

TEHNOLOGIJA PROIZVODNJE BRVNARA ITALPARA





Konstruktivna razrada proizvoda

Šta radimo?

KN/FPD I.zadatak



Tehnološka šema formiranja proizvoda

Kako radimo?

FPD 5. zadatak



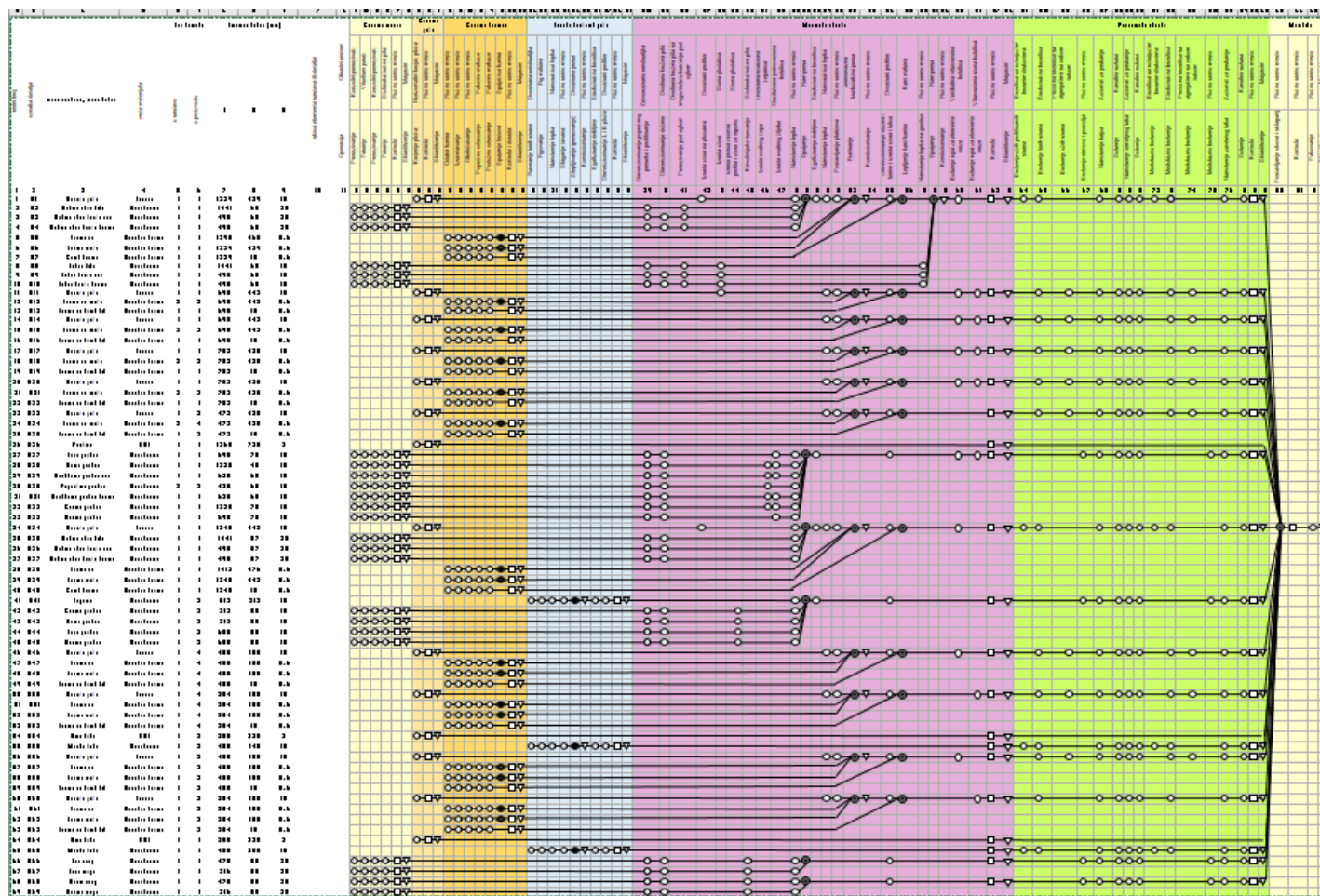
Kako organizujemo?/ OP

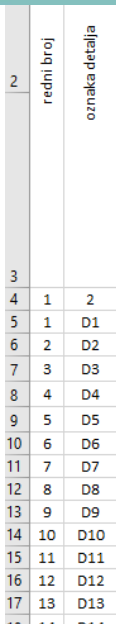


Kada puštam nalog?/ UP

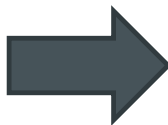


Koliko prostora mi treba da smestim sve OS/ PP



[illegible]

redni broj označitelj	naziv sastava, naziv detaja	vrsta materijala	u sastavu u proizvodnji	dimenzije detaja(mm)			dijela elementa, materijala ili detaja	operacije obradni sistem	kreiranje ploča				kreiranje finisira			
				L	B	D			kreiranje ploče	kontrola	kontrola	kontrola	kreiranje finisira	kontrola	kontrola	kontrola
1 D1	Osnova gostila	Ivenica	1	1	1297	381	22		OO□V				OO□V			
2 D2	Furner Bak	Bak flr	1	1	1297	381	0.55						OO□V			
3 D3	Furner nabije	Bak flr	1	1	1297	381	0.55						OO□V			
4 D4	Kaoz oči	Bak flr	1	1	1297	22	0.55						OO□V			
5 D5	Vertikalni Ivenica	Ivenica	1	2	769	381	19		OO□V				OO□V			
6 D6	Furner Ivenica	Bak flr	2	4	769	381	0.55						OO□V			
7 D7	Kaoz oči	Bak flr	1	2	769	19	0.55						OO□V			
8 D8	Furner Ivenica	Ivenica	1	2	416	378	19		OO□V				OO□V			
9 D9	Furner Ivenica	Bak flr	1	2	416	378	0.55						OO□V			
10 D10	Furner nabije	Bak flr	1	2	416	378	0.55						OO□V			
11 D11	Kaoz oči	Bak flr	1	2	416	378	0.55						OO□V			
12 D12	Furner Ivenica	Ivenica	1	2	791	381	19		OO□V				OO□V			
13 D13	Furner Ivenica	Bak flr	1	2	791	378	0.55						OO□V			
14 D14	Furner nabije	Bak flr	1	2	791	378	0.55						OO□V			
15 D15	Kaoz oči	Bak flr	1	2	791	19	0.55						OO□V			
16 D16	Furner Ivenica	Bak flr	1	2	381	19	0.55						OO□V			
17 D17	Vertikalni Ivenica	Ivenica	1	2	769	381	19		OO□V				OO□V			



- ❖ Radni nalog
- ❖ Kapacitet pogona
- ❖ Kapacitet/učinak/zauzetost mašine
- ❖ Vreme izrade elementa/proizvoda – utrošak vremena
- ❖ Uska grla

TEHNOLOGIJA PROIZVODNJE BRVNARA I TALPARA



TRADICIONALNI NAČIN
IZRADE

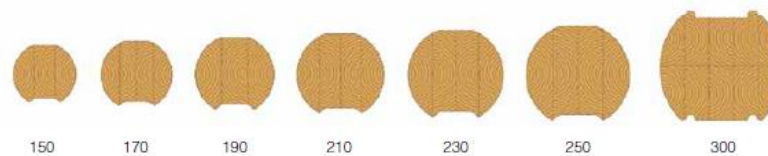
MATERIJALI



Oblo drvo



Masivno i KVH drvo



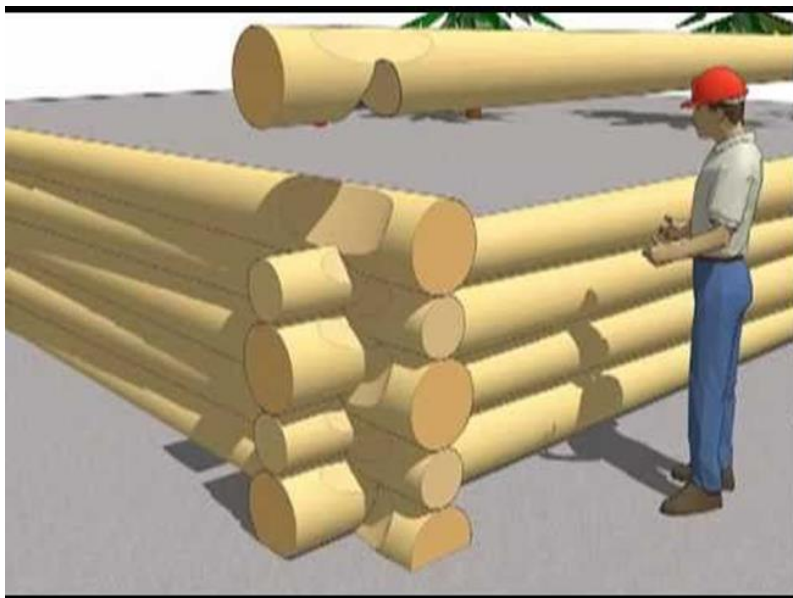
Duo i trio grede



ELEMENTIVEZE

Zasek

Lastin rep



NAČINI IZRADE

Tradicionalni način



Savremeni način



TEHNOLOGIJA PROIZVODNJE BRVNARA I TALPARA



**SAVREMENI
NAČIN
IZRADE**

REDOSLED TEHNOLOŠKIH OPERACIJA

1. Krojenja materiala (masiva)
2. Dimenzionisanje poprečnog preseka
3. Nastavljanje gredica po dužini (KVH)
4. Dimenzionisanje poprečnog preseka
5. Nanošenje lepka
6. Nastavljanje gredica po debljini (duo, trio, BSH)
7. Dimenzionisanje poprečnog preseka
8. Izrada elemenata veze

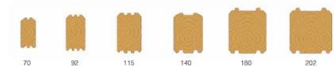
materijali



Oblo drvo



Masivno i KVH drvo



Duo i trio grede



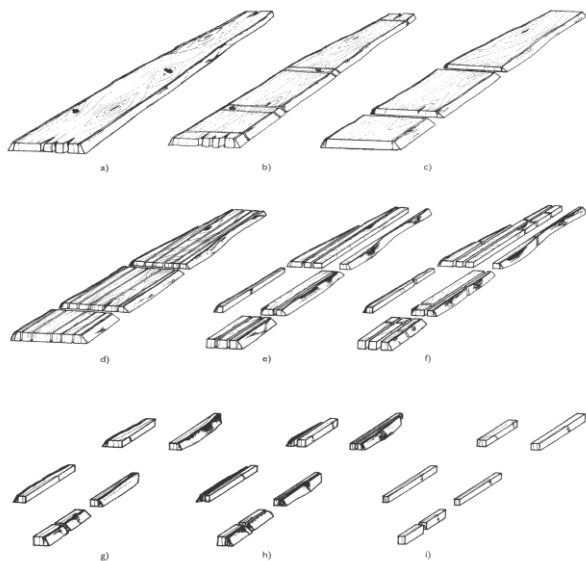


KROJENJE MATERIJALA

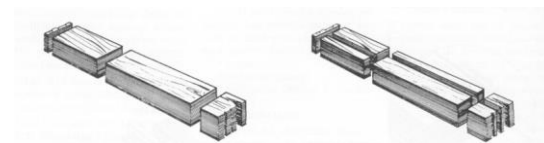
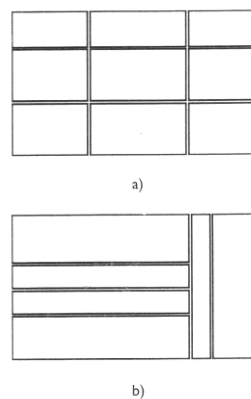
KROJENJE REZANE GRAĐE

