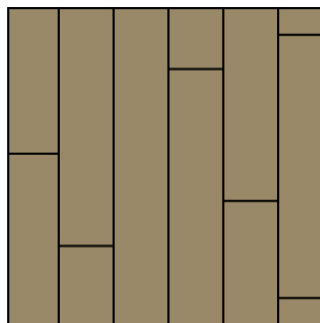
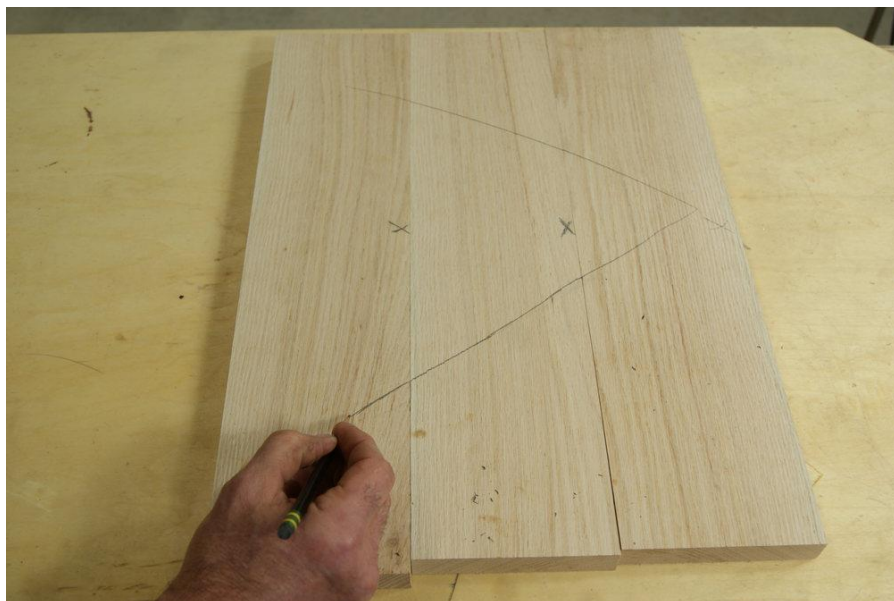


