Fourth School Year

FIXTURES 1

They are production aids, which ***speed up***, make easier and sometimes ***enable*** production.

Basic function of *fixtures*

- The correct and definite ***setting*** of a workpiece.
- The firm, quick and safe ***clamping*** of a workpiece.
- The correct ***guidance*** of tools in regards to a workpiece.
- They ensure the ***achievement*** of required geometrical accuracies and the required surface roughness of machined surfaces.
- They ensure connected component positions during assembly.

Kinds of *fixtures*

<u>According to their classification in production</u>

- ***fixtures*** for machining
- welding ***fixtures***
- checking and measuring ***fixtures***
- drawing ***fixtures***
- assembly ***fixtures***

<u>According to ***extent*** of use</u>

- single-purpose – they are used in mass production or if it is not possible to produce a component in another way
- universal – they are used in piece production

<u>According to ***clamping*** forces</u>

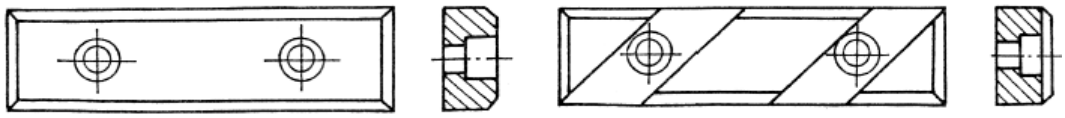
- ***fixtures*** with manual ***clamping***
- with a ***clamp*** - hydraulic
  - pneumatic
  - combined pneumatic-hydraulic
  - magnetic
  - with plastic material

<u>Basic ***fixture*** parts</u>

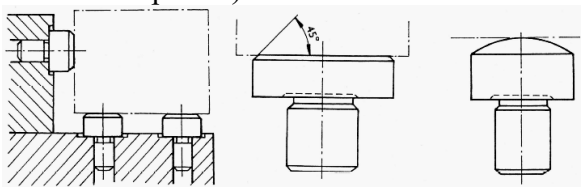
- ***setting*** element
- ***clamping*** element
- tool ***guidance*** element
- the body of a ***fixture***
- auxiliary elements (handles, ***chains***, connecting elements)

Setting elements

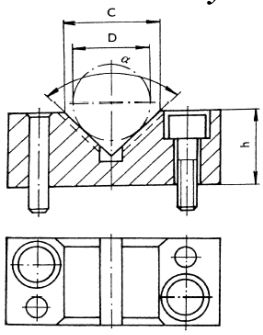
- ***bars*** (for long even workpieces)



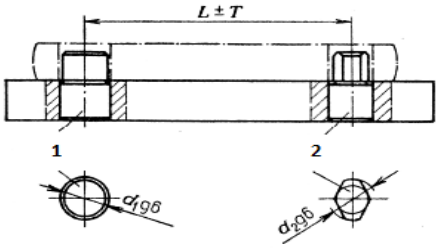
- ***work rest*** (for short even workpieces)



- ***prism*** (for drilling and ***groove*** production into ***cylindrical*** components)

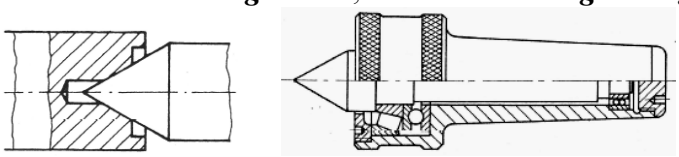


- ***centre pins*** (if it has a part produced with two holes)



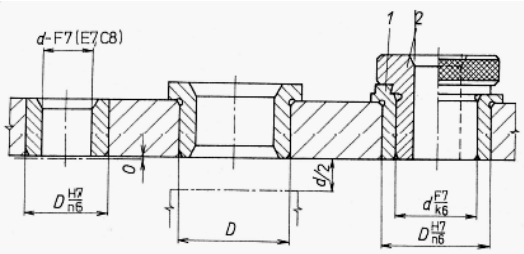
1…***cylindrical*** centre pin
2…***flattened*** centre pin

- ***tips*** – they are used to set ***centering marks***, and are used for ***grinding*** and ***turning***



Fixture guiding elements

They are used for correctly guiding tools in regards to a workpiece. They use a ***drill bush***. They are used for guiding drills, ***reamer drills*** and ***reamers***. ***Drill bushes*** are necessary when we need to make a hole a precise distance from an edge or holes at a precise ***pitch***.



***Fixture clamping* elements**

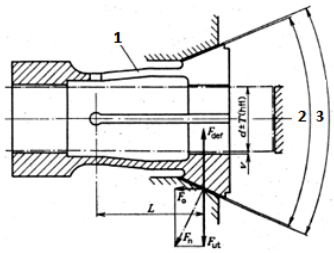
Chucks

They are used for ***clamping*** and ***setting*** as a part of machines with a workpiece rotating motion (***lathes***, ***grinders***).

