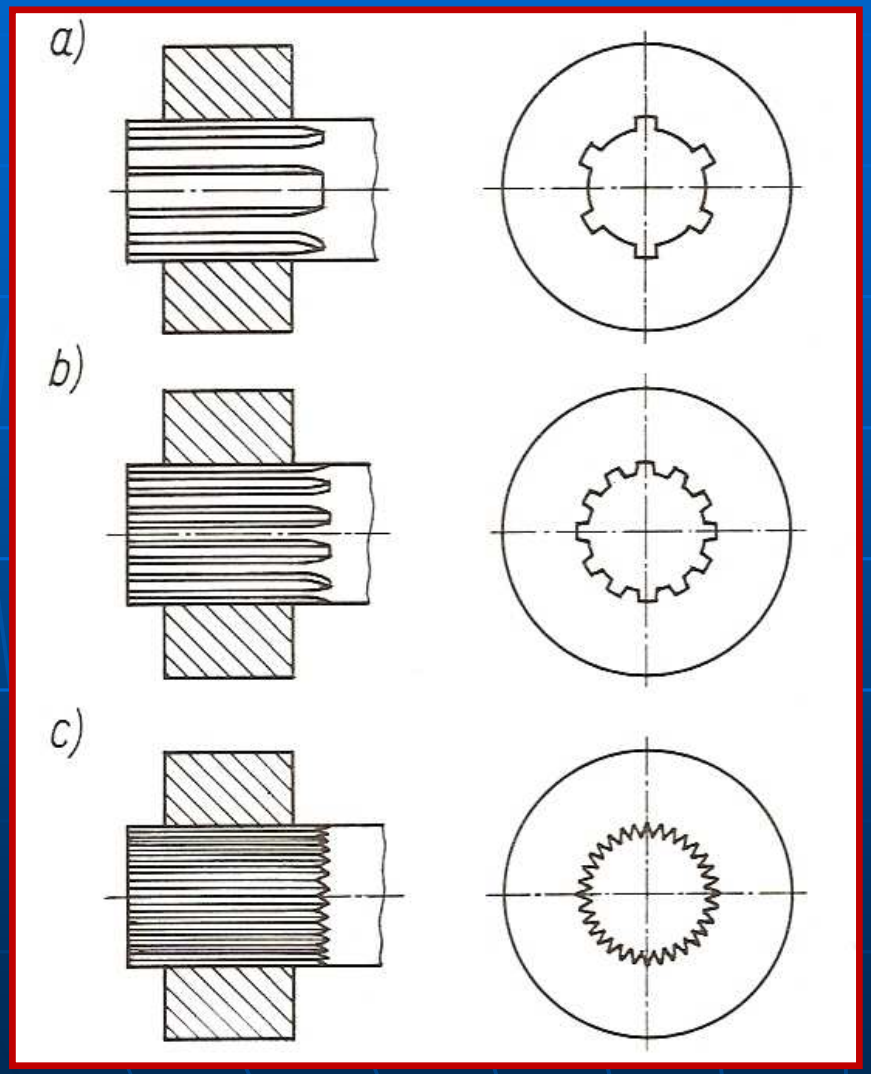
Engineering drawing

Semester I/II

Mechanical Engineering Department
Technical University of Gdańsk

Lecture 11/12

Splines

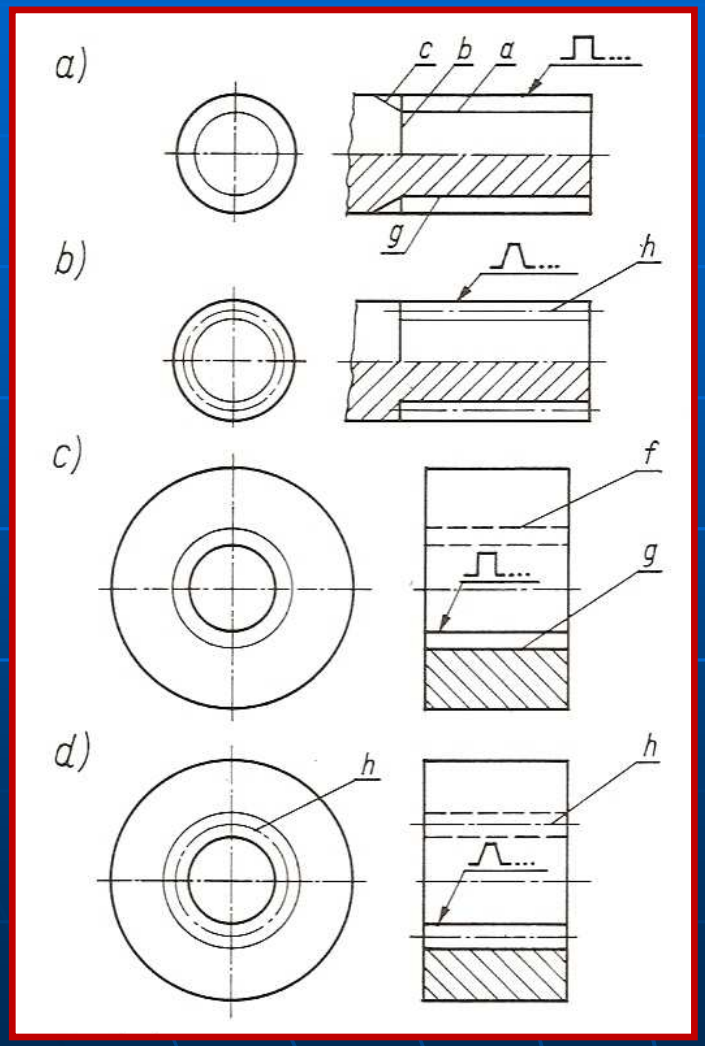


A shaft with parallel splines

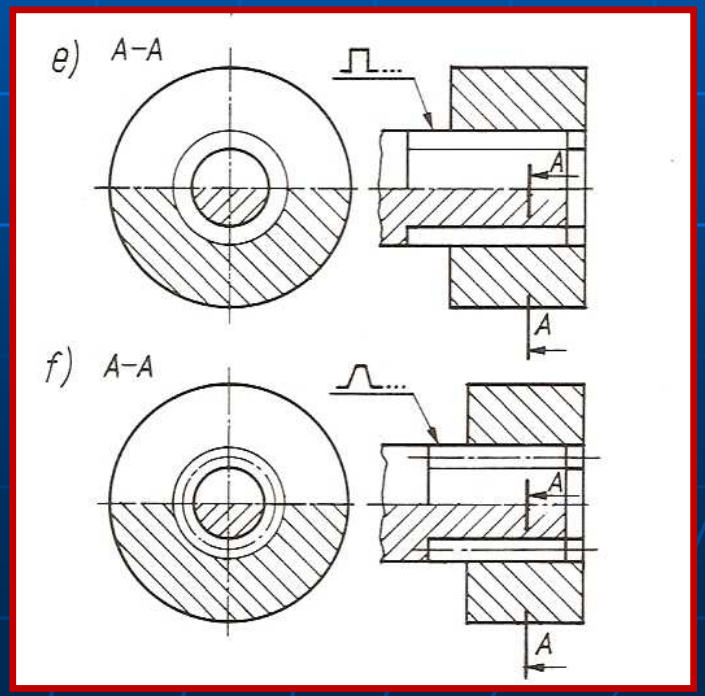
A shaft with involute splines

A multifracture shaft

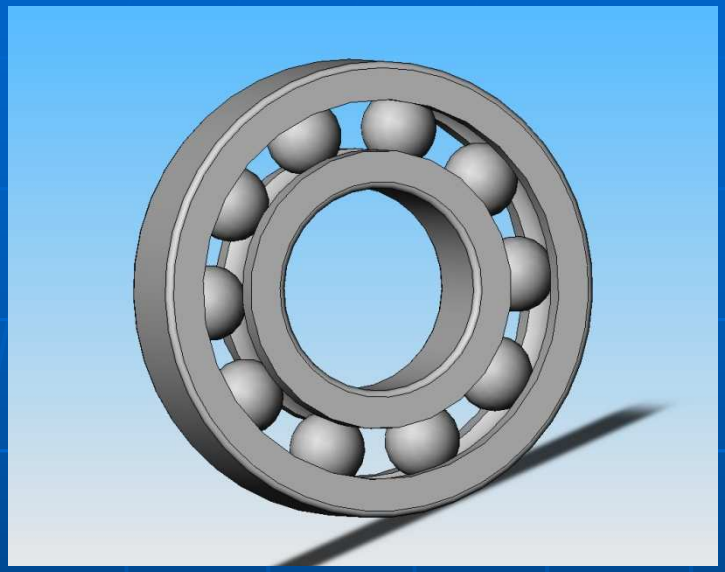
Representing of splines in simplification



a) a shaft with parallel splines
b) a shaft with involute splines
c) a hub with parallel splines
d) a hub with involuts splines
e) splined connection with parallel splines
f) splined connection with involute splines

