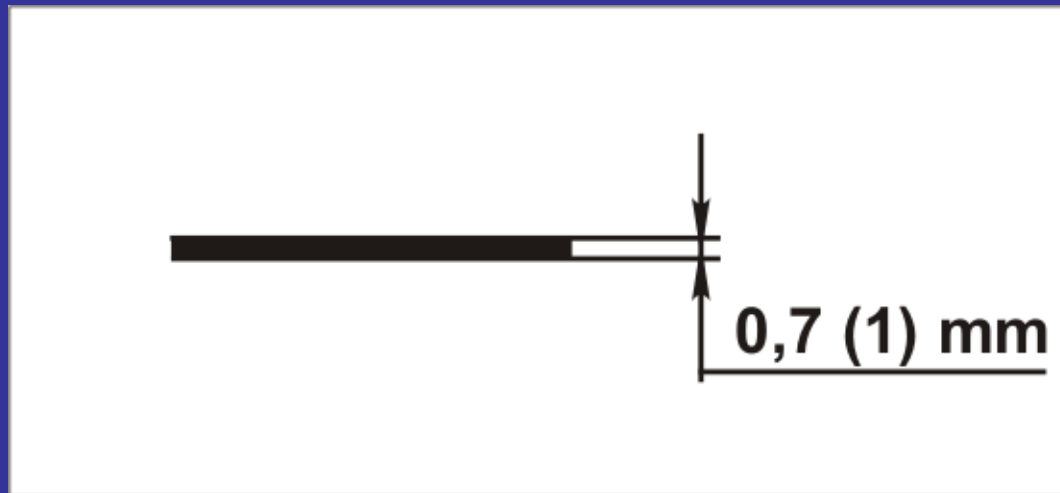


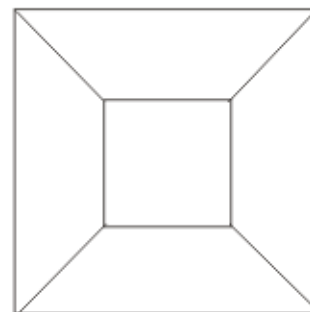
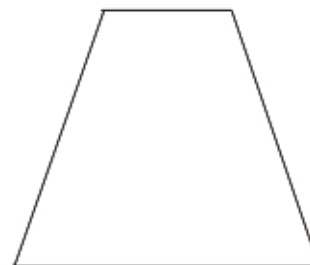
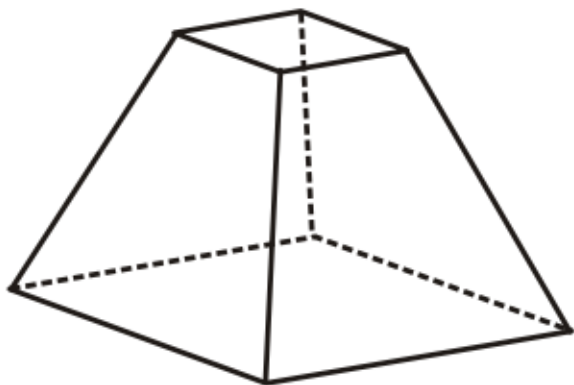
A MŰSZAKI RAJZOKON ALKALMAZANDÓ VONALVASTAGSÁGOK

Vastag vonalak

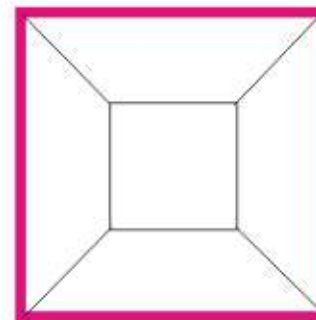
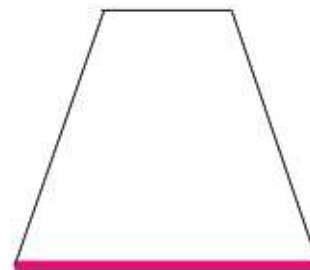
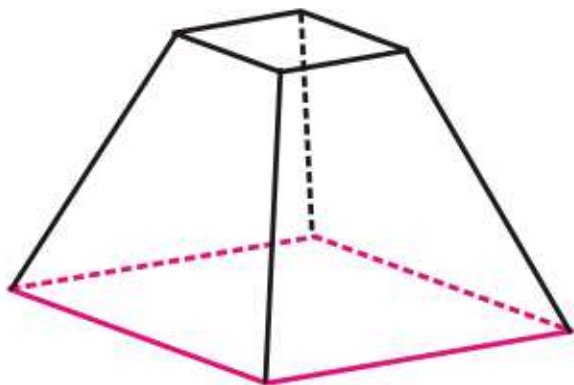
A vonal rajzolata



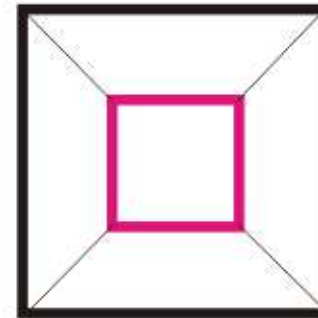
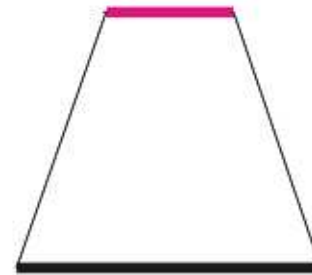
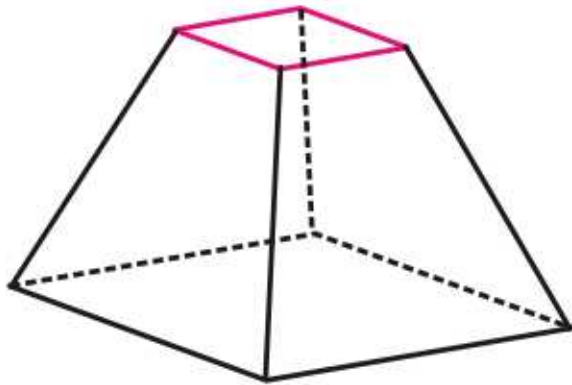
Kontúrvonalak



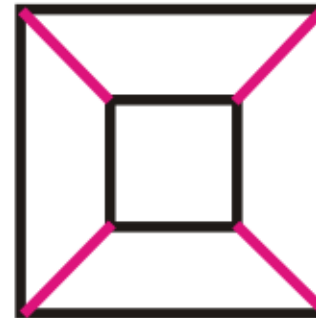
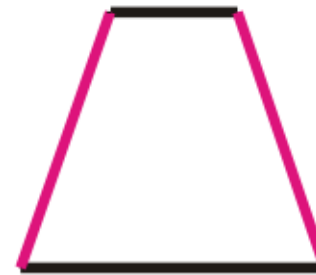
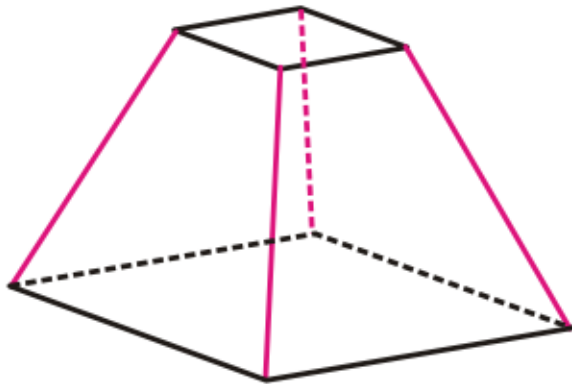
Kontúrvonalak



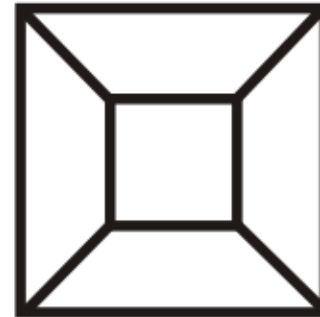
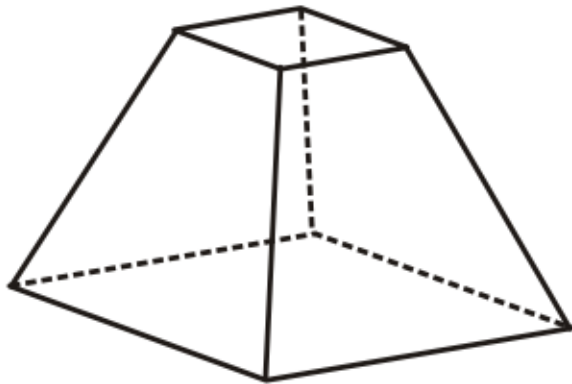
Felületek határvonalai



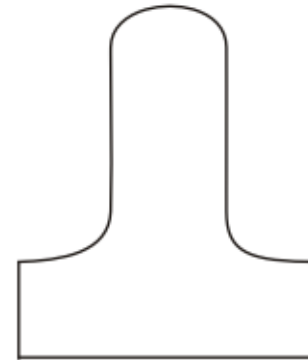
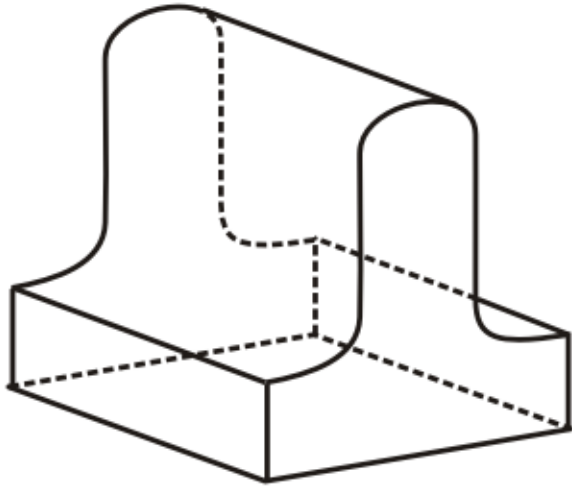
Az adott nézeten látható élek



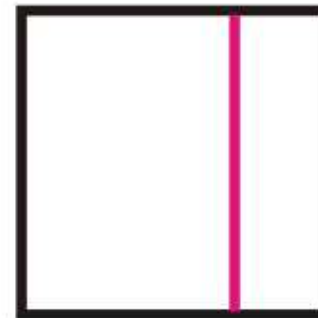
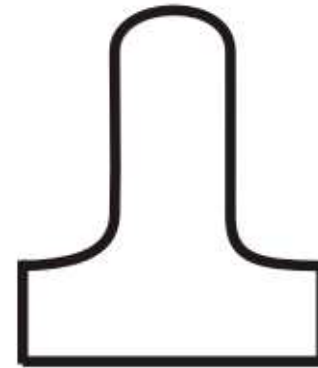
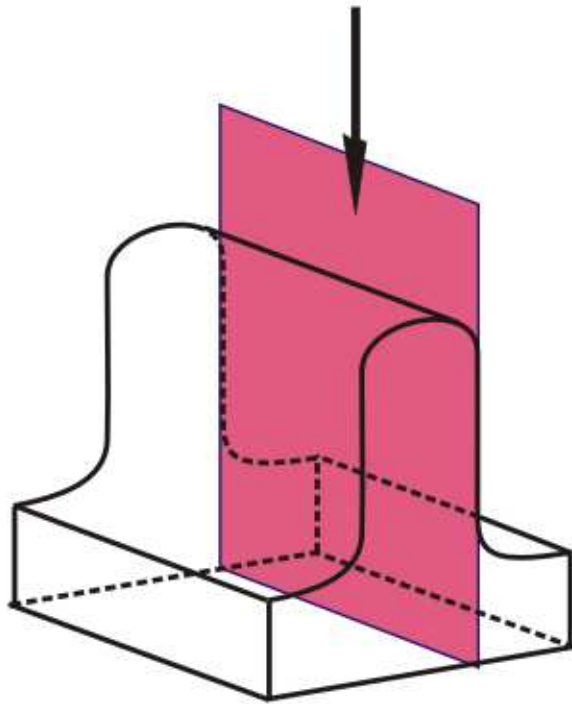
Az adott nézeten látható élek



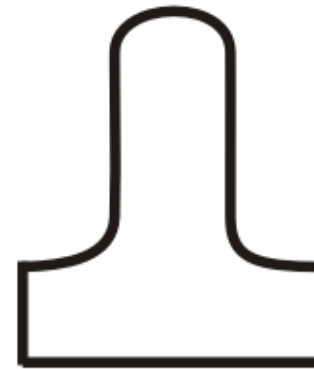
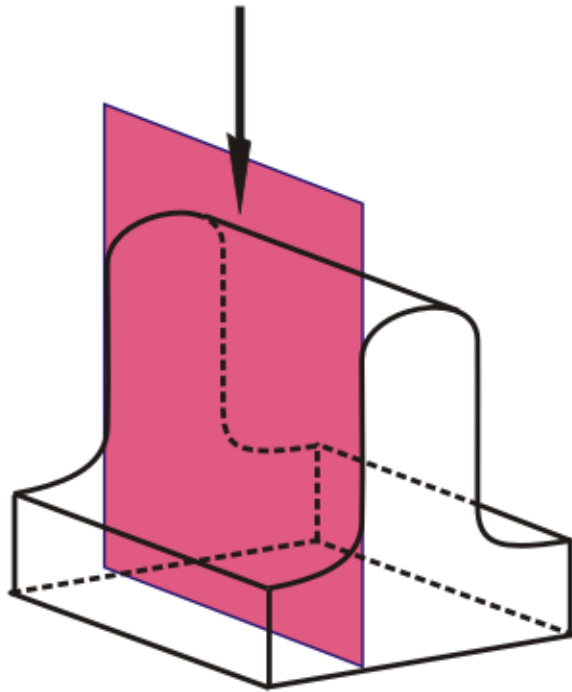
A nézési iránnyal párhuzamos felületek éle



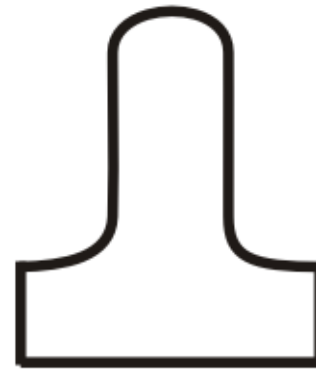
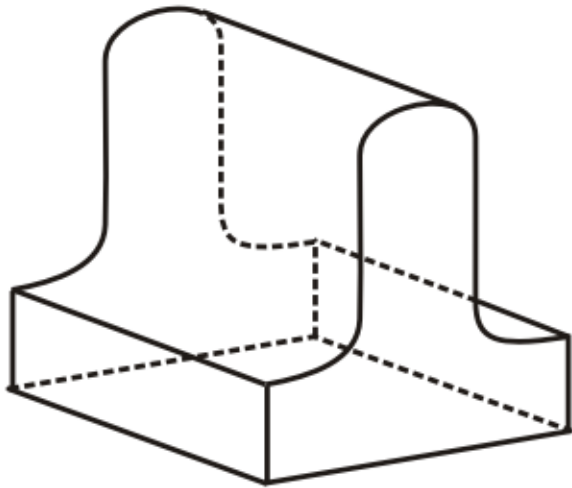
A nézési iránnyal párhuzamos felületek éle



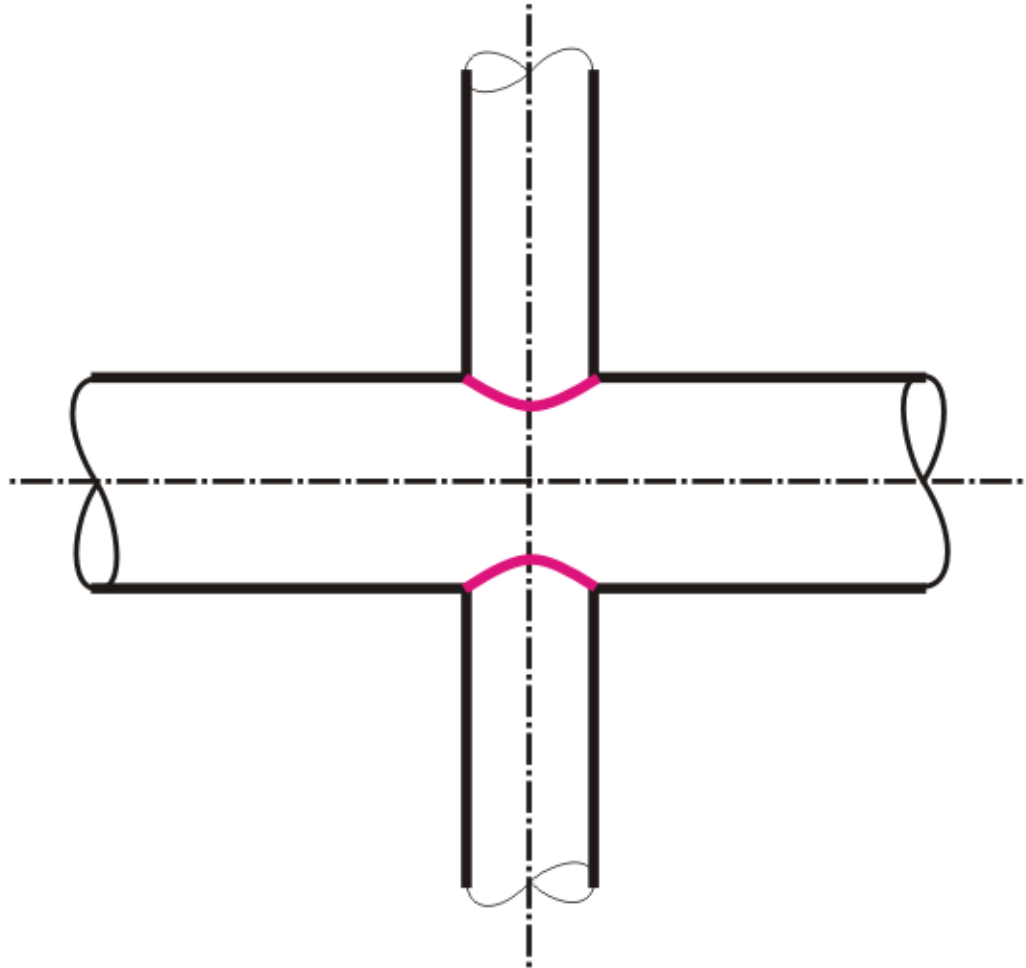
A nézési iránnyal párhuzamos felületek éle



A nézési iránnyal párhuzamos felületek éle

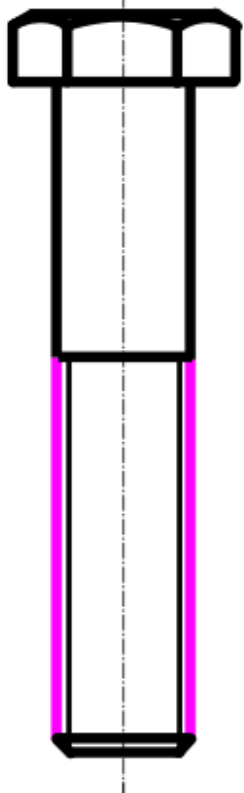


Éles vonalú (nem legömbölyített) áthatások

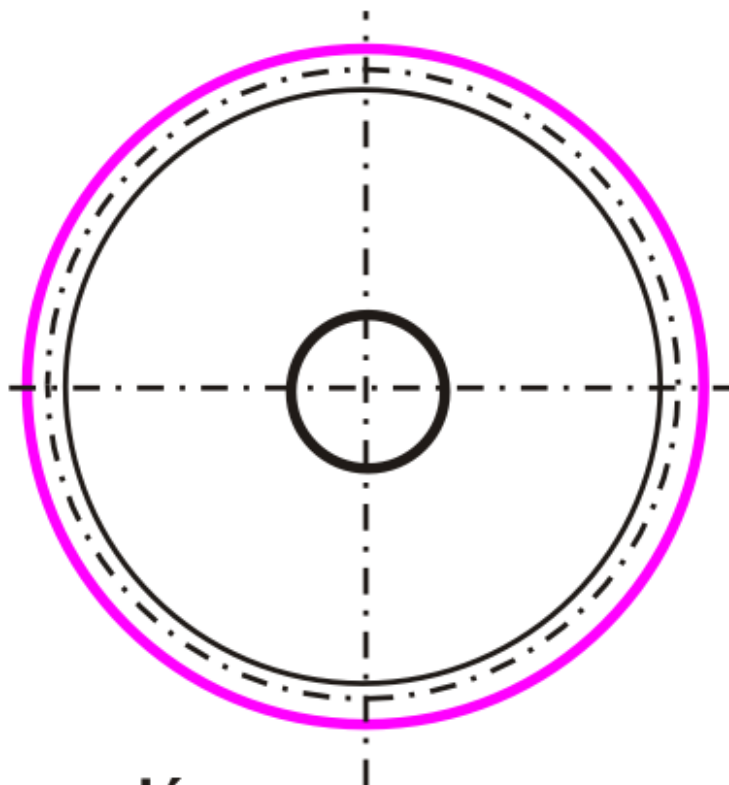


Ismétlődő elemek külső burkolóvonalala

Menetes orsó



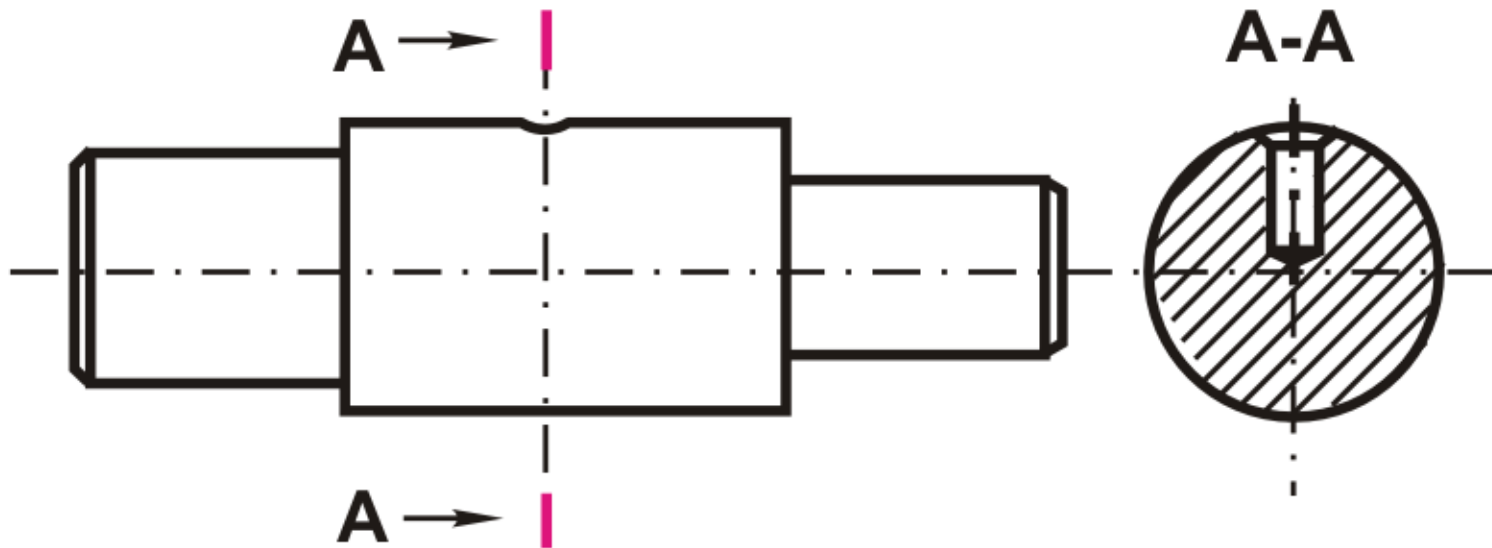
Fogaskerék



Fogasléc

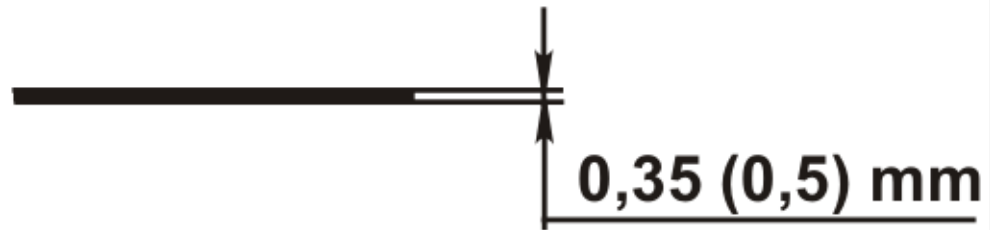


Metszetek nyomvonalának végei

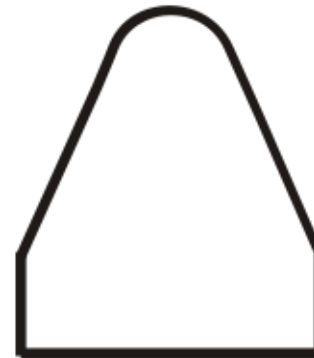
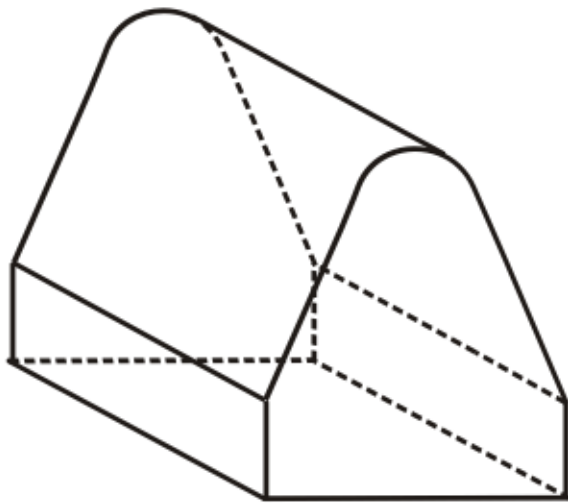


Vékony vonalak

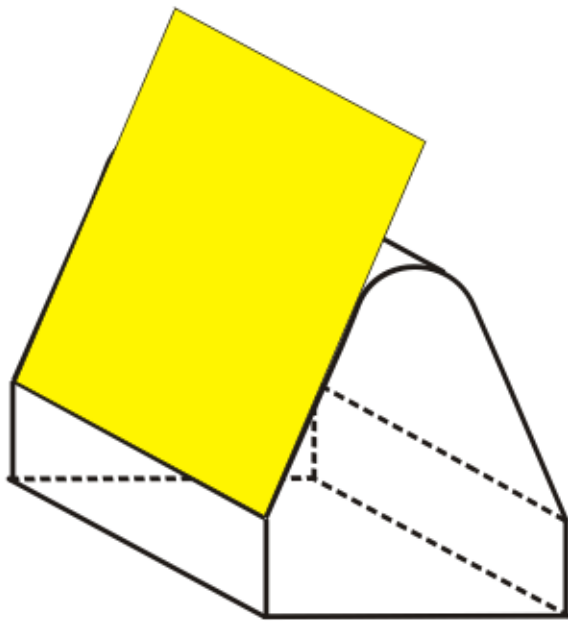
A vonal rajzolata



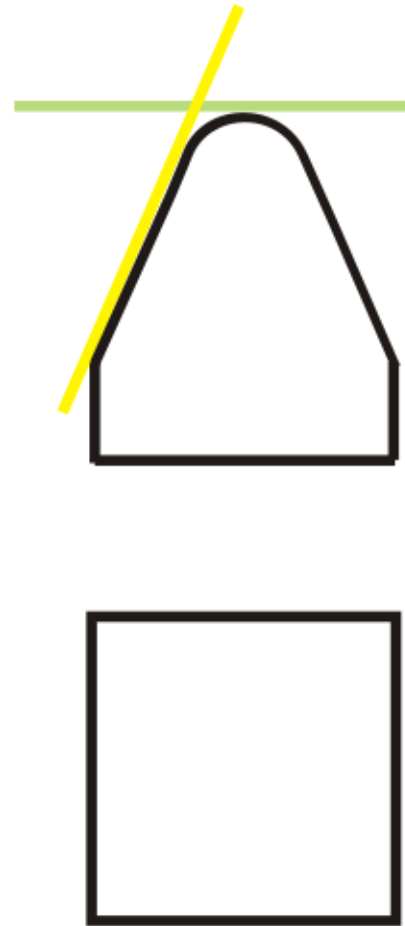
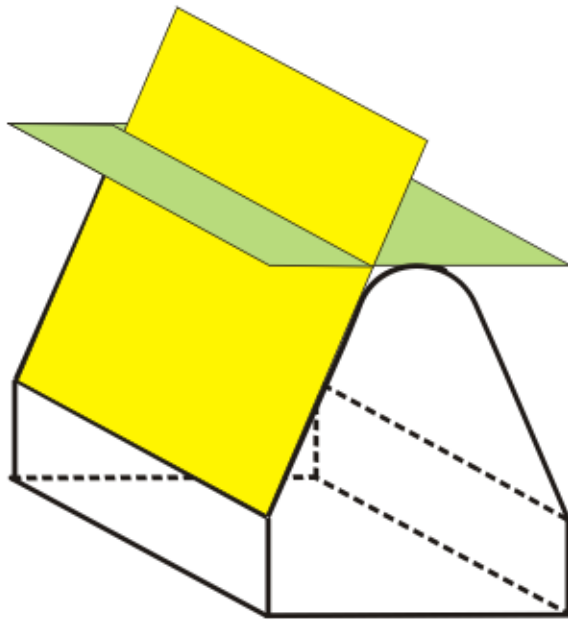
Tagoló vonalak