Collets

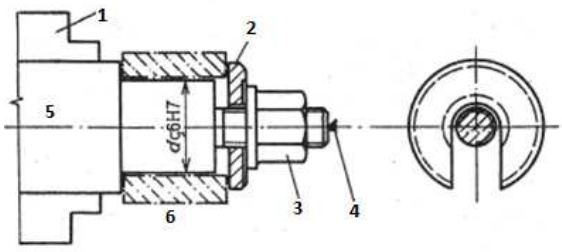
They are used for ***clamping cylindrical*** surfaces.

1…***collets***
2…$\alpha = 31°$
3…$\alpha = 30°$



Arbors

They are used for ***clamping*** and ***setting*** components with holes.

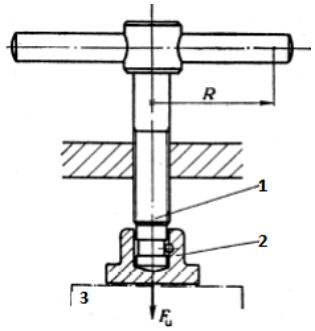


1…***chuck***
2…round ***work rest*** with a ***slot***
3…***hexagonal nut***
4…***centering marks***
5…***overhung arbor***
6…workpiece

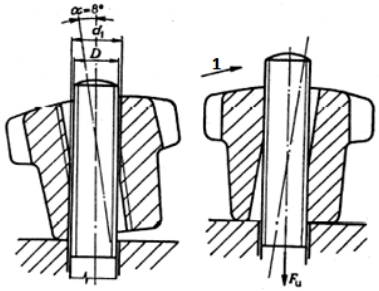
Screws and nuts

They are cheap, produced simply, and self-locking. By using a little controlling force we can create great ***clamping*** force.

The disadvantage is lengthy ***clamping*** for great ***strokes*** and there is limited space for ***lever*** and handle motion.



1…***screw*** with a ***peg*** handle
2…pressure ***work rest***
3…workpiece

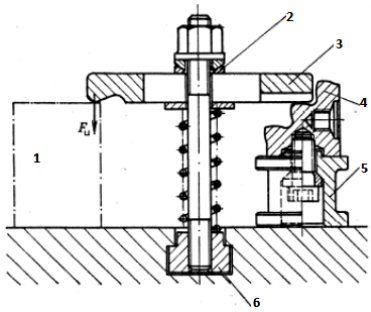


quick-***clamping nut***
1…***swung out*** in ***clamping***

Clamps

They are ***levers*** for ***clamping*** even surfaces.

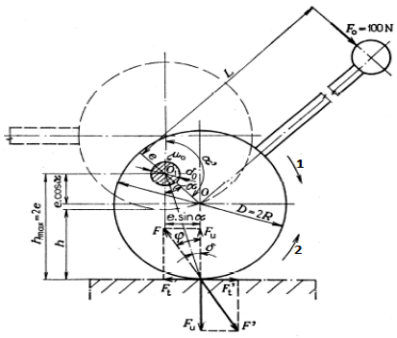
1…workpiece
2…round work rest
3…***pull-out*** surface ***clamp***
4…support under ***clamp***
5…support ***stand***
6…guiding insert into a T groove



Eccentrics

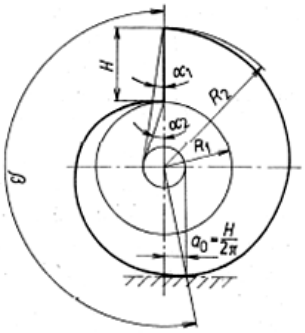
They rotate around a centre, which is not the centre of symmetry. The advantage is their simple production and ***clamping*** speed. The disadvantage is their low ***clamping*** height.

1…***clamping***
2…***loosening***

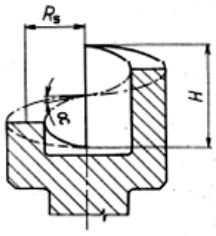


Cams

The surface is made up of an Archimedes ***screw*** or helix. The disadvantage is their complicated production. The advantage is their great ***extent*** of ***clamping***.



cam with an Archimedes ***screw***



cam with a helix

Literature and sources used: Augustin Frank a kol., Strojírenská technologie 4, SNTL

VOCABULARY

achievement	dosažení	**hexagonal**	šestihranná
arbor	trn	**lathe**	soustruh
bar	lišta	**lever**	páka
cam	vačka	**loosening**	uvolnění
centering mark	středící důlek	**nut**	matice
centre pin	středící čep	**overhung**	letmý
chain	řetěz, řetízek	**peg**	kolík
chuck	sklíčidlo	**pitch**	rozteč
clamp	upínat, svorka	**prism**	prizma
clamping	upínání, upnutí	**pull-out**	výsuvný
collet	kleština	**reamer**	výstružník
cylindrical	válcový	**reamer drill**	výhrubník
drill bush	vrtací pouzdro	**screw**	šroub
eccentric	výstředník	**setting**	ustavení
enable	umožnit	**slot**	výřez
extent	rozsah	**speed up**	zrychlovat
fixture	přípravek	**stand**	podpěra
flattened	zploštělý	**stroke**	zdvih
grinder	bruska	**swung out**	vyklonění
grinding	broušení	**tip**	hrot
groove	drážka	**turning**	soustružení
guidance	vedení	**work rest**	opěrka
helix	šroubovice		

COMPREHENSION QUESTIONS

1. What basic functions of fixtures do you remember from the text?
2. What kind of fixtures do you know?
3. Why do we use the fixture guiding element?
4. What fixture clamping elements do you know?