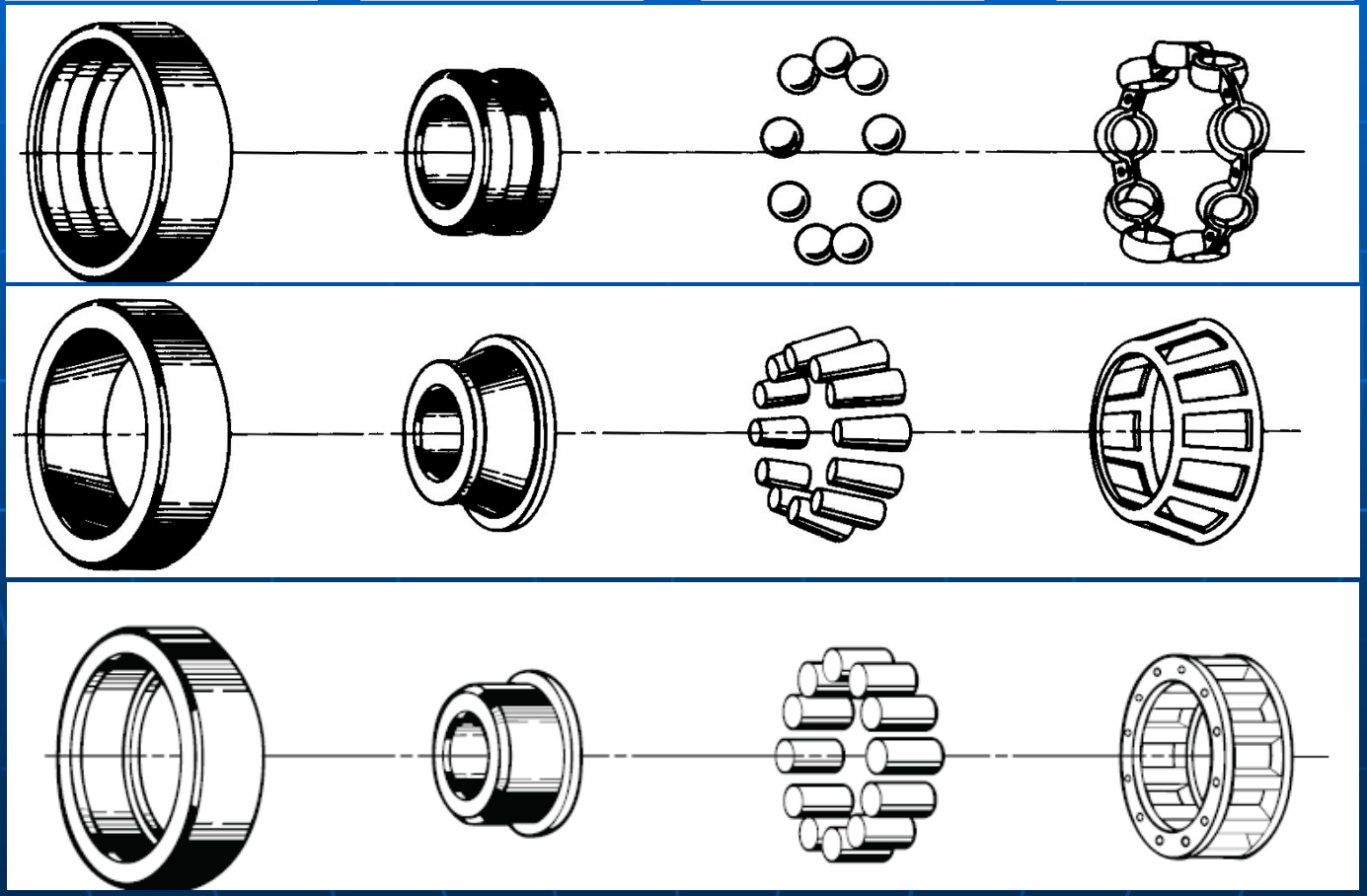


Rolling bearings



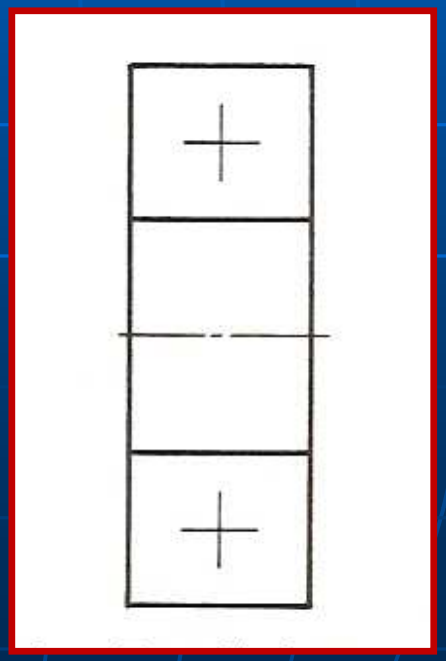
Rolling bearings – structure

Outer ring	Inner ring	Rolling parts	Bearing cage

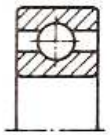
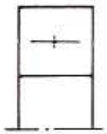
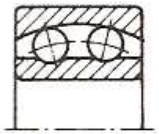
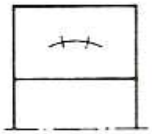
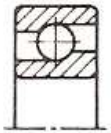
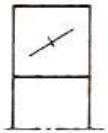
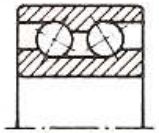
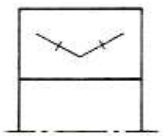
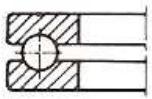
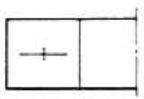
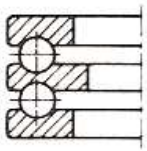
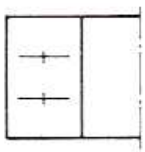


Representing of ball bearings

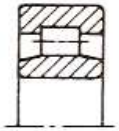
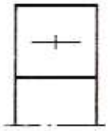
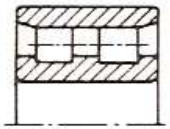
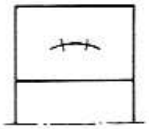
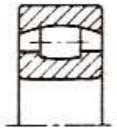
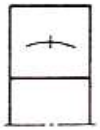
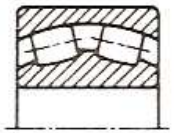
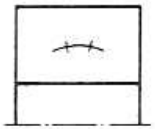
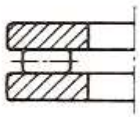
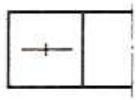
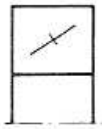
- in simplification
- in agreed way with description bearing features
- in agreed way describing overall shapes only



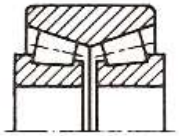
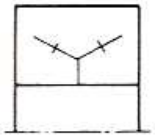
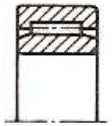
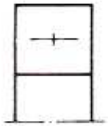
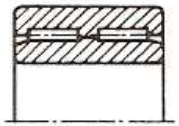
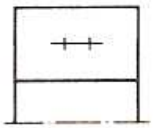
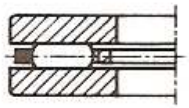
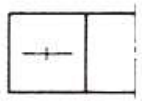
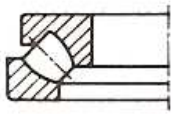
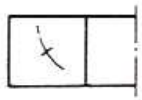
Representing of ball bearings

Bearing name		Simplification	Agreed way with description bearing features
Ordinary ball bearing	Kulkowe zwykłe		
Self-aligning ball bearing	Kulkowe wahliwe		
Single angular bearing	Kulkowe skośne jednorzędowe		
Double angular bearing	Kulkowe skośne dwurzędowe		
Single thrust bearing	Kulkowe wzdłużne jednokierunkowe		
Double thrust bearing	Kulkowe wzdłużne dwukierunkowe		