KROJENJE MATERIJALA

Individualno krojenje



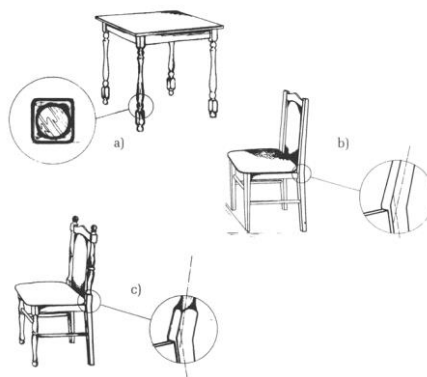
Grupno krojenje



NAČINI KROJENJA U ZAVISNOSTI OD OBLIKA DETALJA

Krojenje obradaka sa jednom osom

- Poprečno - podužni način krojenja
- Podužno - poprečni način krojenja
- Poprečno – podužno –poprečni način krojenja



Krojenje obradaka sa ukrštenim osama

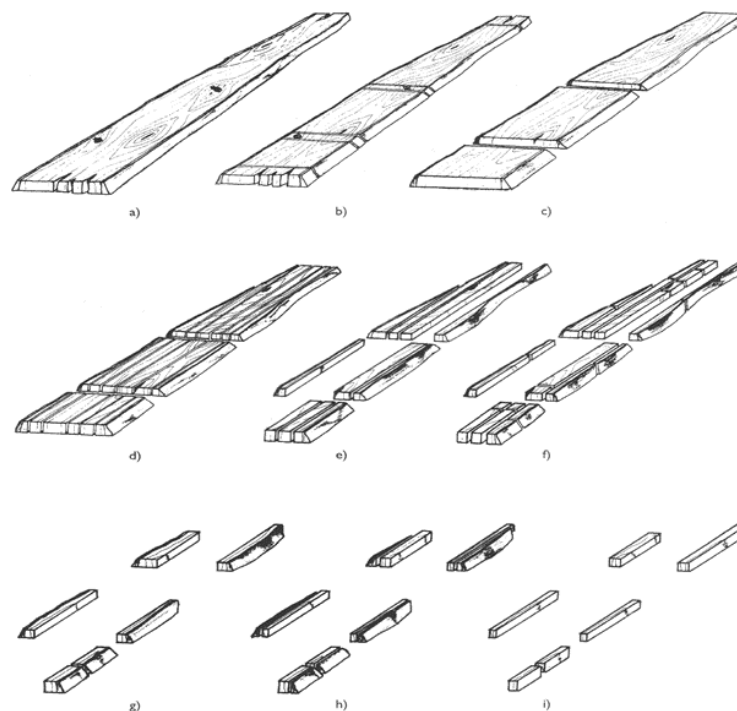
- Poprečno - podužni način krojenja
- Podužno uklapajući
- Iz daščanih ploča

NAČINI KROJENJA U ZAVISNOSTI OD OBLIKA DETALJA

Krojenje obradaka sa
jednom osom



- Poprečno - podužni način krojenja
- Poprečno – podužno –poprečni način krojenja
- Podužno - poprečni način krojenja



PODUŽNO-POPREČNI NAČIN KROJENJA



1. Paranje

2. Prerezivanje

3. Izrezivanje (dorada)

PODUŽNO-POPREČNI NAČIN KROJENJA



1. Paranje

2. Prerezivanje

3. Izrezivanje (dorada)

PODUŽNO-POPREČNI NAČIN KROJENJA



1. Paranje
2. Prerezivanje
- 3. Izrezivanje (dorada)**

OBRADNI SISTEMI ZA KROJENJE REZANE GRAĐE



**Krojač ploča = cirkular!?!
Prerezivač=parač= cirkular!?!
Cirkular?!?!!!!!!!**





Da li se pominje u knjizi iz
Mašina neki cirkular?





电动工具

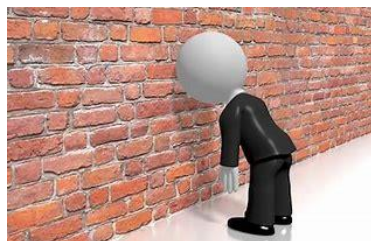




OBRADNI SISTEMI



IZBOR!?!?



MODEL		D(mm)	u	Pomerljive testere
NADSTOLNI	jednolisni	≈350	Ručno/mehanizovano	ne
	višelisni	≈350	Mehanizovano	da
PODSTOLNI	jednolisni	≈350	Ručno/mehanizovano	ne
	višelisni	≈350	Mehanizovano	ne

OBRADNI SISTEMI



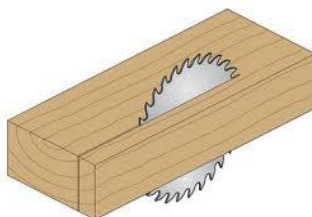
PARAČI

■ NADSTOLNI

- Jednolisni
- Višelisni

■ PODSTOLNI

- Jednolisni
- Višelisni



GEOMETRIJSKE KARAKTERISTIKE

B_{max}

B_{min}

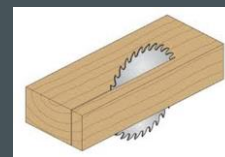
L_{max}

L_{min}

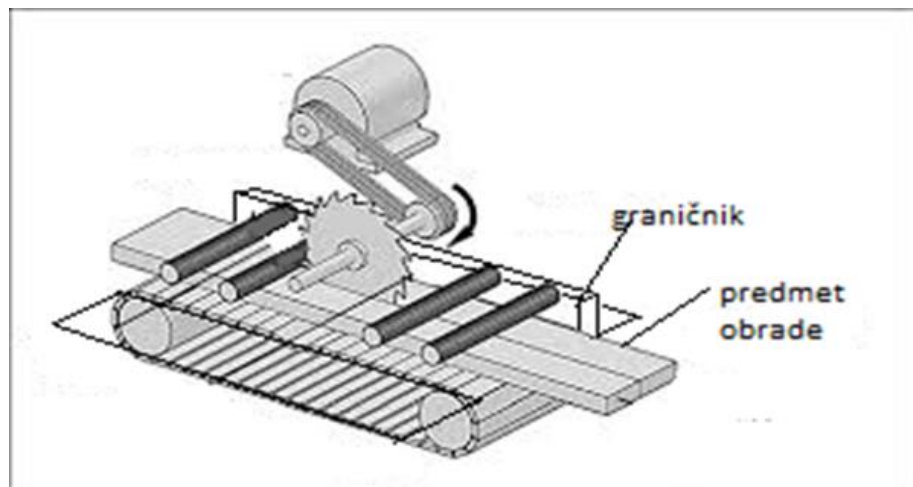
D_{max}

D_{min}

PARAČI - NADSTOLNI



NADSTOLNI
Jednolisni
Višelisni



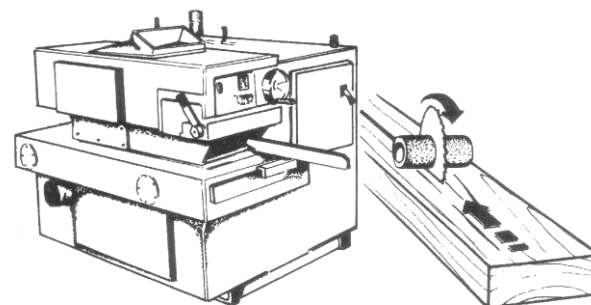
Glavno kretanje:



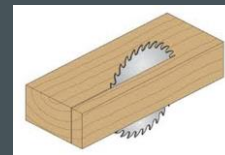
Pomočno kretanje-ručno/mehanizovano



Poziciono kretanje: graničnik

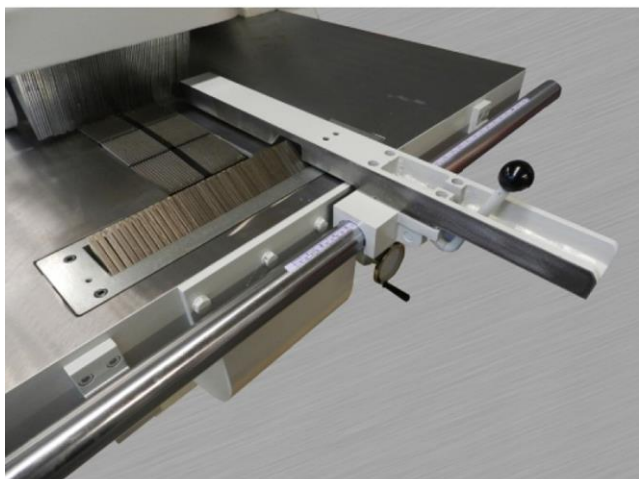


PARAČI - PODSTOLNI

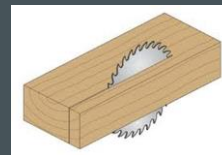


PODSTOLNI
Jednolisni
Višelisni

Pozicioniranje daske - Pomeranje graničnika



PARAČI - NADSTOLNI



NADSTOLNI
Jednolisni
Višelisni

■ NADSTOLNI

■ Jednolisni

■ Višelisni



■ PODSTOLNI

■ Jednolisni

■ Višelisni

- Fiksni raspored testera
- Pomerljive testere

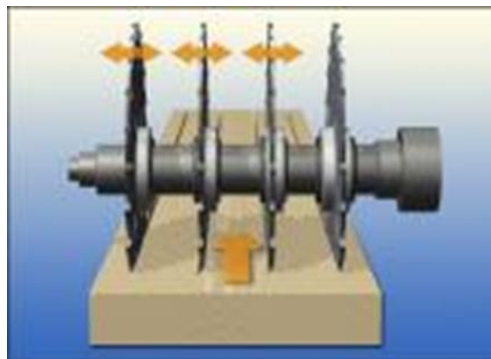
Glavno kretanje:

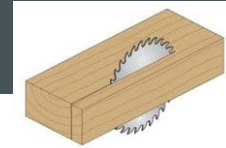


Pomočno kretanje- mehanizovano



Poziciono kretanje: graničnik, pomerljive testre



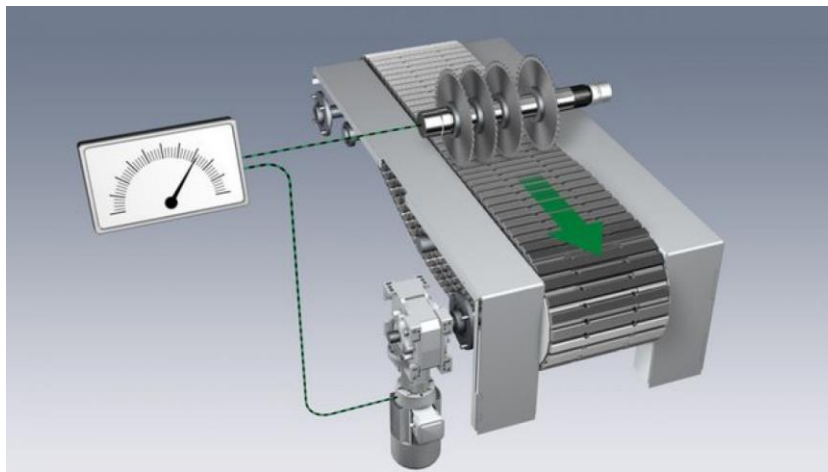


NADSTOL
NI

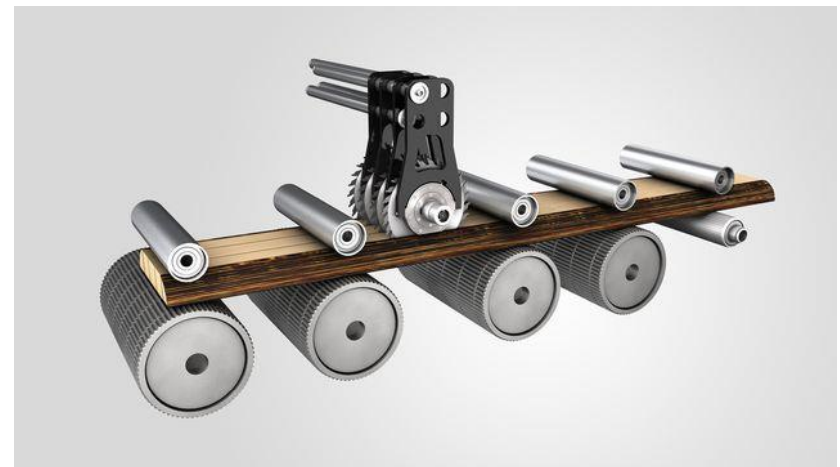
Jednolis
ni
Višelisni

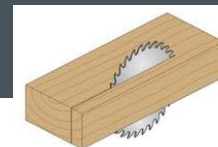
Pomočno kretanje- mehanizovano

Beskonačna nazubljena traka



Transportni valjci





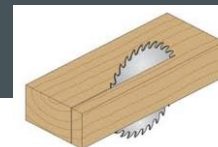
NADSTOL
NI

Jednolis
ni
Višelisni

Pomoćno kretanje- mehanizovano

Beskonačna nazubljena traka





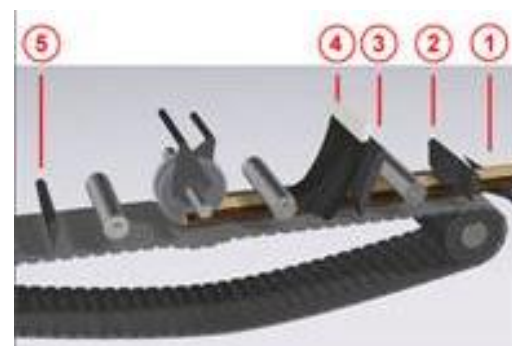
NADSTOL
NI

Jednolis
ni

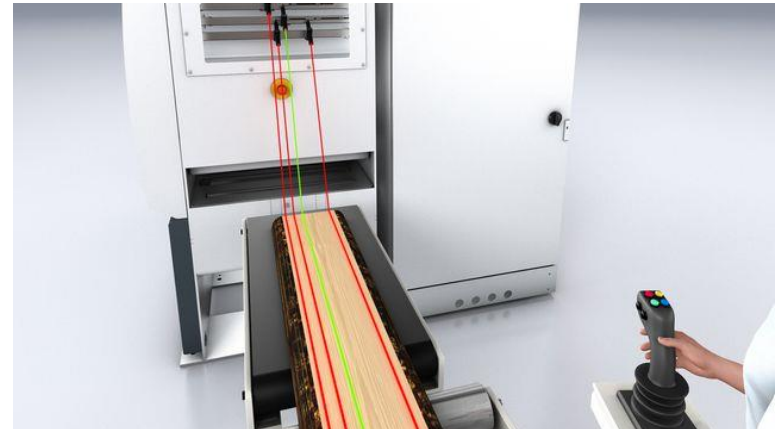
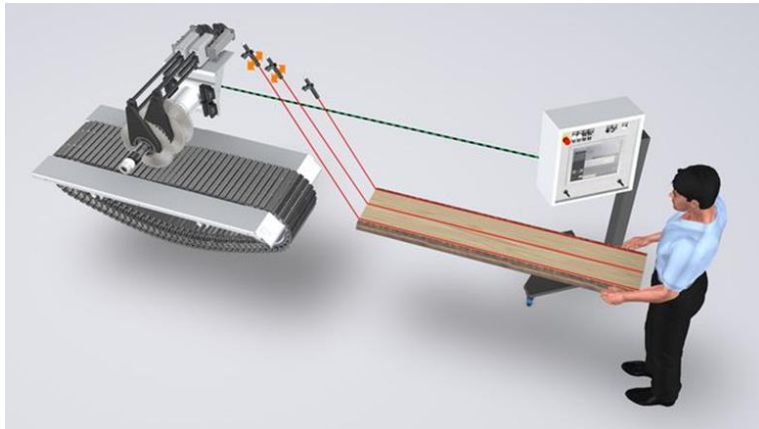
Višelisni

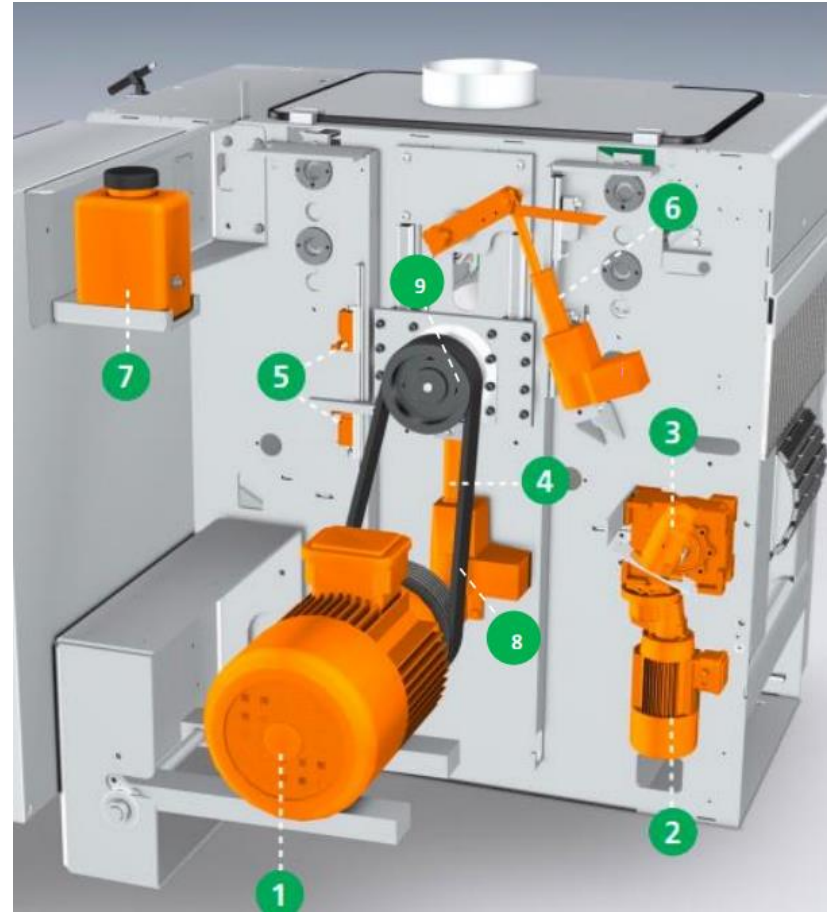
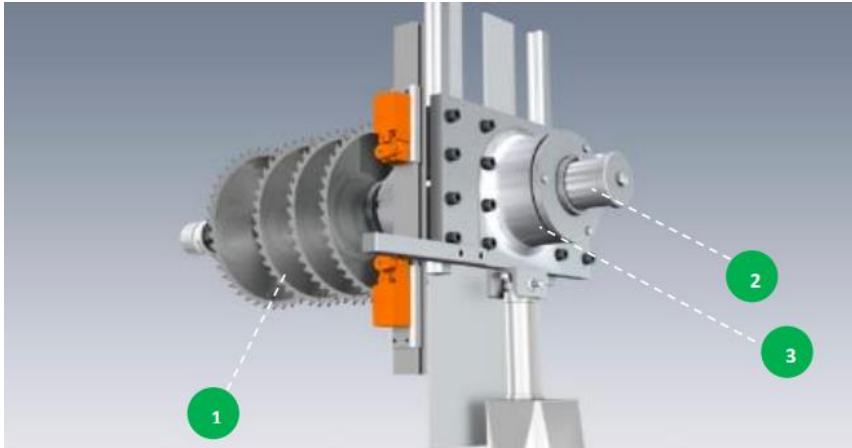
Pomoćno kretanje- mehanizovano

Beskonačna nazubljena traka

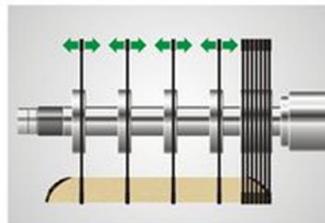
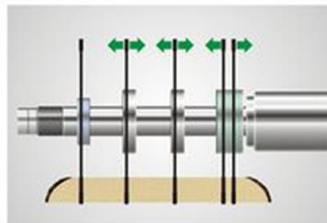
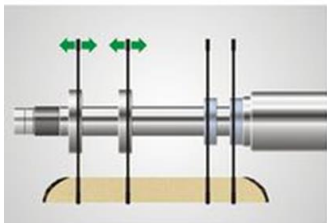
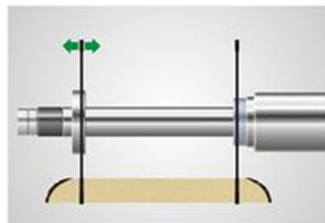
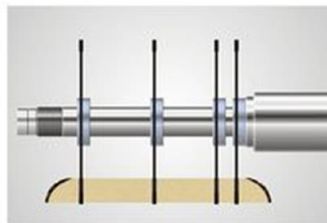
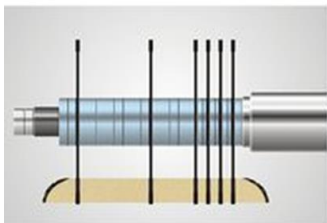


POMERLJIVE TESTERE





RASPORED TESTERA KOD VIŠELISNIH PARAČA



OBRADNI SISTEMI



PREREZIVAČI



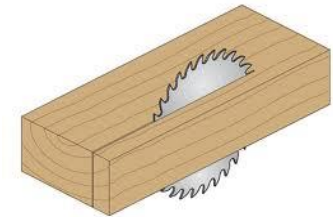
■ NADSTOLNI

- ✗ • Sa paralelogramom
- Konzolni
- ✗ • Klatni/viseći

■ PODSTOLNI

- Klatni/dubeći
- Sa kombinovanim kretanjem
- Sa vertikalnim kretanjem

PARAČI



■ NADSTOLNI

- Jednolisni
- Višelisni

■ PODSTOLNI

- Jednolisni
- Višelisni

OBRADNI SISTEMI



IZBOR!?!?