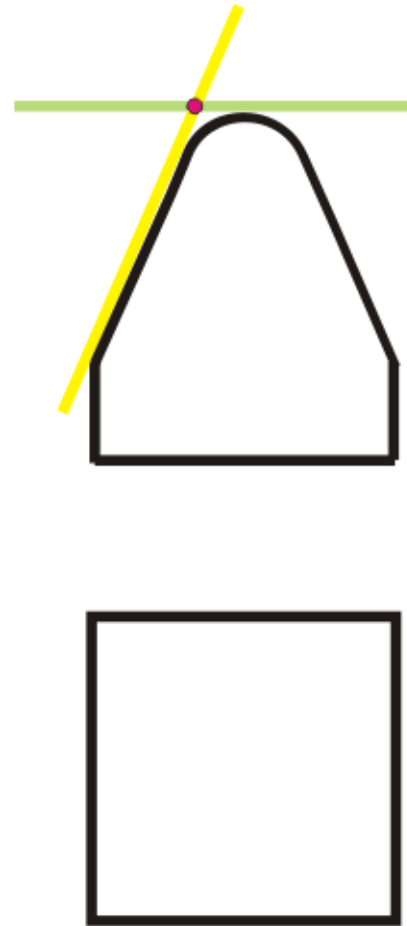
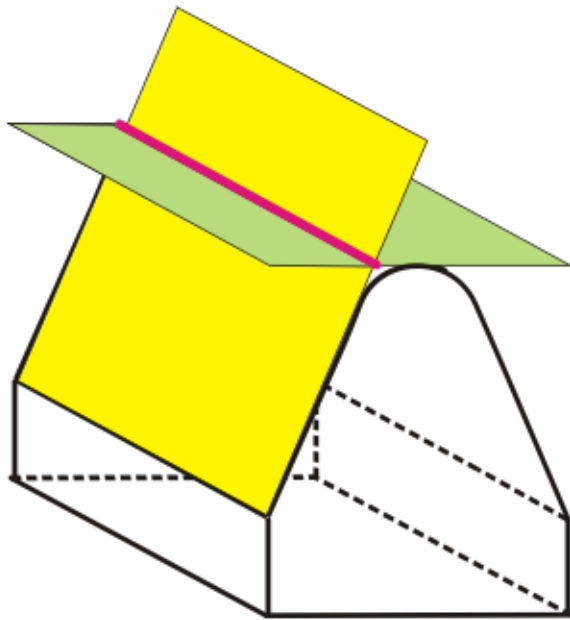
Tagoló vonalak



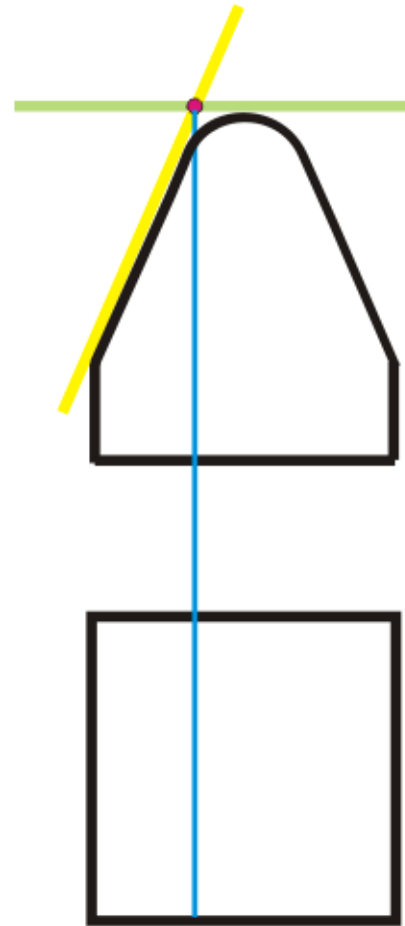
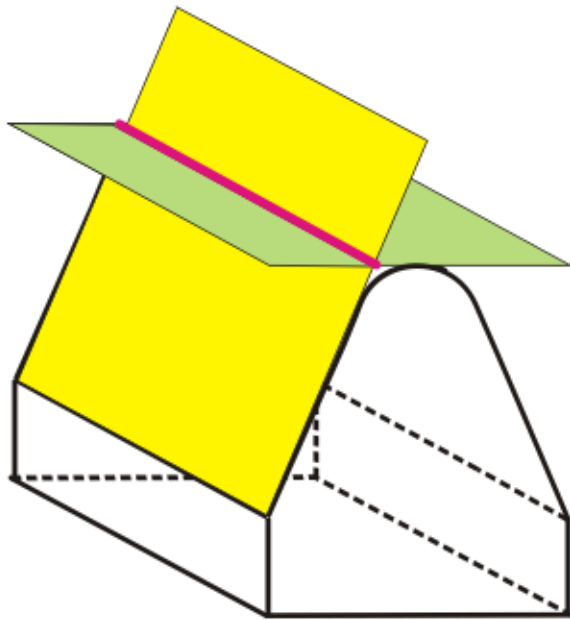
Tagoló vonalak



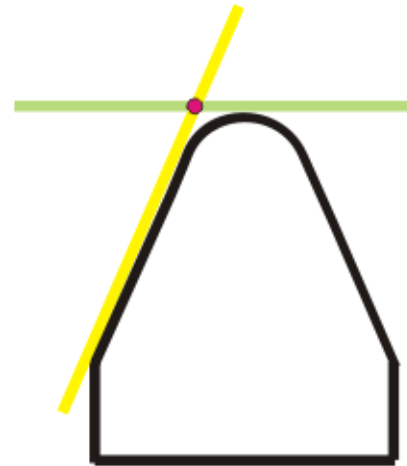
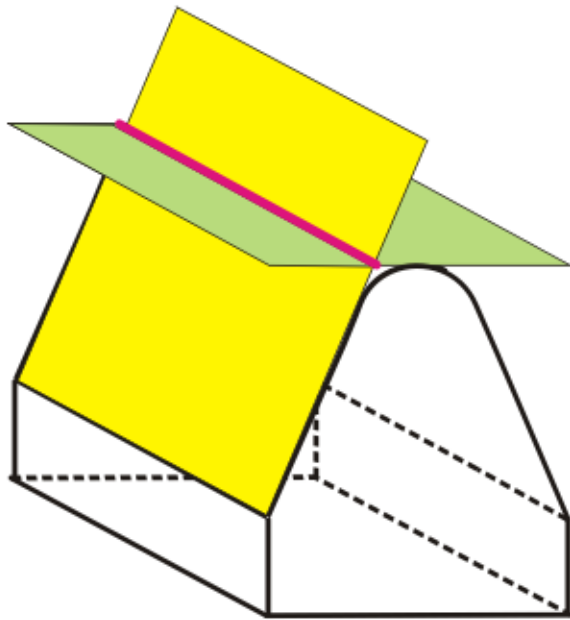
Tagoló vonalak



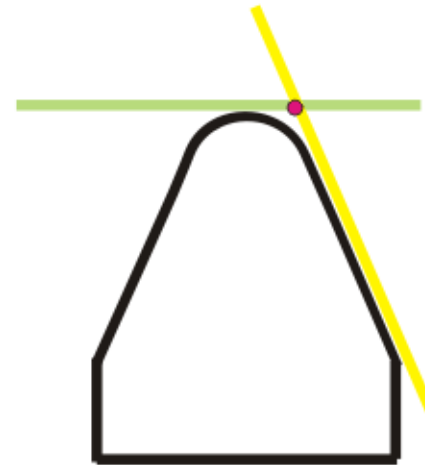
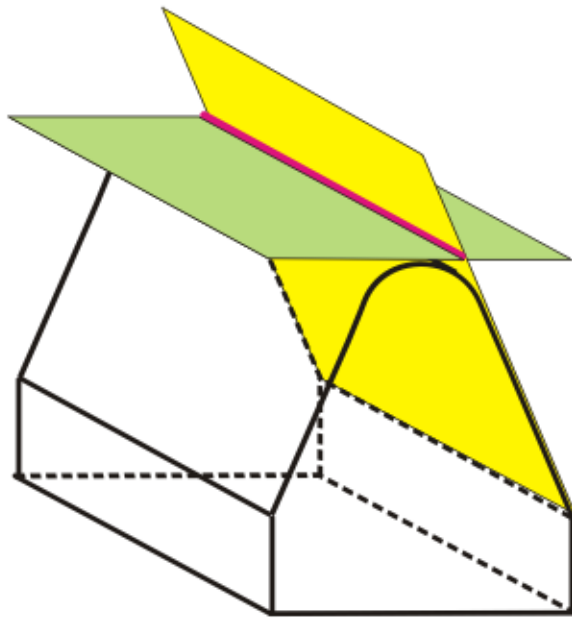
Tagoló vonalak



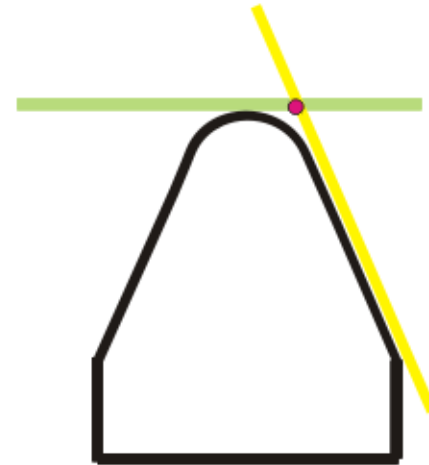
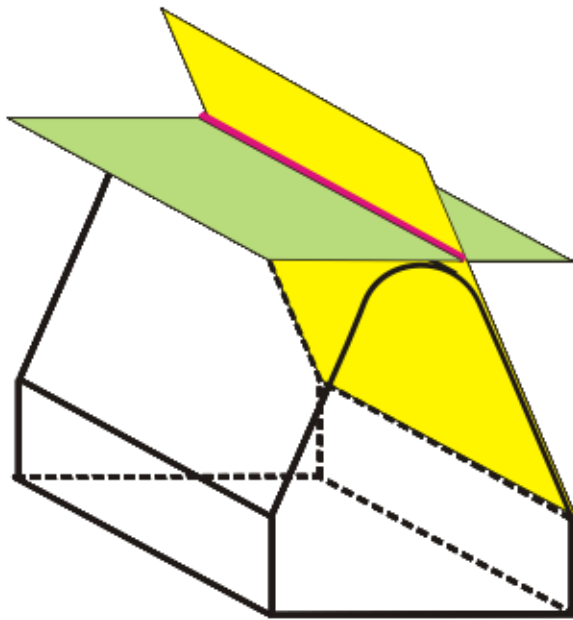
Tagoló vonalak



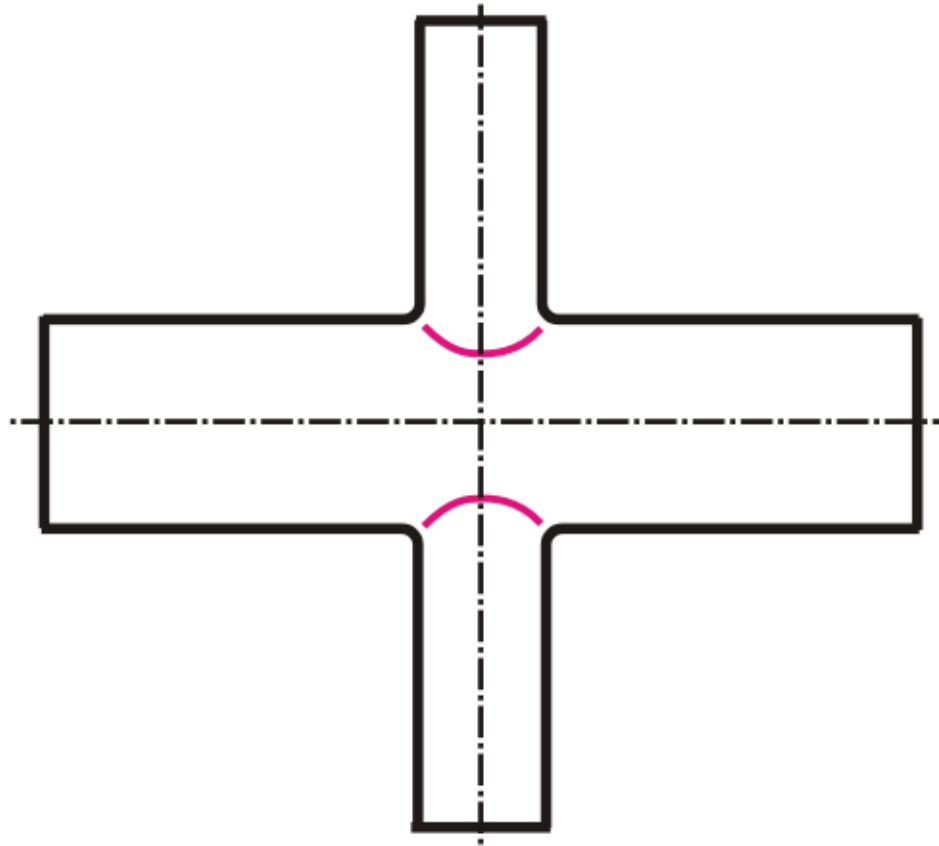
Tagoló vonalak



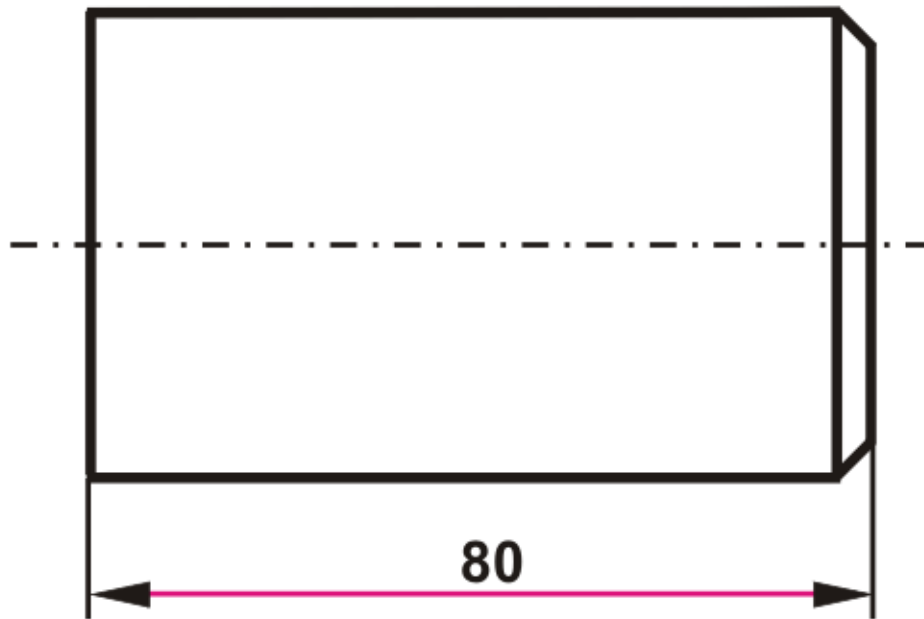
Tagoló vonalak



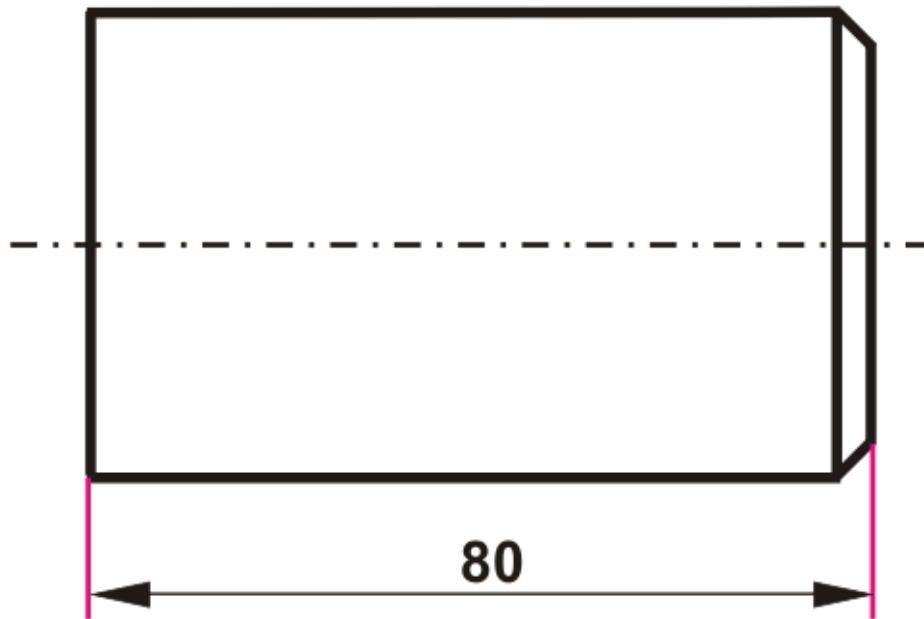
Tagoló vonalak



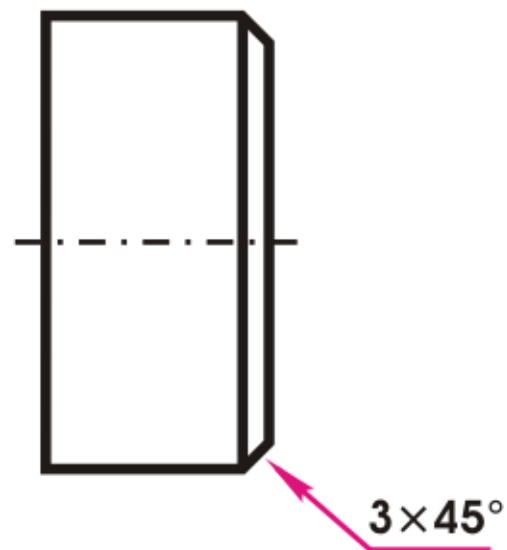
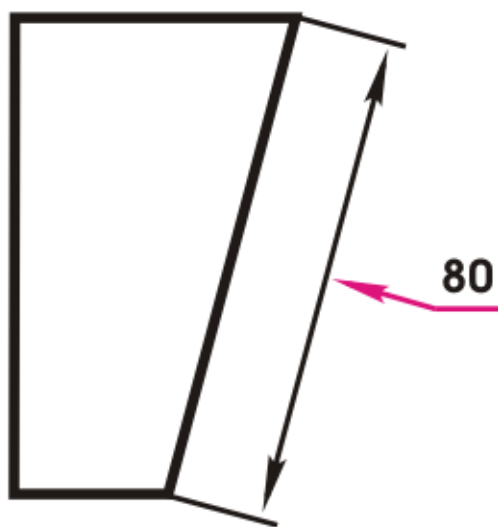
Méretvonalak



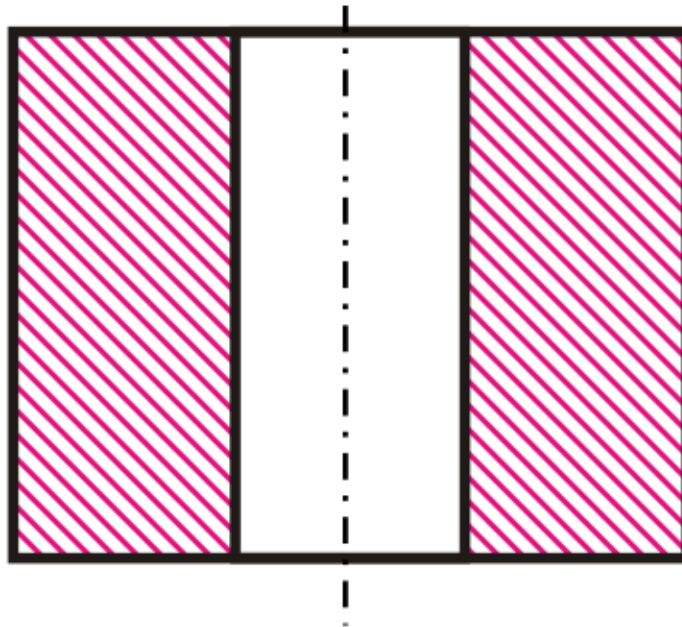
Méret-segédvonalak



Mutatóvonalak

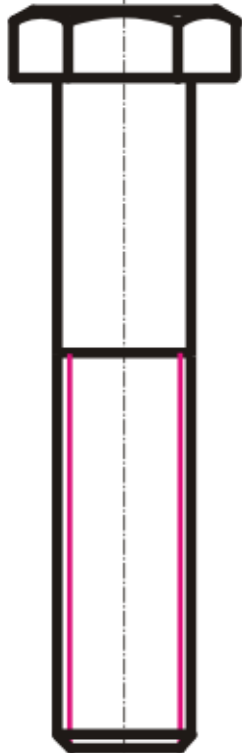


Vonalkázás (sraffozás)