Representing of ball bearings

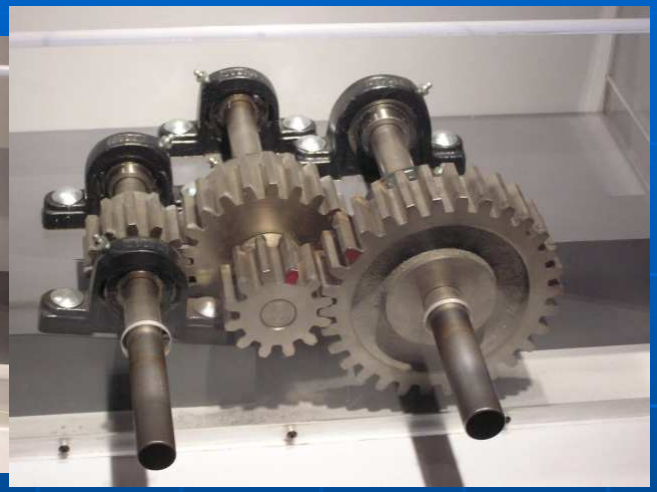
Bearing name		Simplification	Agreed way with description bearing features
Roller bearing	Walcowe		
Double roller bearing	Walcowe dwurzędowe		
Barrel bearing	Baryłkowe jednorzędowe		
Double barrel bearing	Baryłkowe dwurzędowe		
Roller thrust bearing	Walcowe wzdłużne		
Tapper roller bearing	Stożkowe		

Representing of ball bearings

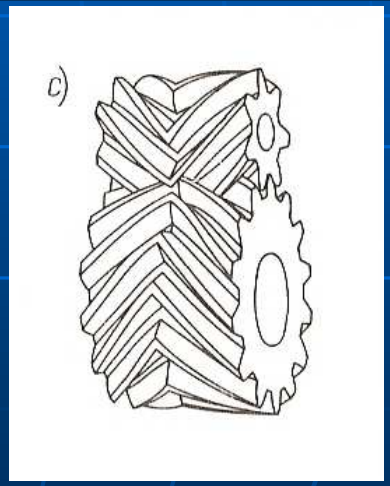
Bearing name		Simplification	Agreed way with description bearing features
Double tapper roller bearing	Stożkowe dwurzędowe		
Needle bearing	Igiełkowe		
Double needle bearing	Igiełkowe dwurzędowe		
Needle thrust bearing	Igiełkowe wzdłużne		
Bareel thrust bearing	Baryłkowe wzdłużne		