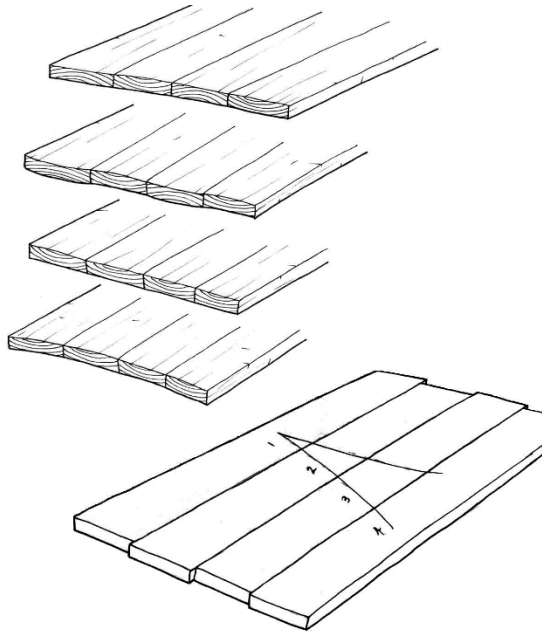
Izbor gredica

- Po dimenzijama
- Po boji i teksturi



Izbor gredica – slaganje gredica u tavan

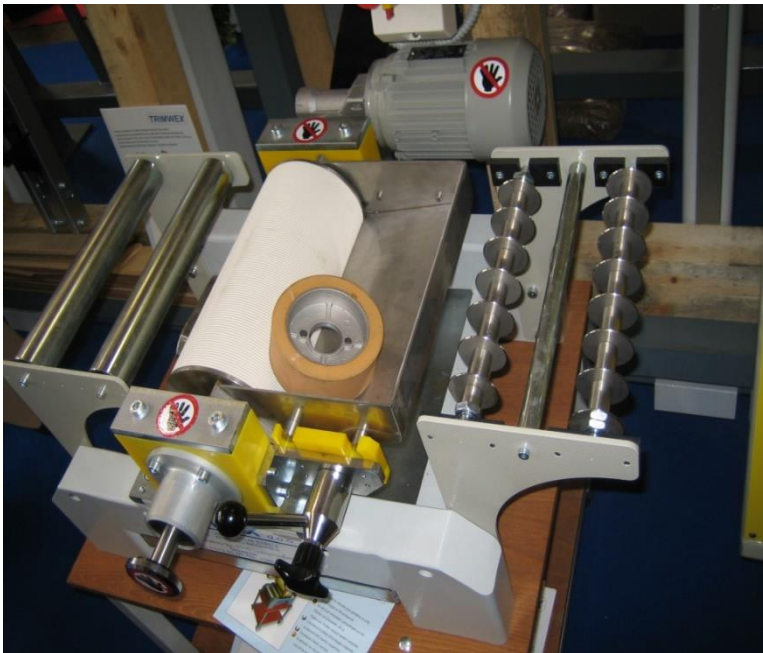


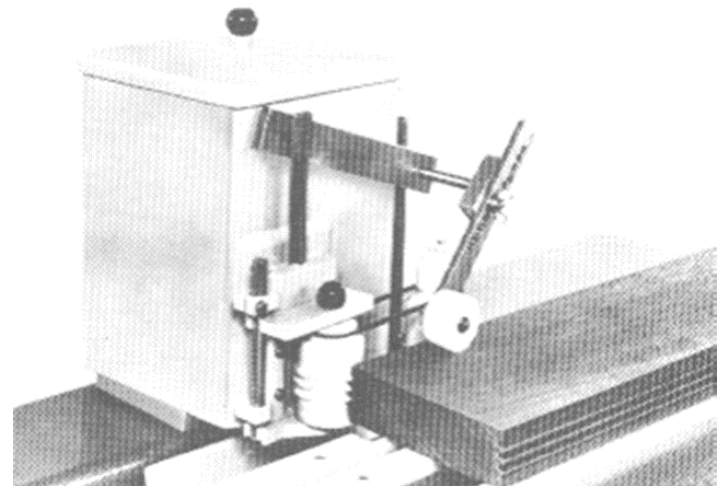
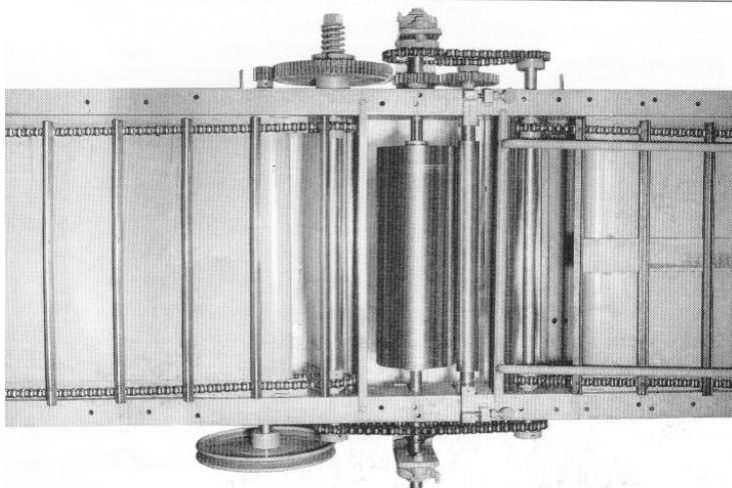
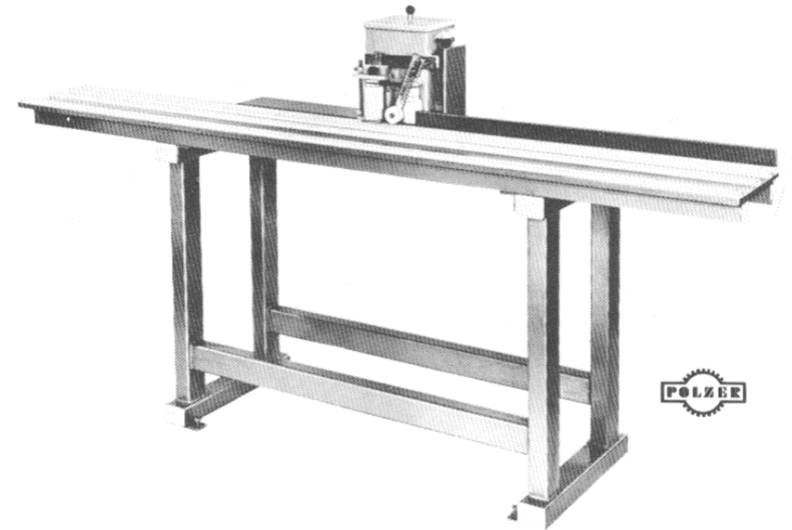
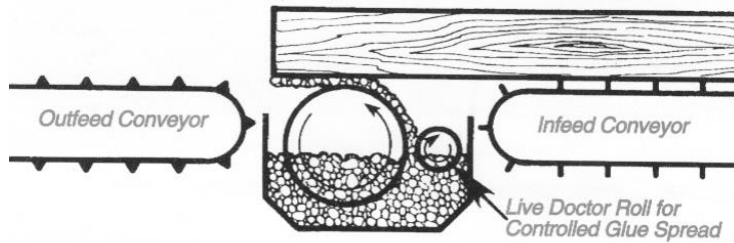
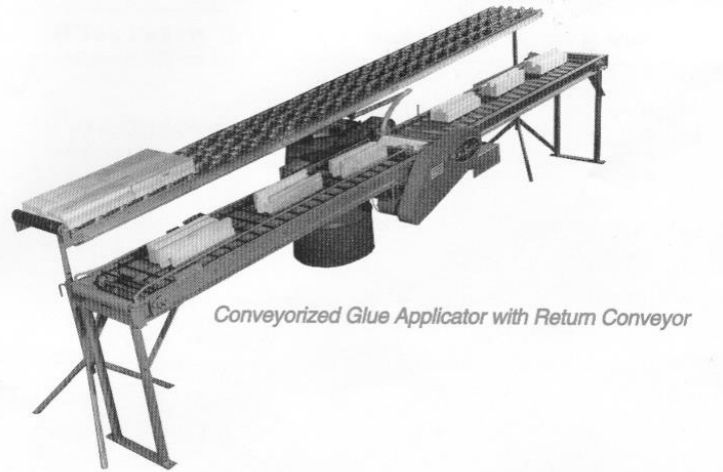