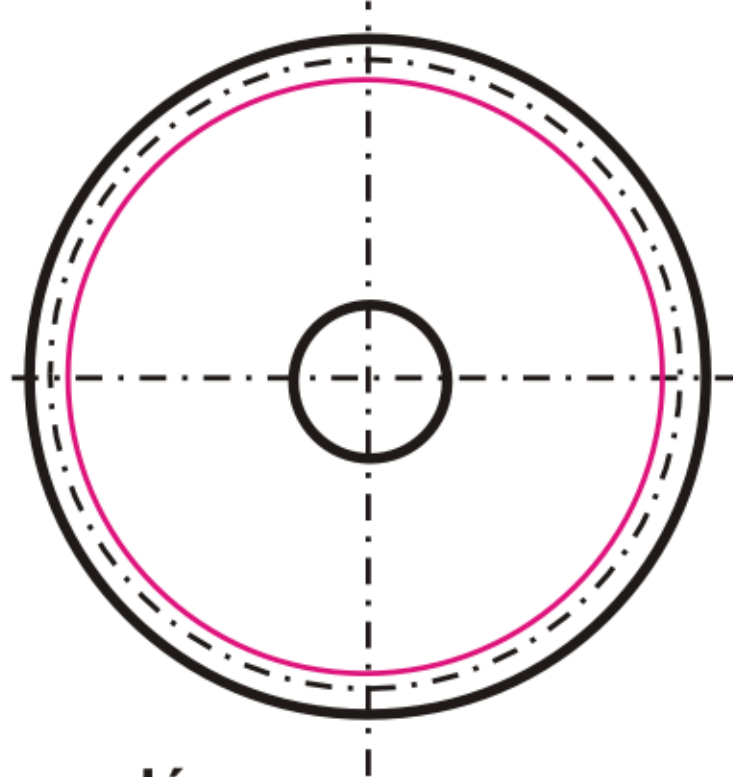


Ismétlődő elemek belső burkolóvonalala

Menetes orsó



Fogaskerék

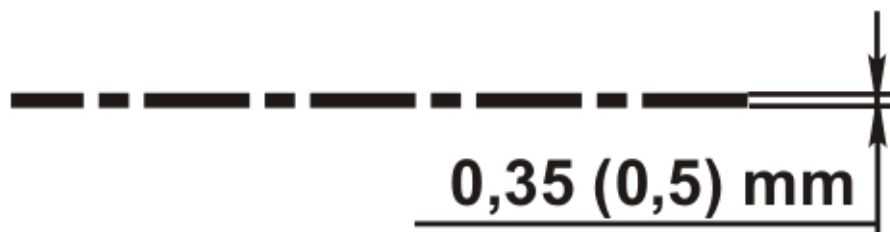


Fogasléc

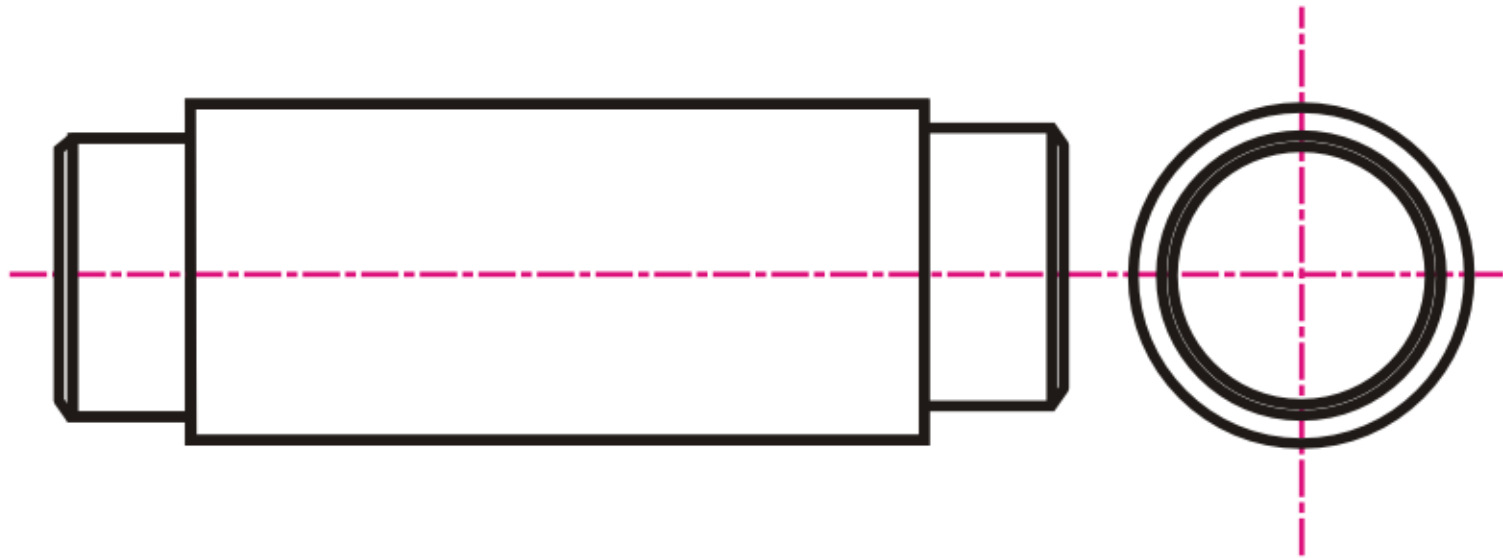


Pont-vonalak

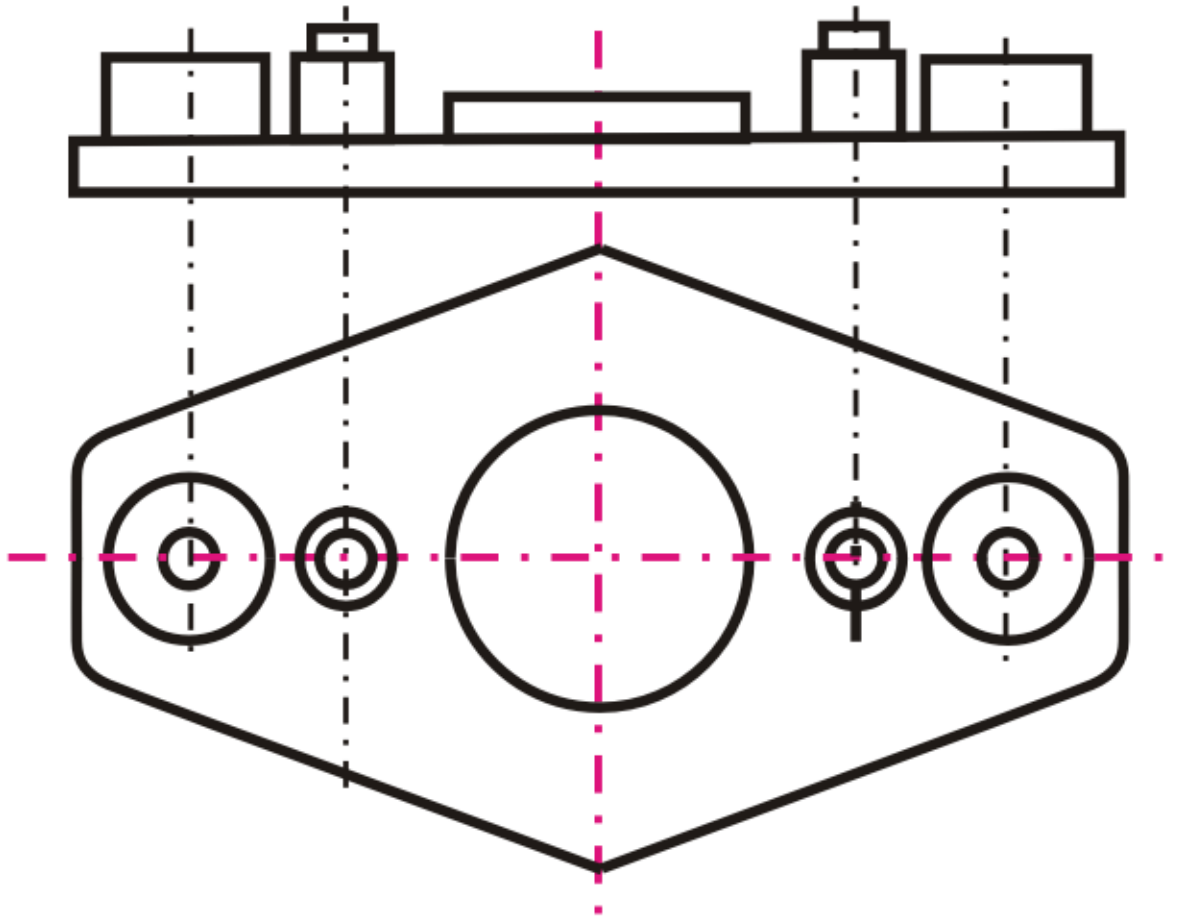
A pont-vonalak rajzolata



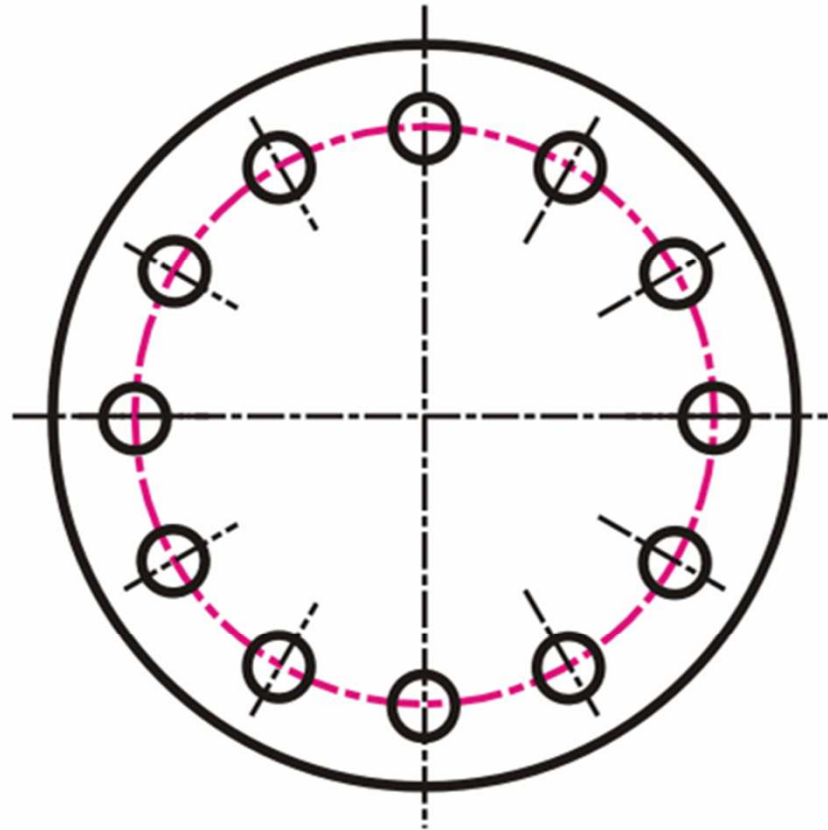
Forgástestek tengelye (középvonala)