MODEL		D(mm)	u	automatizacij a
NADSTOLNI	Sa paralelogramom	≈350	Ručno	ne
	Konzolni	≈350	Ručno/mehanizovano	Ne/da
PODSTOLNI	Sa kombinovanim kretanjem	≈350	Mehanizovano	da
	Sa vertikalnim kretanjem	≈550	Mehanizovano	da

OBRADNI SISTEMI



PREREZIVAČI

■ NADSTOLNI

- Sa paralelogramom
- Konzolni



- Klatni

■ PODSTOLNI



- Klatni/dubeći
- Sa kombinovanim kretanjem
- Sa vertikalnim kretanjem

GEOMETRIJSKE KARAKTERISTIKE

Bmax

Bmin

Lmax

Lmin

Dmax

Dmin

OBRADNI SISTEMI



PREREZIVAČI

■ NADSTOLNI

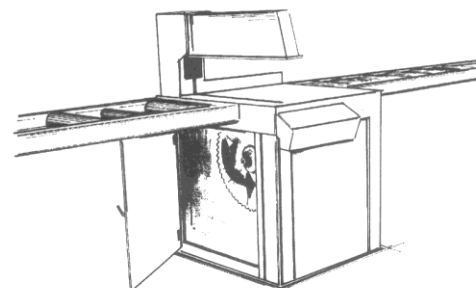
- Sa paralelogramom
- Konzolni
- Klatni

■ PODSTOLNI

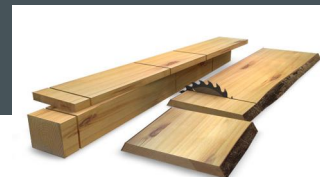
- ✗ • Klatni/dubeći
- Sa kombinovanim kretanjem
- Sa vertikalnim kretanjem



PREDNOSTI / MANE



PREREZIVAČI - PODSTOLNI



PODSTOLNI

- Sa vertikalnim kretanjem
- Sa kombinovanim kretanjem



Glavno kretanje:



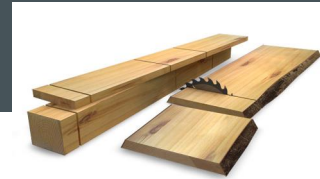
Pomoćno kretanje:



Poziciono kretanje:

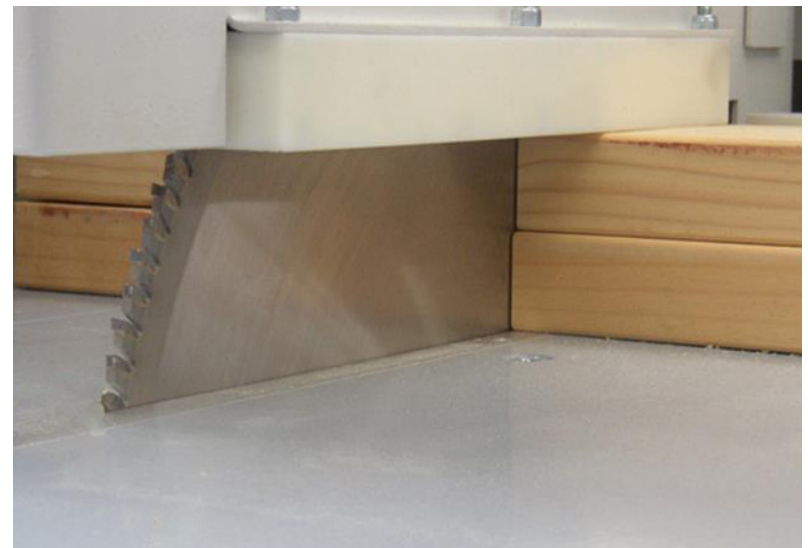


PREREZIVAČI - PODSTOLNI

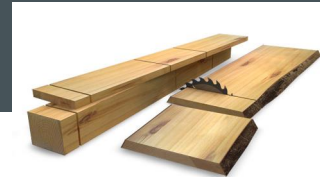


PODSTOLNI

- Sa vertikalnim kretanjem
- Sa kombinovanim kretanjem

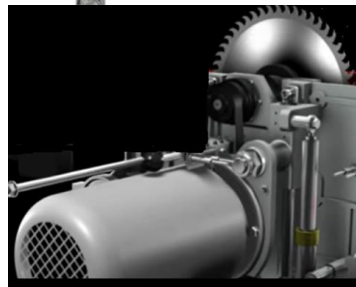


PREREZIVAČI - PODSTOLNI

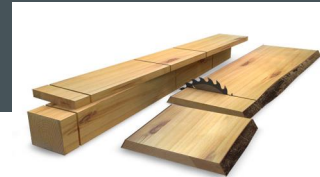


PODSTOLNI

- Sa vertikalnim kretanjem
- Sa kombinovanim kretanjem



PREREZIVAČI - PODSTOLNI



PODSTOLNI

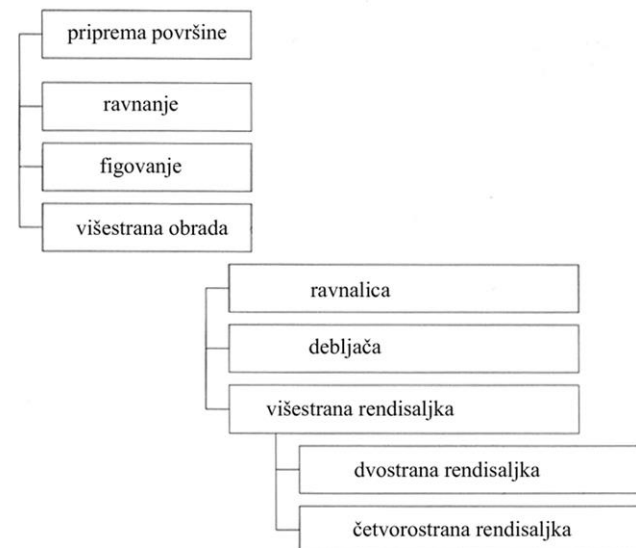
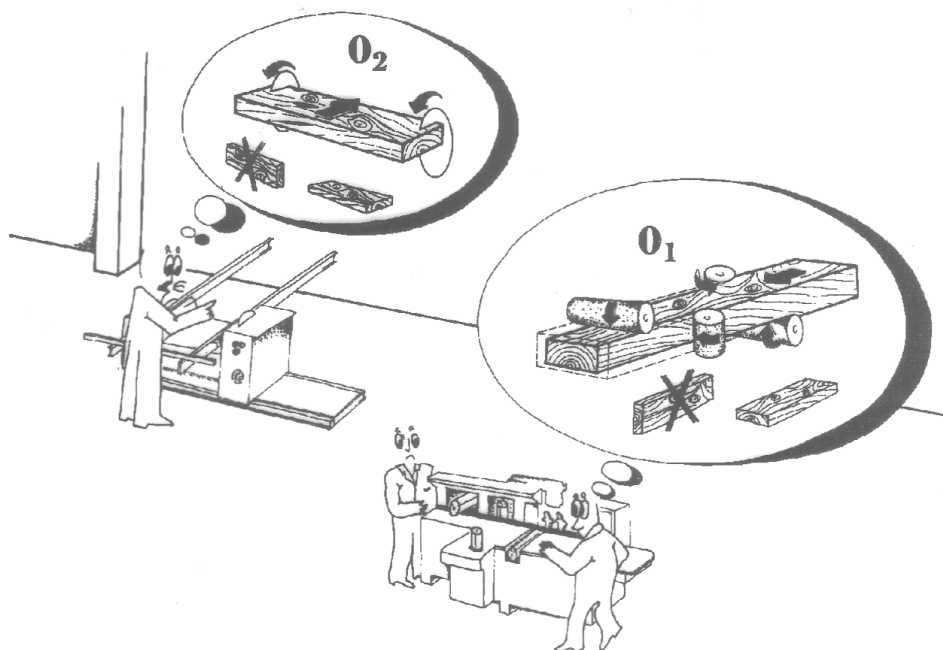
- Sa vertikalnim kretanjem
- Sa kombinanim kretanjem