Nanošenje lepka

- Četka
- Valjak – ručni
- **Nanosačica lepka**

Nanošenje lepka – nanosačice lepka





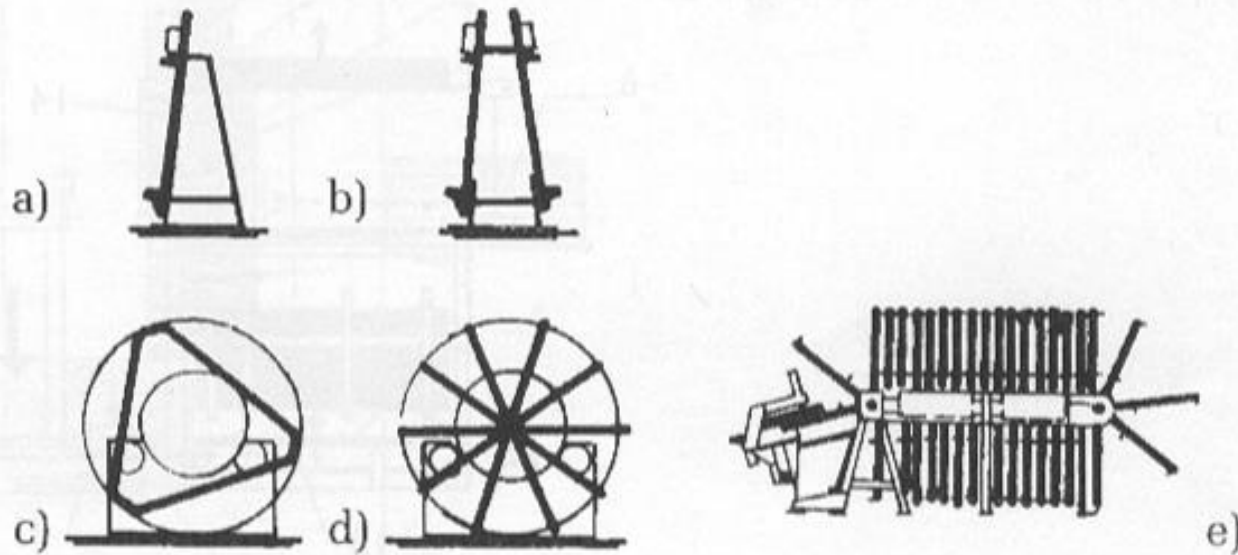
Lepkovi

Vrsta lepka	varijanta obrade
Glutinski	1
PVA-c	1/2/3

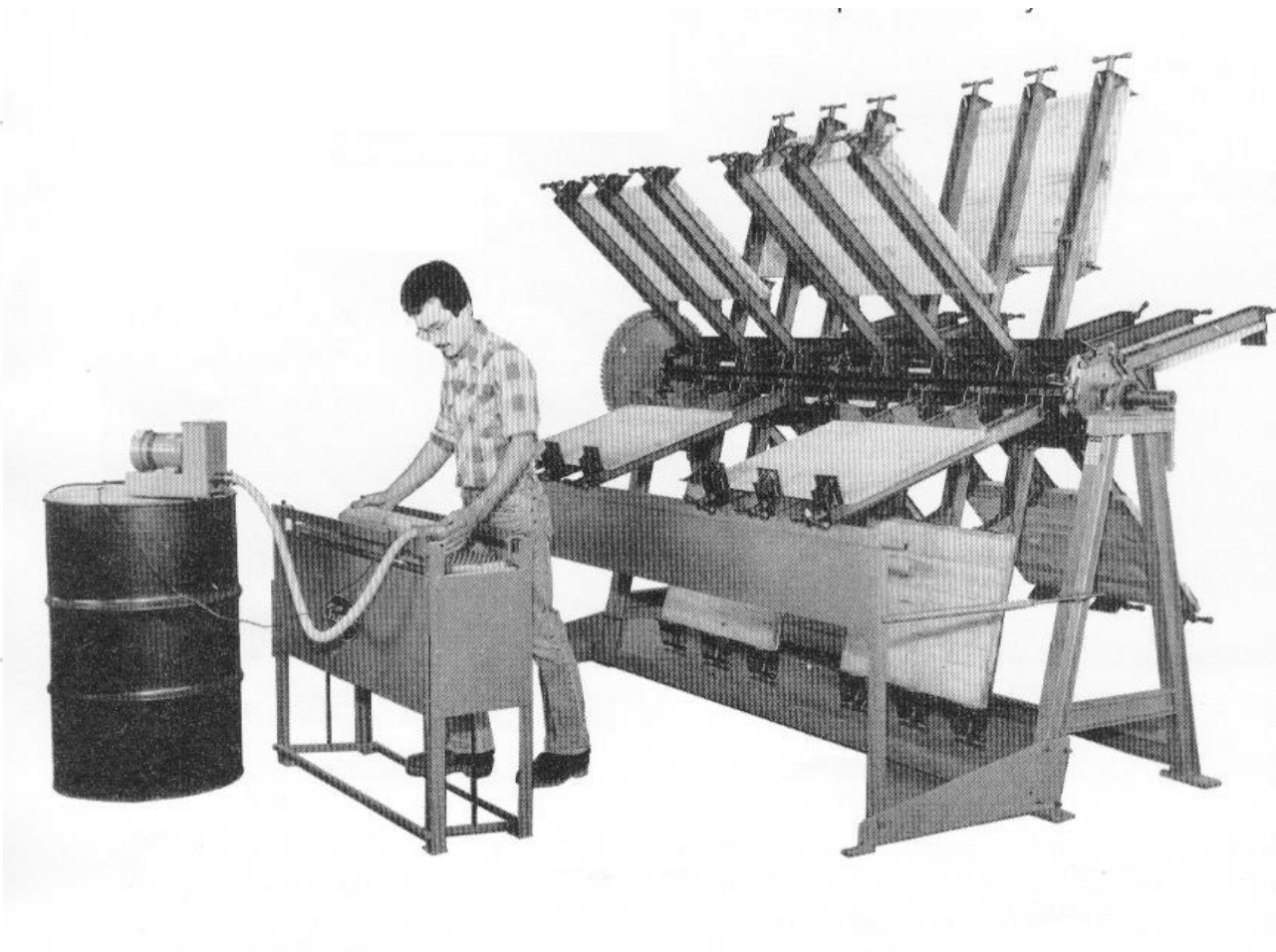
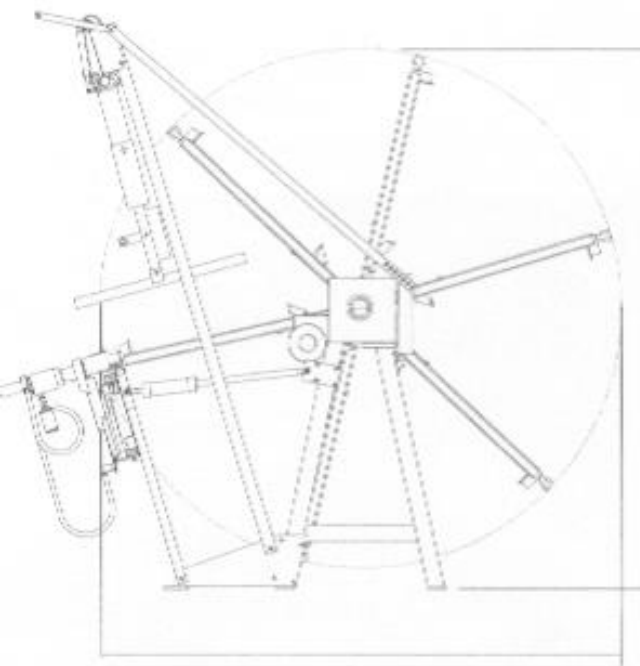
Prese