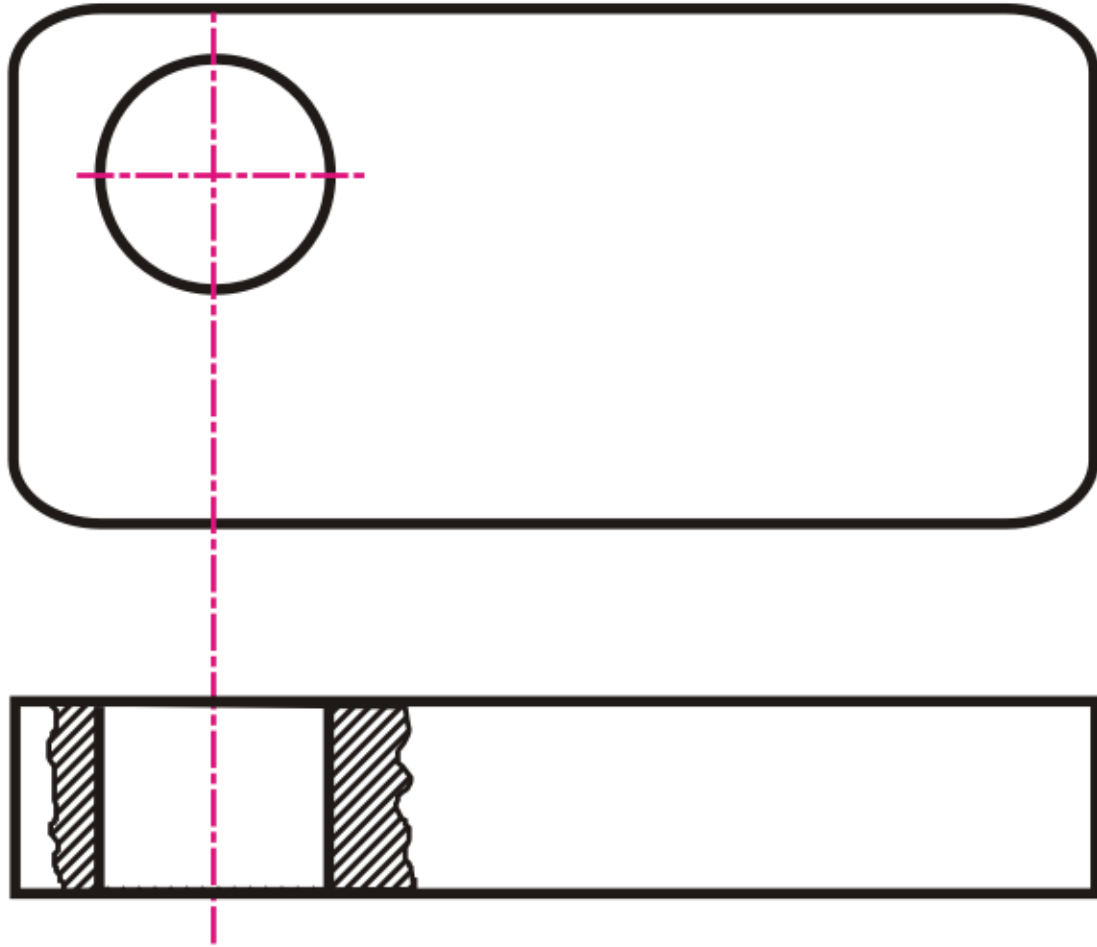
Szimmetrikus alkatrészek középvonala



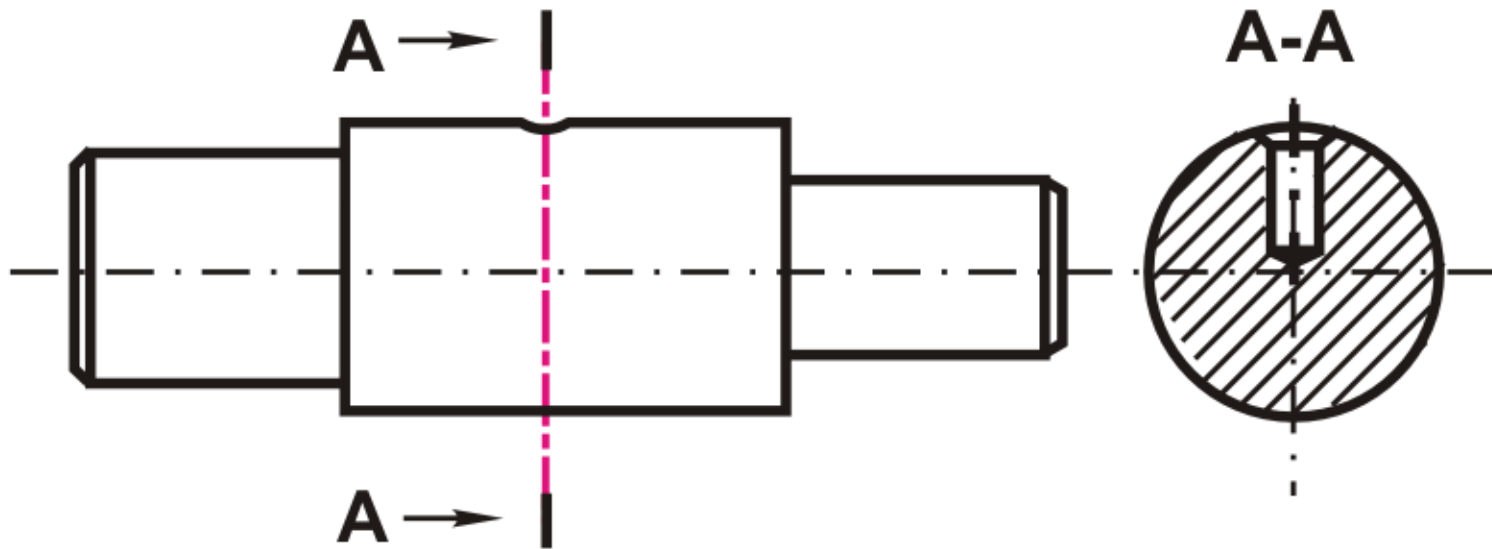
Osztókörök középvonala



Furatok középvonala és szimmetria-tengelyei

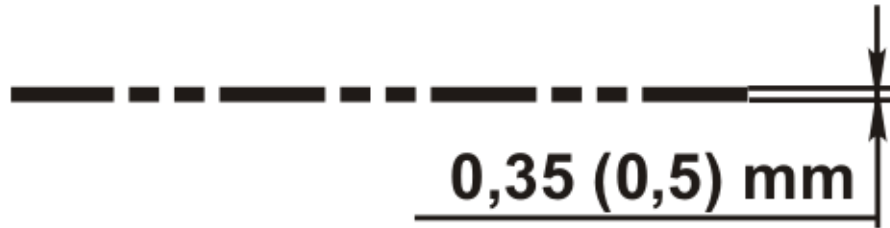


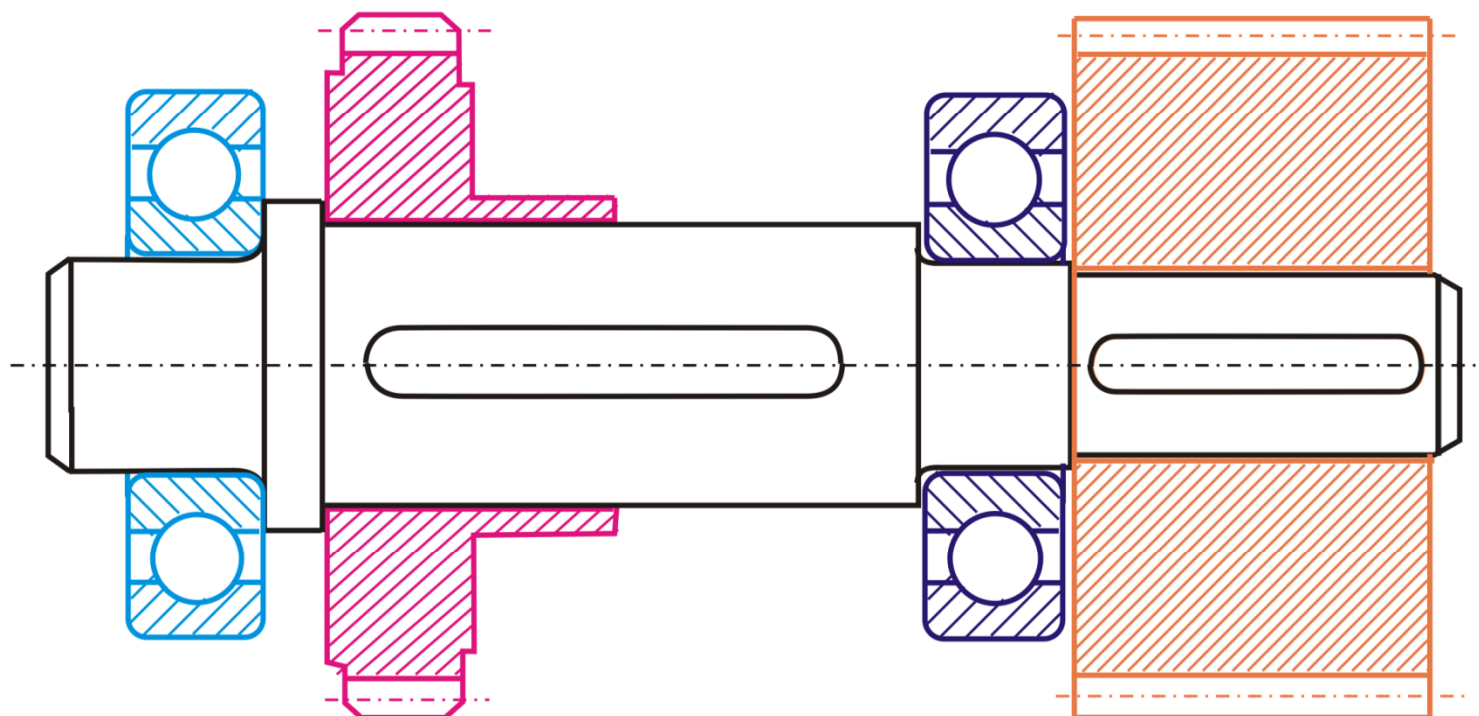
Szelvények nyomvonal



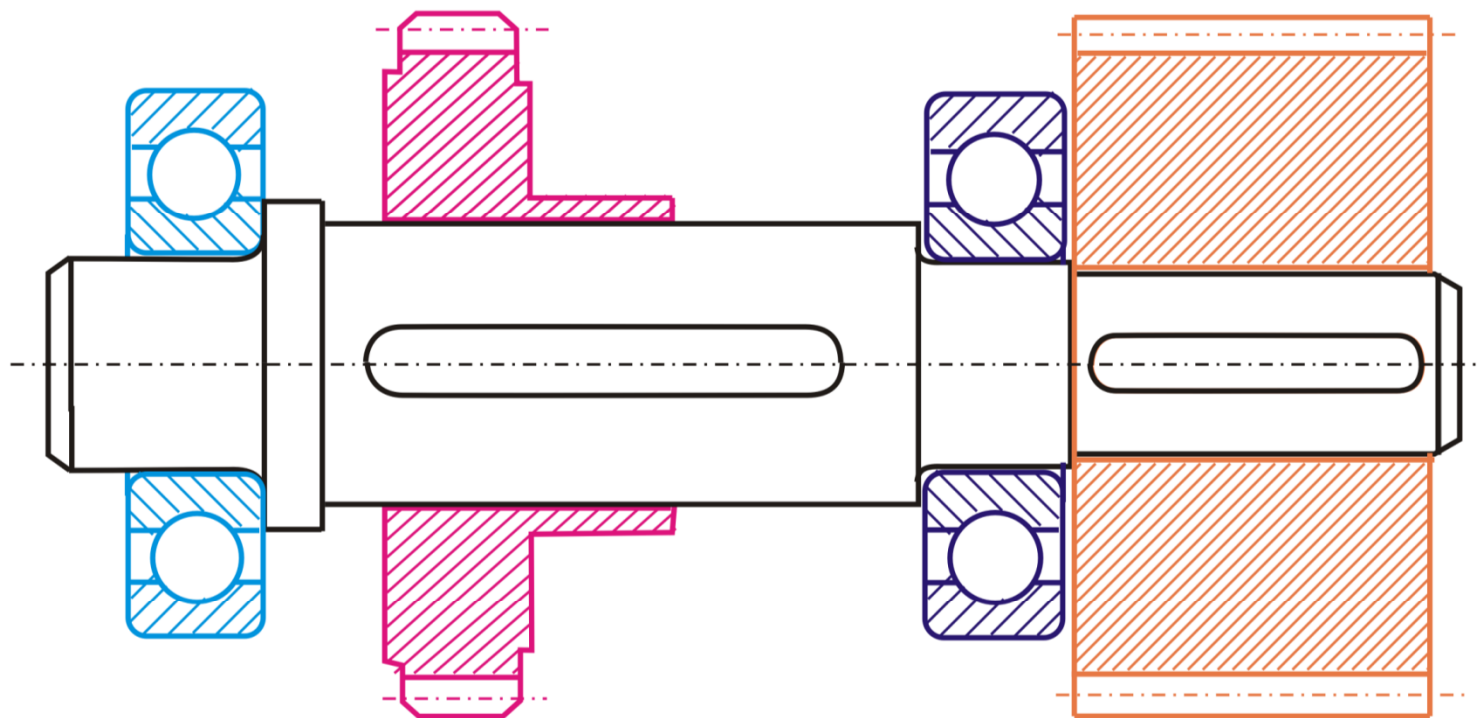
Kétpont-vonalak

A két-pont-vonalak rajzolata

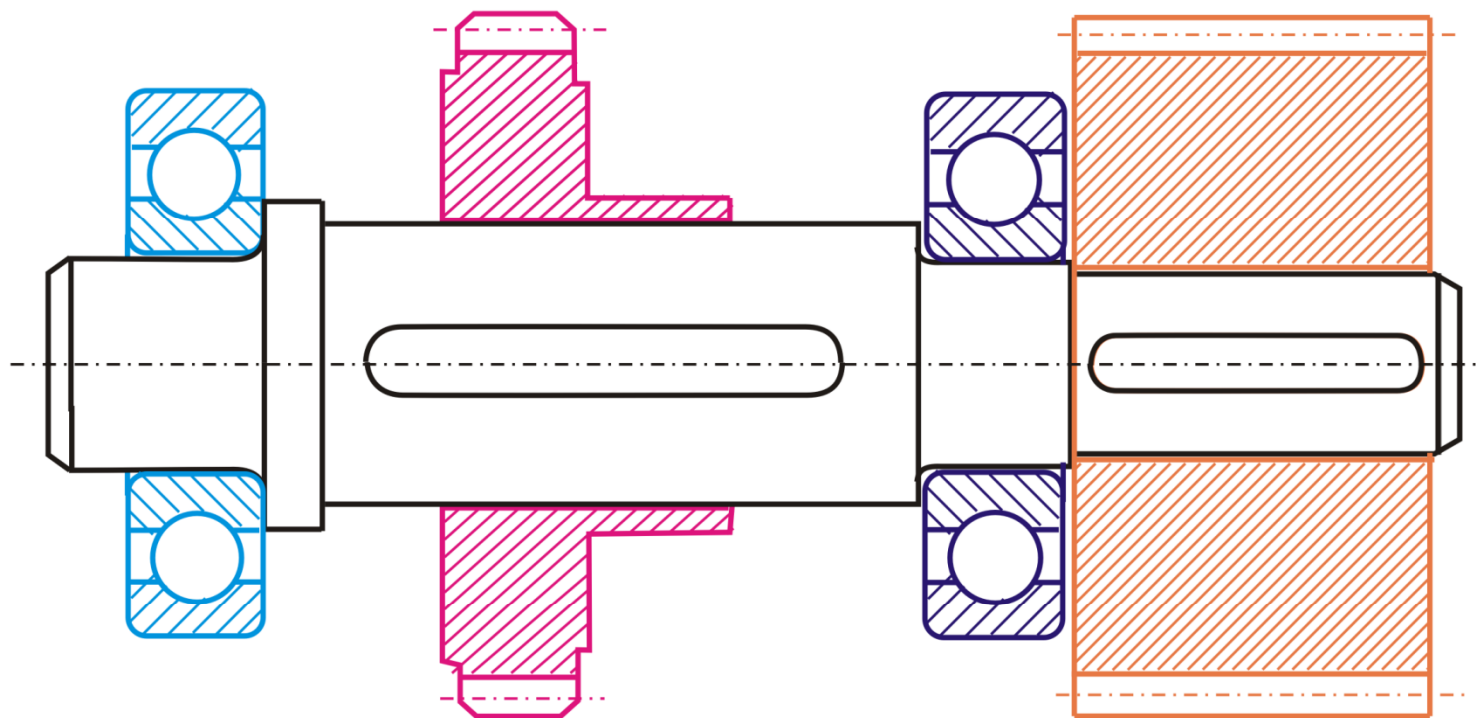




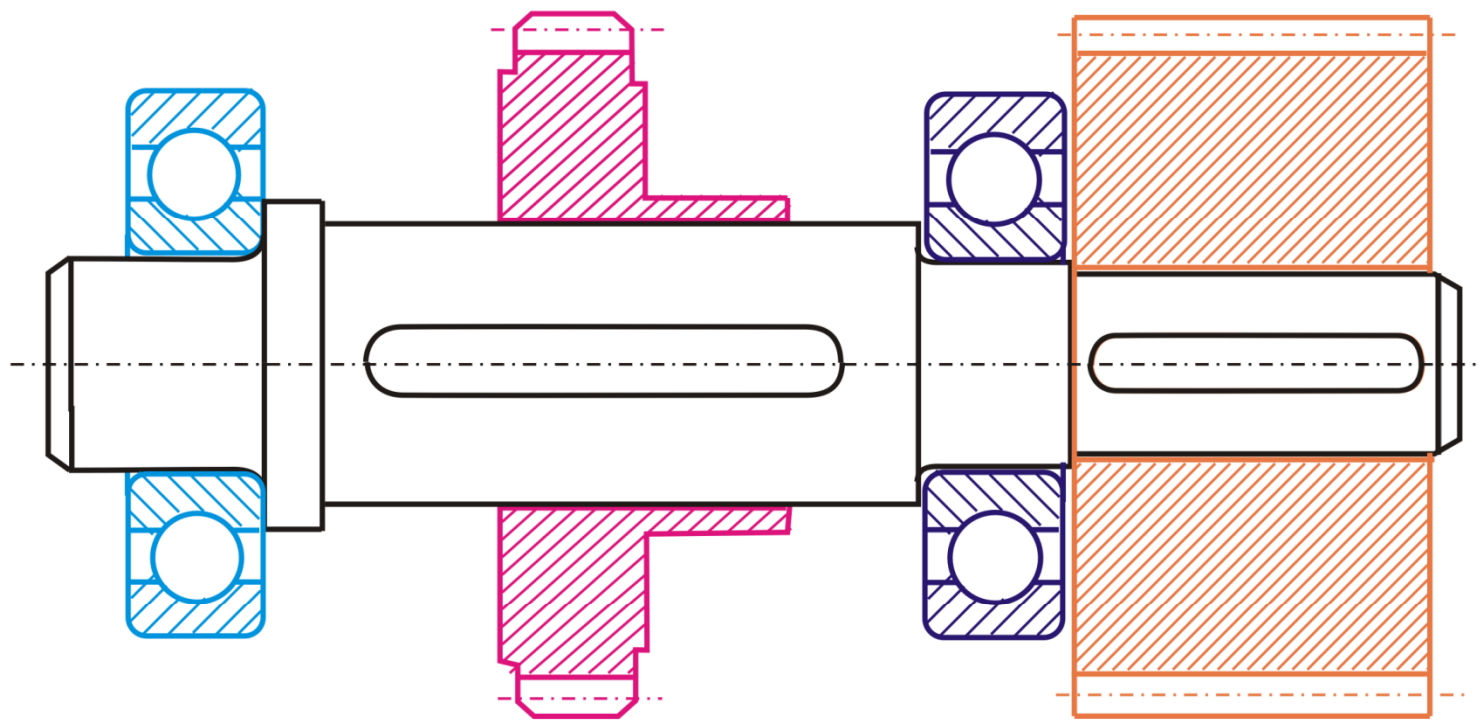
Mozgó alkatrészek szélső helyzetei



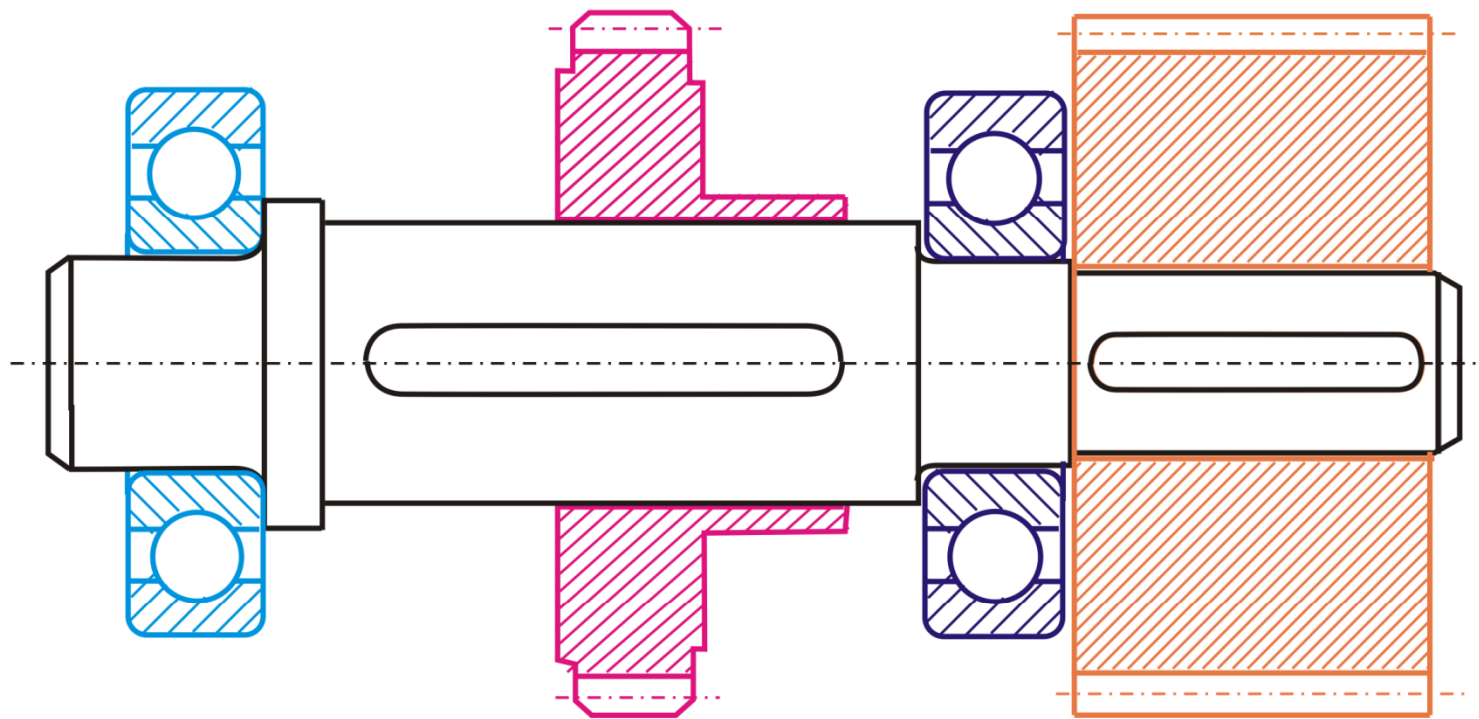
Mozgó alkatrészek szélső helyzetei



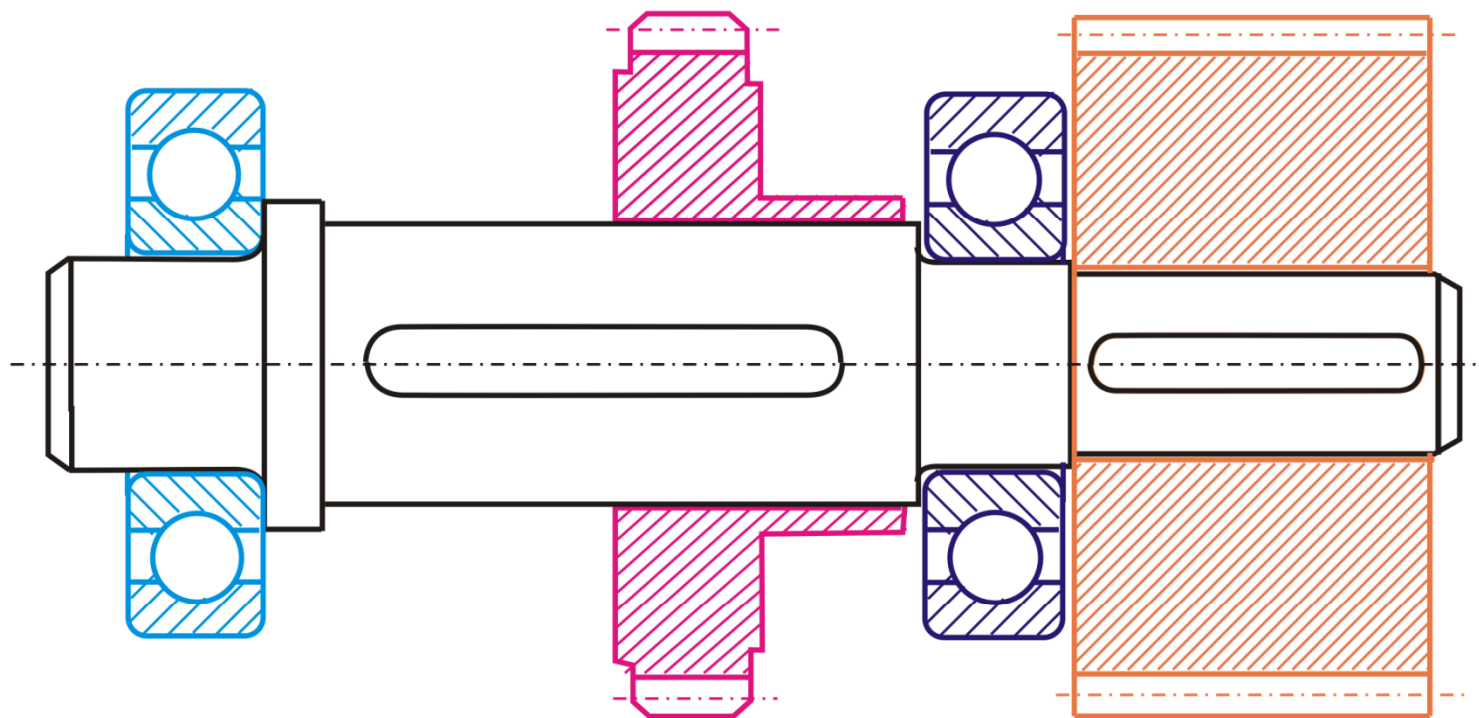
Mozgó alkatrészek szélső helyzetei



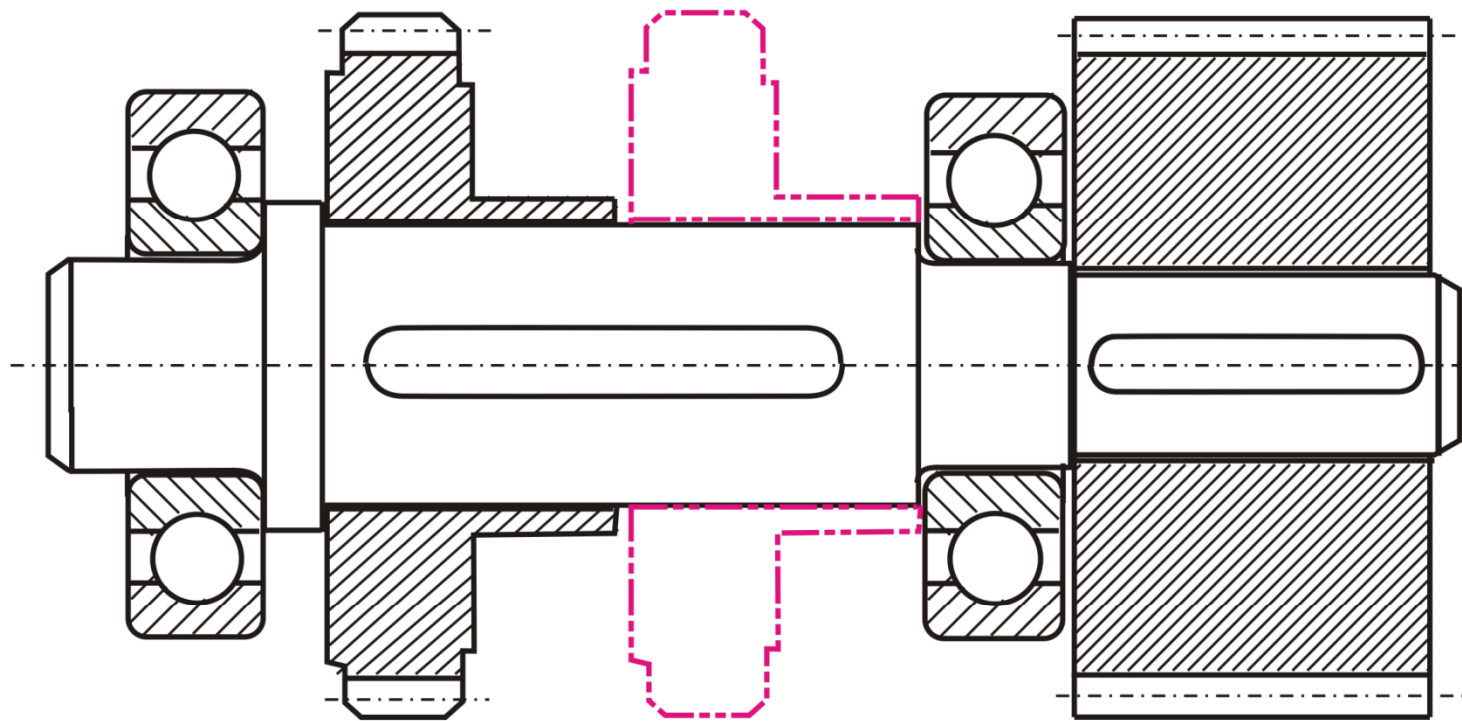
Mozgó alkatrészek szélső helyzetei



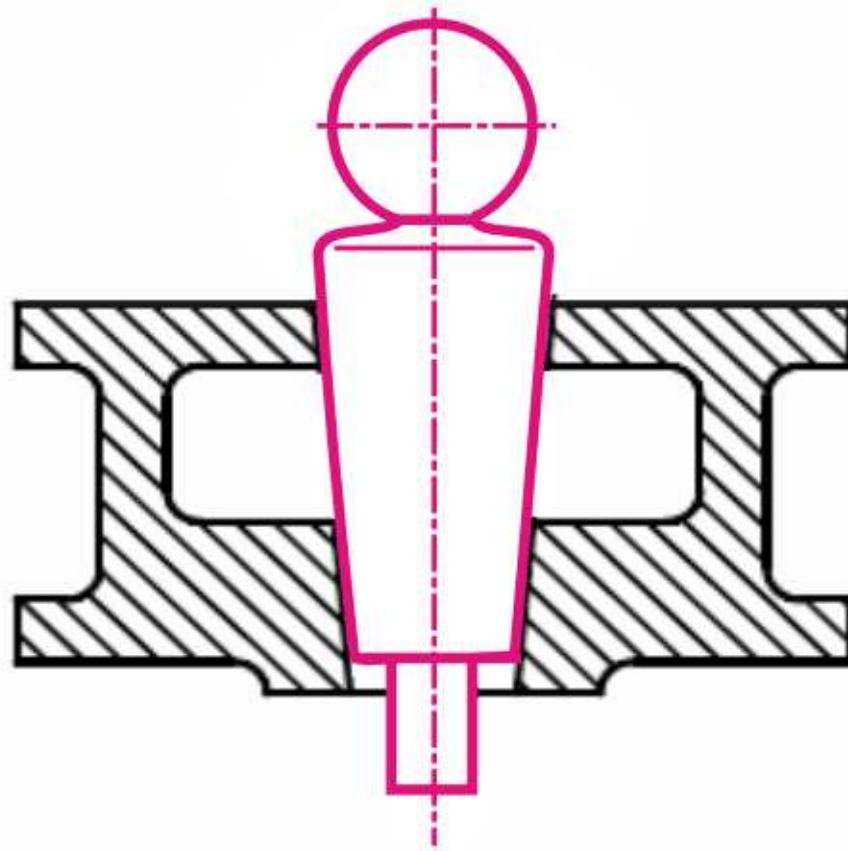
Mozgó alkatrészek szélső helyzetei



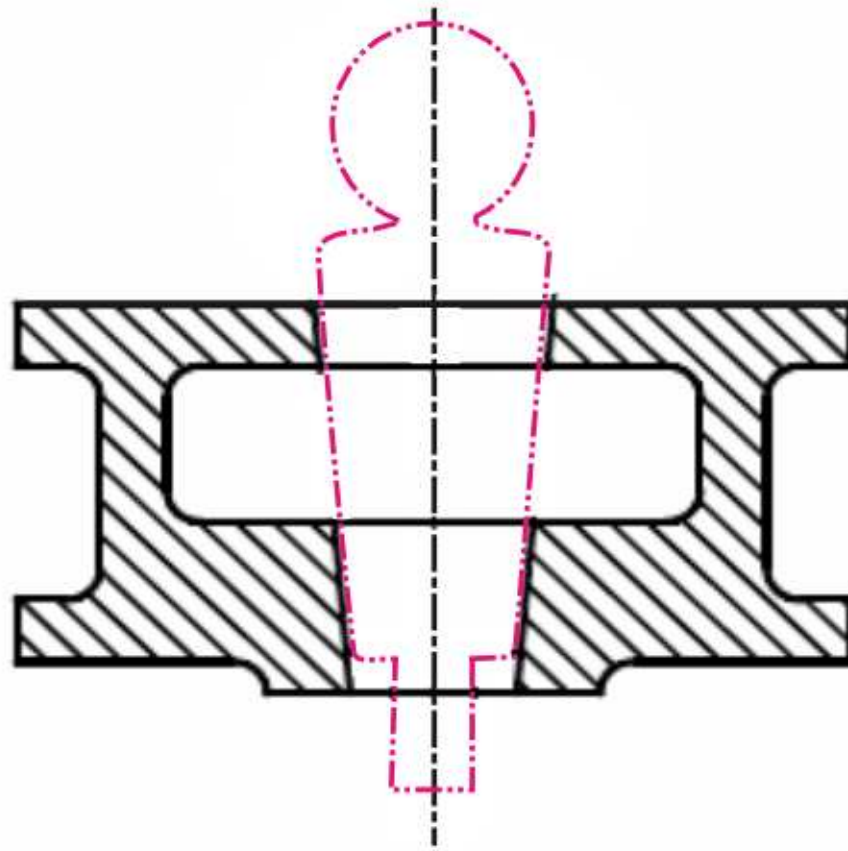
Mozgó alkatrészek szélső helyzetei



Csatlakozó alkatrészek körvonalala



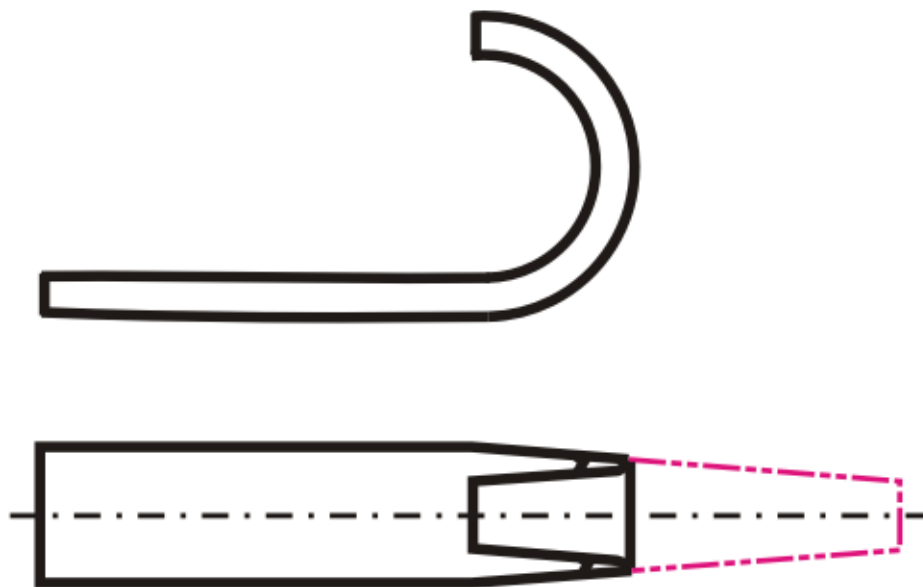
Csatlakozó alkatrészek körvonalala



Alkatrész kiterített (gyártás előtti) alakjának körvonala

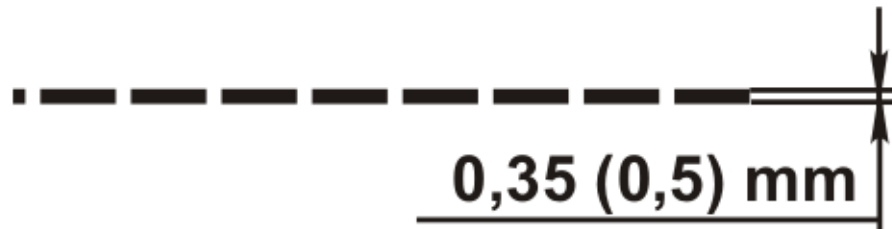


Alkatrész kiterített (gyártás előtti) alakjának körvonala

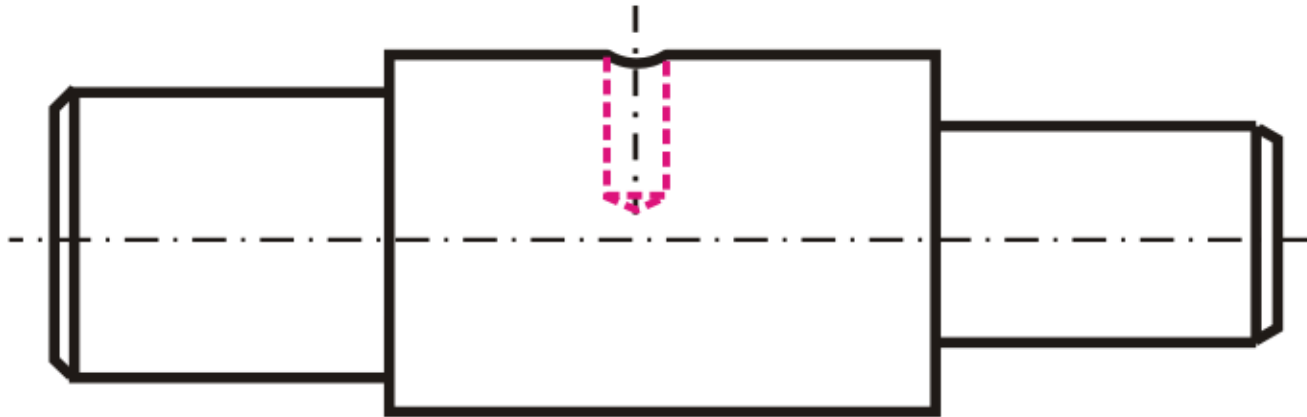


Szaggatott vonalak

A szaggatott vonalak rajzolata



Nem látható, de az egyértelműséghez fontos élek ábrázolása (kerülni kell!)

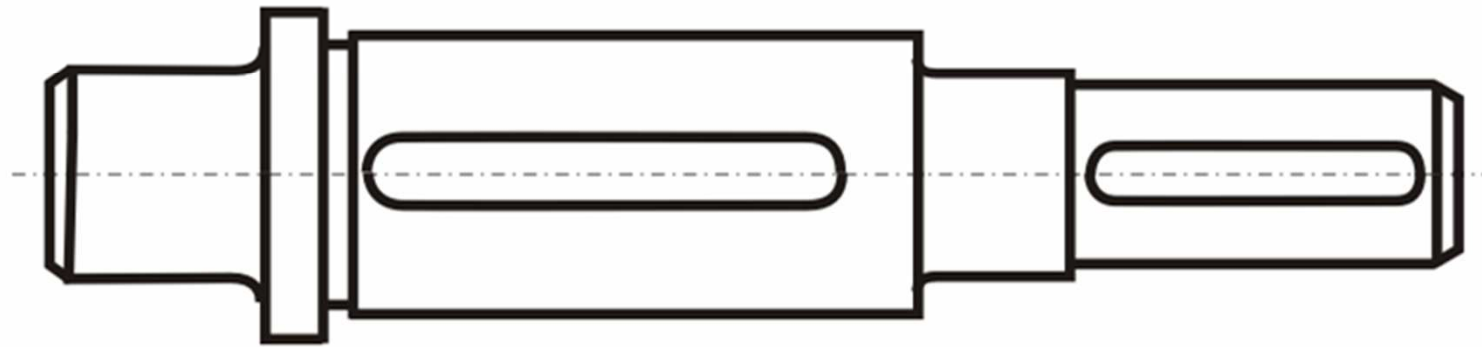


**Szabadkézzel rajzolt (tört)
vonalak**

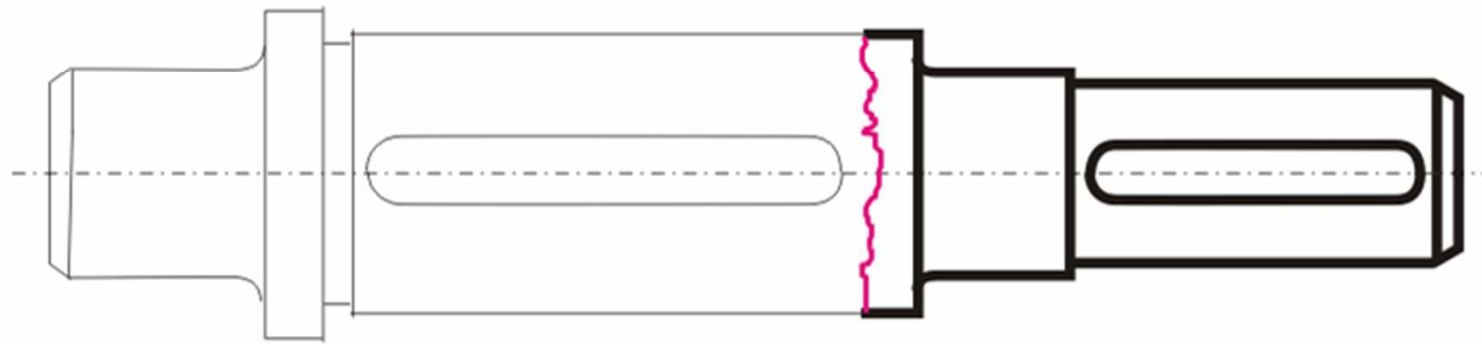
A törtvonalak rajzolata



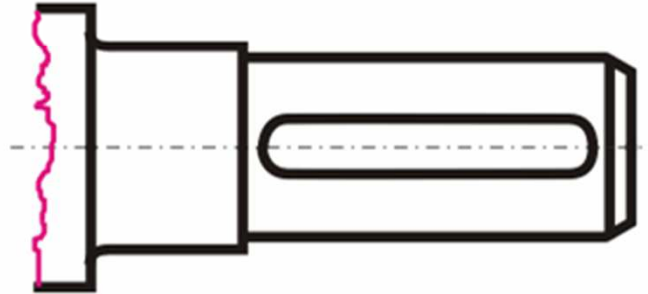
Alkatrész elhagyott részének határa



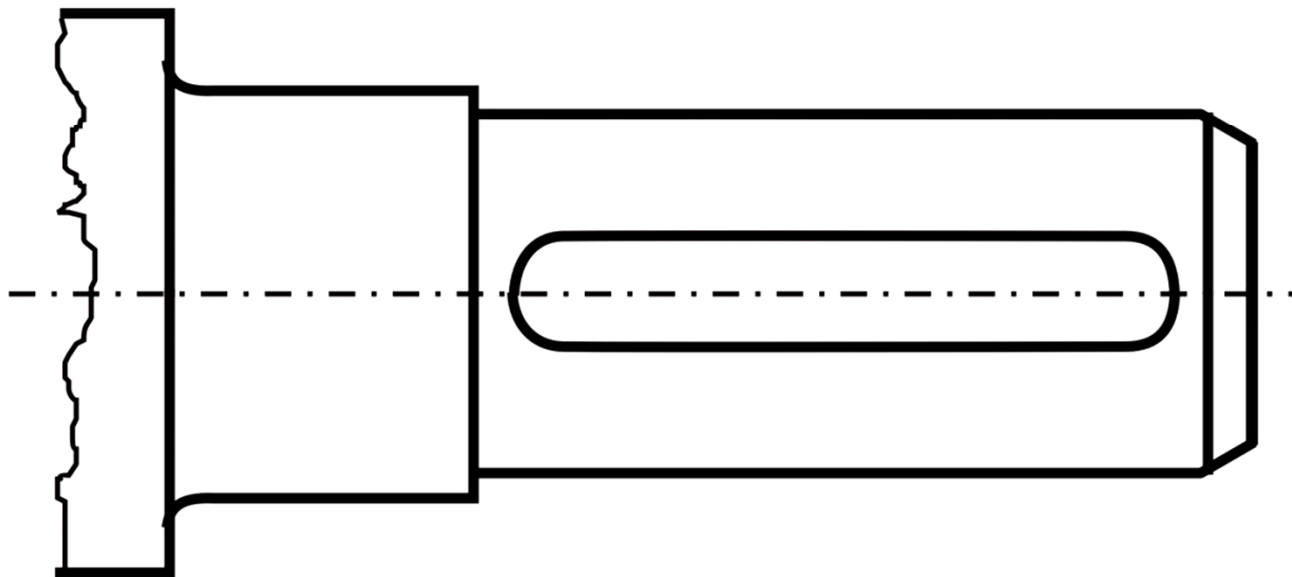
Alkatrész elhagyott részének határa



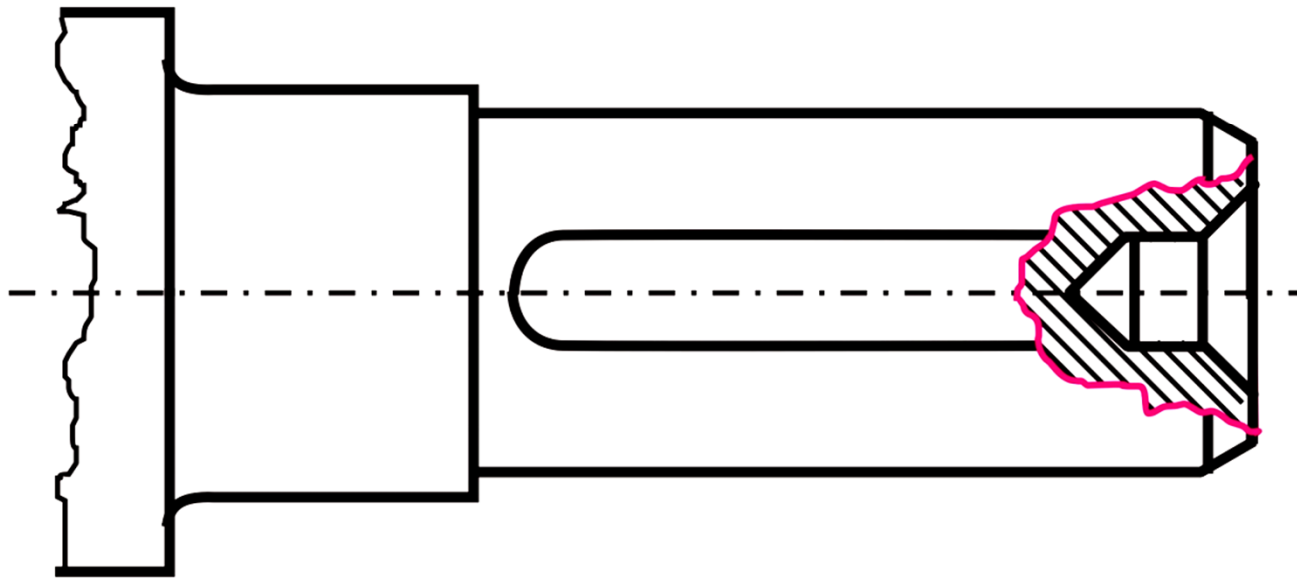
Alkatrész elhagyott részének határa



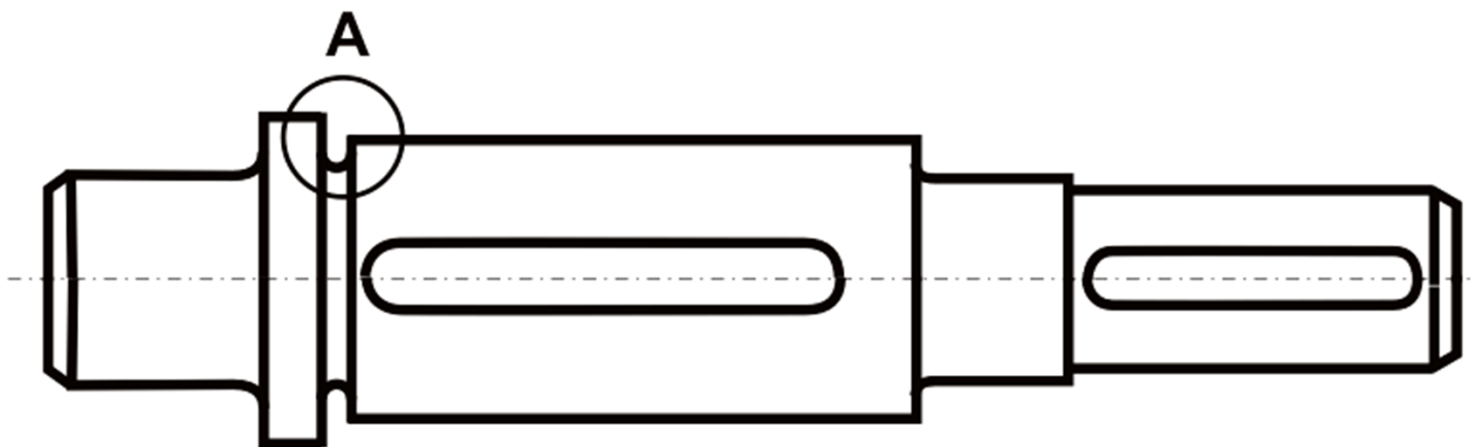
Kitörés határa



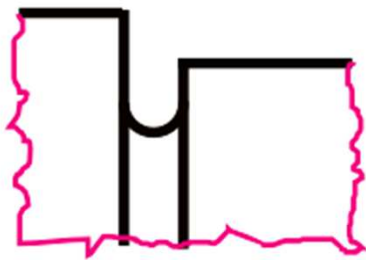
Kitörés határa



Résznézet határvonala



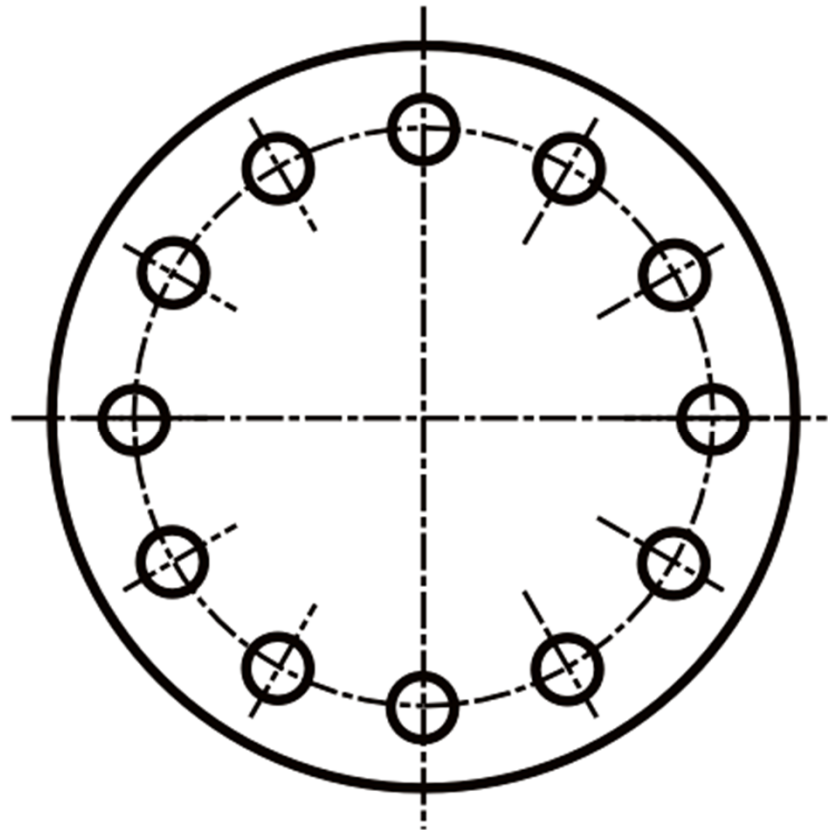
A (2:1)