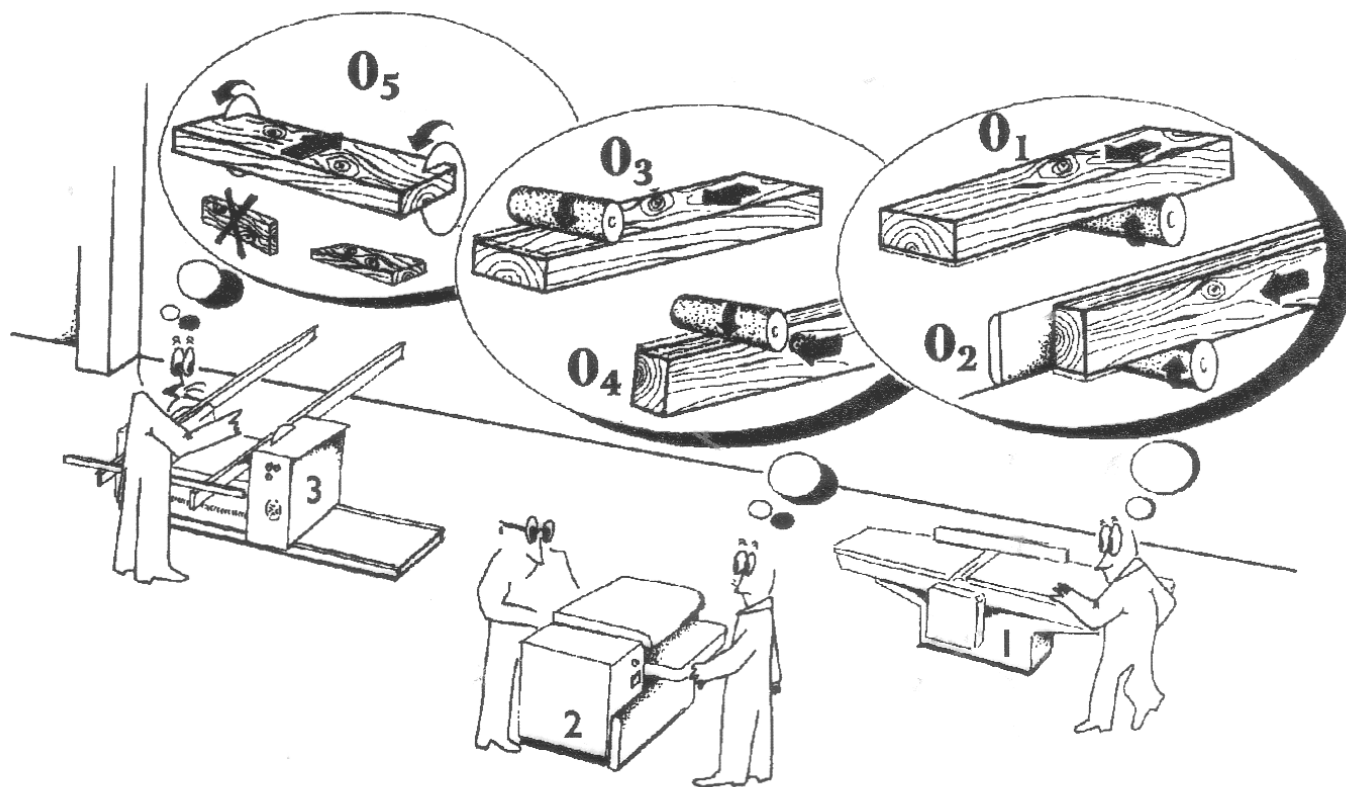


DIMENSIONISANJE I KONAČNA OBRAĐA DETALJA

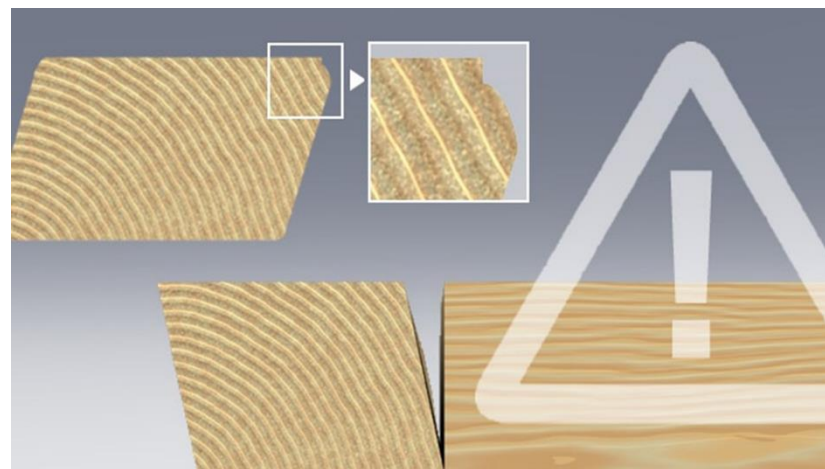
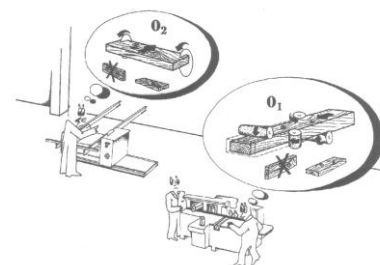
DIMENZIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA PRIMENOM 2 OPERACIJE



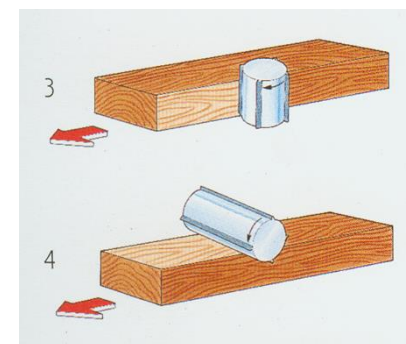
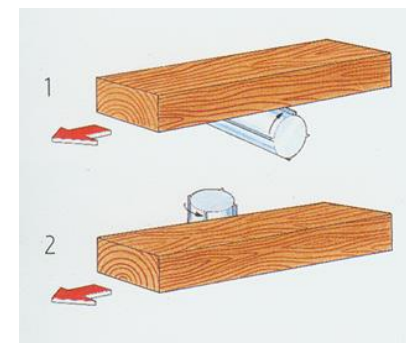
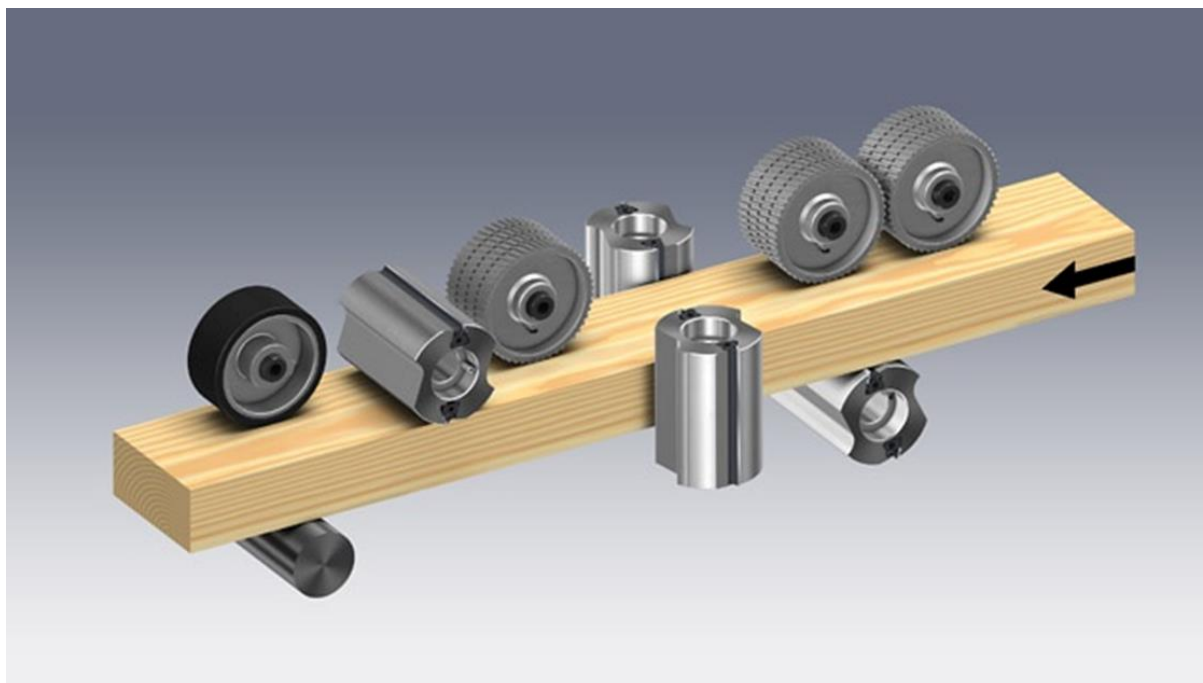
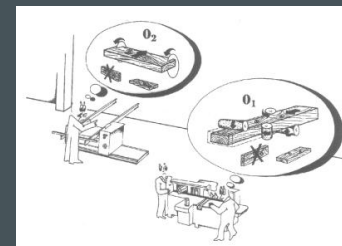
DIMENZIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA PRIMENOM 5 OPERACIJA



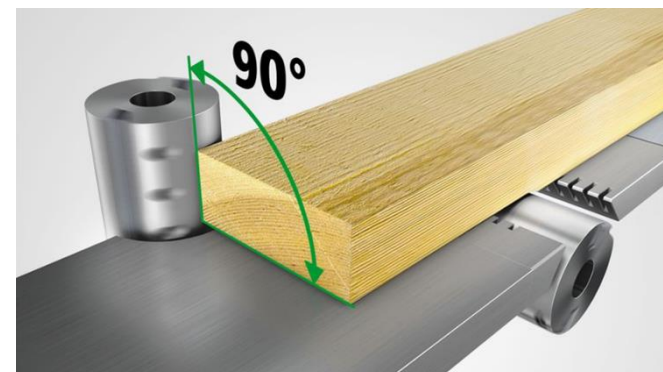
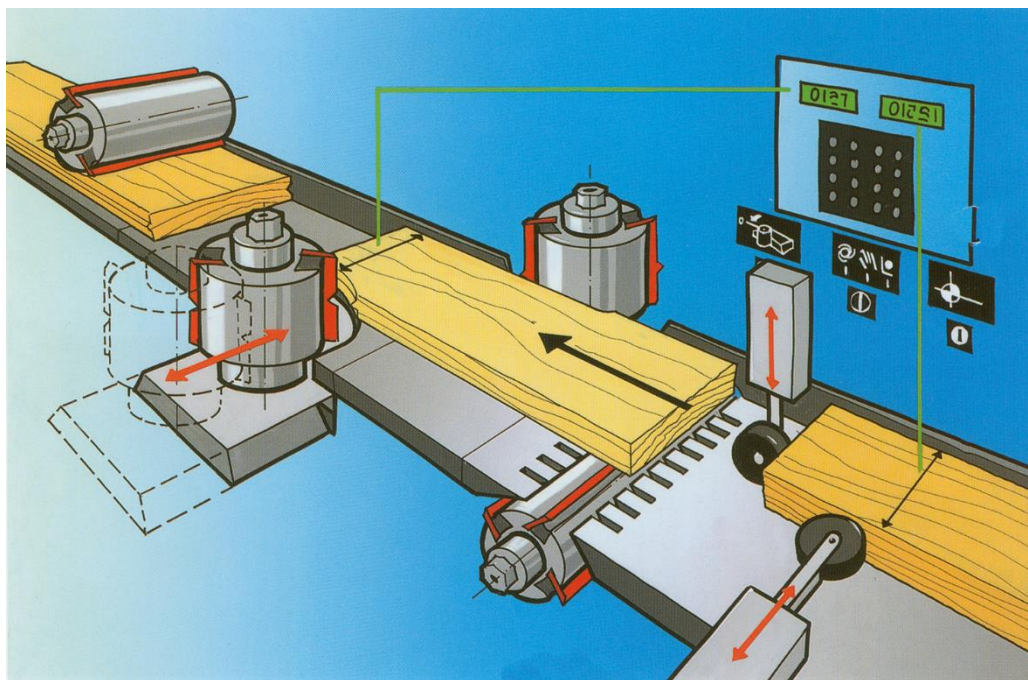
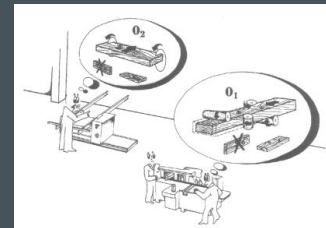
DIMENZIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA PRIMENOM 2 OPERACIJE