Vrsta presa	varijanta obrade
ramovske	1/2/3
VF prese	2/3

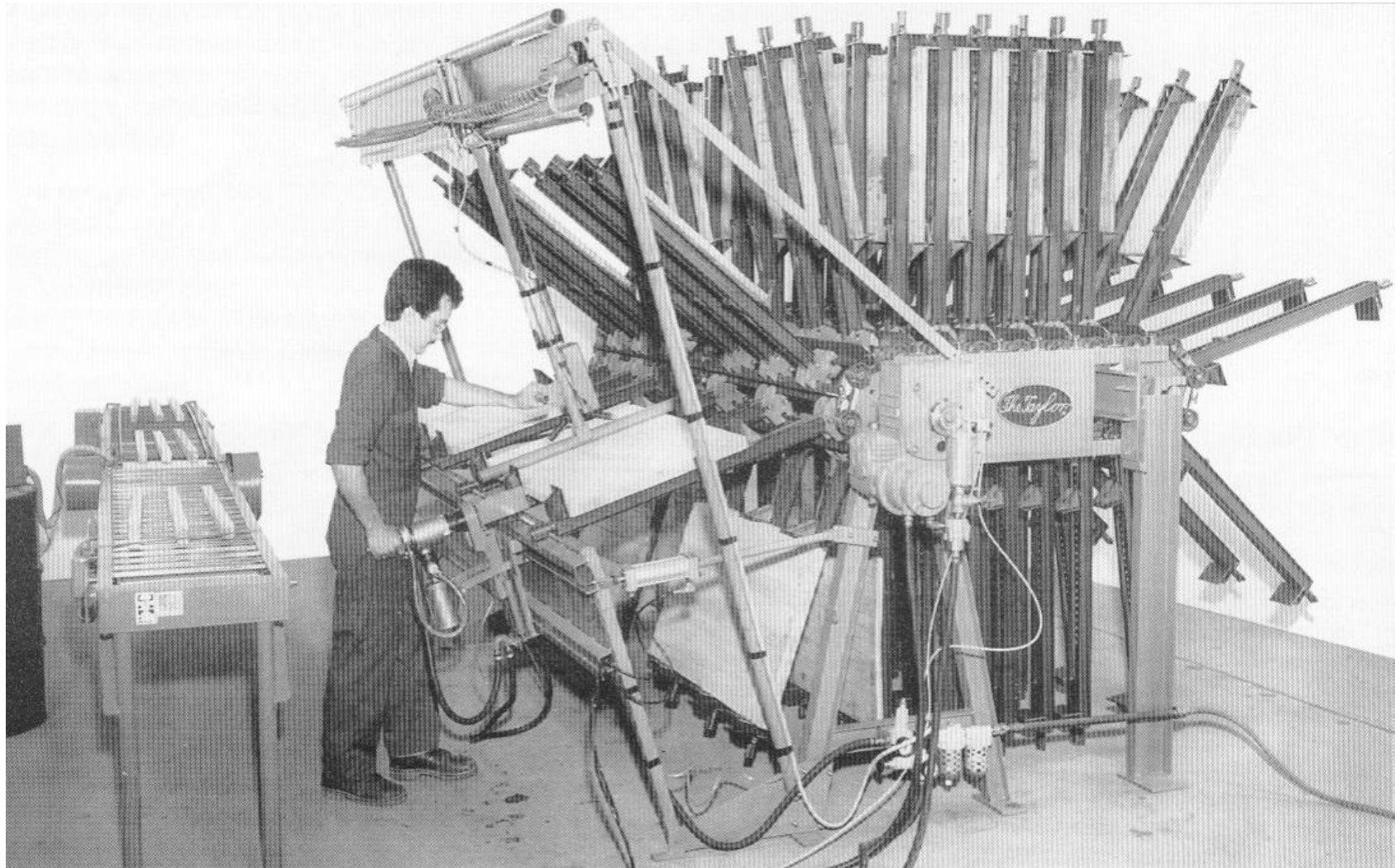
Ramovske prese



Ramovske prese - zvezdaste



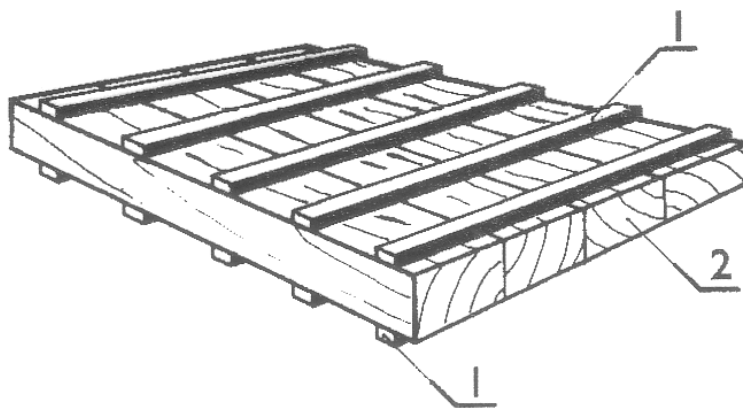
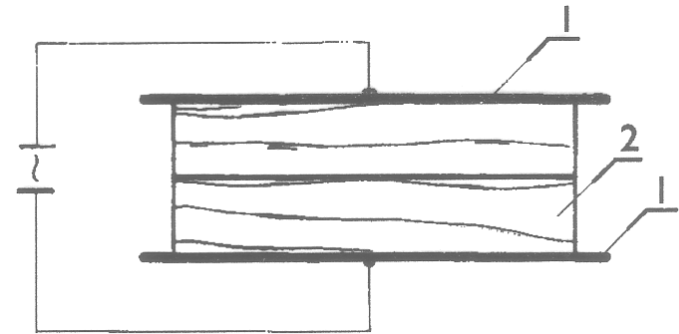
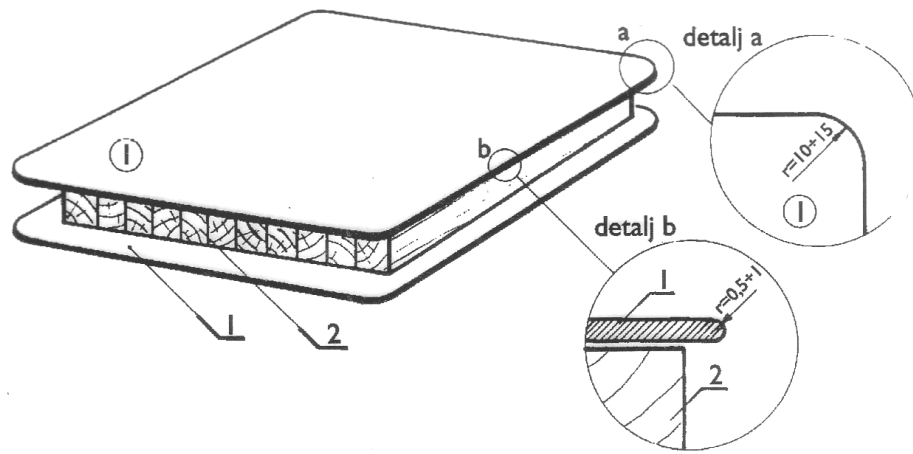
Ramovske prese - konvejerne