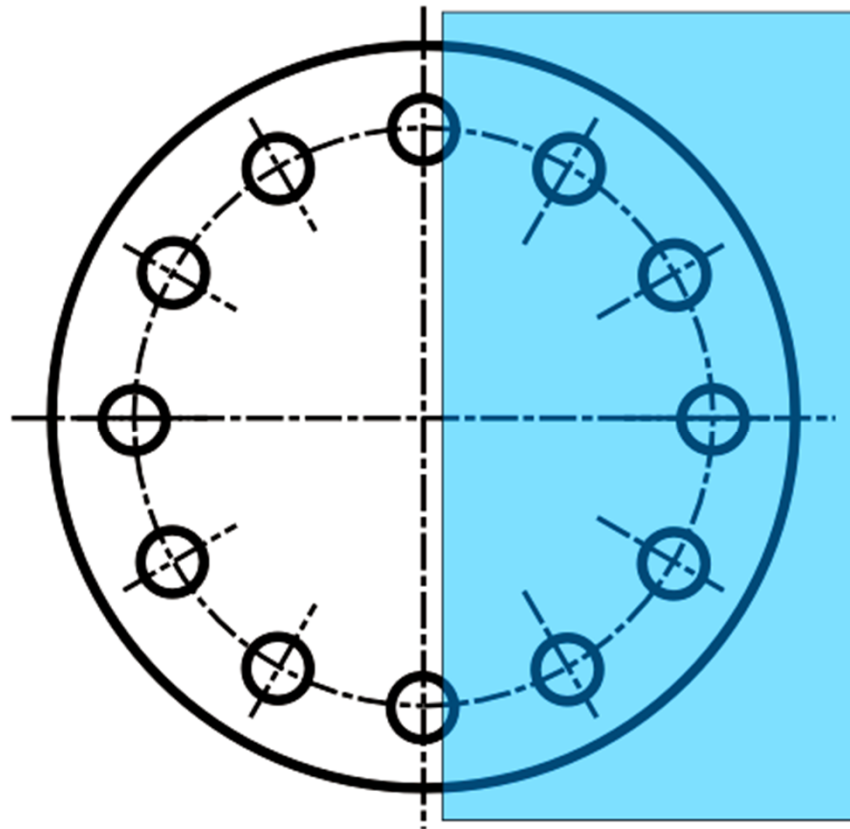
RAJZOLÁSI EGYSZERÜSÍTÉSEK

Szimmetrikus tárgyak egyszerűsített ábrázolása

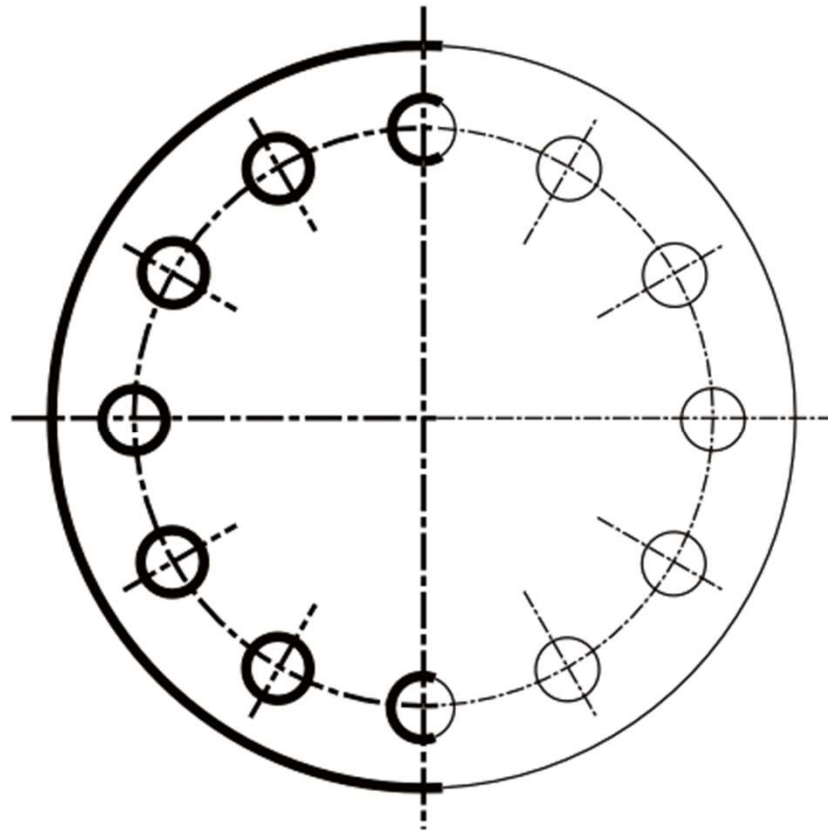
Félnézet



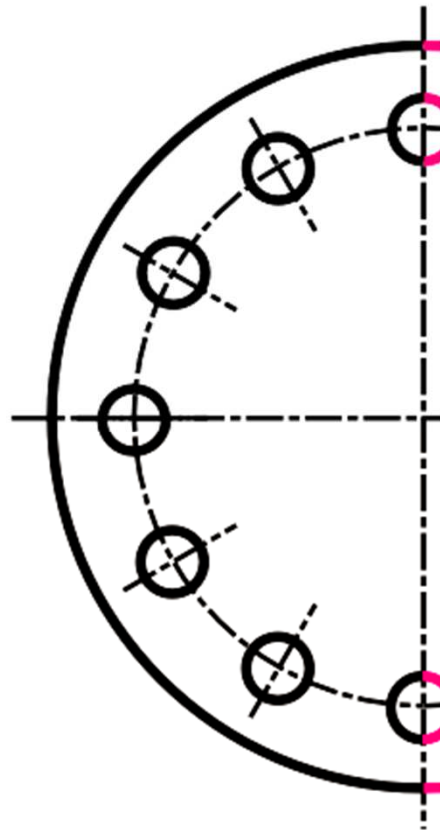
Félnézet



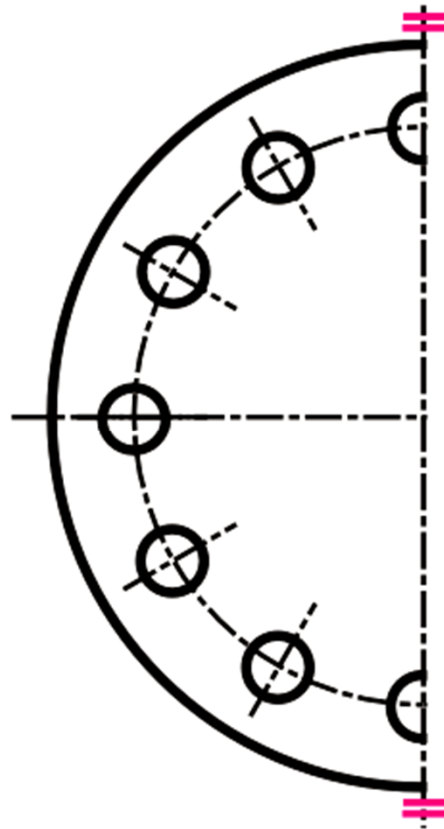
Félnézet



Félnézet

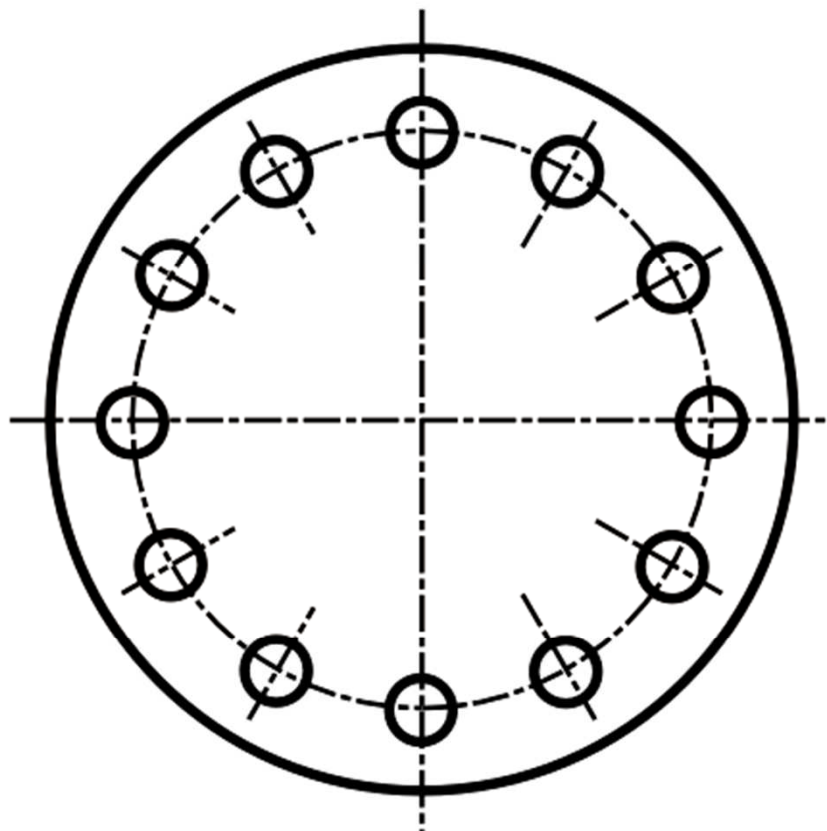


Félnézet

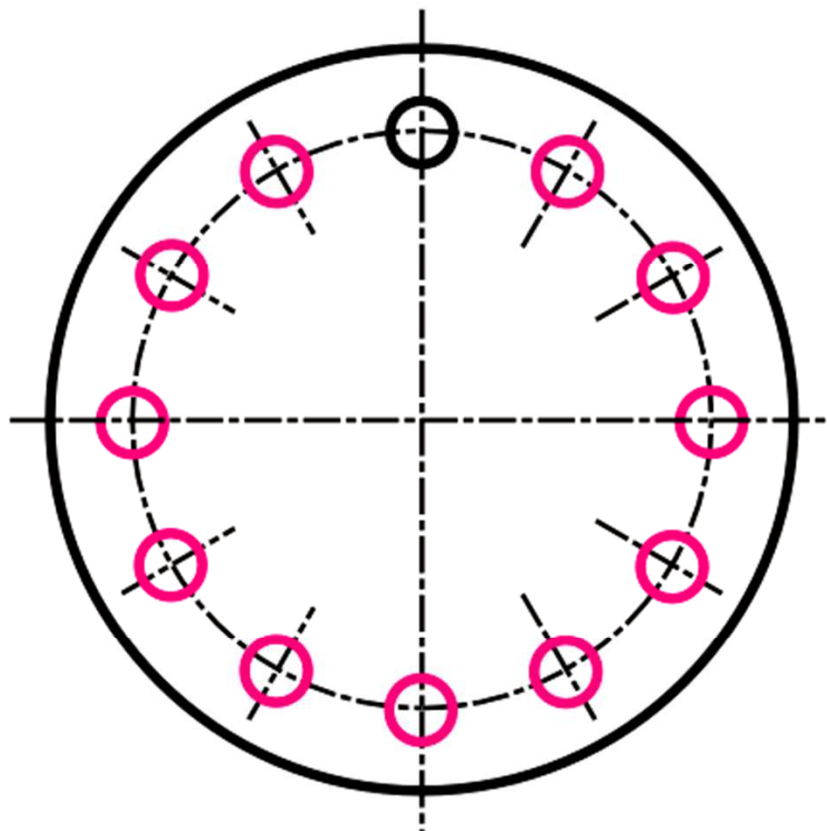


Ismétlődő elemek „ritkített” ábrázolása

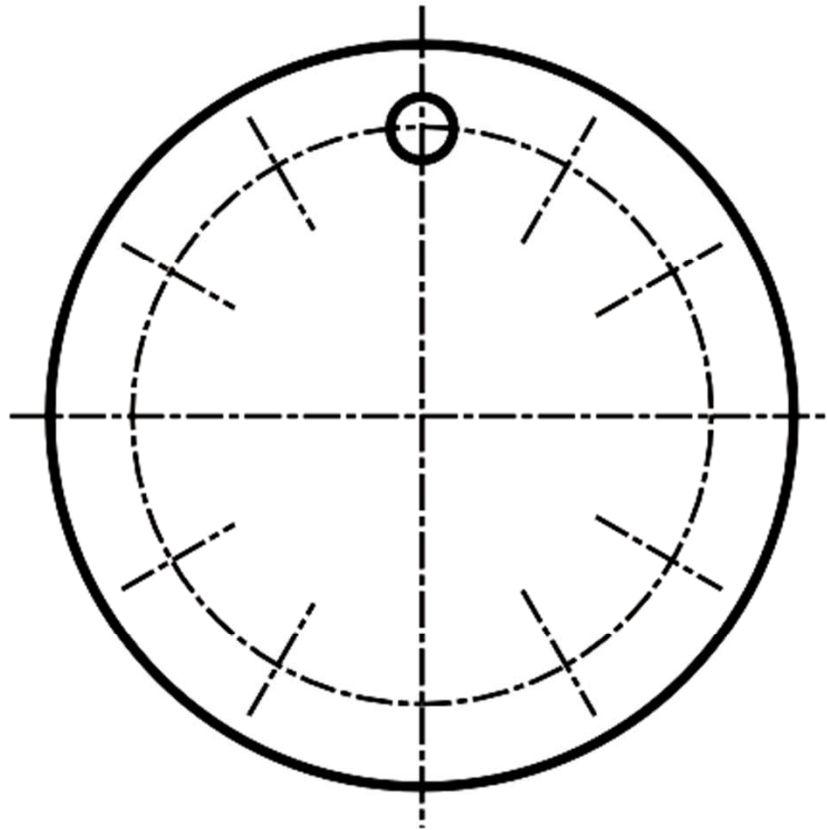
Ismétlődő furatok



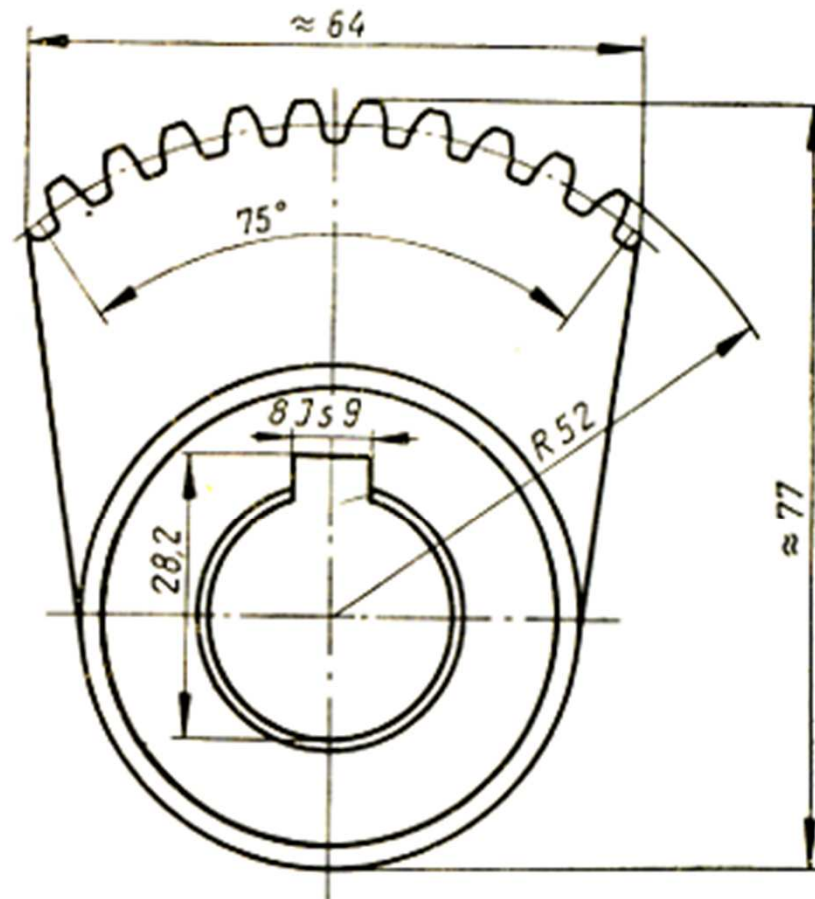
Ismétlődő furatok



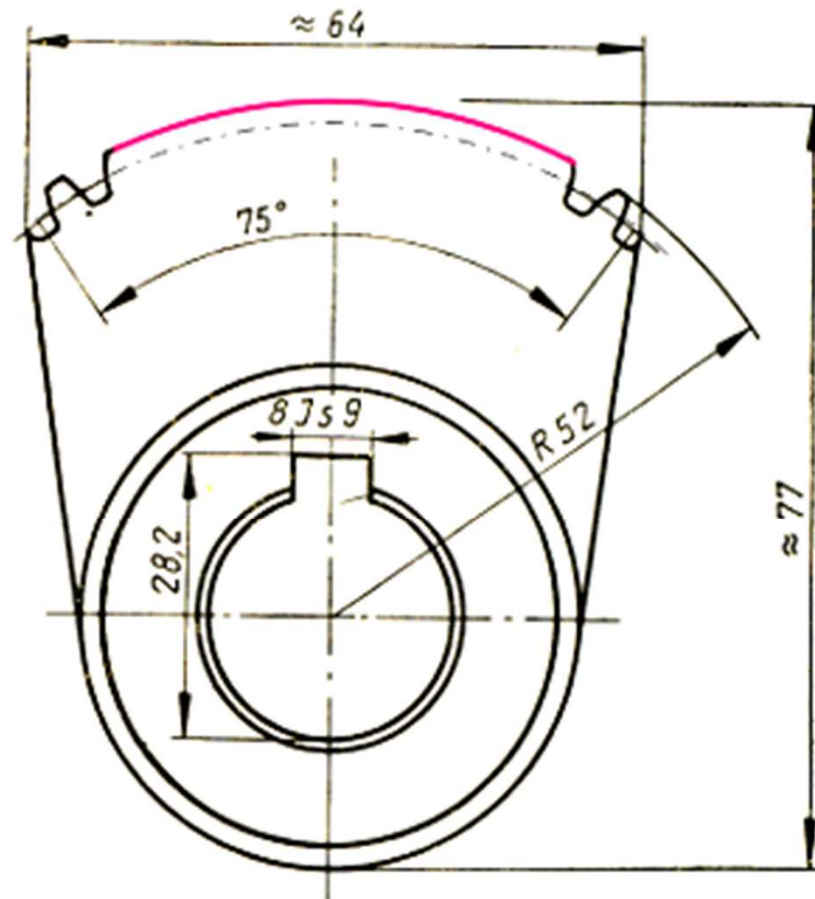
Ismétlődő furatok



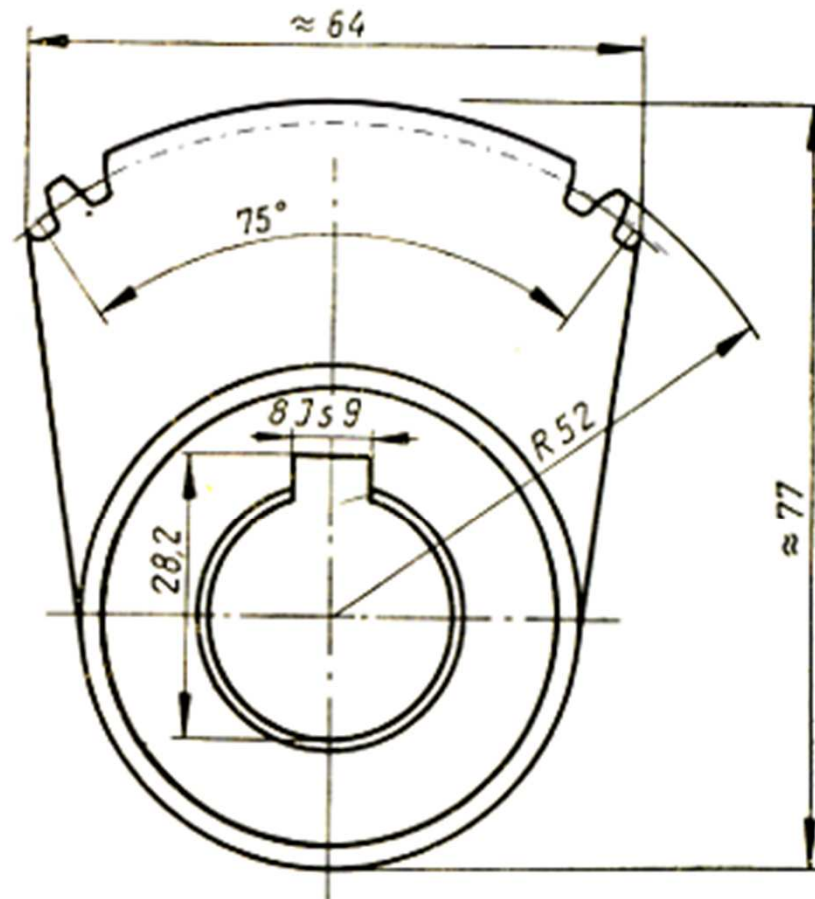
Ismétlődő mintázat



Ismétlődő mintázat

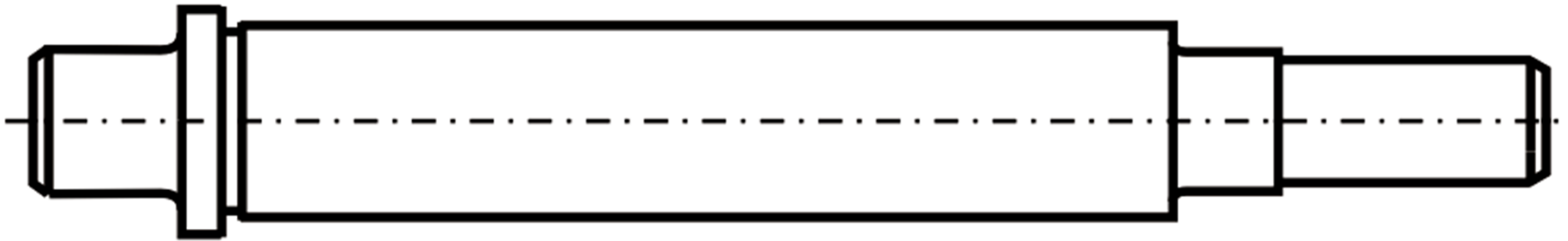


Ismétlődő mintázat

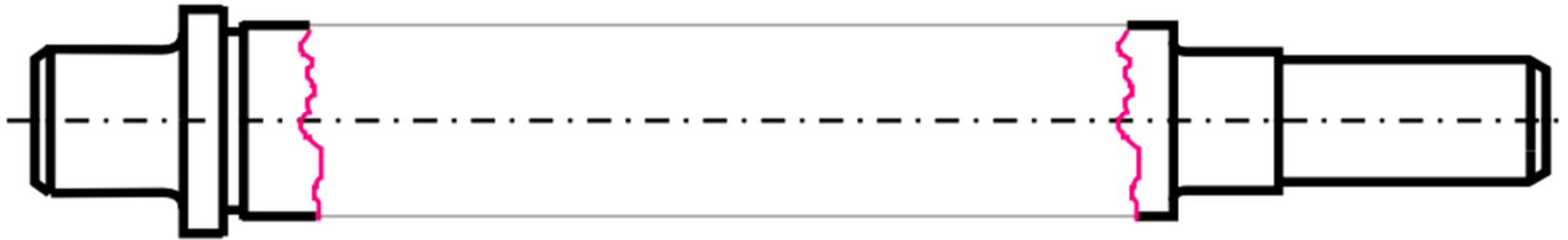


Semmitmondó részletek elhagyása

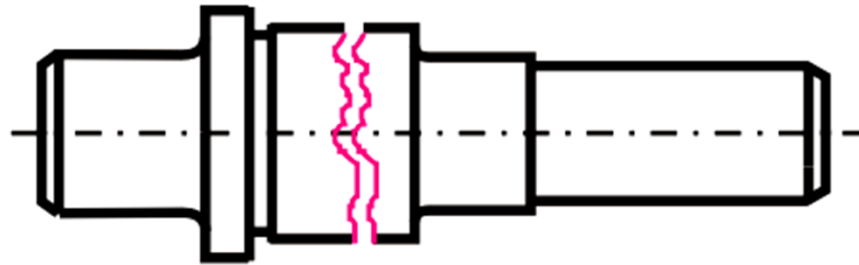
Hosszú alkatrészek „kitörése”