Types of gear transmissions

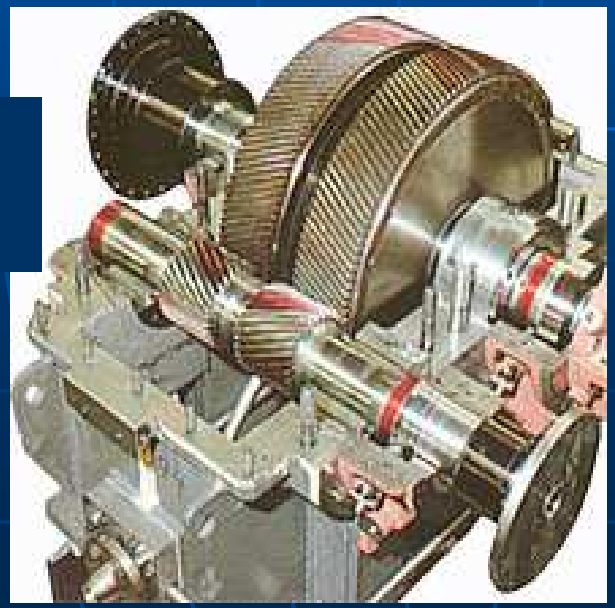
Spur gear



Herringbone gear

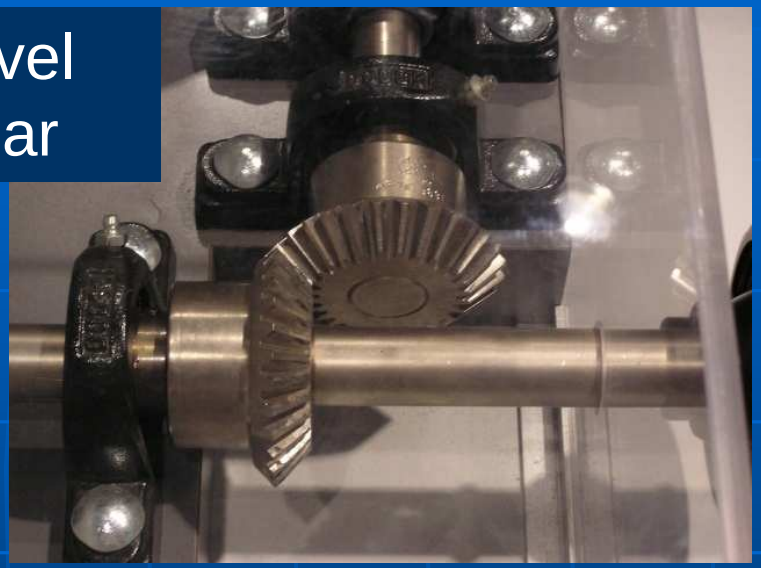


Helical gear

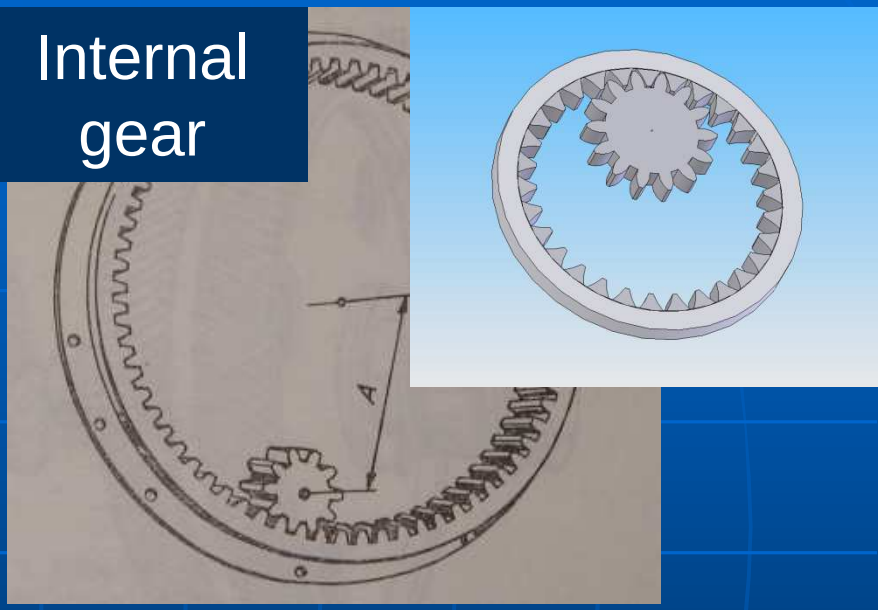


Types of gear transmissions

Bevel gear

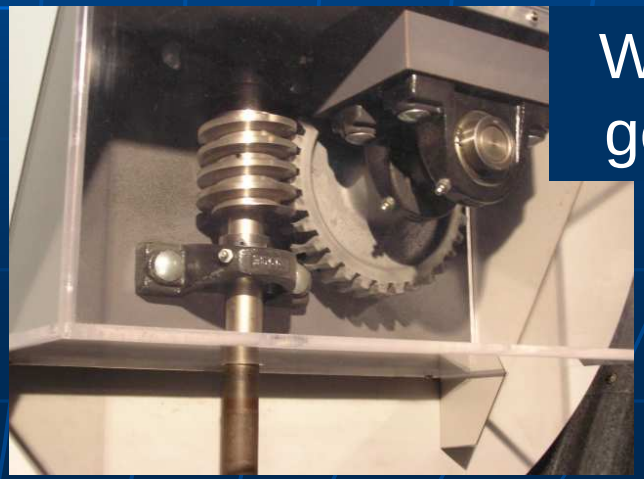


Internal gear



Planetary gears

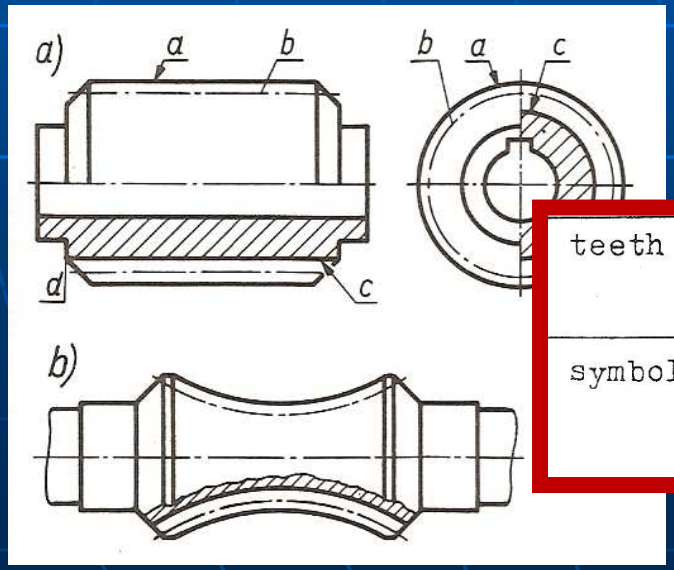
Worm gears

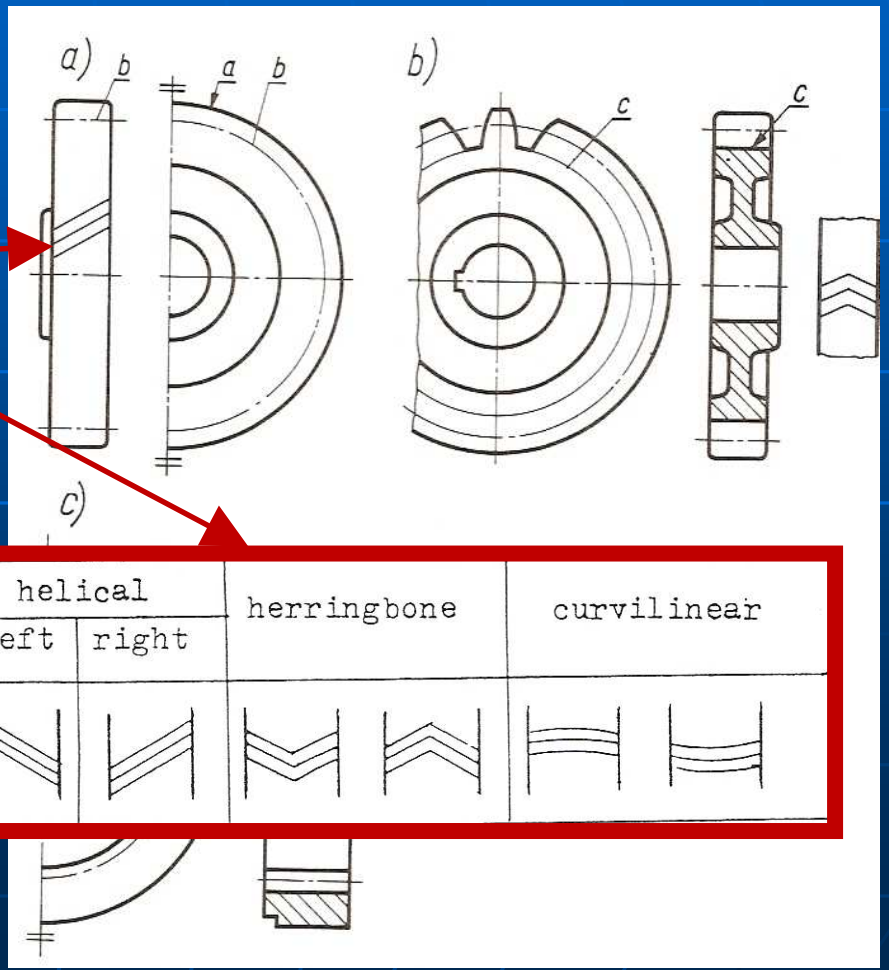


Representing of gears and gear transmission

Design features of gears and gears transmissions are represented on drawings by means of:

- addendum circles (a),
- pitch circles (b),
- dedendum circles (c),
- helix angle lines.

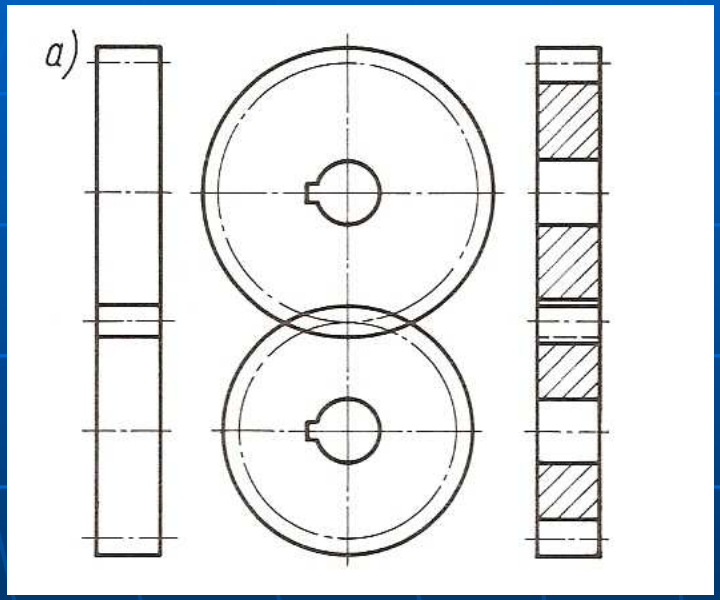




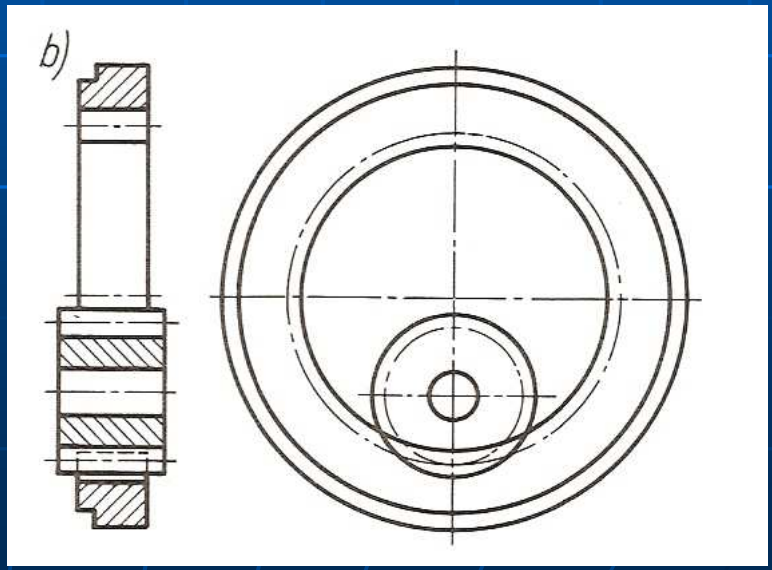
teeth type	helical		herringbone	curvilinear
	left	right		
symbol				