EXERCISES

1. Cryptogram – encrypt the phrase from the text.

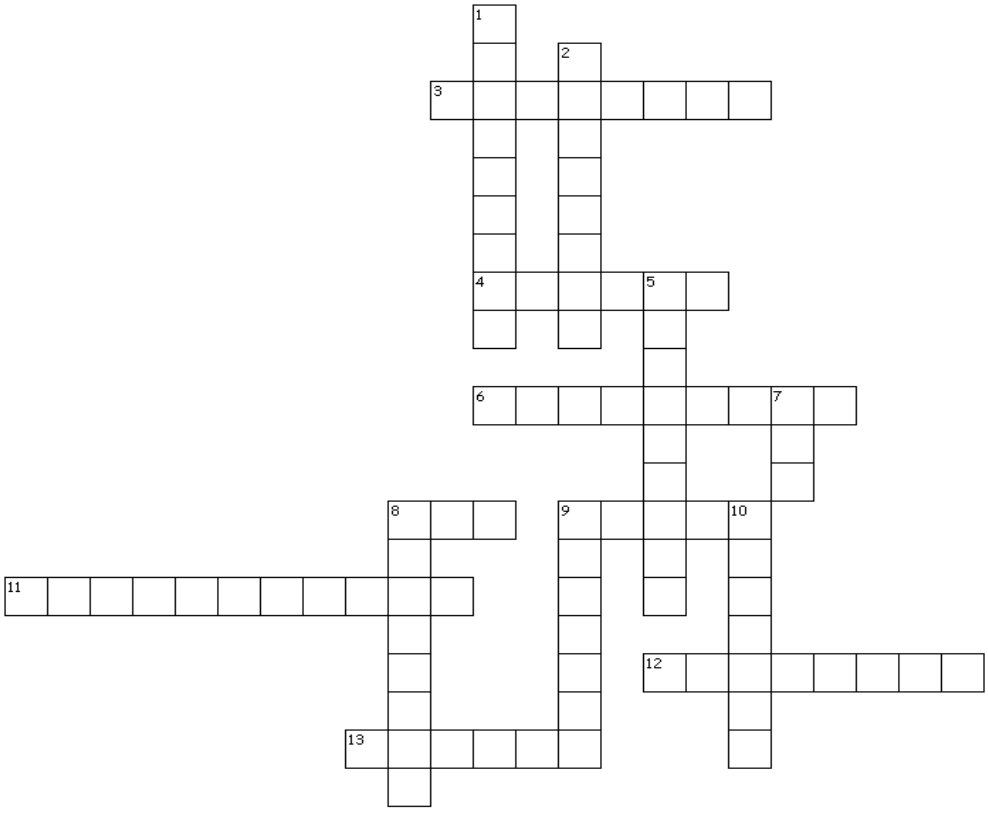
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
				23				1			11	16					18			5					

	I			U	R	E		U	I		I			E	L	E	M	E			
20	1	13	19	5	18	23	15	5	1	6	1	12	15	23	11	23	16	23	12	19	10
R	E		U		E			R			R	R	E			L			U	I		I		
24	18	23	5	10	23	6	20	21	18	2	21	18	18	23	2	19	11	17	15	5	1	6	1	12	15
			L		I		R	E		R									R			I	E		
19	21	21	11	10	1	12	18	23	15	24	18	6	10	19	21		24		7	21	18	14	26	1	23	2
E	.			E		U		E			R	I	L	L		U					I				
23		19	25	23	17	5	10	23		24	6	18	1	11	11	8	5	10	25	7	25	1	2	25		
	I		U		E			R		U	I		I			R	I	L	L		,				
	1	10	5	10	23	6	20	21	18	15	5	1	6	1	12	15	6	18	1	11	11	10				
	R	E		M	E	R		R	I	L	L					R	E		M	E	R		.		
	18	23	24	16	23	18	6	18	1	11	11	10	24	12	6	18	23	24	16	23	18	10			

2. Criss Cross Puzzle – 15 words were placed into the puzzle.

Across
3. tlak
4. kleština
6. uvolnění
8. vačka
9. šroub
11. válcový
12. vedení
13. umožnit

Down
1. obrobek
2. montážní
5. výstředník
7. matice
8. upínání
9. povrch
10. svařovací



EXERCISES – KEY FOR TEACHERS

1. Cryptogram

The phrase:
Fixture guiding elements are used for correctly guiding tools in regards to a workpiece. They use a drill bush which is used for guiding drills, reamer drills and reamers.

2. Criss Cross Puzzle

enable	umožnit
guidance	vedení
clamping	upínání
welding	svařovací
assembly	montážní
collet	kleština
cylindrical	válcový
nut	matice
workpiece	obrobek
screw	šroub
pressure	tlak
eccentric	výstředník
cam	vačka
surface	povrch
loosening	uvolnění