Hosszú alkatrészek „kitörése”



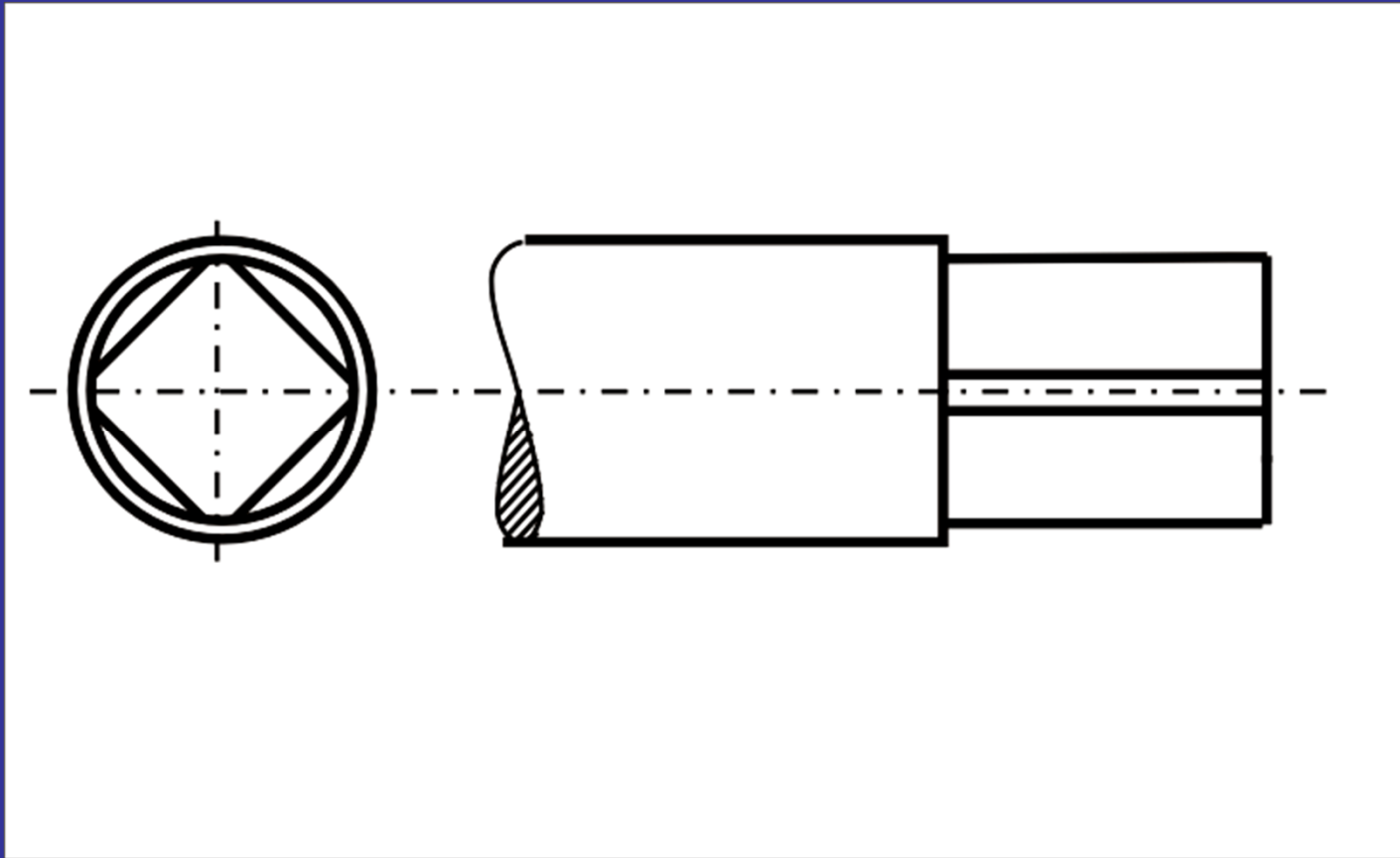
Hosszú alkatrészek „kitörése”



Sík felületek ábrázolása

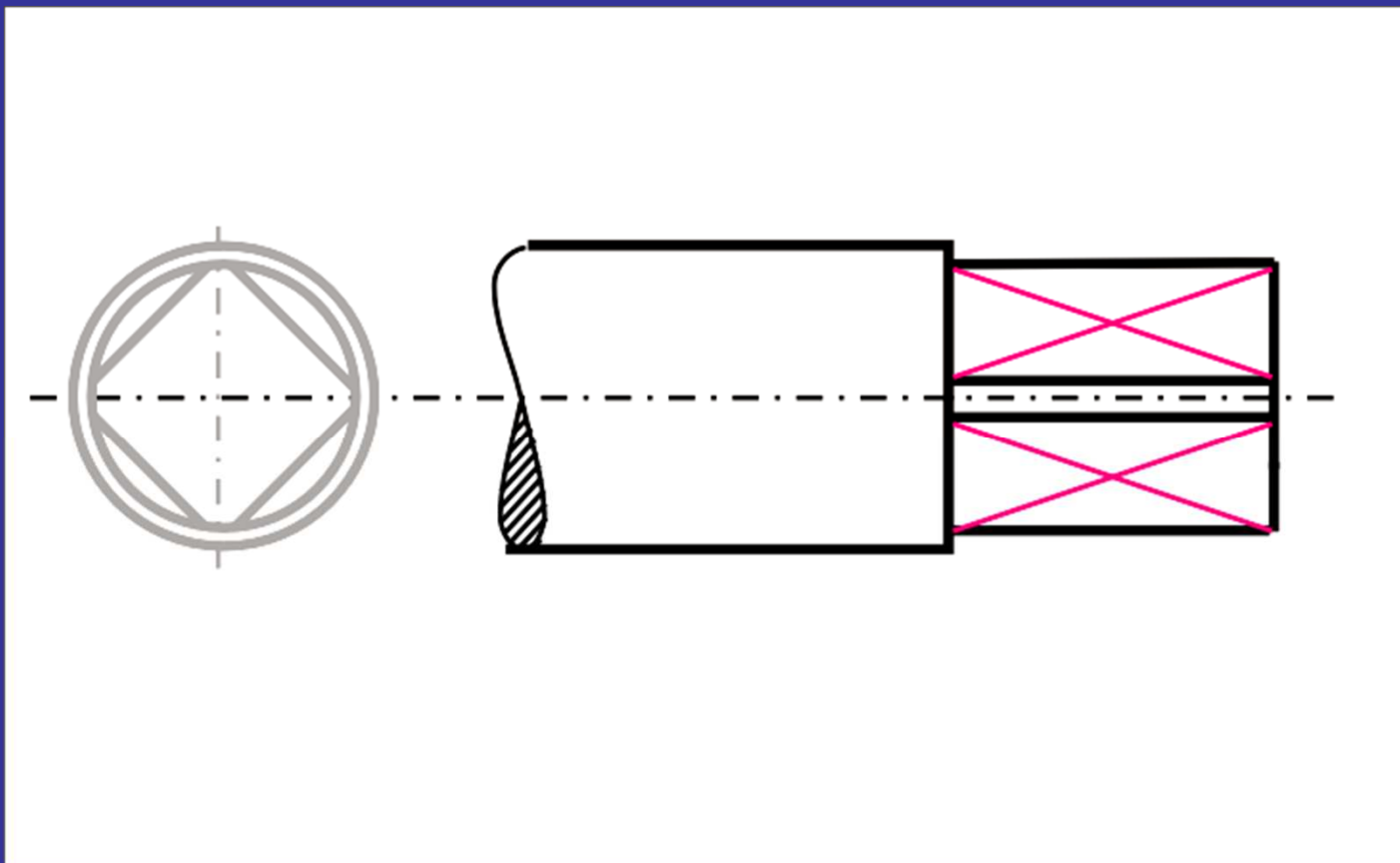
Sík felület ábrázolása

(ha a vetületek nem elegendőek a sík jelleg érzékeltetésére)



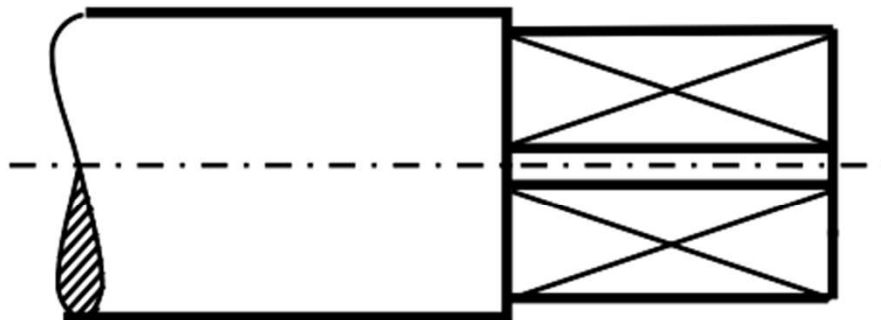
Sík felület ábrázolása

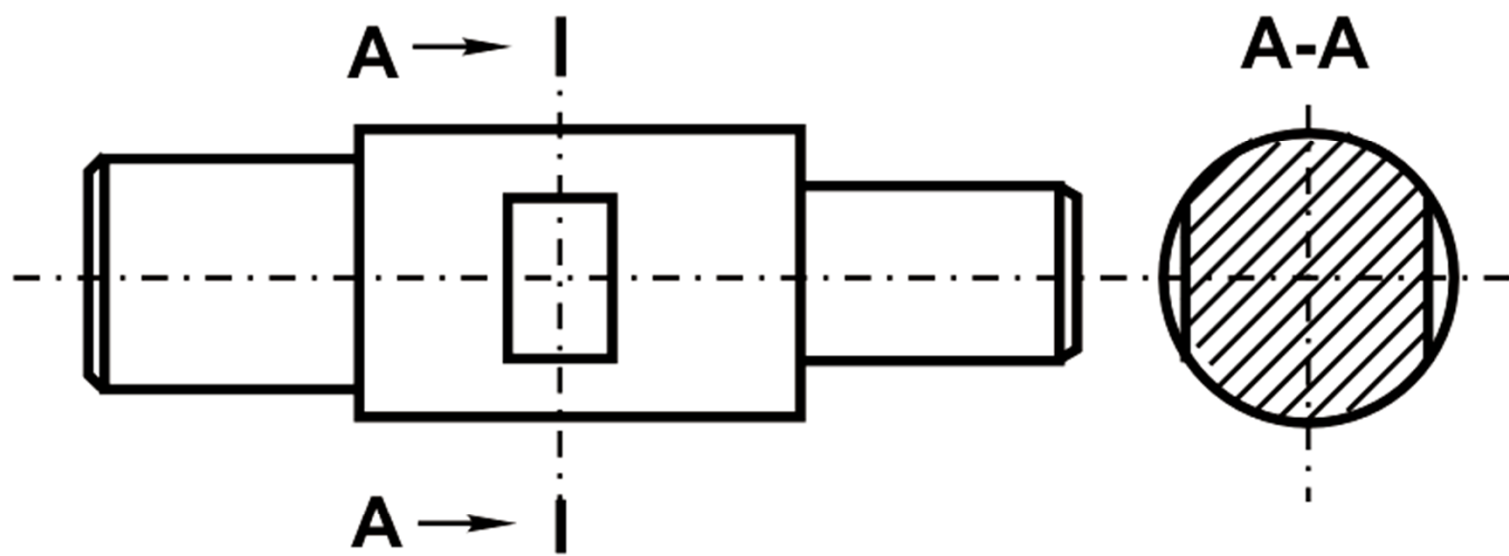
(ha a vetületek nem elegendőek a sík jelleg érzékeltetésére)

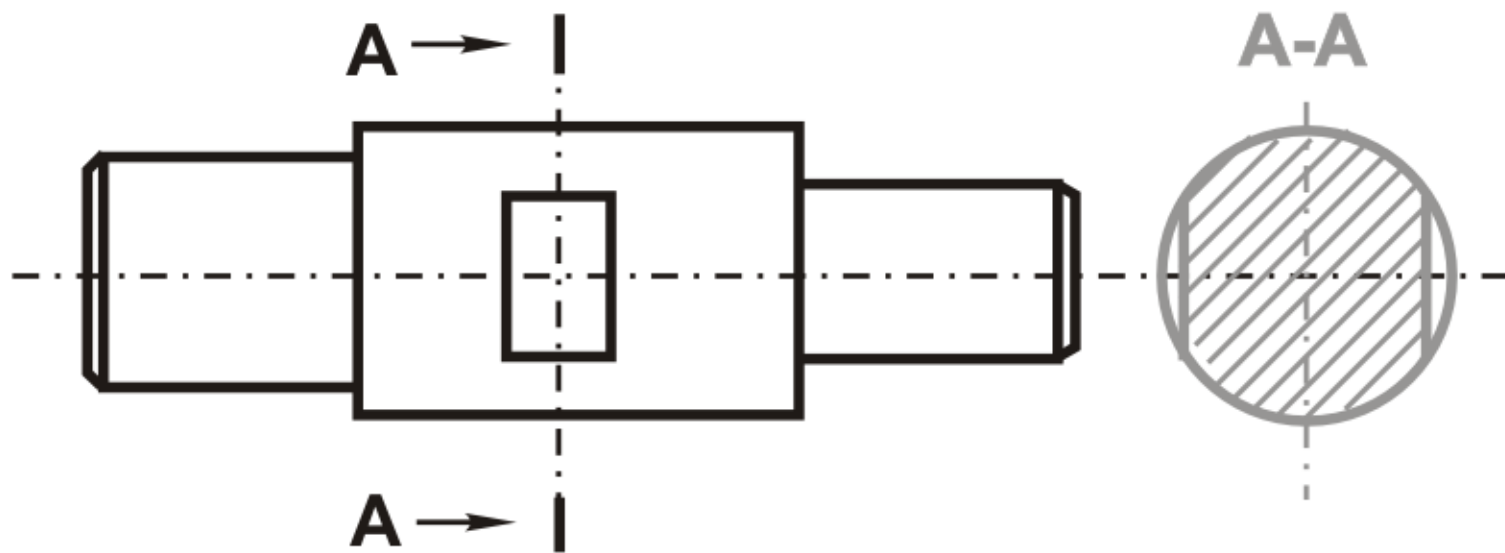


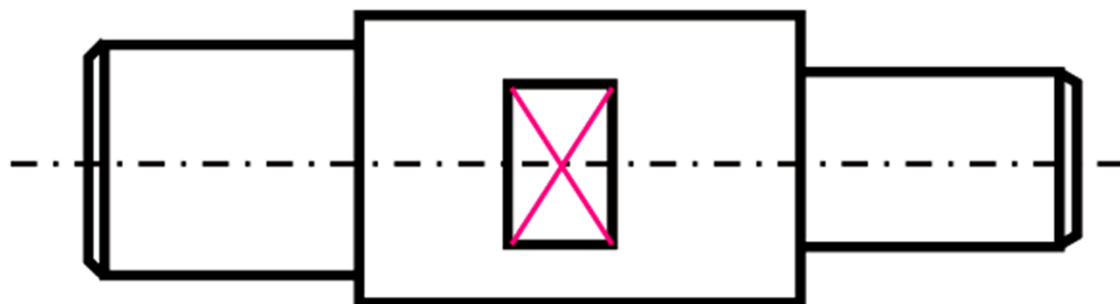
Sík felület ábrázolása

(ha a vetületek nem elegendőek a sík jelleg érzékeltetésére)





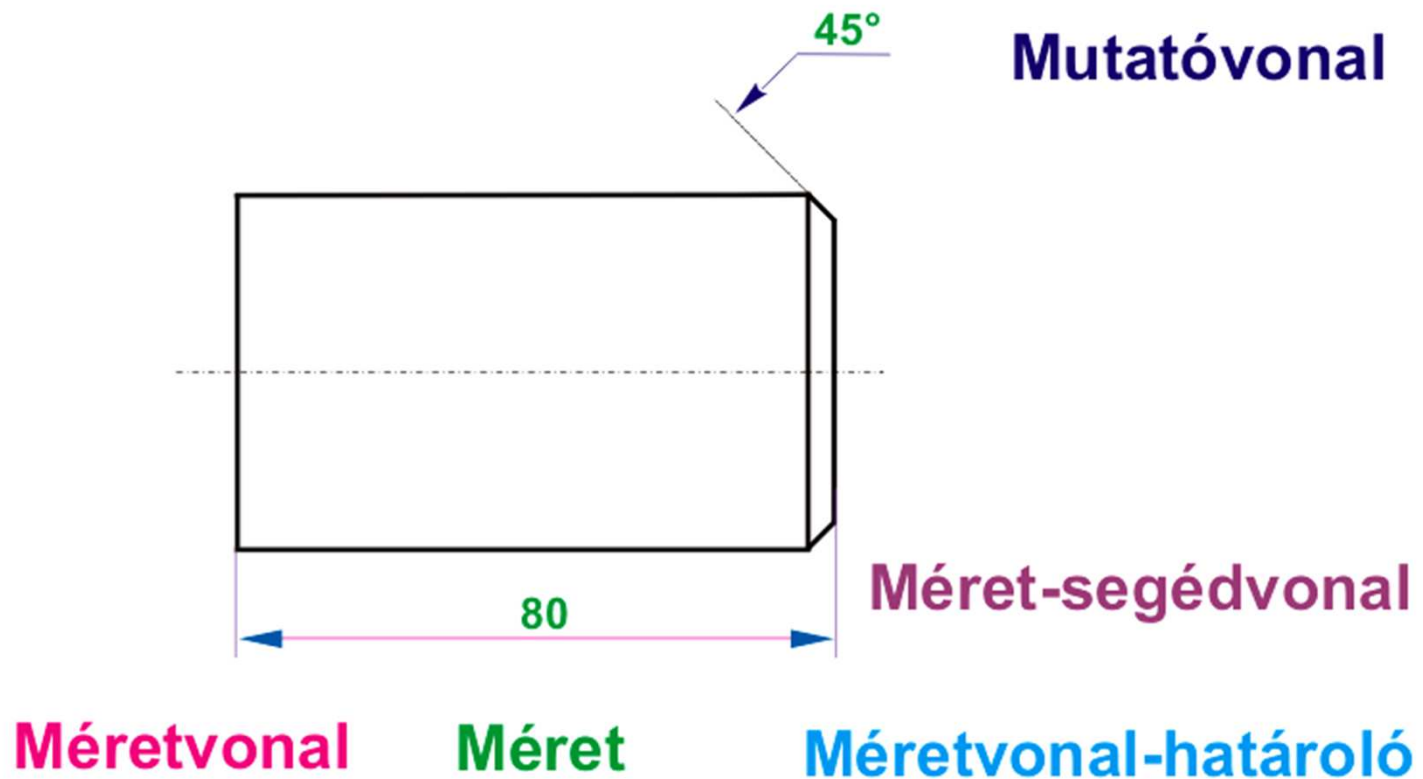




A MÉRETMEGADÁS SZABÁLYAI

A MÉRETMEGADÁS JELEI

A méretmegadás alapsémája

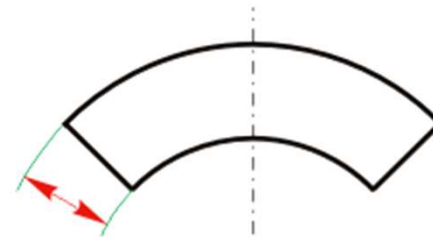
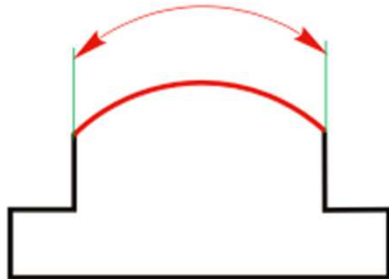
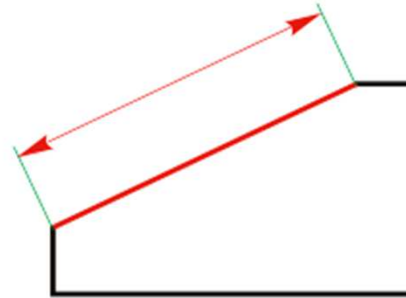
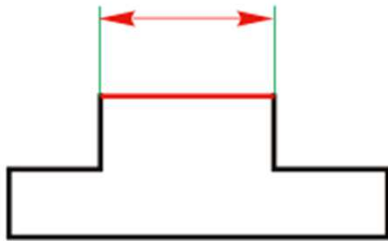


A méretvonal

Formája: vékony vonal (0,35 mm)

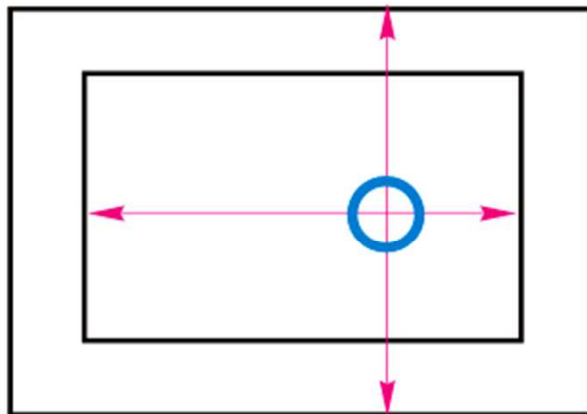
Célja: a méretezett szakasz geometriai ábrázolása

A méretvonalak párhuzamosak a méretezett szakasszal

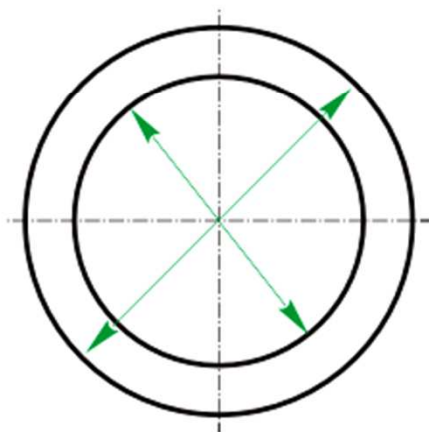


A méretvonalak nem metszhetik egymást

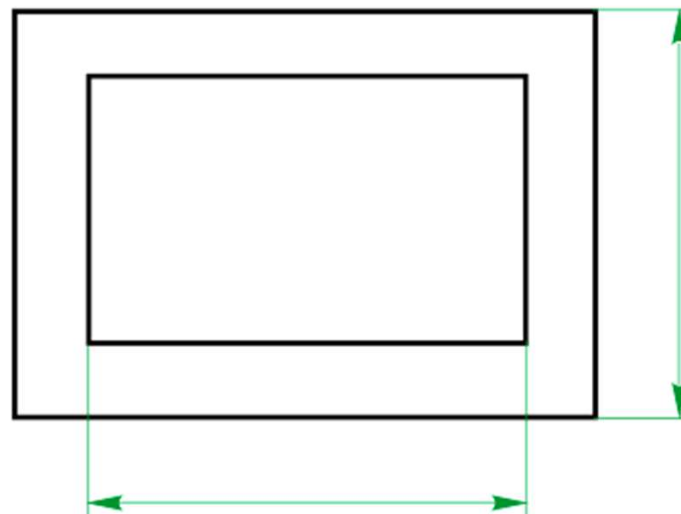
TILOS!