Representing of gears and gear transmission

Parallel axles spur gear transmission

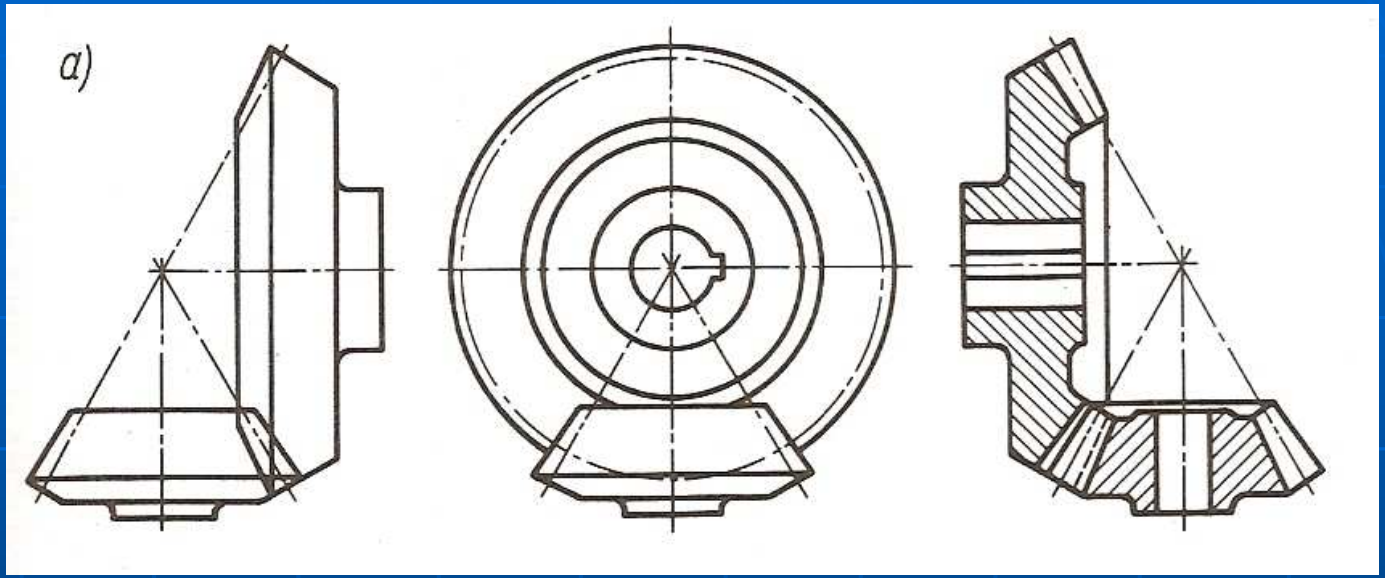


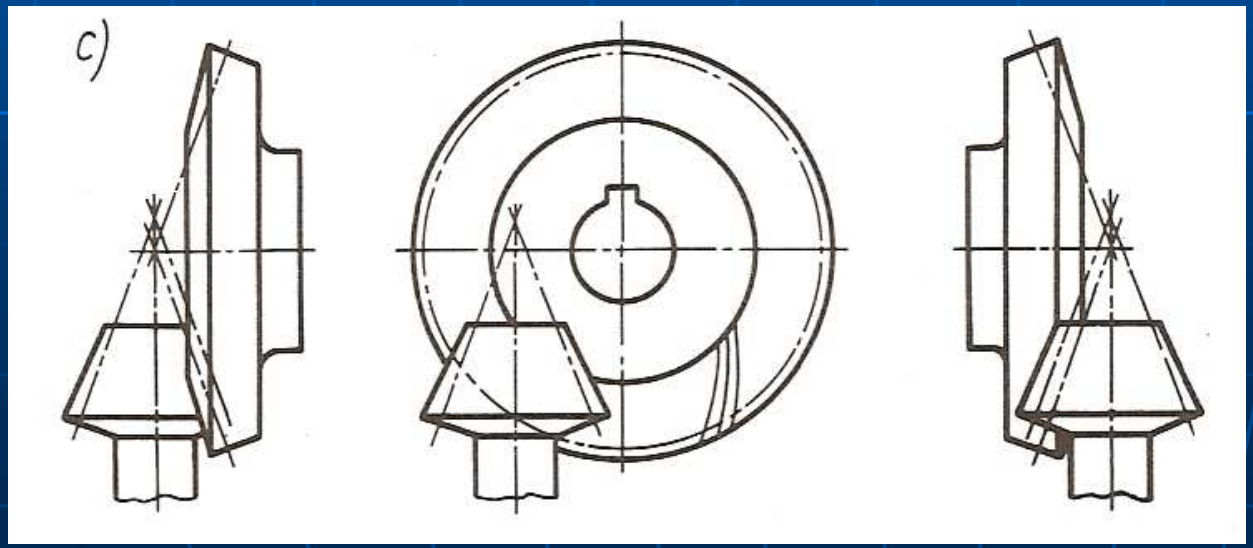
Inner mesh spur gear transmission



Representing of gears and gear transmission

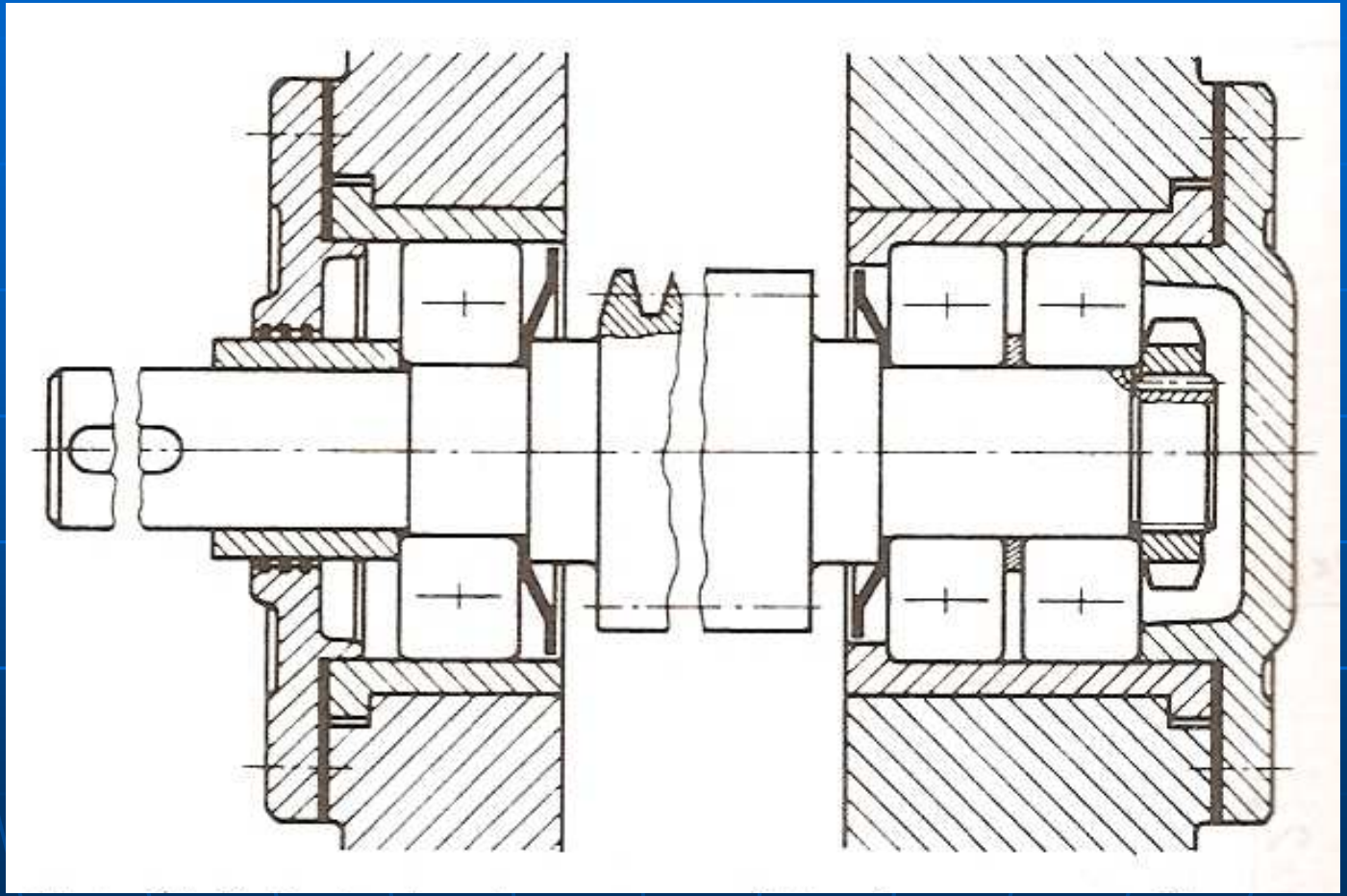
Straight teeth bevel gear transmission