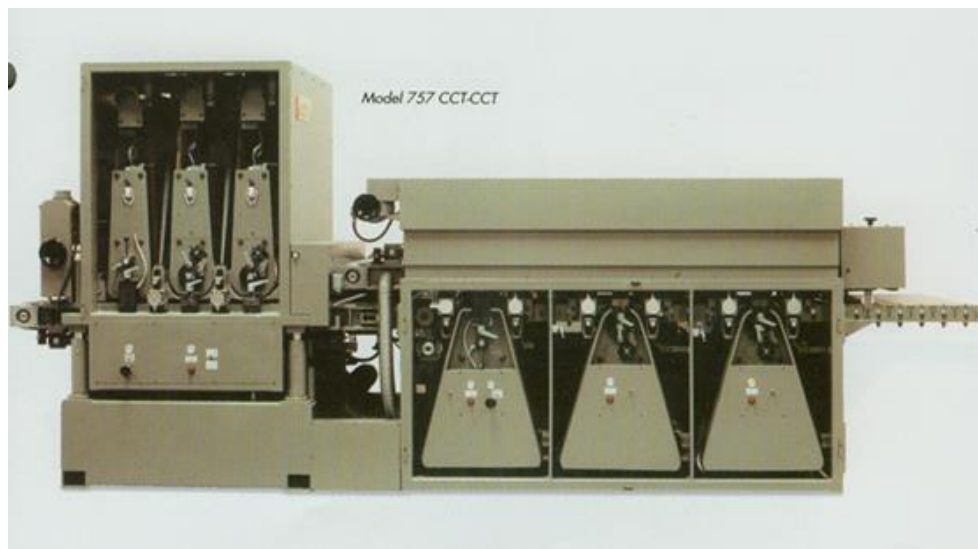
VF prese



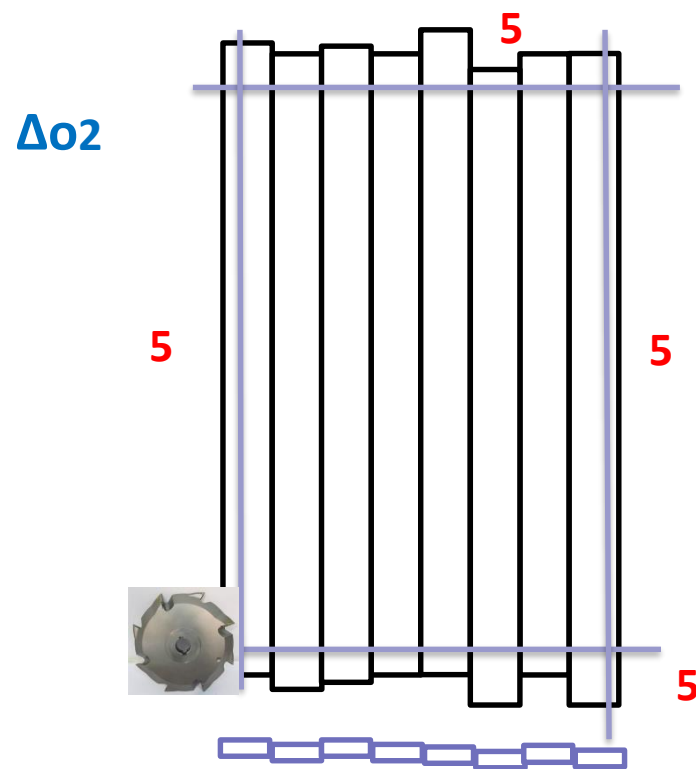
VF generator



Egaliziranje debljine



nazivne mere (mm)			ΔO_1	ΔO_2	ΔO_3	Krojene mere (mm)
D1'	L	1600	20	10		
	B	80	6	5		
	D	20	6	2		
D2"	L	1600	20	10		
	B	80	6	0		
	D	20	6	2		



Dimenzionisanje B i L

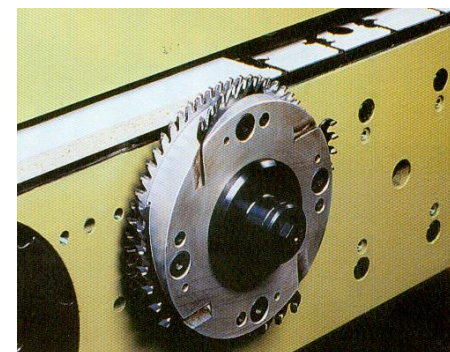
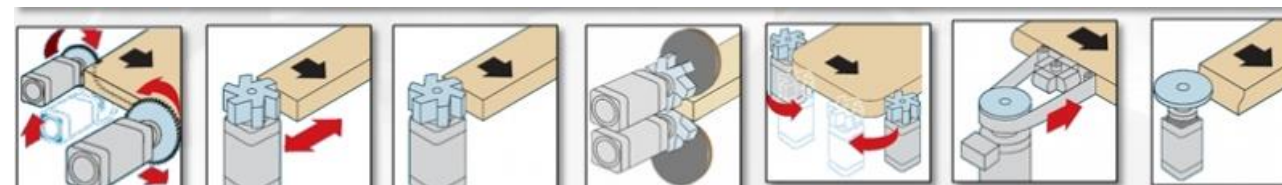
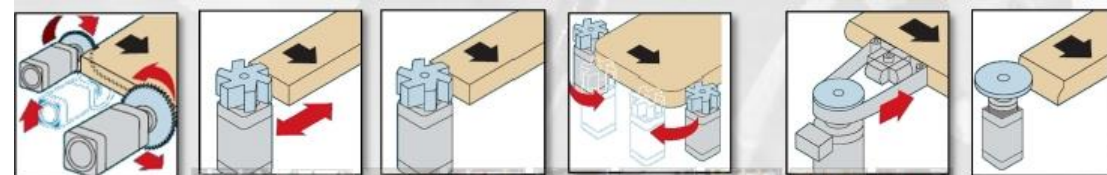
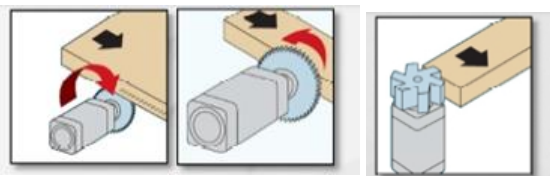
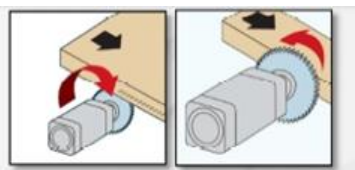


<https://youtu.be/ztt2Ar8du5I>
<https://youtu.be/IG6BdPf9nH4>
<https://youtu.be/9UwRklS60FE>

- Posluživanje: 2 radnika
- Br.vretna: 2+2 do 7+7
- $d = 30 / 40\text{mm}$
- $D_{kp} = 300 \div 350\text{mm}$
- $Div = 250 \div 400\text{mm}$
- $D_{gl} < 350\text{mm}$
- $h_{max} < 200\text{mm}$
- $n_{max} = 9000 \text{ o/min}$
- $u = 8 \div 24 \text{ m/min (mehanizovano)}$
- $E = \pm 3.55,5 \text{ kW (x br.vretna)}$