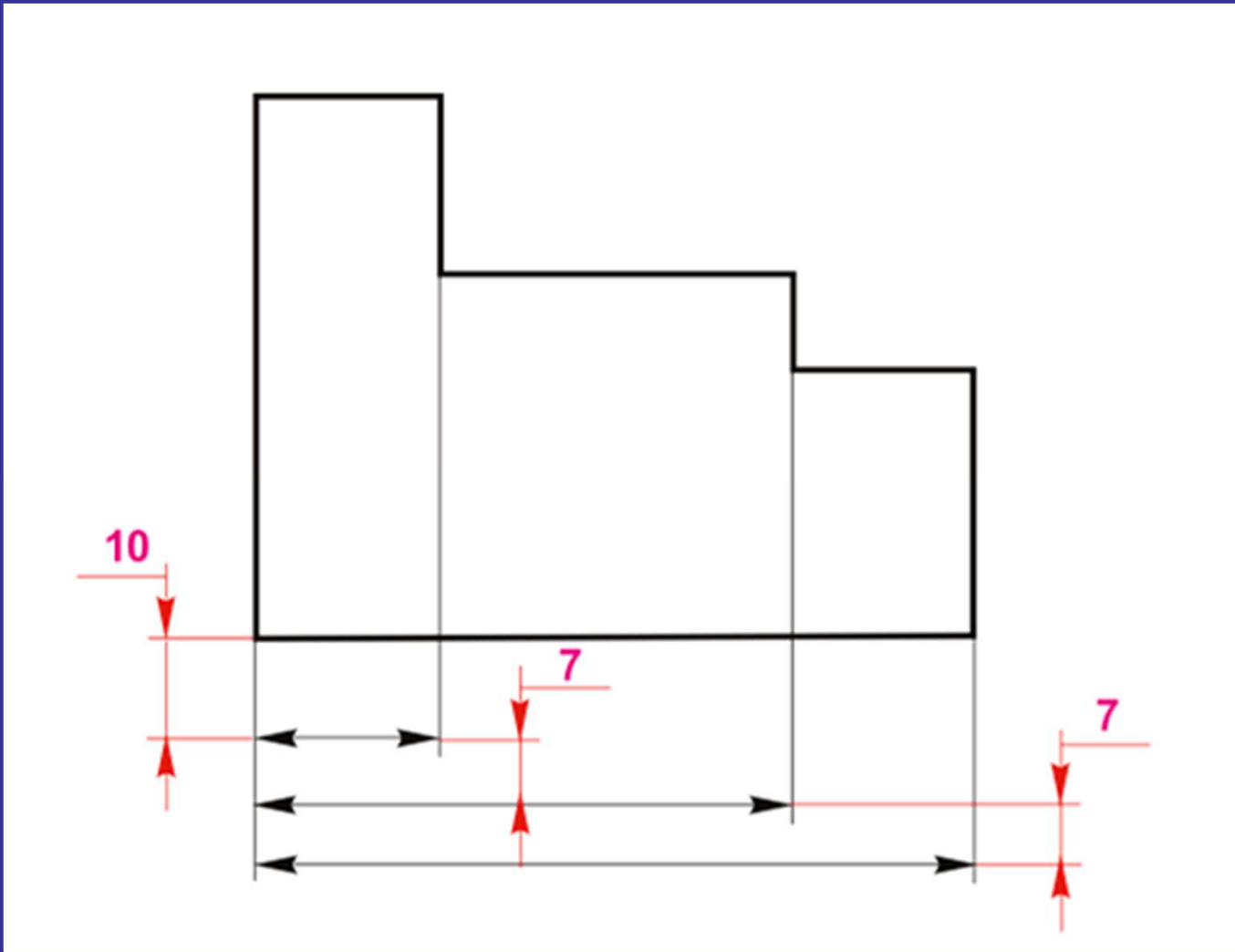
Kivétel



HELYES



A méretvonalak távolsága a többi vonaltól

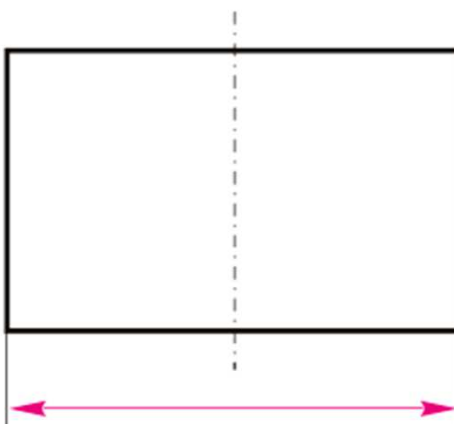


A méretvonalak végpontjainak lehetséges helyzetei

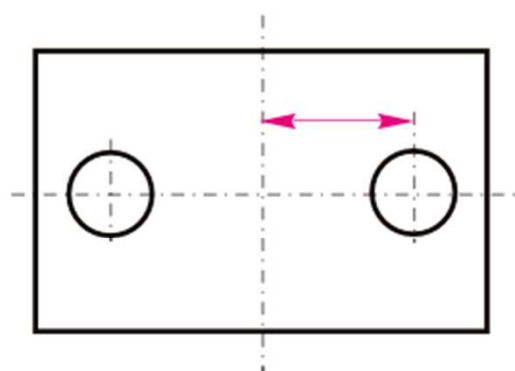
Kontúrvonal



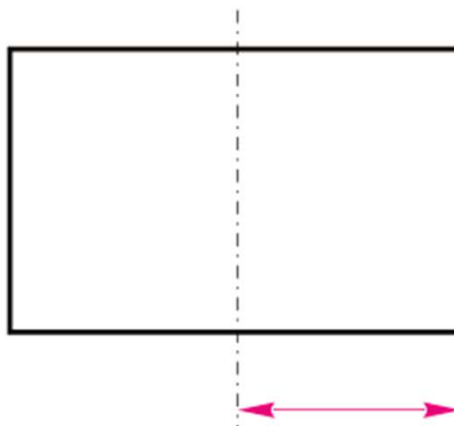
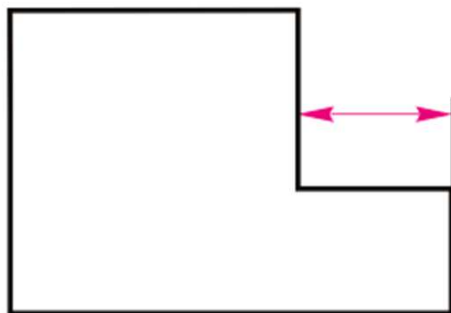
Méret-segédvonal



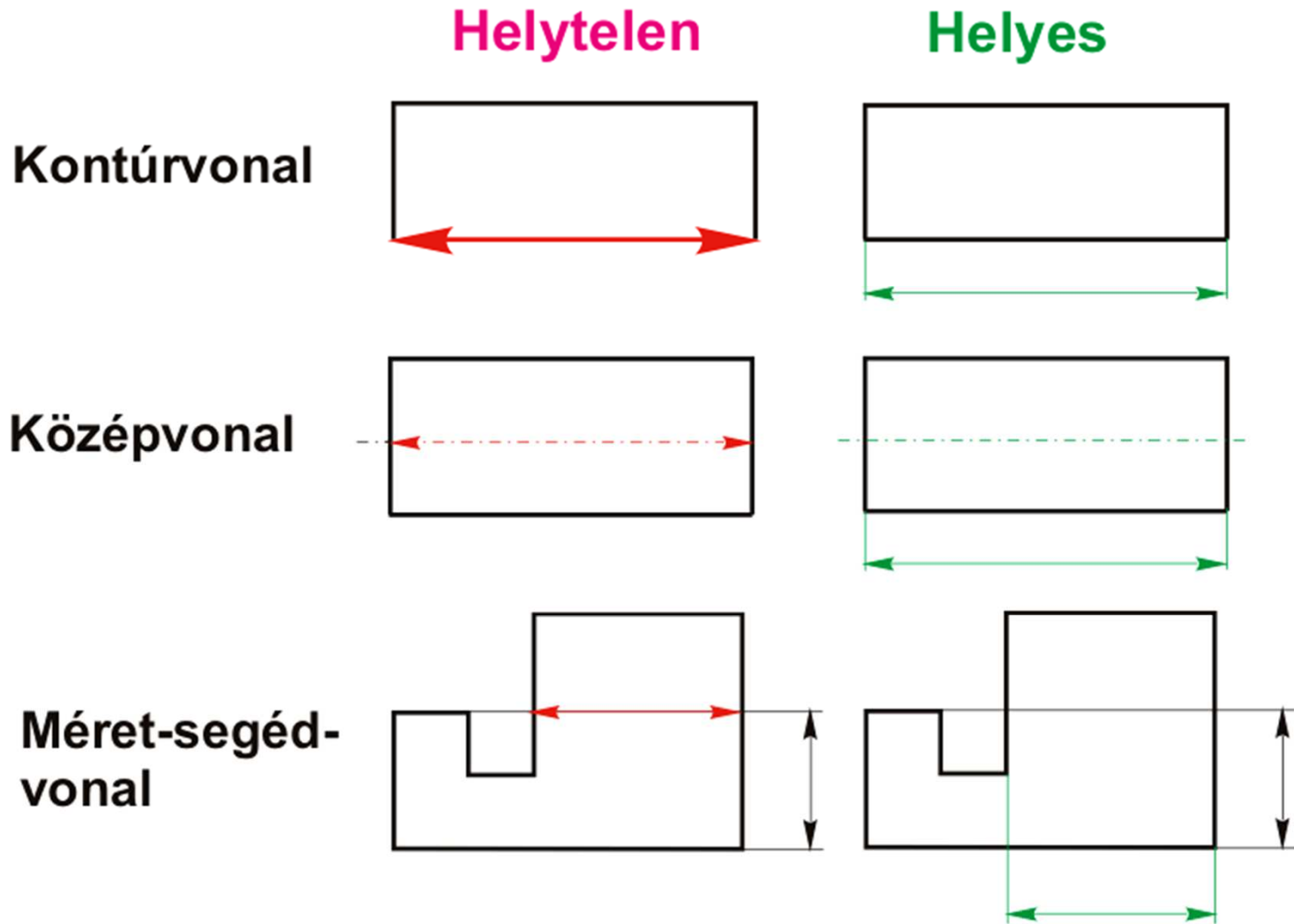
Középvonal



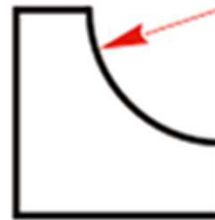
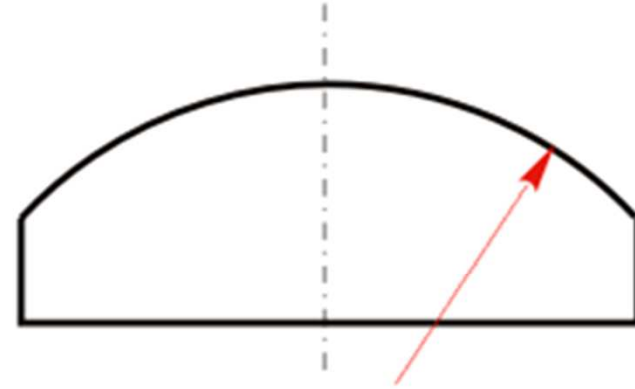
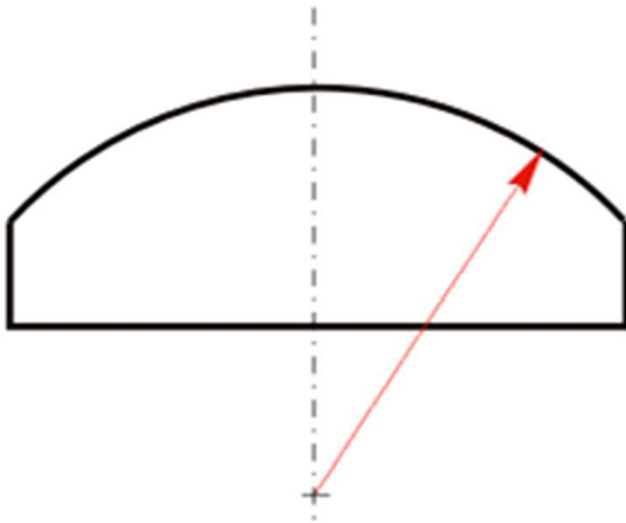
Kombinációk



Méretvonalaként nem használható vonalak



Íves felültek méretvonalai



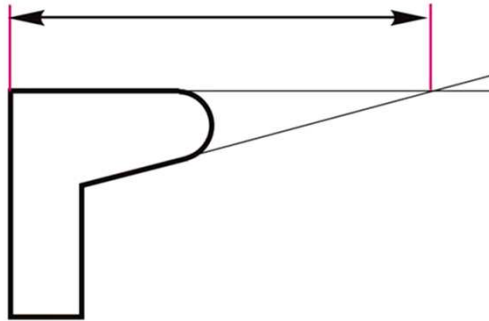
A méret-segédvonal

Formája: vékony vonal

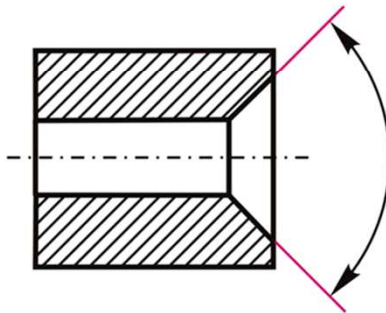
Célja: kivetített méretek jelzése

Méret-segédvonal változatok

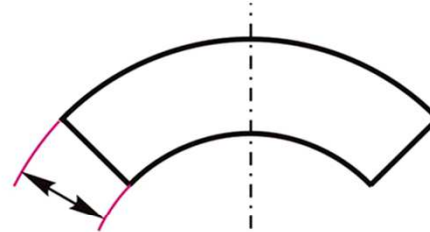
Lekerekített felületek



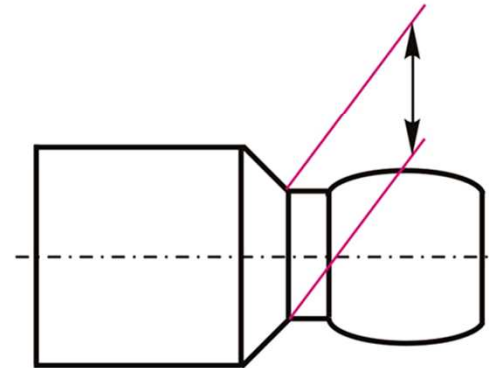
Szöget bezáró felületek



Íves felületek



Átlósan kiemelt méretvonalak



A méretvonal-határoló

Méretvonal-határolók változatai

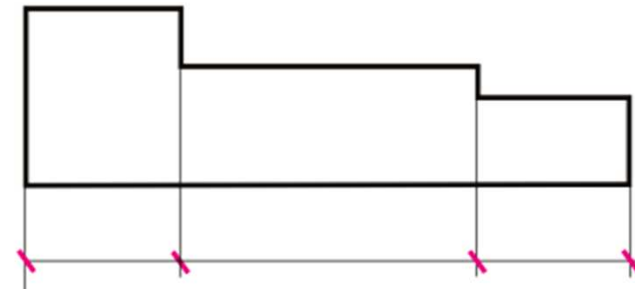
Kiindulási jel



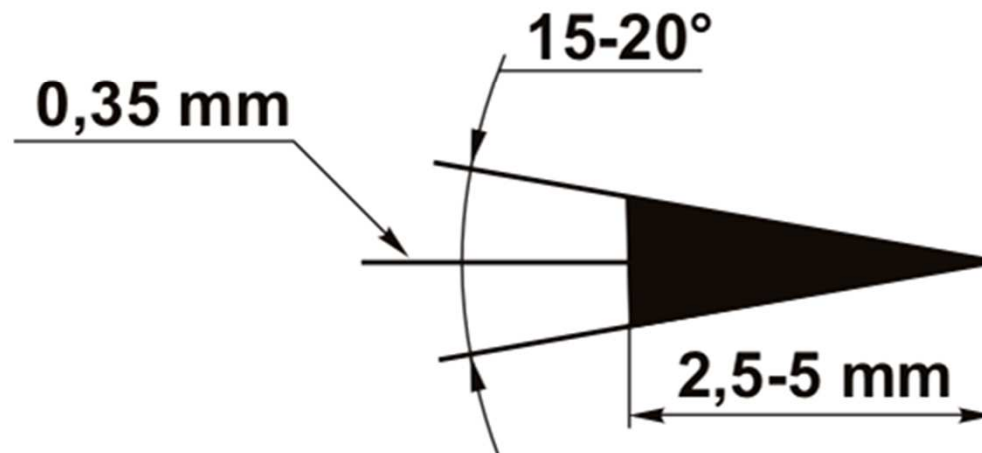
Nyíl



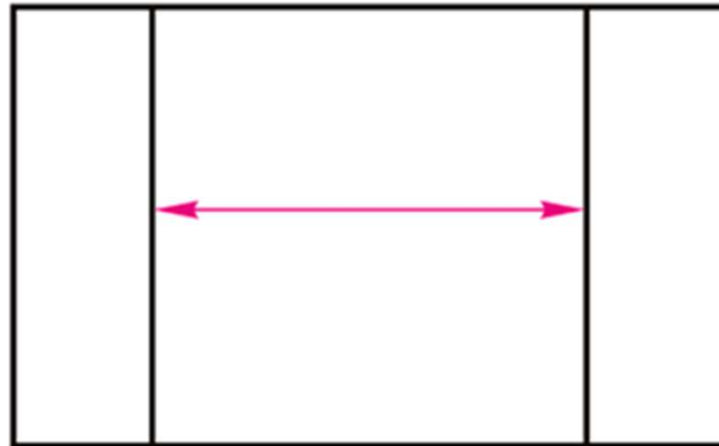
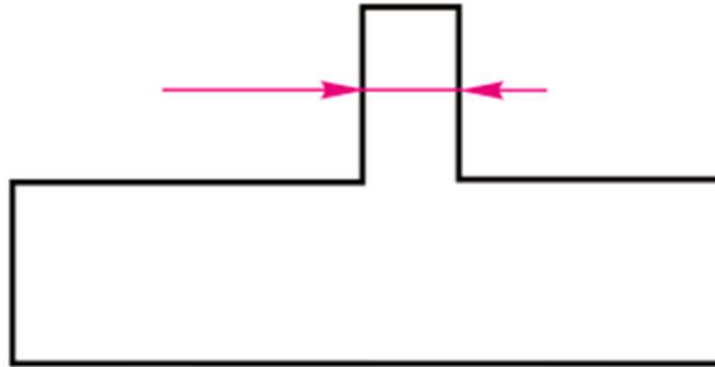
Ferde vonás



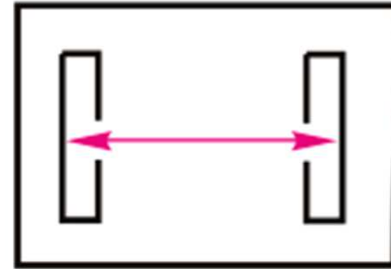
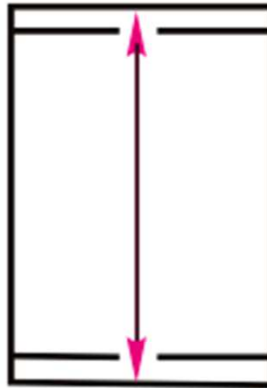
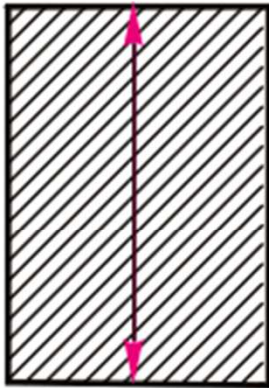
A nyíl szokásos formája



A nyíl elhelyezési lehetőségei



A nyíllal fedésben lévő rajzi elemek ábrázolása

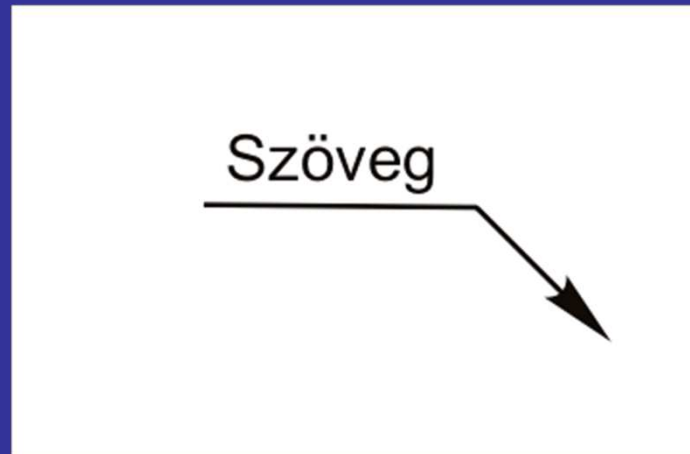


A mutatóvonal

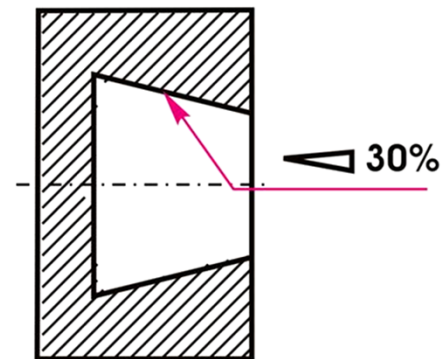
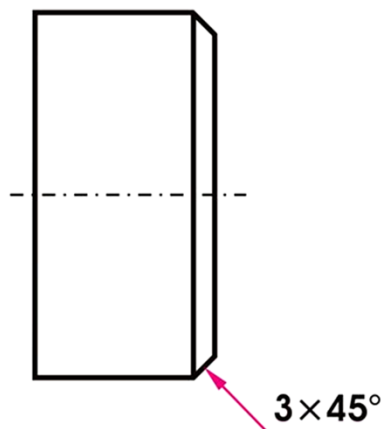
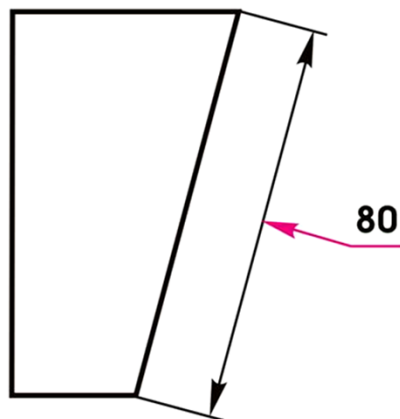
Formája: vékony vonal (0,35 mm)

Célja: a kiemelt szöveg (méret) helyzetének jelölése

A mutatóvonal alakja



A mutatóvonal elhelyezésének változatai



A méret felirata

Betűnagyság: **3,5 mm**

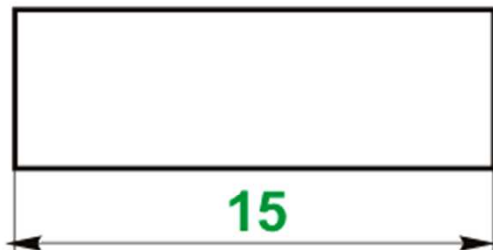
Méreték mértékegysége: **mm**

Mértékegység **nem** írando ki

A szöveg (méretszám) a méretvonal felett, középen,
balról jobbra, vagy **alulról felfelé** legyen olvasható

A szöveg elhelyezésének változatai I.

Helyes

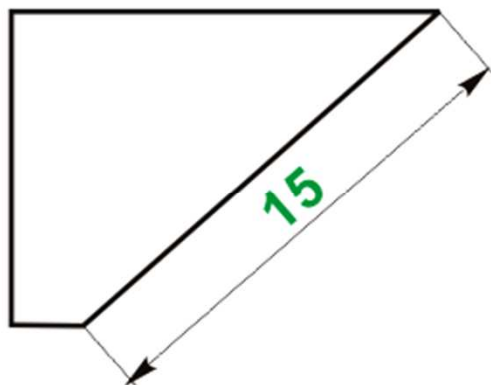


Tiltott!

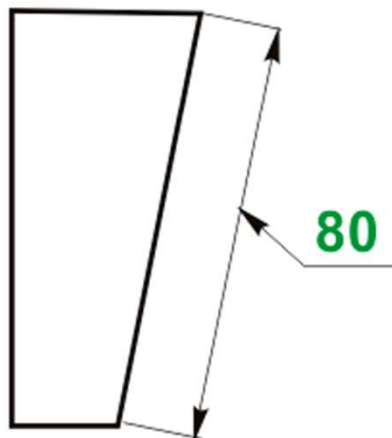
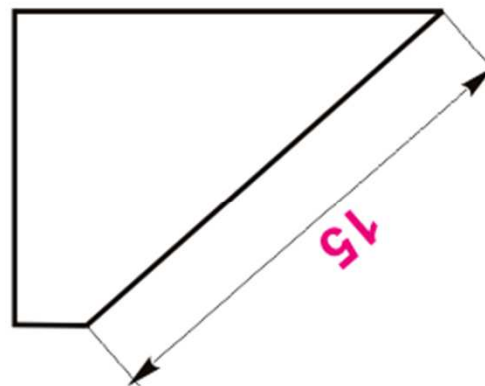


A szöveg elhelyezésének változatai II.

Helyes

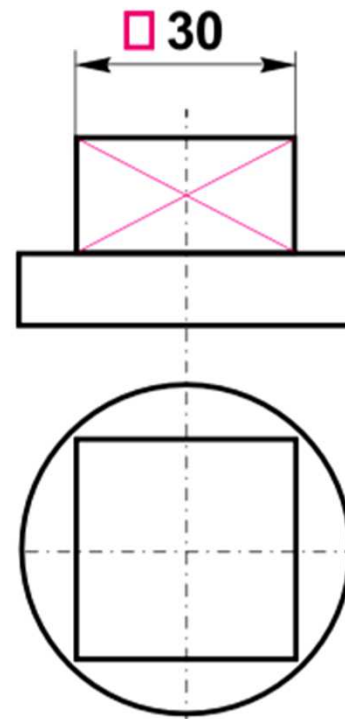
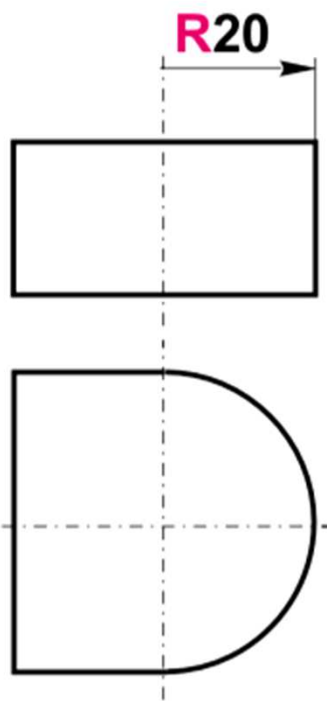
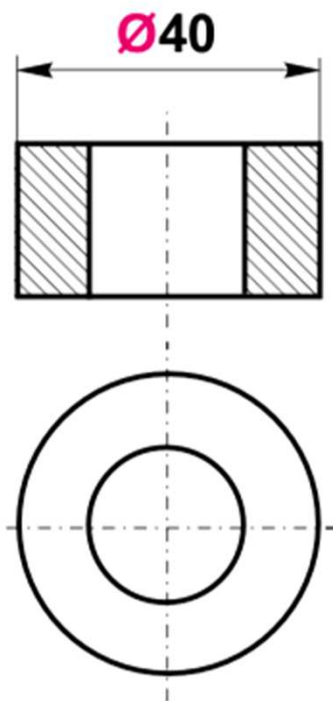


Tiltott!