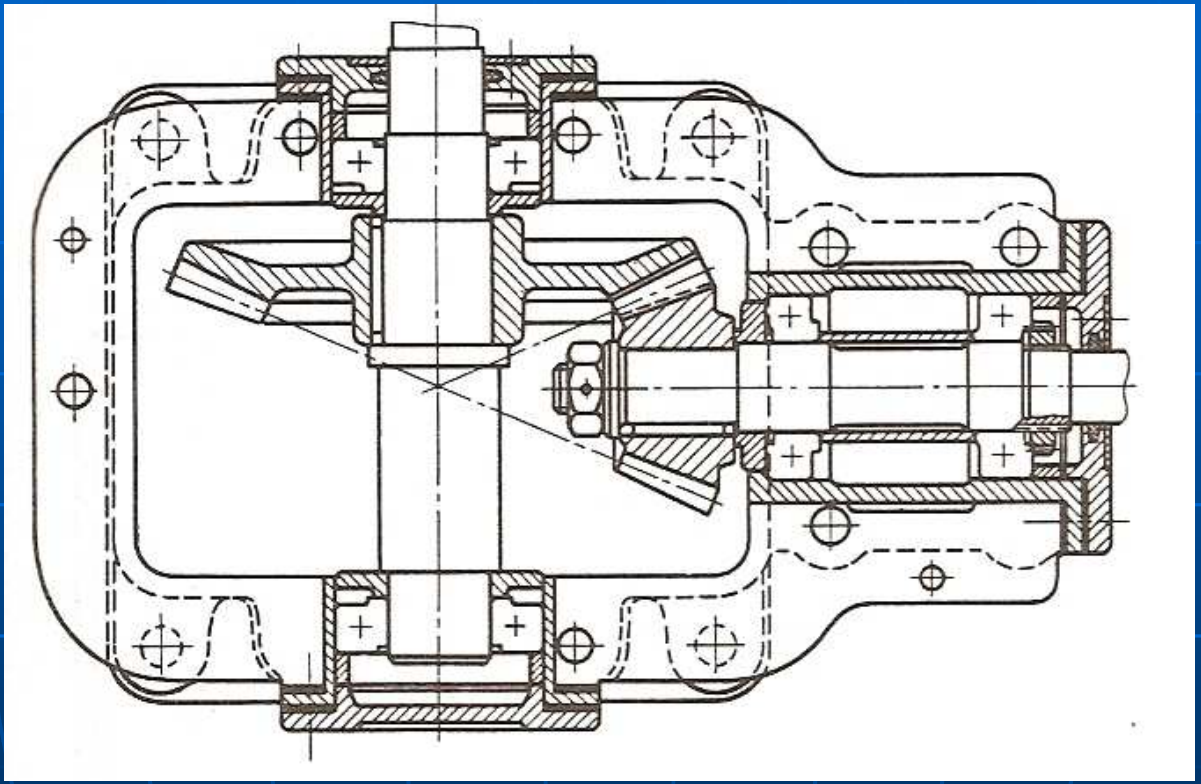
Spiral curved bevel gear transmission

Representing of ball bearings



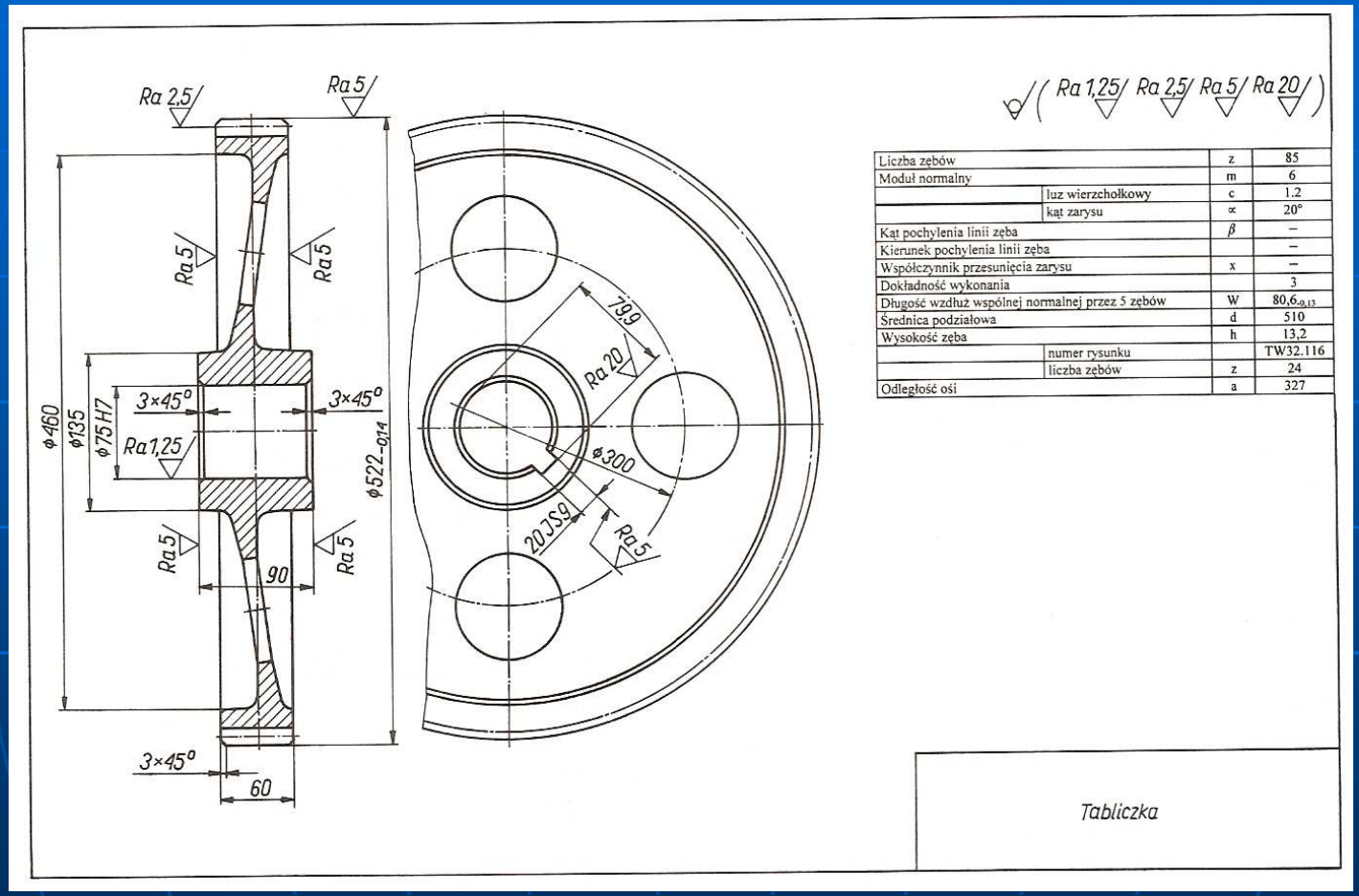
Assembly drawing

Representing of gears and gear transmission



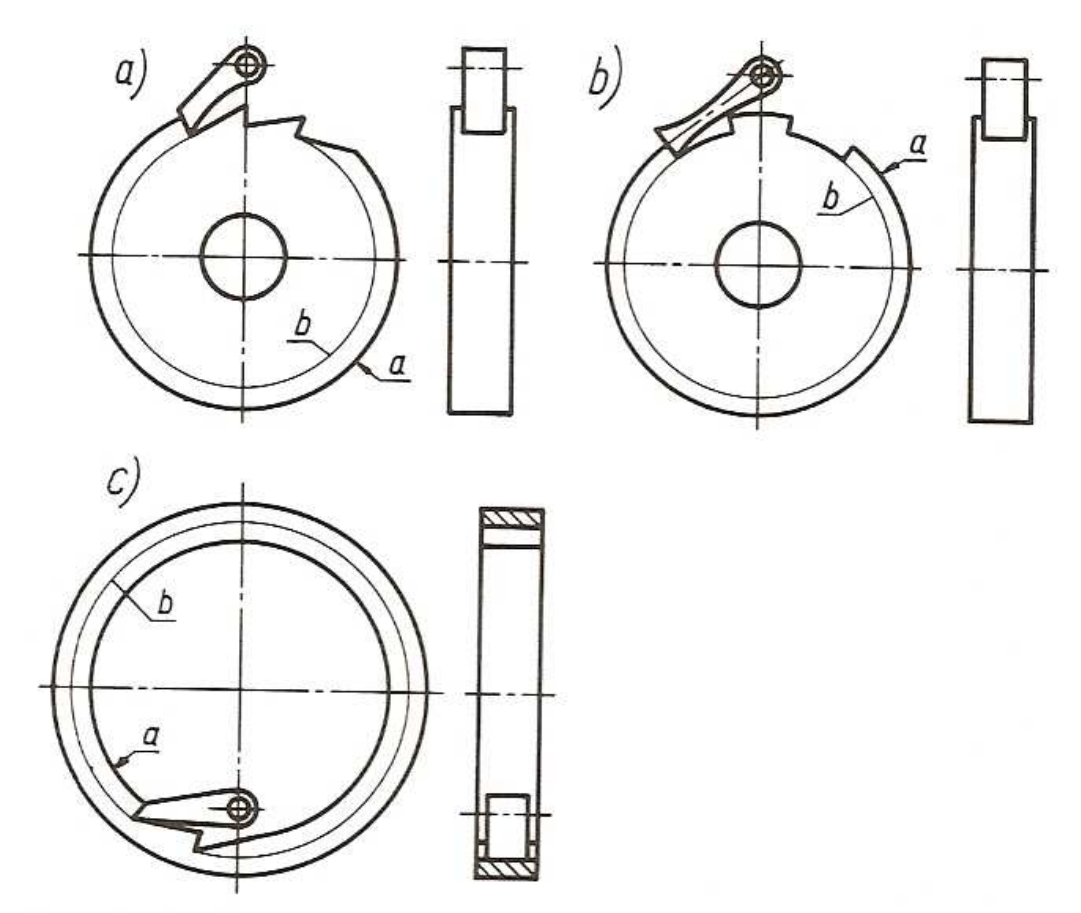
Assembly drawing – straight teeth bevel gear transmission