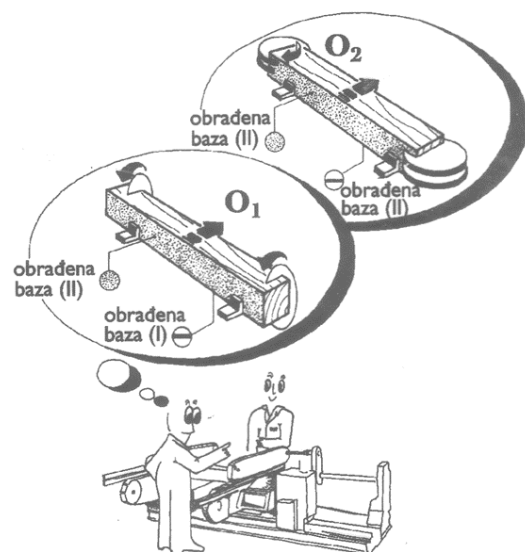
dvostrani profiler

- Kombinacije alata

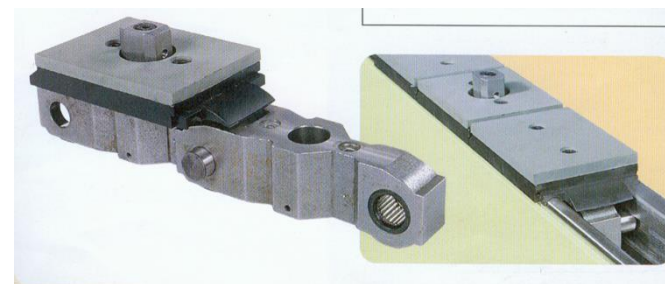
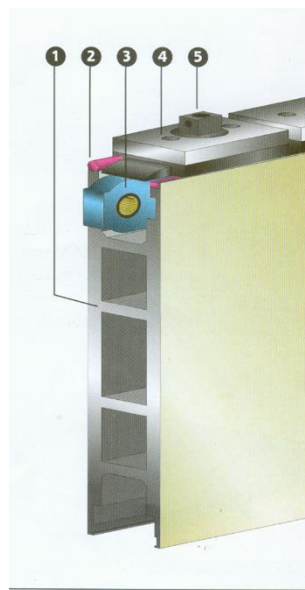
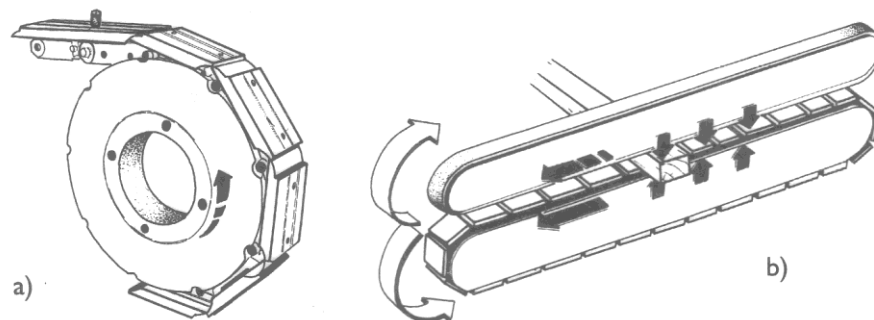


kinematika

Glavno kretanje

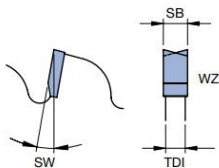
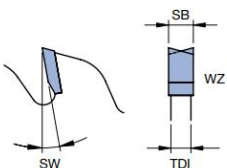


Pomoćno kretanje



alati

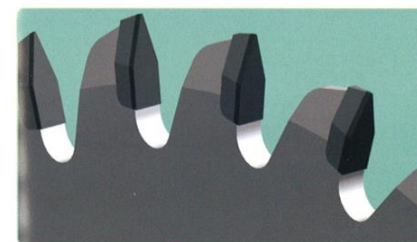
Kružne pile



predrezači

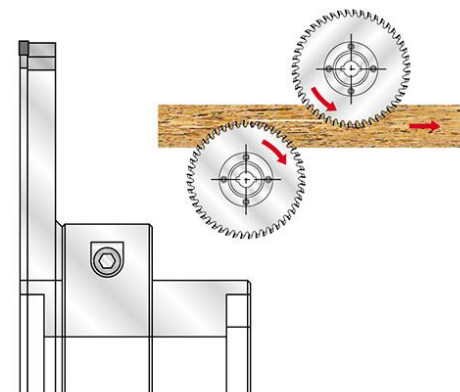


$D=125\div 200\text{mm}$
 $n=12.0000\text{ o/min}$
 $b=2,8\div 4\text{mm}$



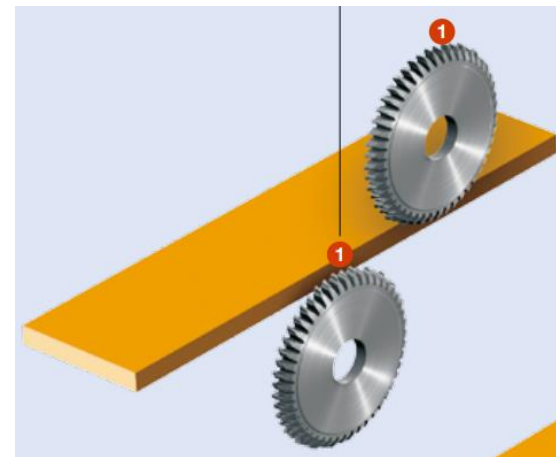
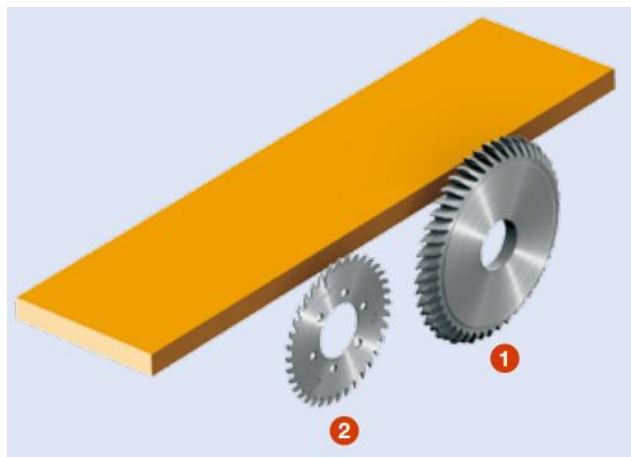
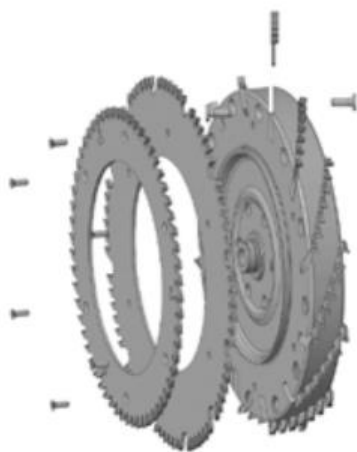
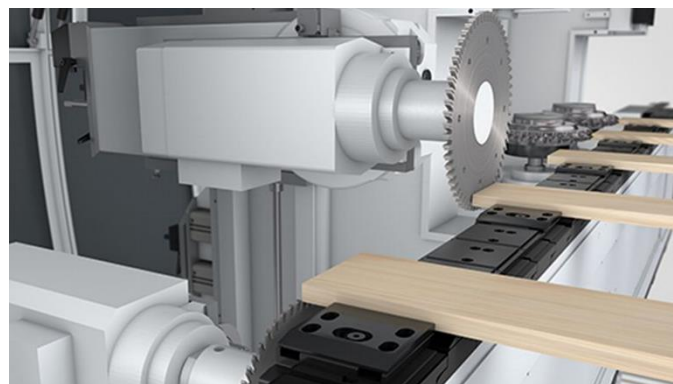
alati