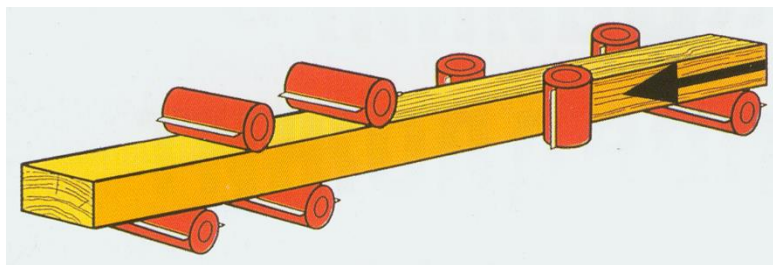
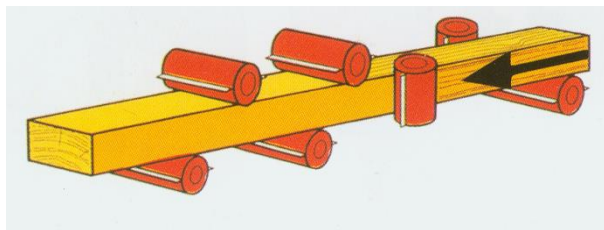
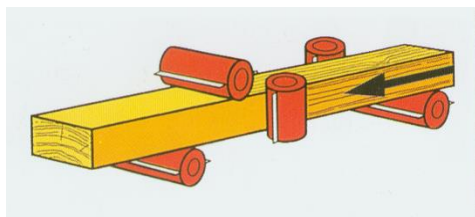
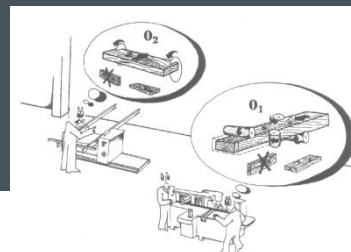
DIMENSIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA PRIMENOM 2 OPERACIJE



DIMENZIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA PRIMENOM 2 OPERACIJE

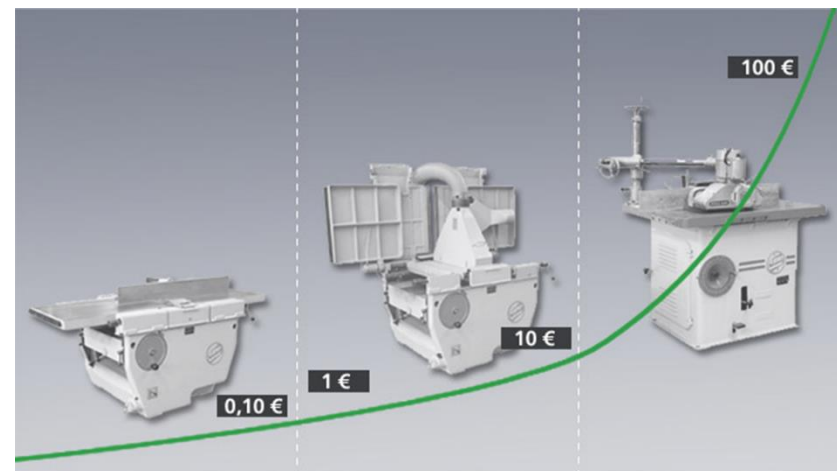
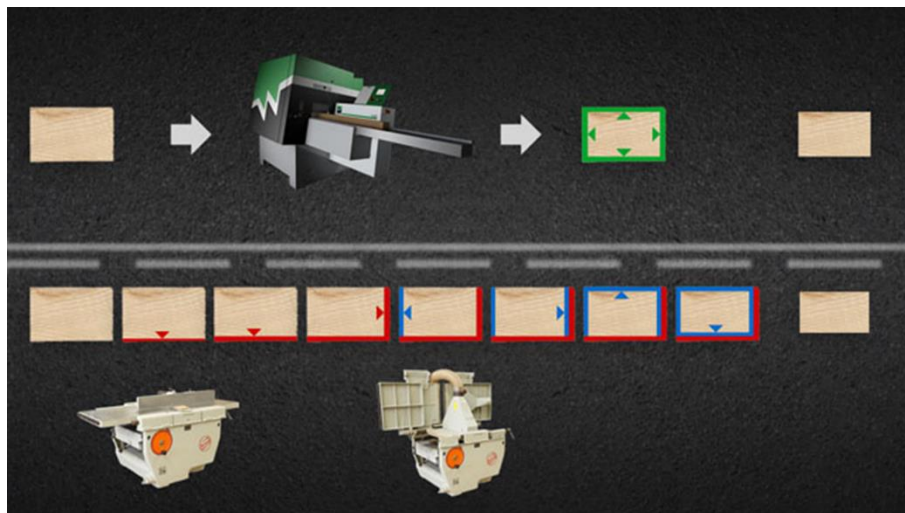


DIMENZIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA PRIMENOM 2 OPERACIJE

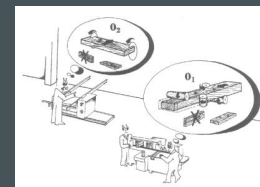


DIMENZIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA

PREDNOSTI / RAZLIKE



DIMENZIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA PRIMENOM 5 OPERACIJA – DIMENZIONISANJE DUŽINE



Dvolisna kružna pila



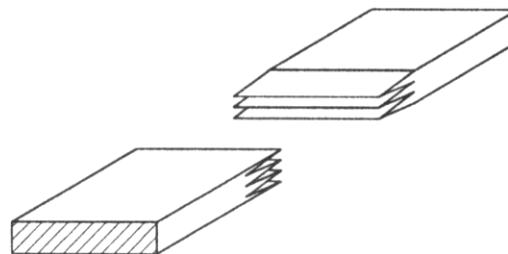
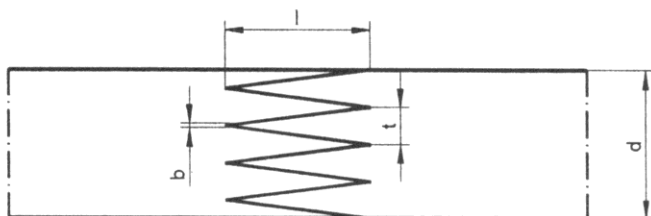
Dvolisna kružna pila sa
mogućnošću kraćenja pod
uglom



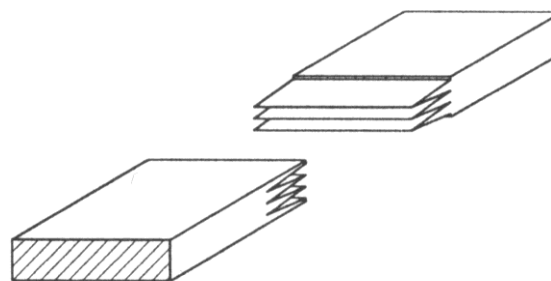
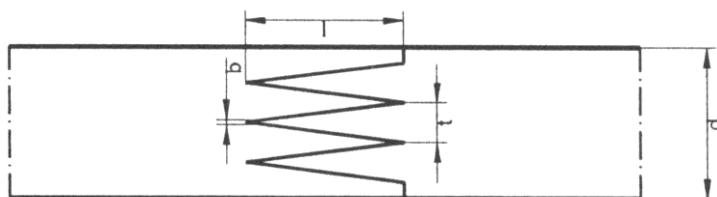
PREDNOSTI / RAZLIKE

NASTAVLJANJE GREDICA PO DUŽINI

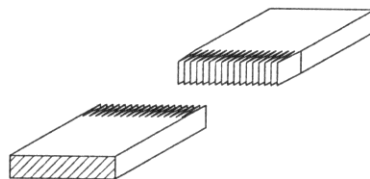
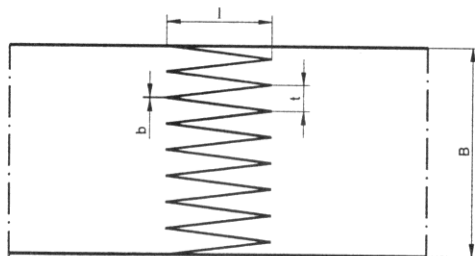




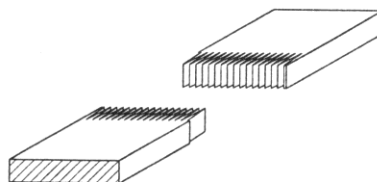
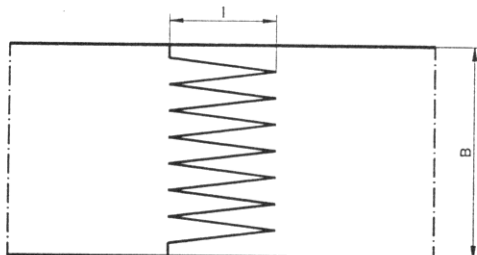
Bočni klinasto zupčasti spoj –tip A



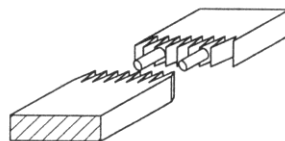
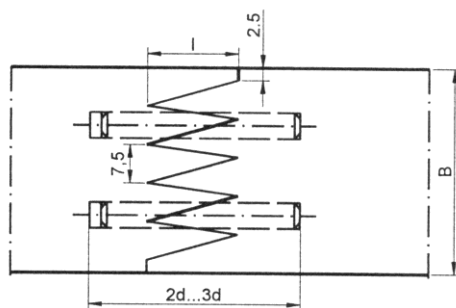
Bočni klinasto zupčasti spoj –tip B



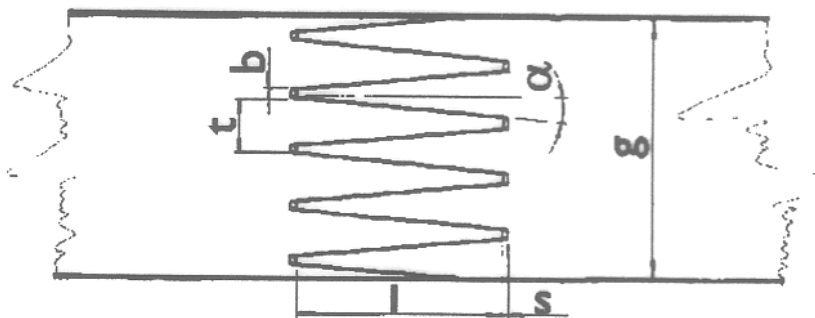
Stranični klinasto zupčasti spoj – tip A



Stranični klinasto zupčasti spoj – tip B



Stranični klinasto zupčasti spoj – tip B, ojačan tiplovima



Veličine geometrijskih karakteristika kod spojeva
izloženih visokom i srednjem naprezanju

Grupna naprezanja	l	t	b	v
	mm			
Visoko i srednje mehaničko naprezanje	7,5	2,5	0,2	0,08
	10	3,7	0,6	0,16
	20	6,2	1	0,16
	50	12	2	0,17
	60	15	2,7	0,18
Srednje mehaničko naprezanje	4	1,6	0,4	0,25
	15	7	1,7	0,24
	30	10	2	0,2