Representing of gears and gear transmission

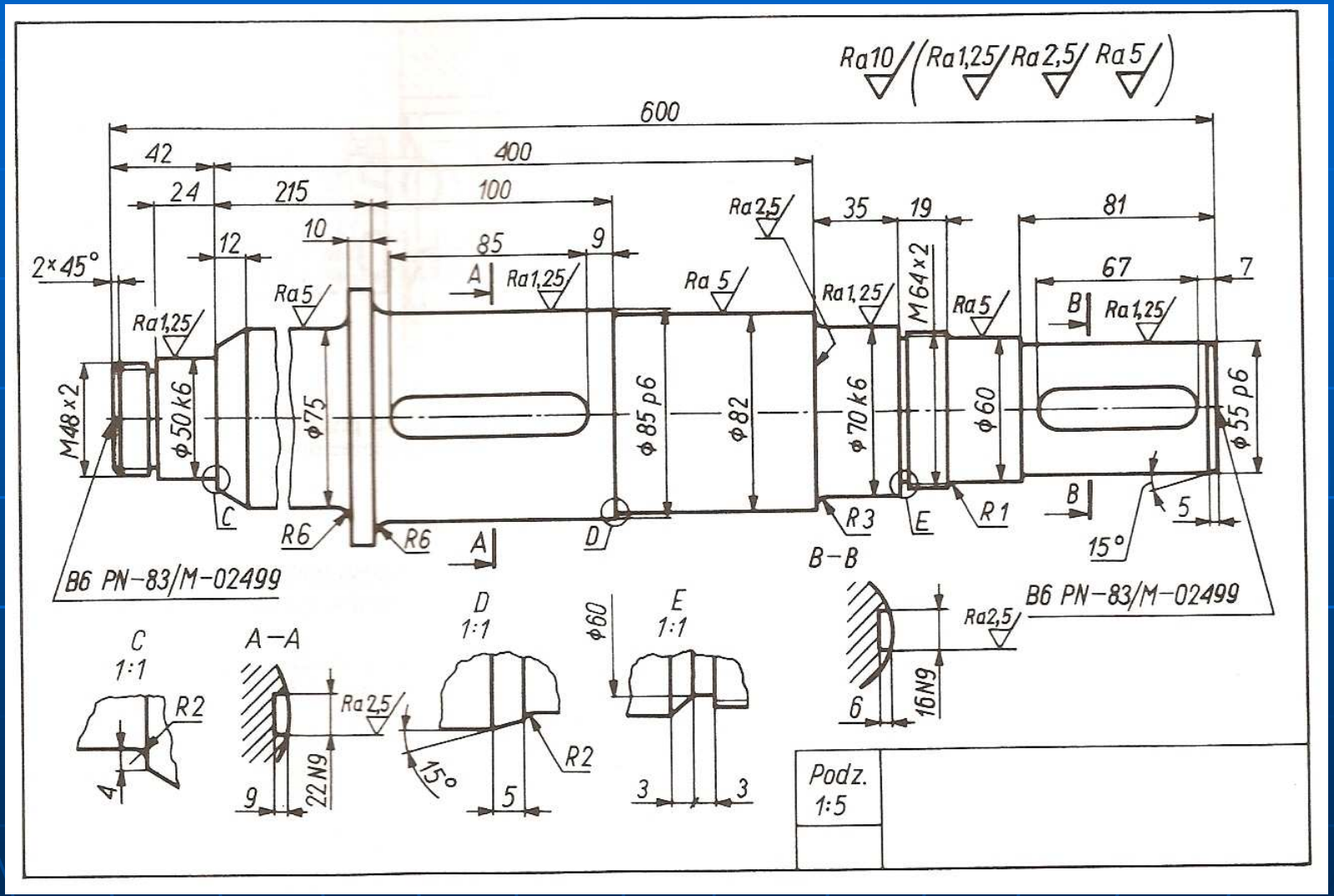


Working drawing – toothed wheel

Representing of ratched wheels

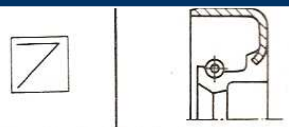
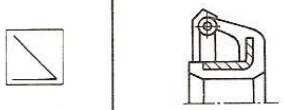
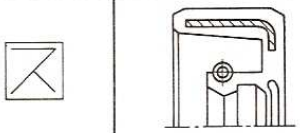
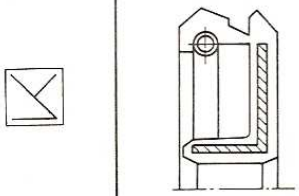
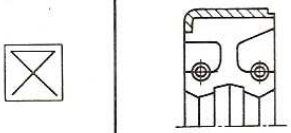
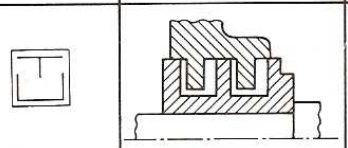


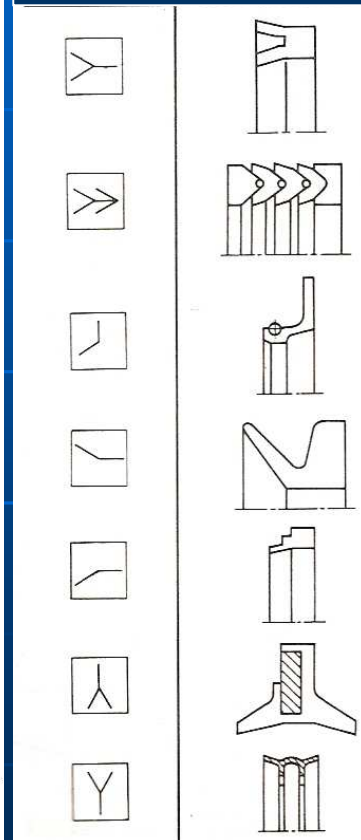
Drawings of shafts and axles



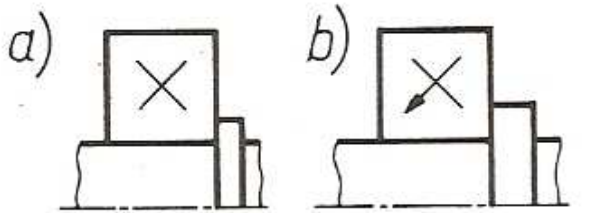
Working drawing – shaft

Representing of seals

Agreed way with description seal features	Aplication
	Uszczelnienie typu wargowego dla wałów obrotowych, bez wargi przeciwpyłowej
	Uszczelnienie typu wargowego dla wałów obrotowych, bez wargi przeciwpyłowej
	Uszczelnienie typu wargowego dla wałów obrotowych, z wargą przeciwpyłową
	Uszczelnienie typu wargowego dla wałów obrotowych, z wargą przeciwpyłową
	Uszczelnienie typu wargowego dla wałów obrotowych, bez wargi przeciwpyłowej, dwustronne
	Uszczelnienie labiryntowe (niezależne od liczby elementów)

Agreed way with description seal features	Aplication
	Przedstawienie umowne szczegółowe pierścieni U, pierścieni V i pakietów uszczelnień