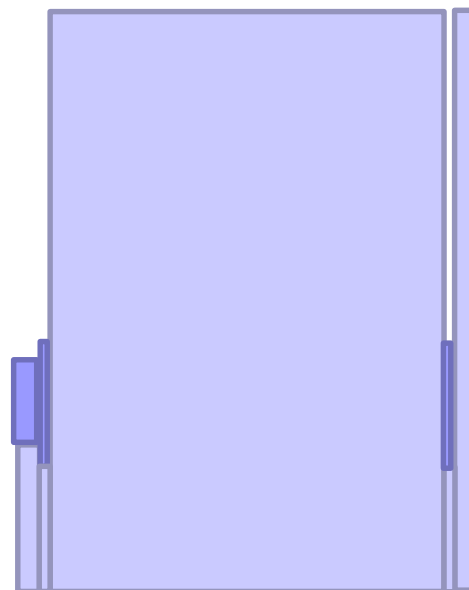
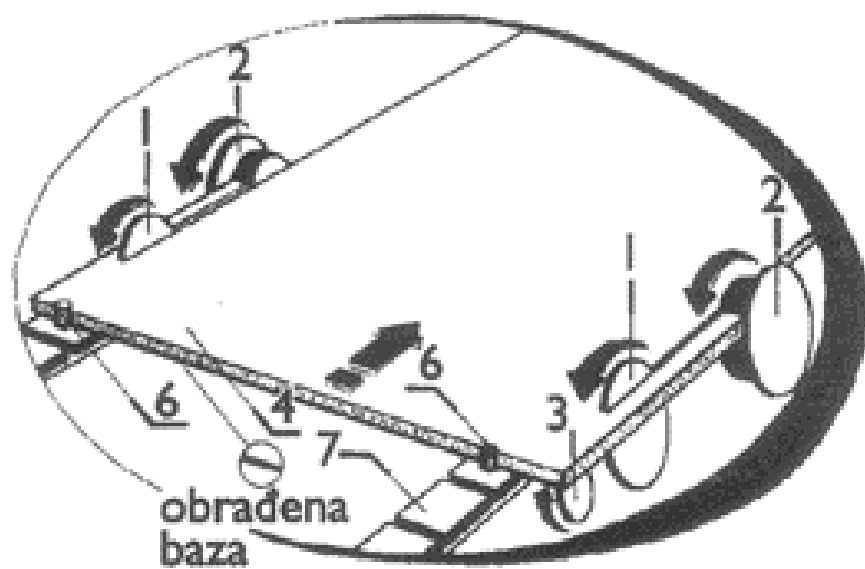
iverači



alati

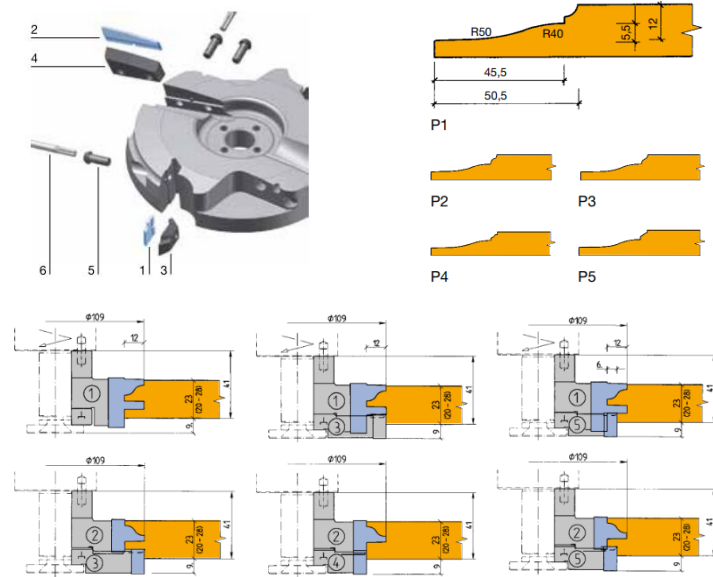
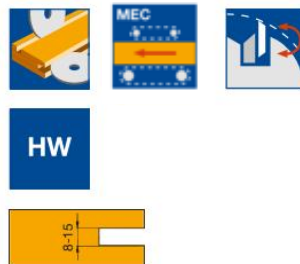
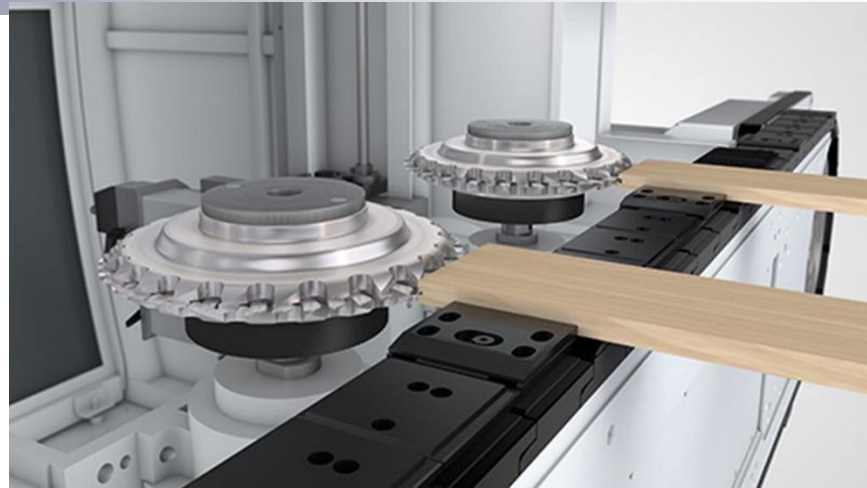
iverači