Izgled linije



3 TEHNOLOŠKE CELINE

■ I.T.C. – deo za izradu el.veze



■ 2.T.C. – prebacivač



■ 3.T.C. - presa





DIMENZIONISANJE DETALJA OD MASIVA PRIZMATIČNOG OBLIKA





NASTAVLJANJE GREDICA PO DEBLJINI

LEPKOVI

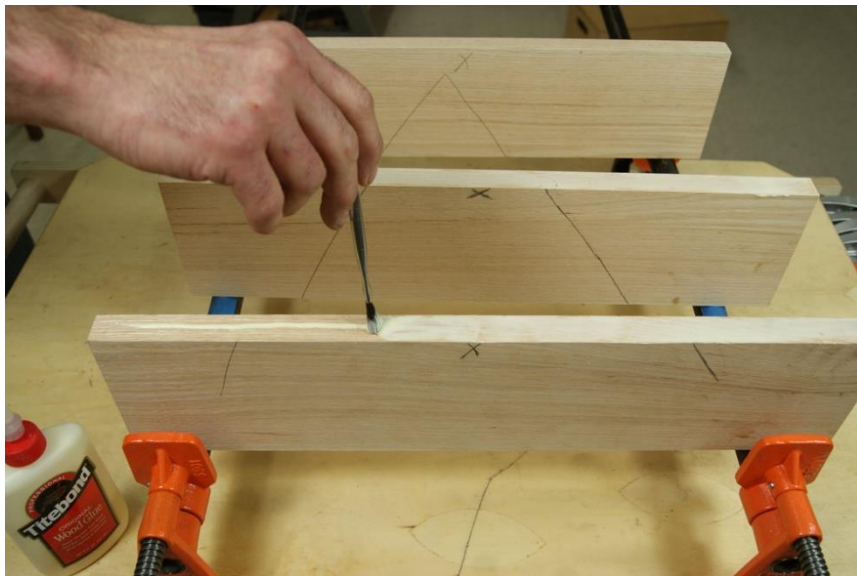
- PUR; PRF; RF
- $T = 18 \div 22^{\circ}\text{C}$
- $P = 1,5 \text{ N/mm}^2$
- $q = 250 \text{ g/m}^2$

Nanošenje lepka

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

NANOŠENJE LEPKA

■ Četkom

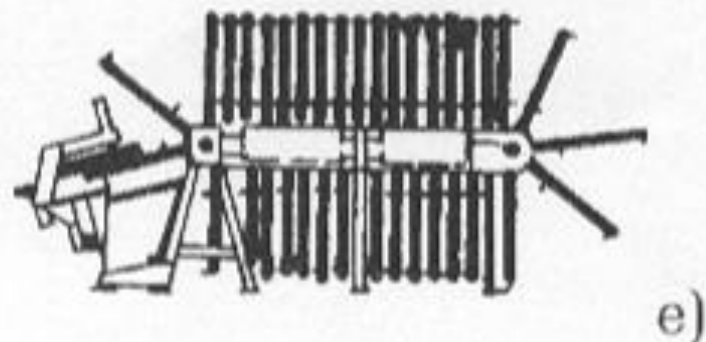
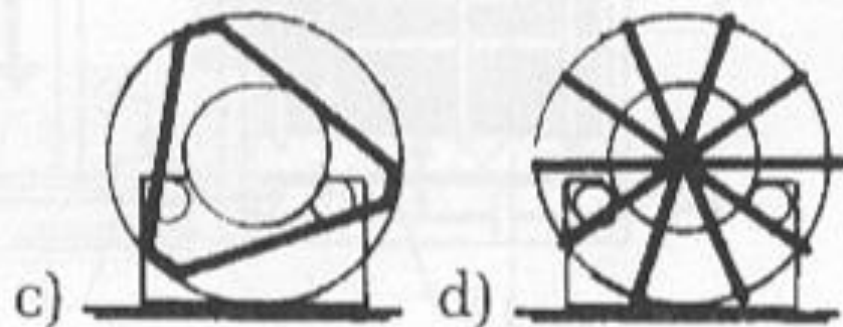
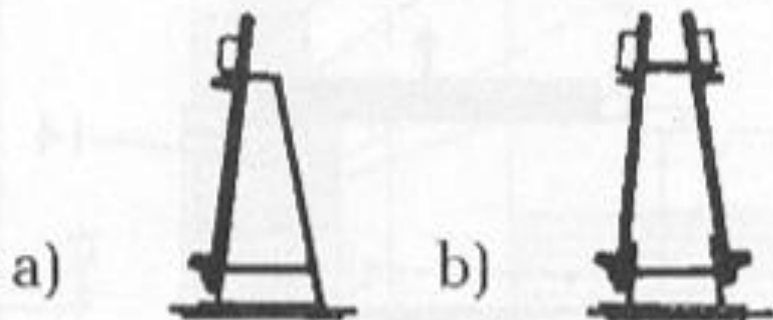


■ Valjkom – ručnim

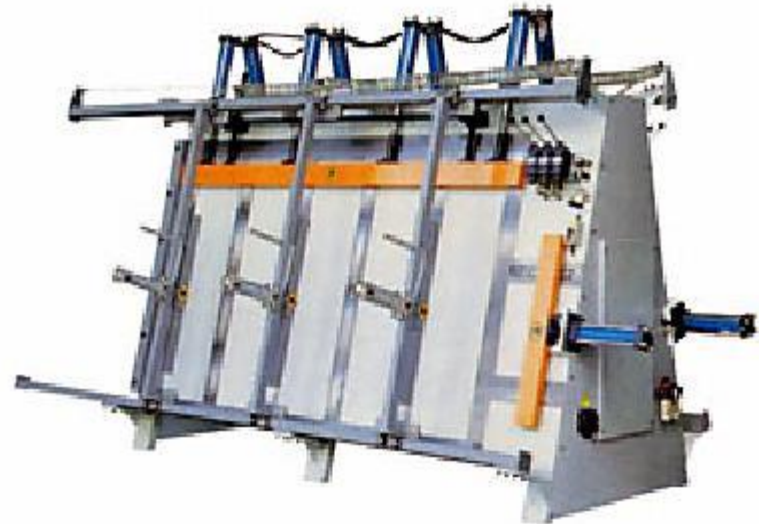
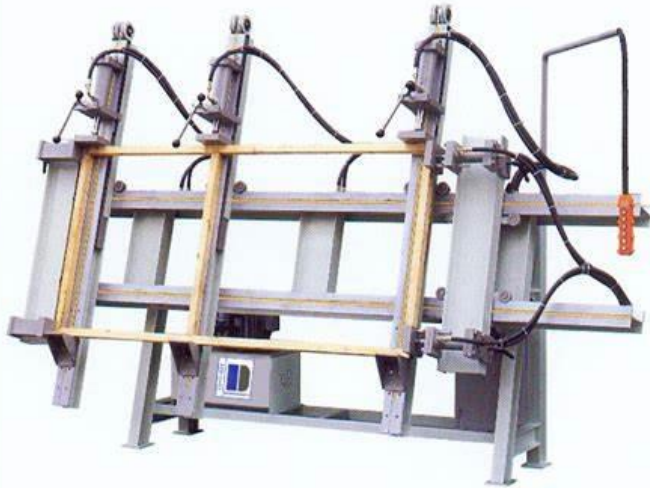




4.Faza Presovanje



RAMOVSKE PRESE



<https://www.bing.com/videos/search?&q=Taylor+Clamp+Carrier+-+JJ+Smith&view=detail&mid=BE27222D99D293339081BE27222D99D293339081&FORM=VDRVSR&ru=%2Fvideos%2Fsearch%3Fq%3DTaylor%2BClamp%2BCarrier%2B-%2BJJ%2BSmith%26qpvt%3DTaylor%2BClamp%2BCarrier%2B-%2BJJ%2BSmith%26FORM%3DVDRE&rvsmid=0A226084869F8691FB180A226084869F8691FB18&ajaxhist=0>

RAMOVSKJE PRESE - ZVEZDASTE



- https://www.bing.com/videos/search?q=Taylor+Clamp+Carrier+-+JJ+Smith&&view=detail&mid=09AAD34C59C6A480A39609AAD34C59C6A480A396&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3DTaylor%2BClamp%2BCarrier%2B-%2BJJ%2BSmith%26qpvt%3DTaylor%2BClamp%2BCarrier%2B-%2BJJ%2BSmith%26FORM%3DVDRE

Ramovske prese - konvejerne



<https://www.bing.com/videos/search?q=Taylor+Clamp+Carrier+-+JJ+Smith&&view=detail&mid=7A614A36CBF7896AEB4C7A614A36CBF7896AEB4C&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3DTaylor%2BClamp%2BCarrier%2B-%2BJJ%2BSmith%26qpvt%3DTaylor%2BClamp%2BCarrier%2B-%2BJJ%2BSmith%26FORM%3DVDRE>



OBRADNI SISTEM

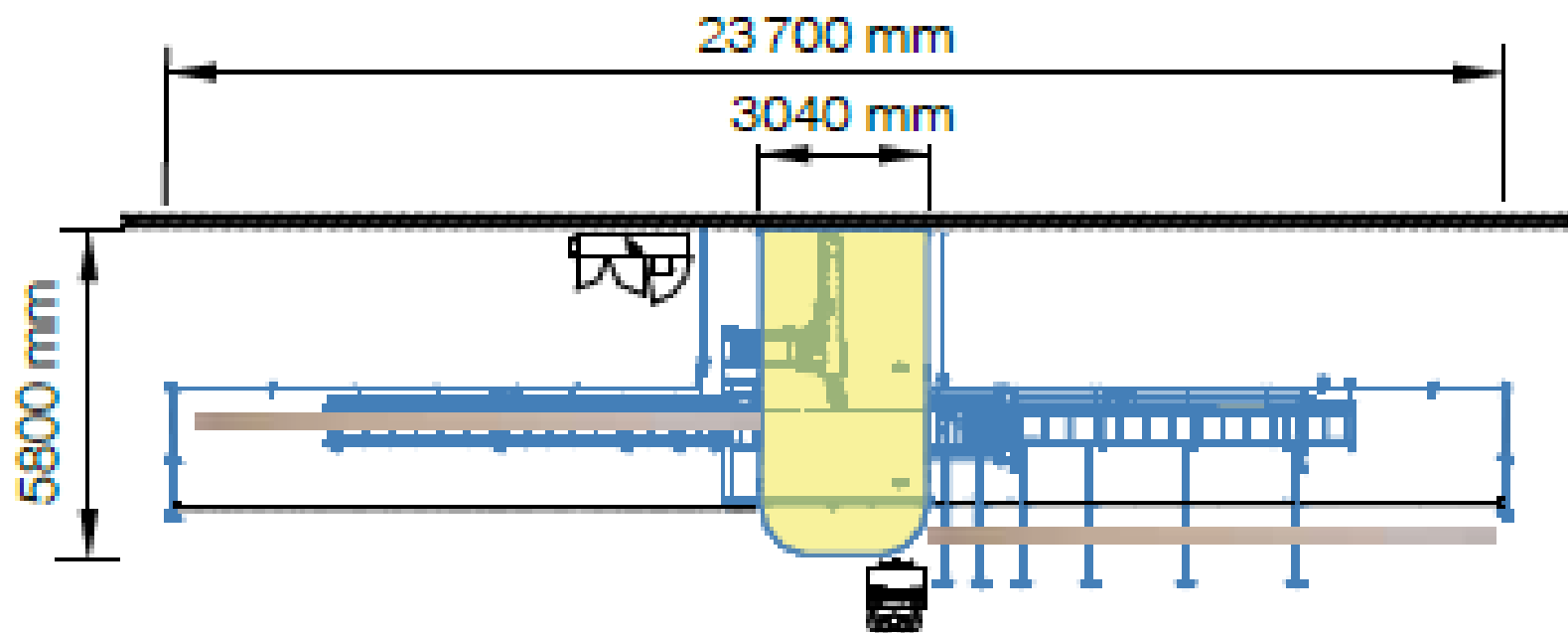
HUNDEGGER CNC

OPŠTI PODACI O MAŠINI

- Naziv mašine:
 - CNC centar za izradu elemenata za objekte od drveta
- Proizvođač:
 - Hundegger
- Tip:
 - K2i
- Br.radnih glava
 - 3 (1+2)