Agreed way without description seal features

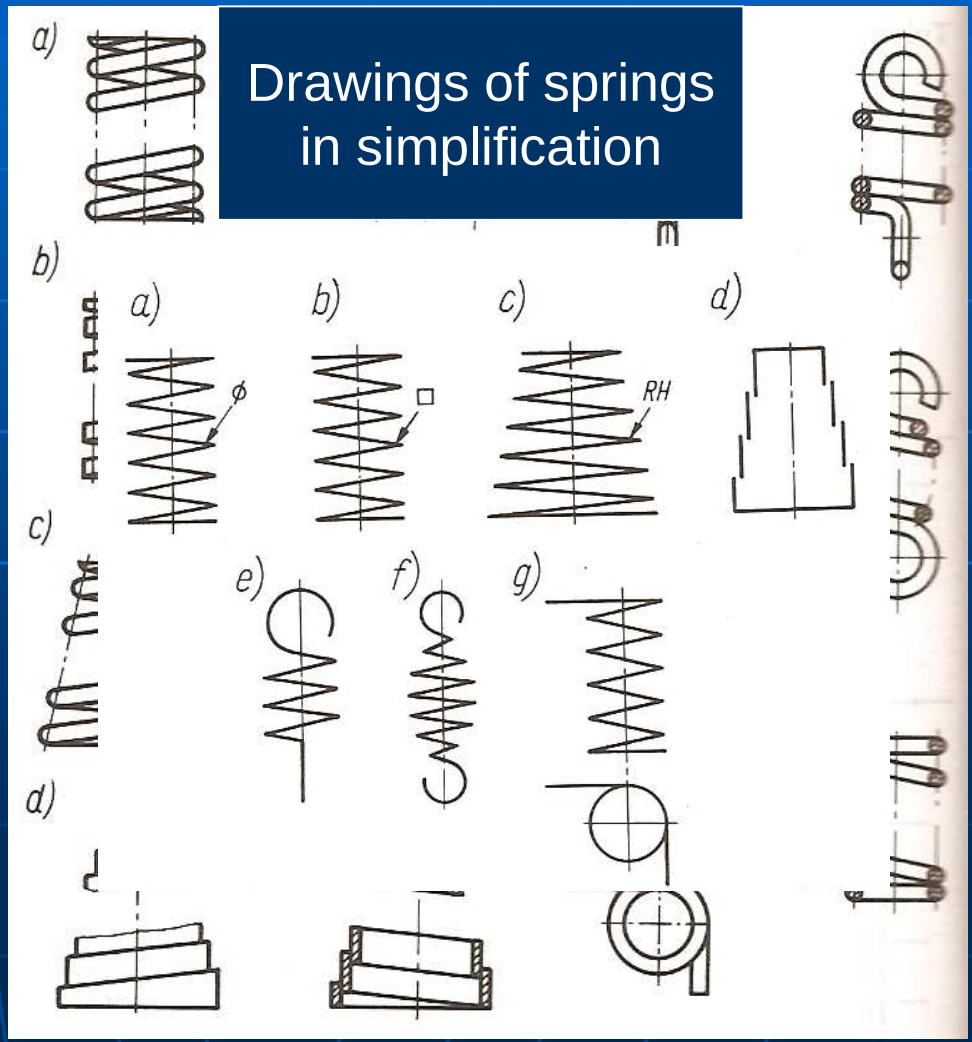


Representing of springs

Drawings of springs

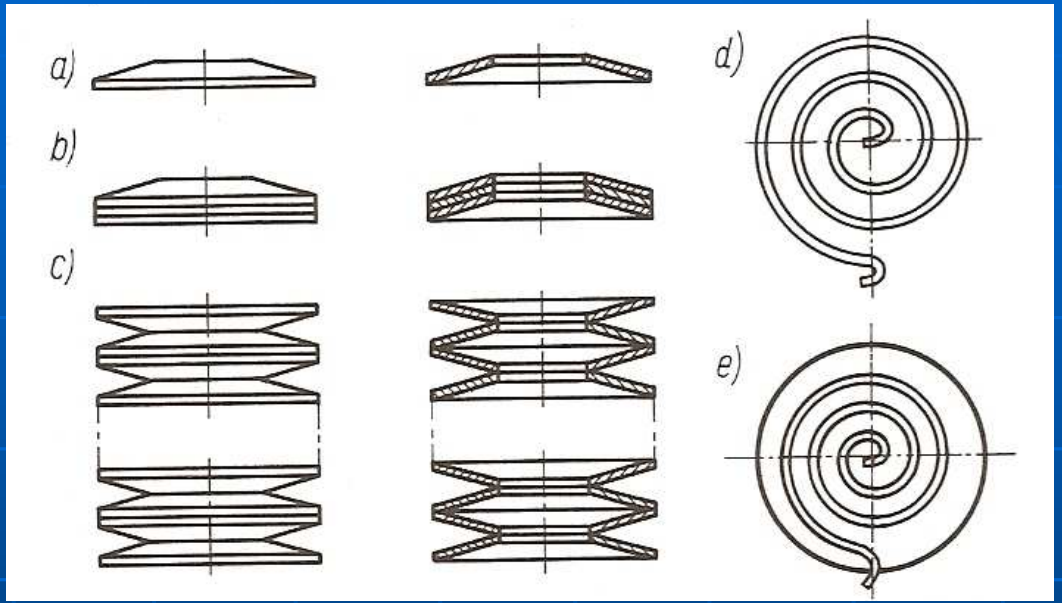
Drawings of springs in simplification

a,b) compression cylindrical springs
c,d) compression tapered springs
e) tension cylindrical springs
f) tension barell springs
g) torsion springs



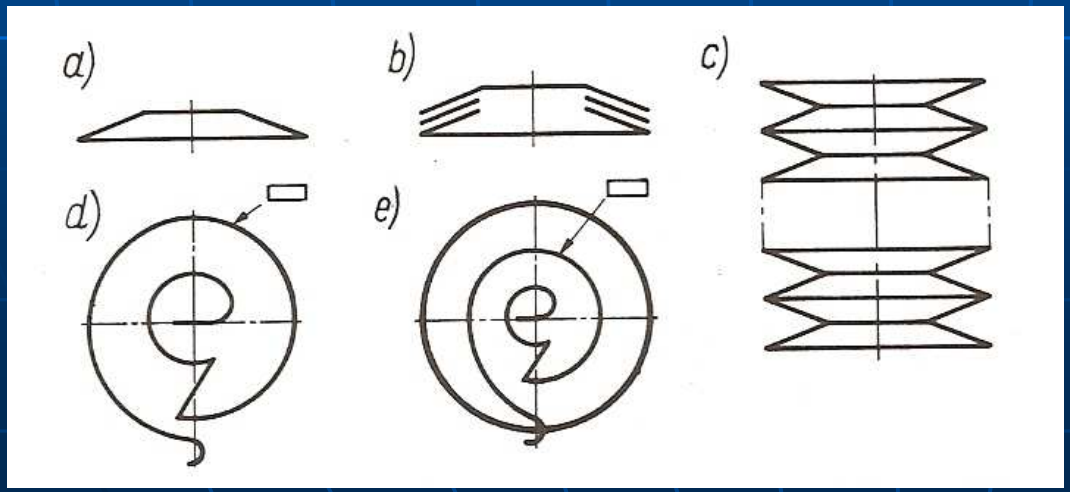
Representing of springs

a, b, c) disk springs
d, e) spiral springs

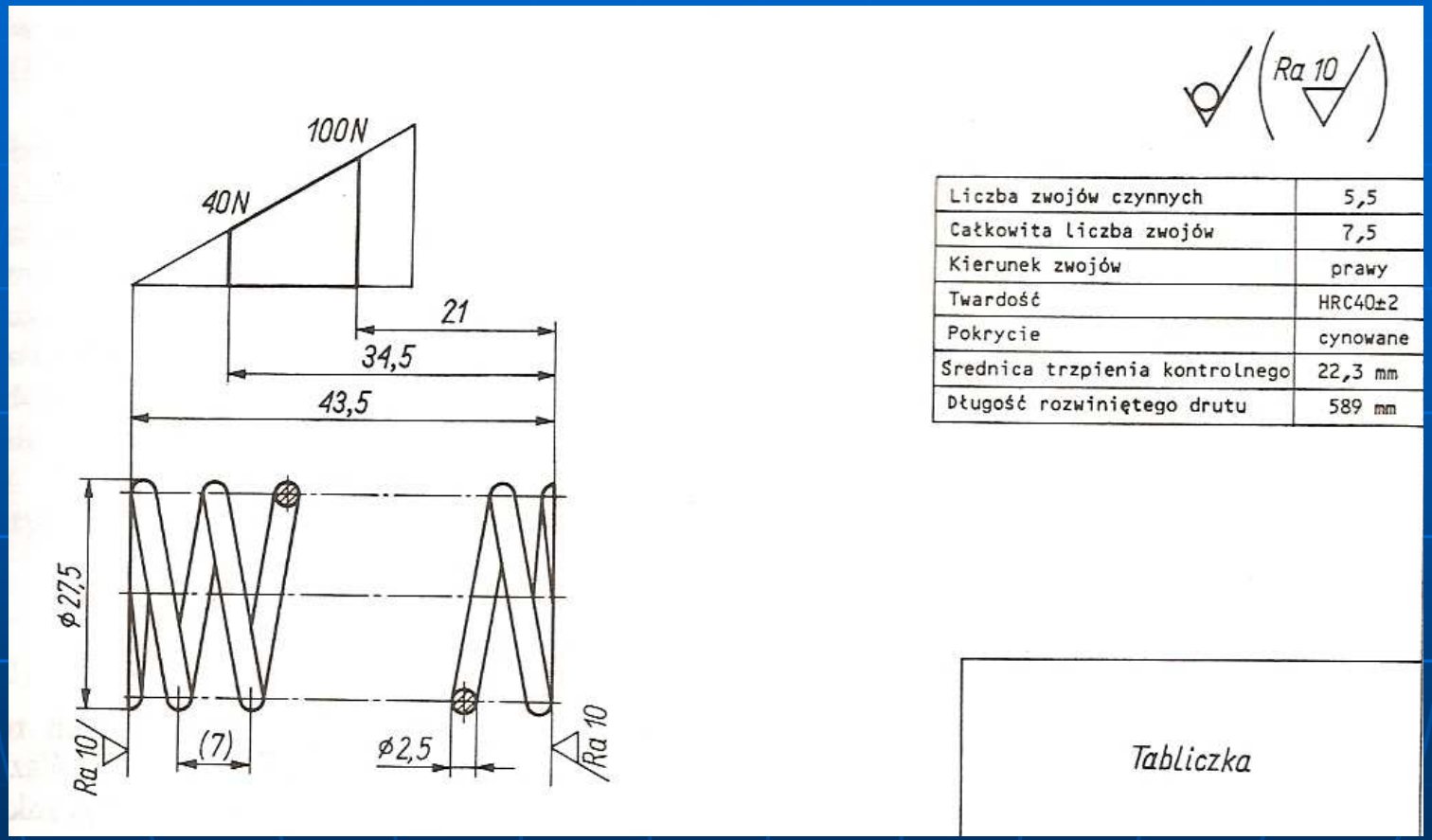


Drawings of springs

Drawings of springs in simplification



Drawings of springs



Liczba zwojów czynnych	5,5
Całkowita liczba zwojów	7,5
Kierunek zwojów	prawy
Twardość	HRC40±2
Pokrycie	cynowane
Średnica trzpienia kontrolnego	22,3 mm
Długość rozwiniętego drutu	589 mm

Tabliczka

Working drawing – compression cylindrical spring

Couplings – examples

Representing of couples