alati

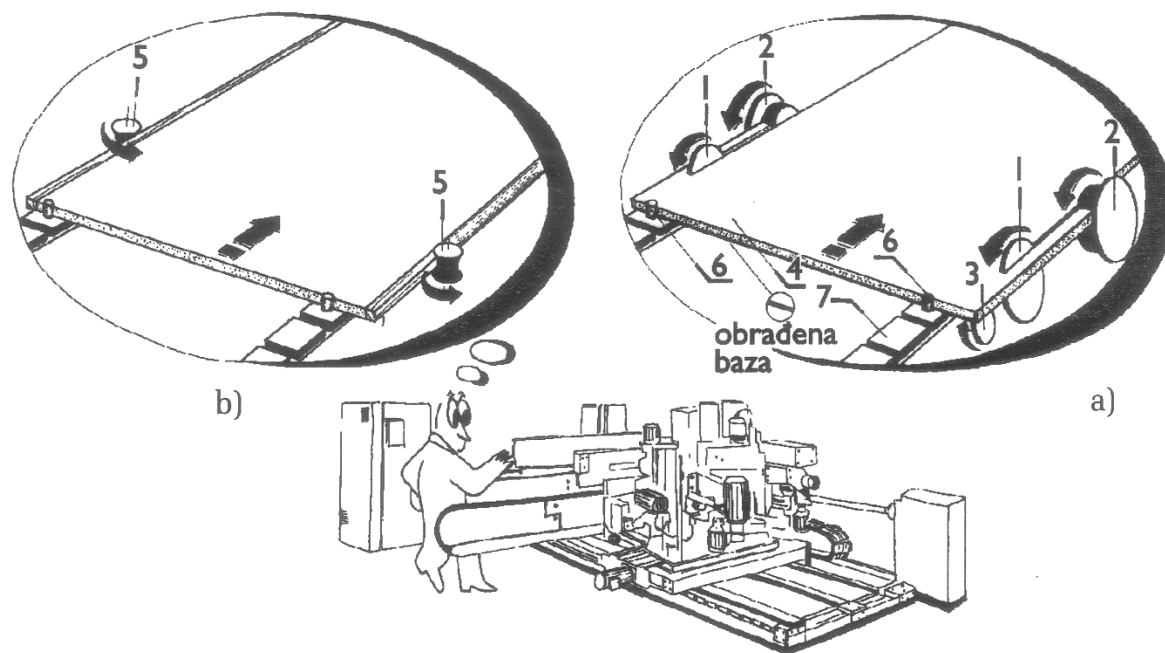
Glodala



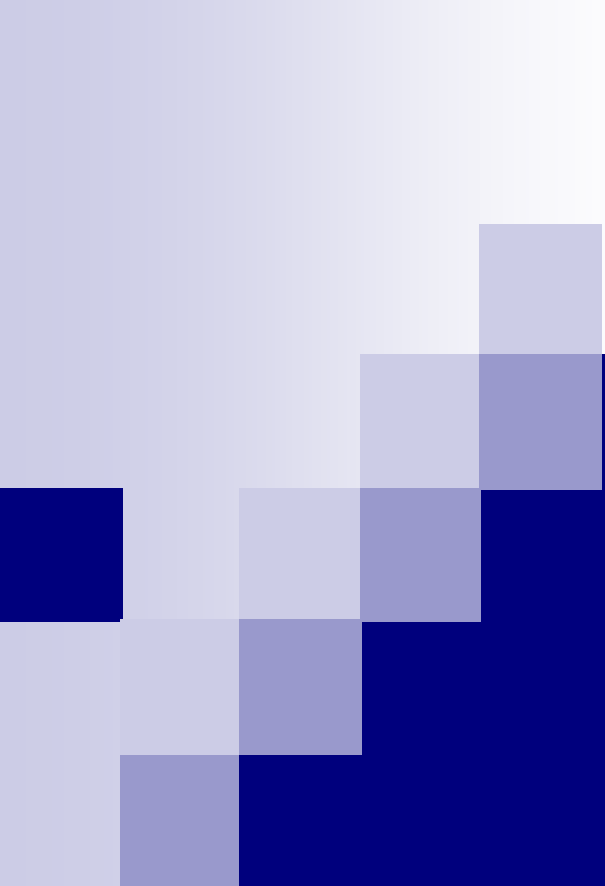
Režimi obrade

alat	D(mm)	a(mm)	n(o/min)	u(m/mim)
Predrezač	125÷200	<2	12.000	8÷24
iverač	300÷350	a=d	3.000	
k.pila	250÷300	a=d	3.000	
Glodalo	<200	$a=\Delta o_2/2$	6.000	
Glodalo	<350	$a=\Delta o_2/2$	6.000	

Redosled I broj prolaza







zadatak

ZADATAK

Ploča trpezarijskog stola, dimenzija 1200•800•42mm izrađuje se kao daščana ploča iz bukovog gredica koje su nastavljene po dužini.

- Dimenzija poprečnog preseska gredica koje dolaze na dužinsko nastavljanje iznosi 50•87mm.
- Dužinsko nastavljanje se vrši na gredicama koje su prethodno obrađene. Nadmera na obradu po debljini i širini iznosi 5mm. Nakon obrade elementi imaju dimenziju 45•82mm.
- Nakon dužinskog nastavljanja štapovi dimenzija 45•82•6000mm se krata na dužinu od 1220mm.
- Skraćeni štapovi se obrađuju na dimenziju 43•80•1220mm.
- Nakon obrade štapovi se lepe u daščanu ploču.
- Prilikom egaliziranja debljine na širokotračnoj brusilici skida se 1mm na ukupnu debljinu.

Ulazni podaci

- Potrebna količina ploča: $N_d = 250$ ploča/dan
- broj smena: $n_s = 2$
- vrsta drveta: bukovina

Metod rada

1. Izabrati tehnologiju za izradu daščanih ploča.
2. Za izabranu tehnologiju proračunati potreban broj mašina.
3. Odrediti režime lepljenja (vrstu lepka, temperaturu lepljenja, silu stezanja, količinu nanosa i vreme stezanja)
4. Proračunati utrošak lepka

1. Obrada sljubnica

Gruba
gredica

Izrada
bazne
površine

figovanje

VARIJANTA I



VARIJANTA II



VARIJANTA III



kontrola kvaliteta izrade

izbor gredica

nanošenje lepka

presovanje



Egaliziranje debljine



dimenzionisanje B i L

Obrada sljubnica

mašina	varijanta obrade
Ravnalica	1
Fig mašina – Ledinek	1/2
Fig mašina – Weinig Super 4	3
Četvorostrana rendisaljka	3


$$N = \frac{Q}{P_{sm} \cdot b \cdot c} = [kom]$$

N – potreban broj mašina (kom)

Q – godišnja količina ploča(m³/god)

P_{sm} – smenska proizvodnost (m³/smeni)

b – broj radnih dana u godini: b = 250

c – broj radnih smena u danu: c = 2

Mašine sa mašinskom obradom

$$P_{sm} = \frac{u * T * k_r * q_{sr}}{l_o * n} \left[\frac{m^3}{sm} \right]$$

q_{sr} – zapremina ploče

l_o – dužina lamele

n – broj komada (lamela po ploči)

Prese

$$P_{sm} = \frac{T * k_r * n_{etaža}}{t_{lepka}} \left[\frac{kom}{sm} \right]$$

t_{lepka} – vreme dostizanja

mehaničke čvrstoće

n – broj etaža u presi

$$P_{god} = P_{sm} * n_{dana} * n_{sm} \left[\frac{m^3}{god} \right]$$

Proračun utroška lepka

- lepak se nanosi obostrano
- količina nanosa $q = 250\text{g/m}^2$

$$Q_l = \frac{N_d \cdot l \cdot d \cdot n_s \cdot q}{k_i} = \left[\frac{\text{Kg}}{\text{dan}} \right]$$

n_s – prosečan broj sljubnica

$$n_s = \frac{b_{pločl}}{b_{gređice}} - 1$$

k_i – koeficijent iskorišćenja: $k_i = 0.93$