GEOMETRIJSKI SISTEM

Installation examples and dimensions



GEOMETRIJSKI SISTEM

- Geometrijske karakteristike mašine

- $B_{\min} = 60\text{mm}$

- $B_{\max} = 1450\text{mm}$

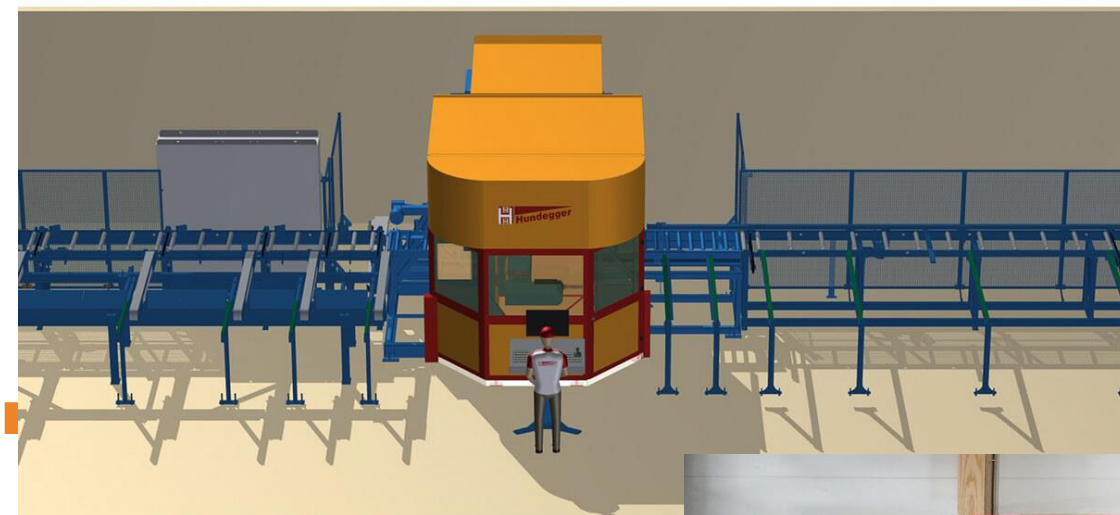
- $D_{\min} = 20\text{mm}$

- $D_{\max} = 300\text{mm}$

- $L_{\min} = 600\text{mm}$

- $L_{\max} = -$

KINEMATSKI SISTEM



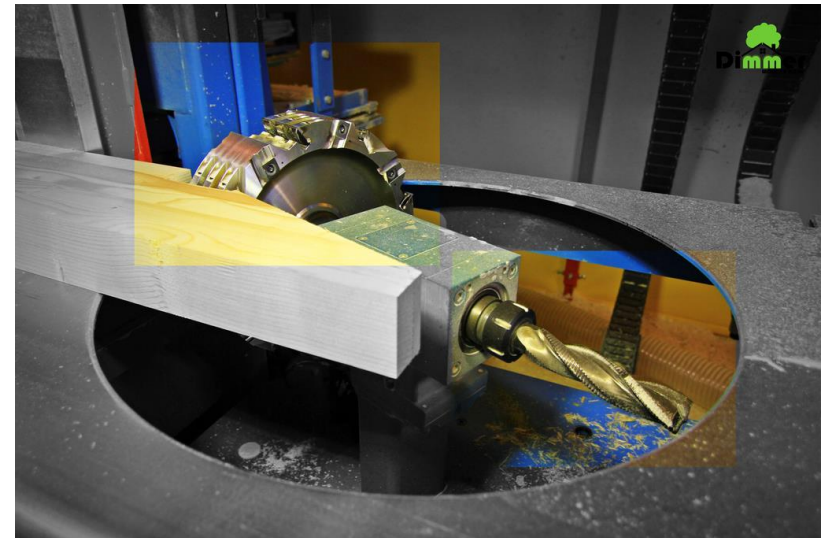


https://www.youtube.com/watch?v=3AQgEVCJY_o

<https://www.youtube.com/watch?v=mKxkY9lbBsQ>

<https://www.youtube.com/watch?v=dd5lj4e9IPU>

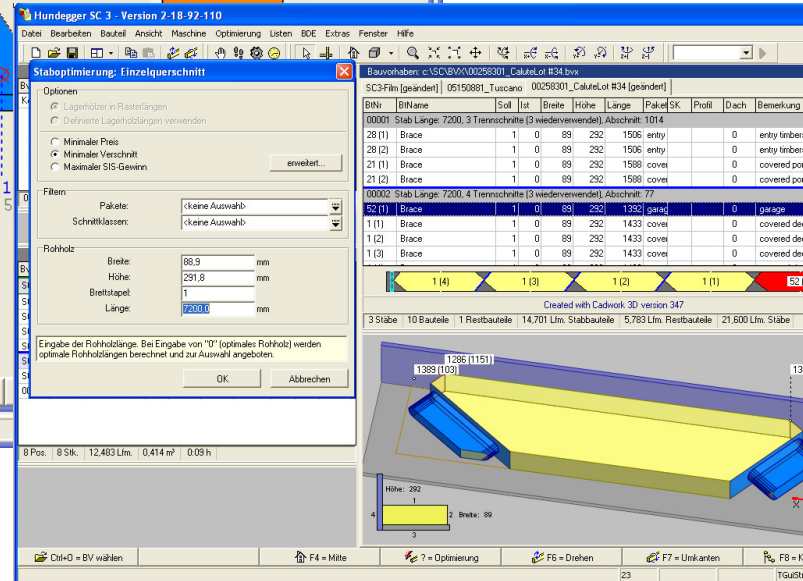
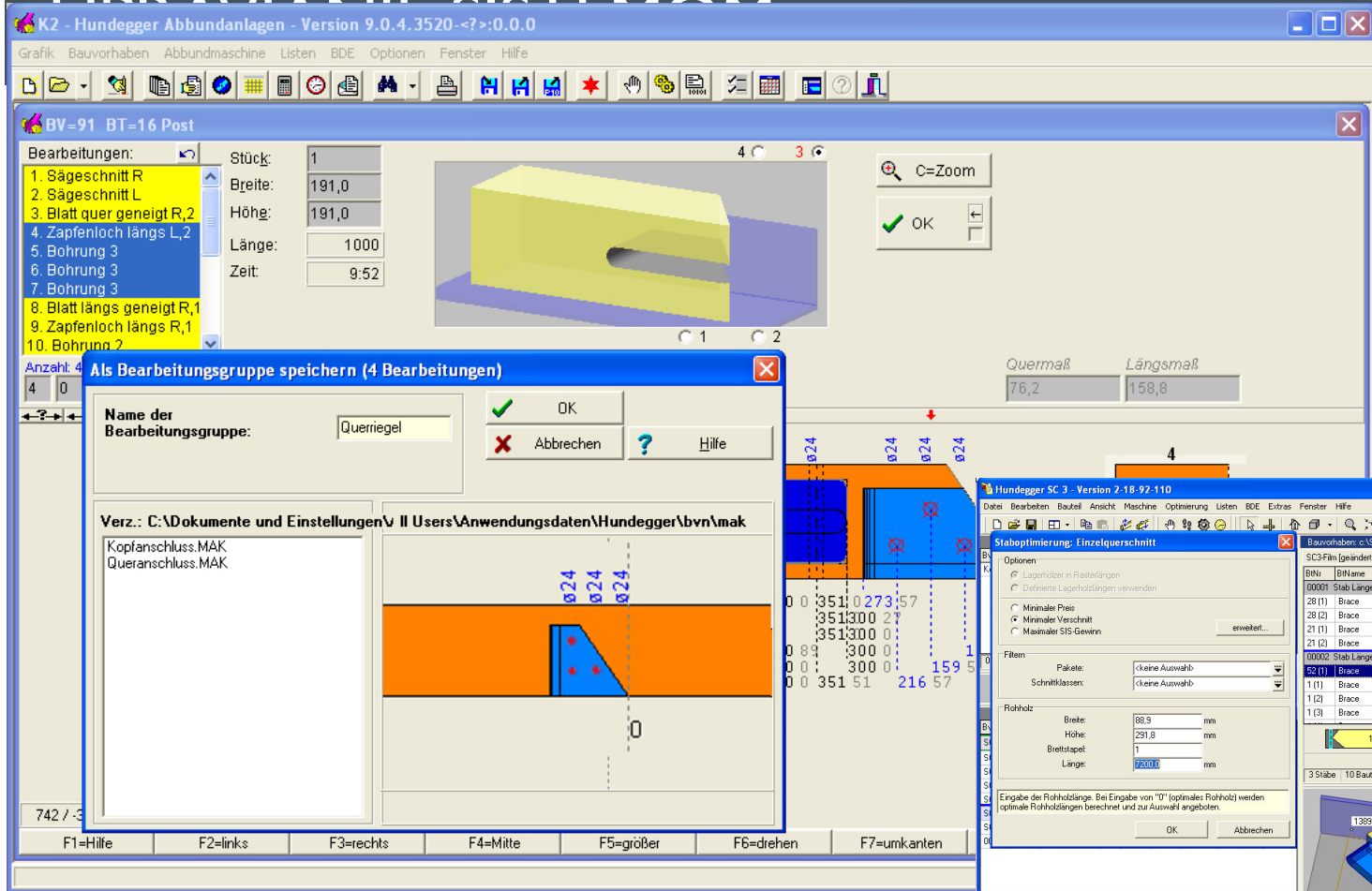
<https://www.youtube.com/watch?v=BCKVq9yTWrl>











BAZIRANJE I POZICIONIRANJE