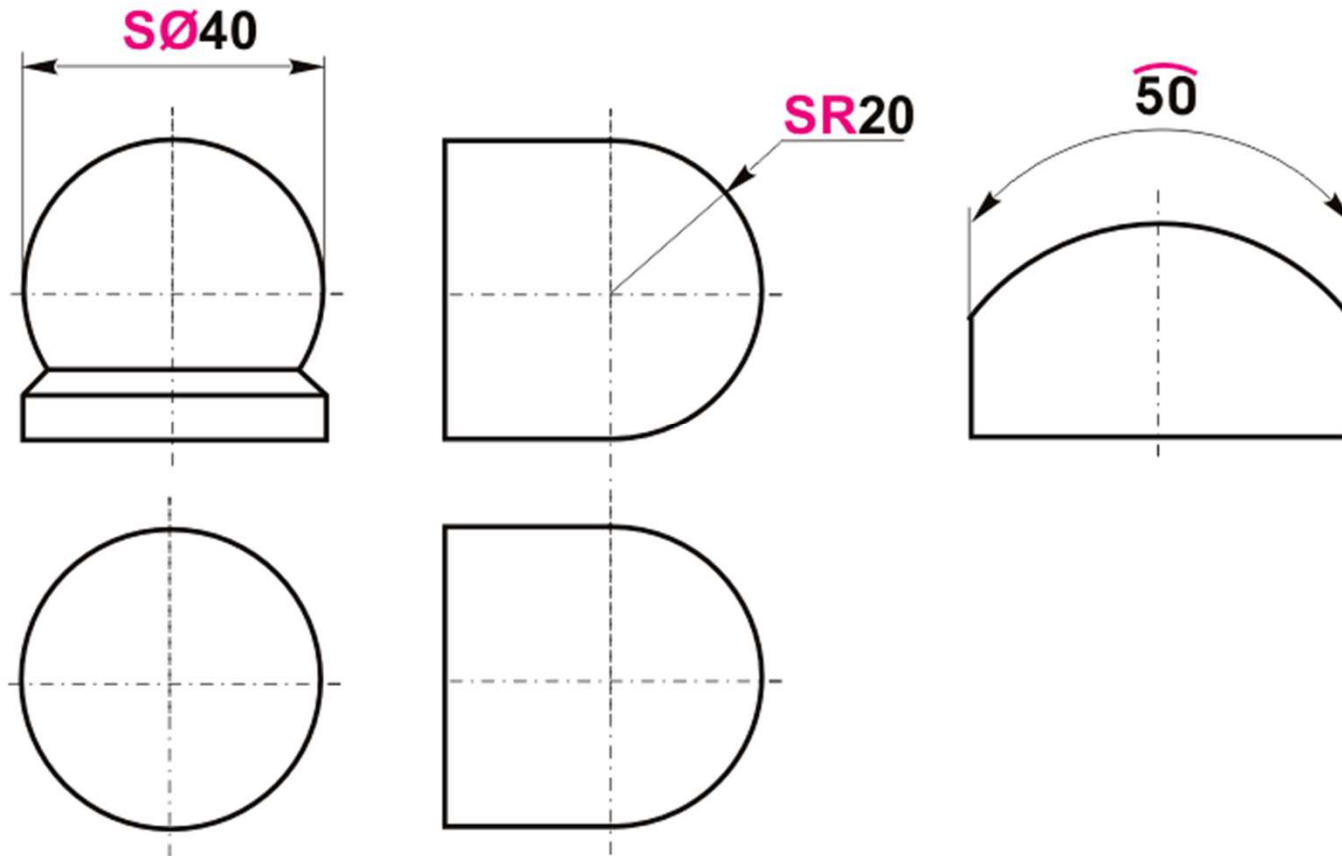


Az alkatrész alakjára utaló jelek

Hengeres, lekerekített és négyzetes hasáb alakú alkatrészek

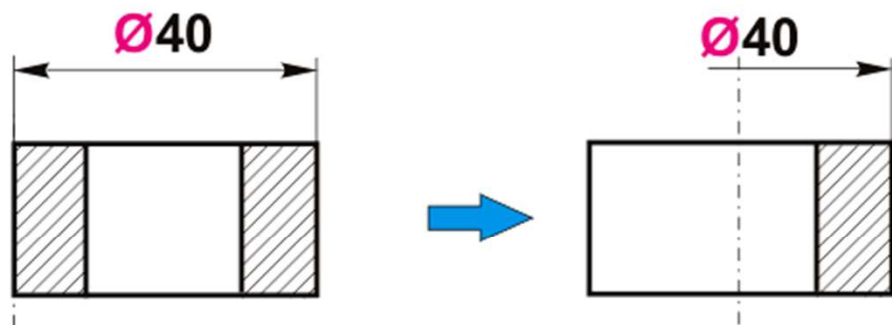


Gömbfelületű és íves alkatrészek

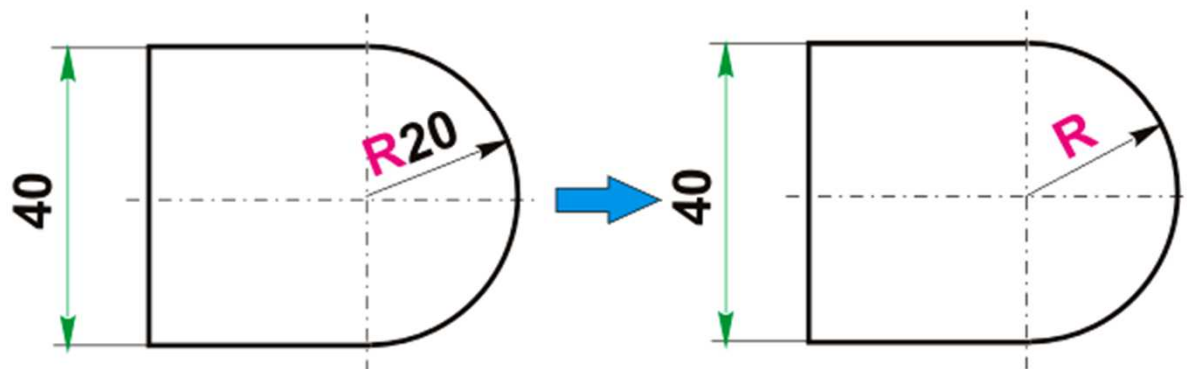


Megengedhető egyszerűsítések

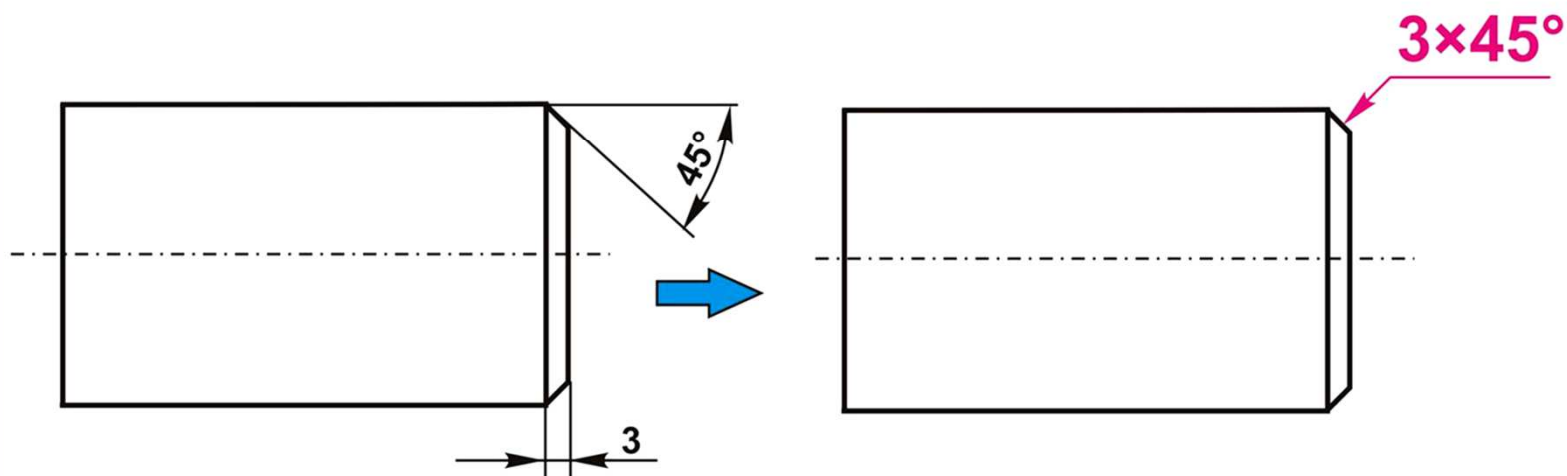
Csak az átmérő felének jelölése



A sugár számértékének elhagyása



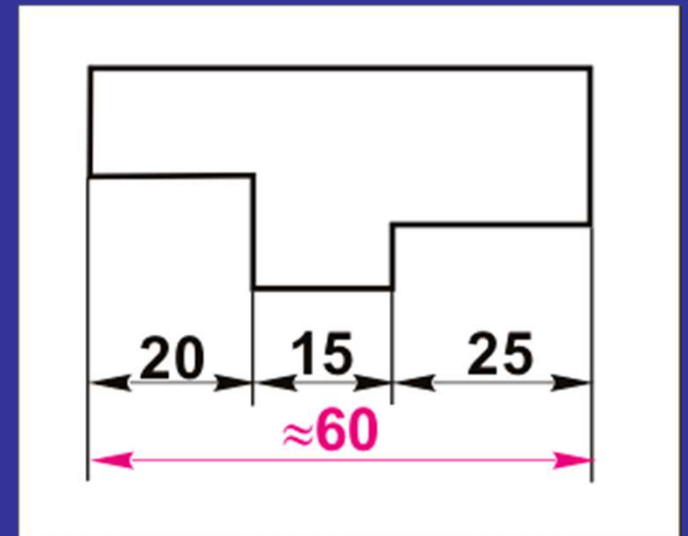
Éltompítások összevont jelölése



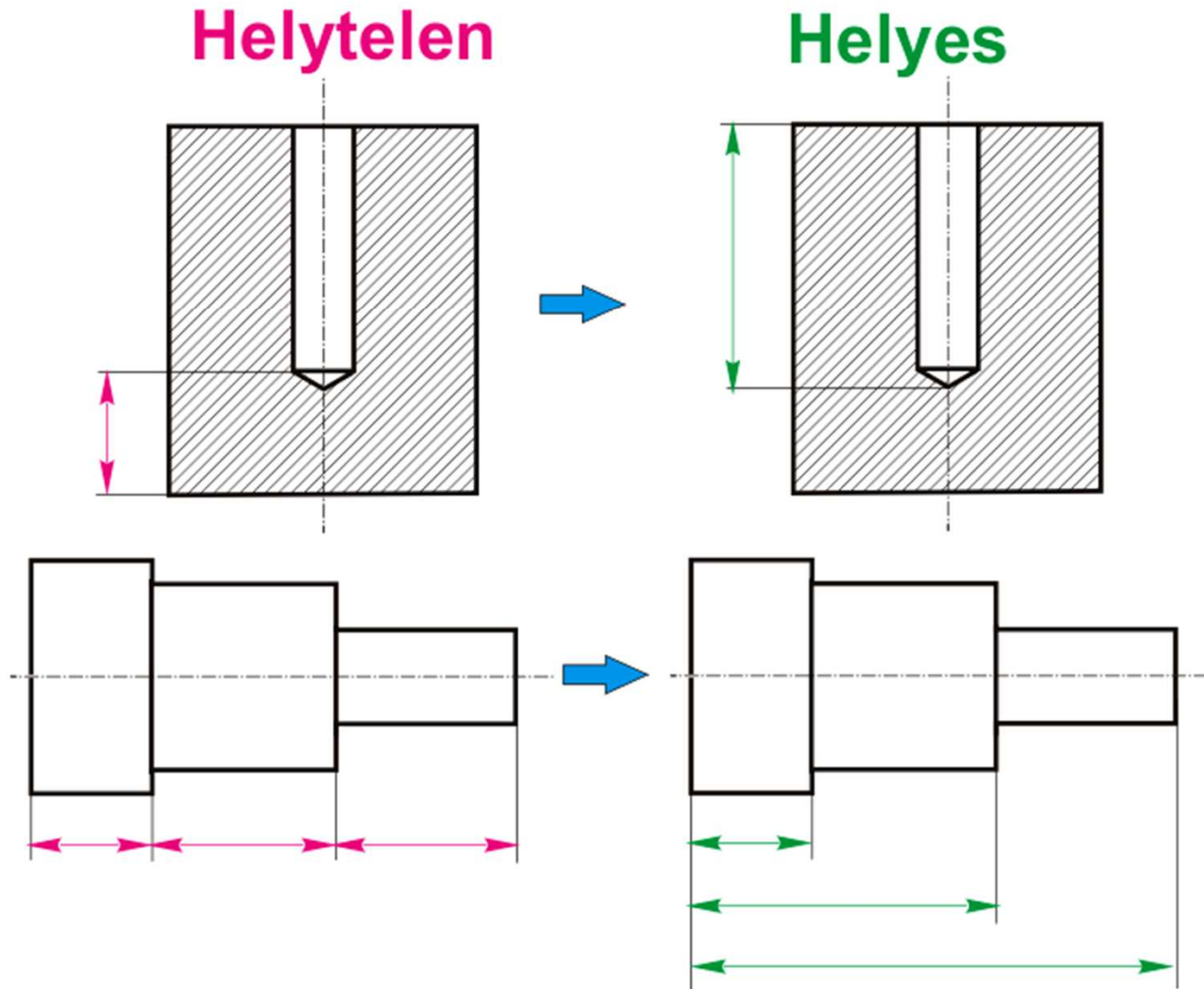
MÉRETHÁLÓZATOK

A mérethálózatok általános jellemzése

- **Fogalma:**
 - rajz méretmegadásainak összessége
- **Alapelvei:**
 - Minden méret egyszer megadandó
 - Egy méret csak egyszer adható meg
 - Zárt méretlánc alkalmazása tilos
 - A mérethálózat legyen áttekinthető

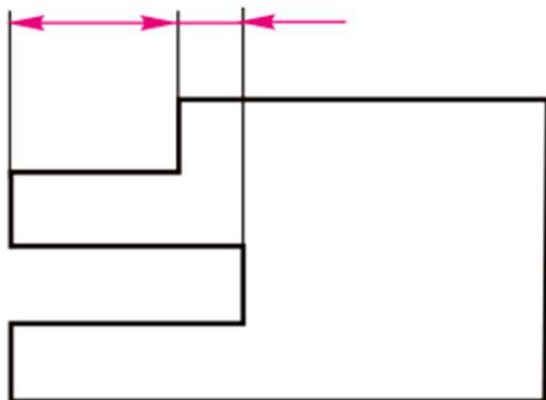


A mérethálózat igazodjon a gyártás technológiájához

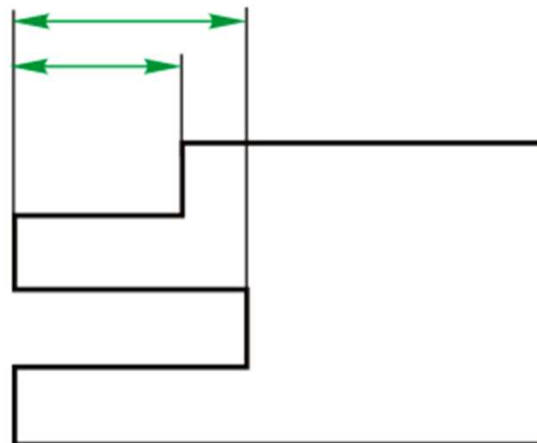


A mérethálózat igazodjon az ellenőrző mérések menetéhez

Helytelen

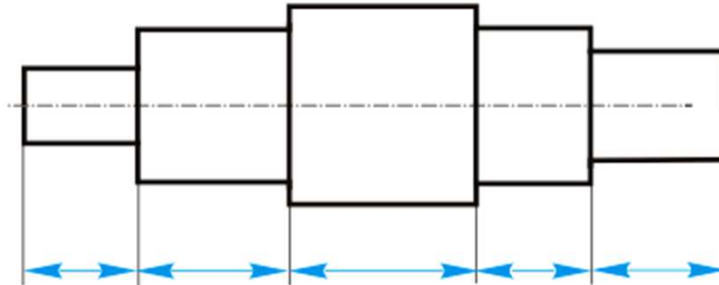


Helyes

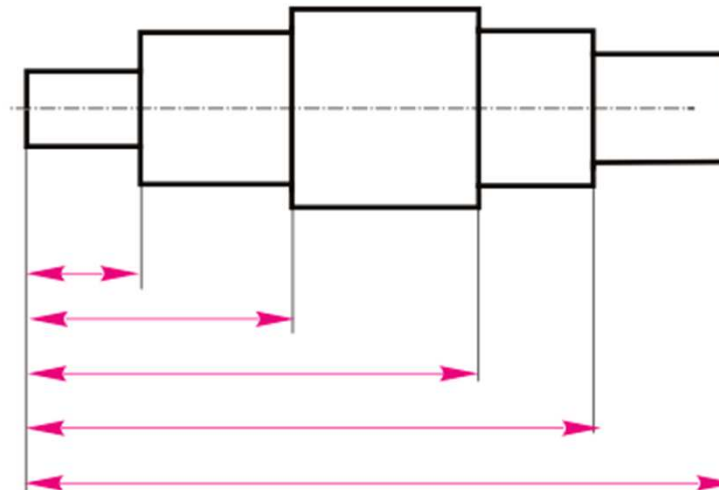


A mérethálózatok fajtái

Láncszerű mérethálózat



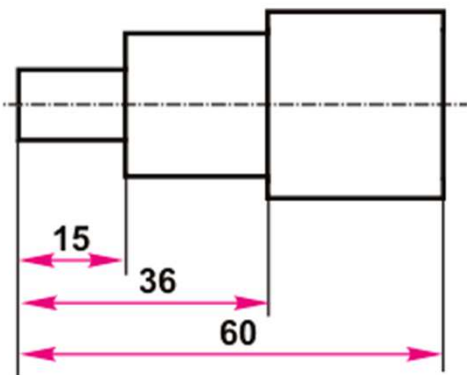
Bázistól induló mérethálózat



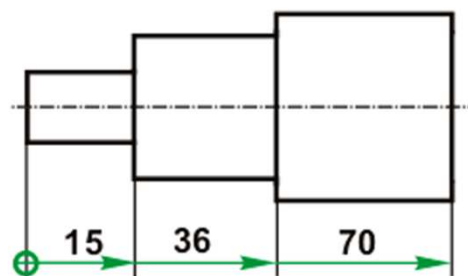
Bázistól induló mérethálózatok

A bázistól induló mérethálózat változatai

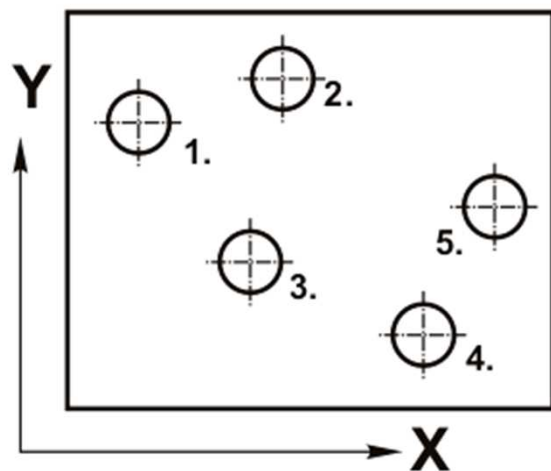
Párhuzamos



Összevont



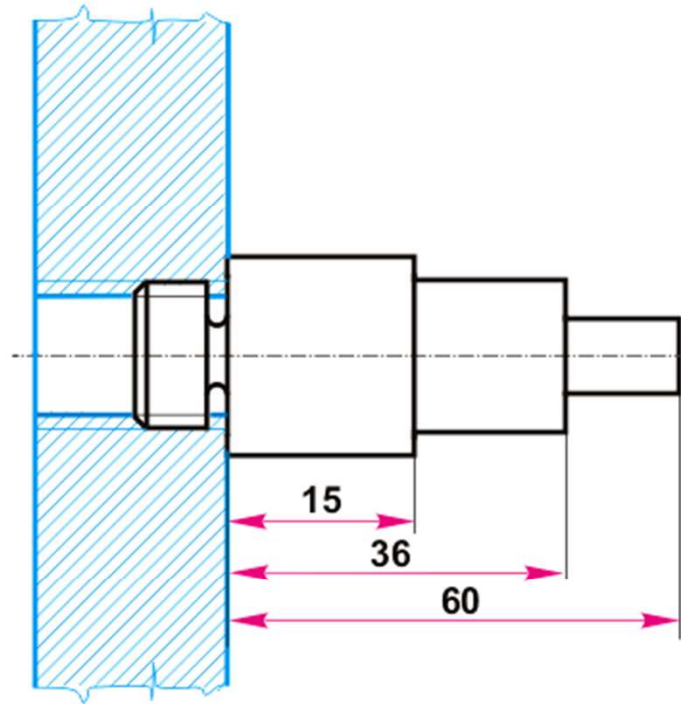
Koordinátás



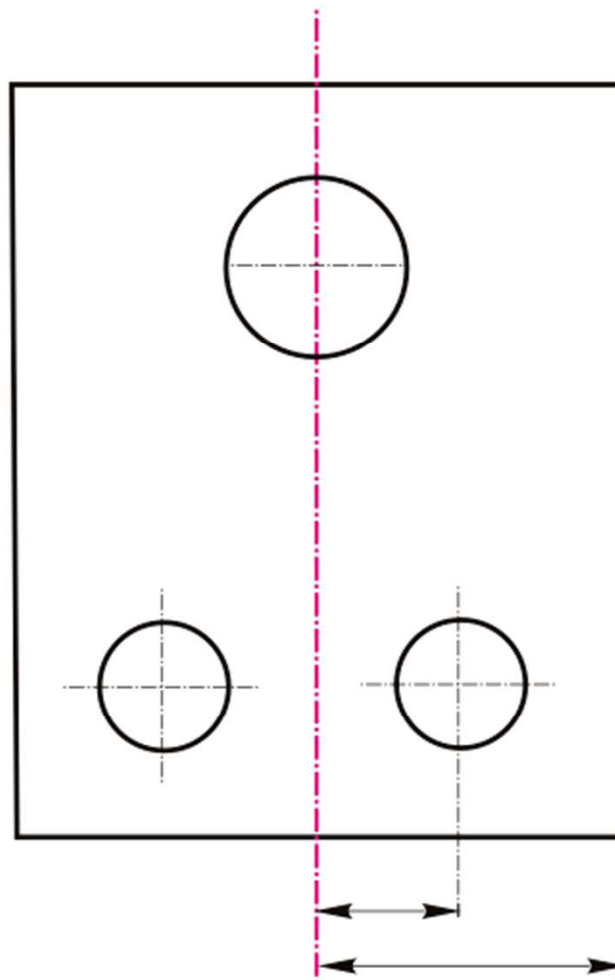
N°	X [mm]	Y [mm]
1.	10	40
2.	30	44
3.	23	20
4.	50	10
5.	60	30

A bázis kiválasztásának szempontjai

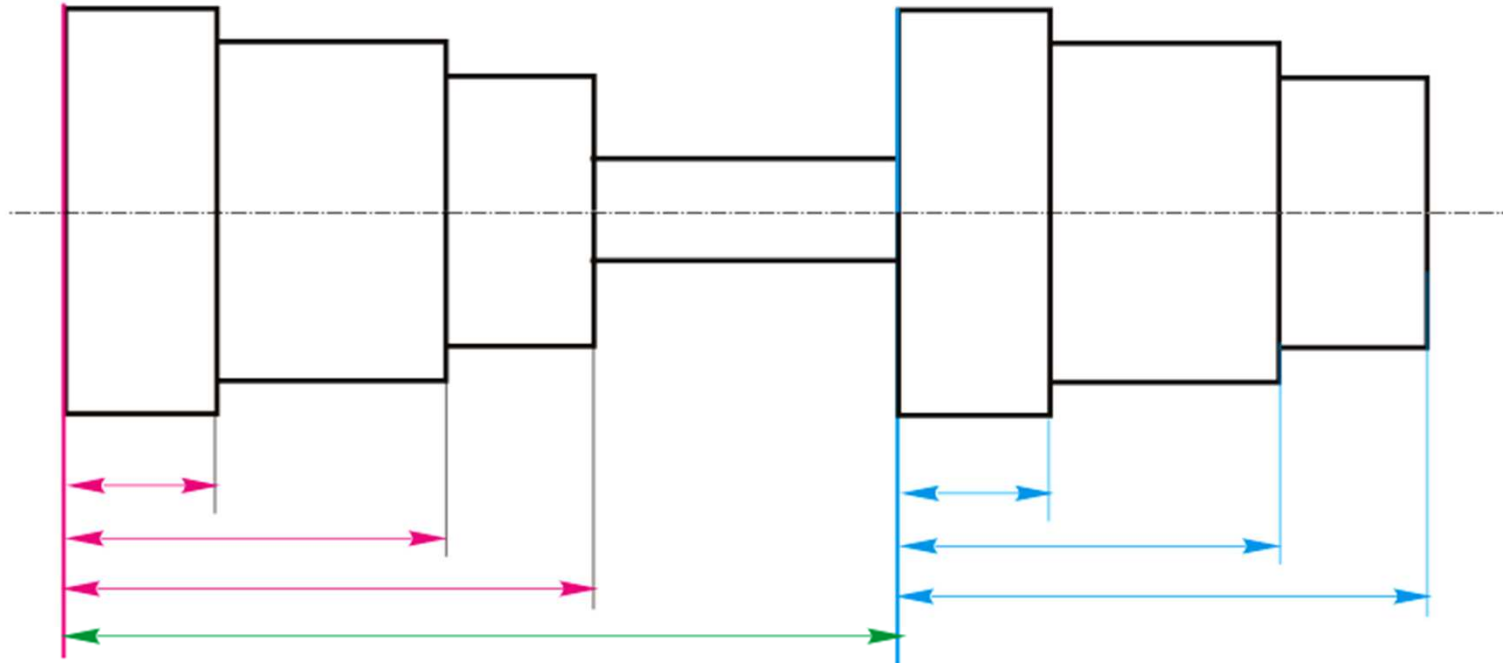
Bázis: az alkatrész működése miatt fontos felület



Bázis: az alkatrész működése miatt fontos szimmetriatengely



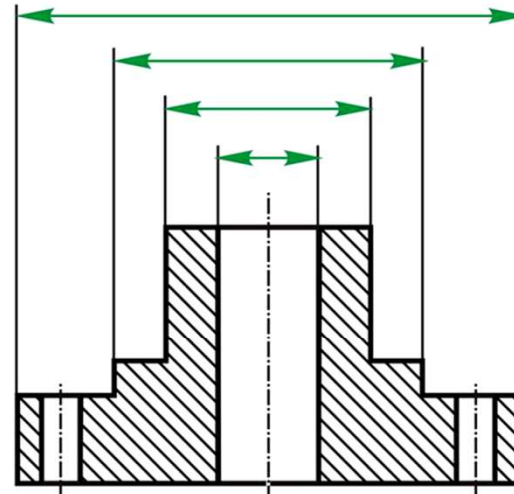
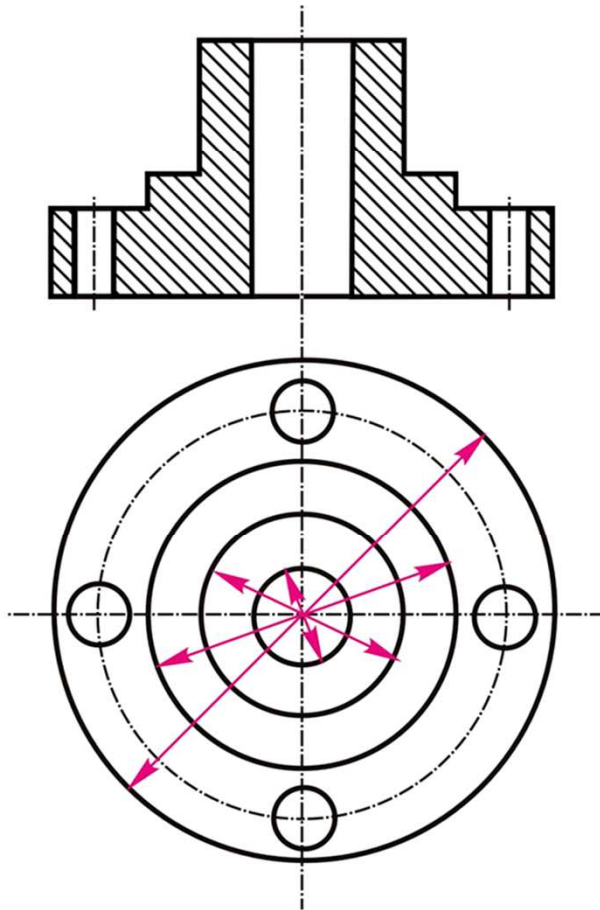
**Bázis: az alkatrész valamely fő méretének
határoló vonala**



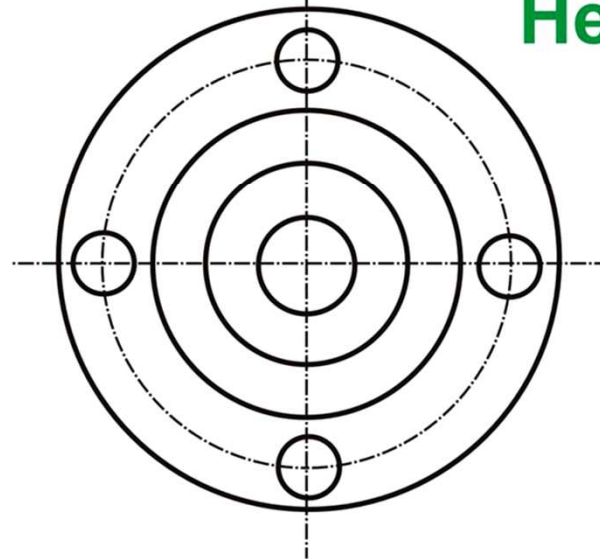
A mérethálózat elhelyezésének szempontjai

A méreteket a legjellemzőbb vetületen kell megadni

Helytelen

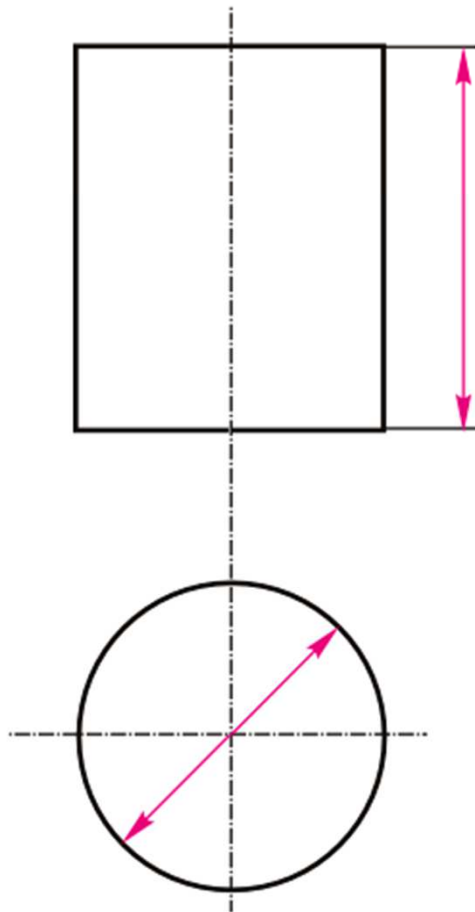


Helyes

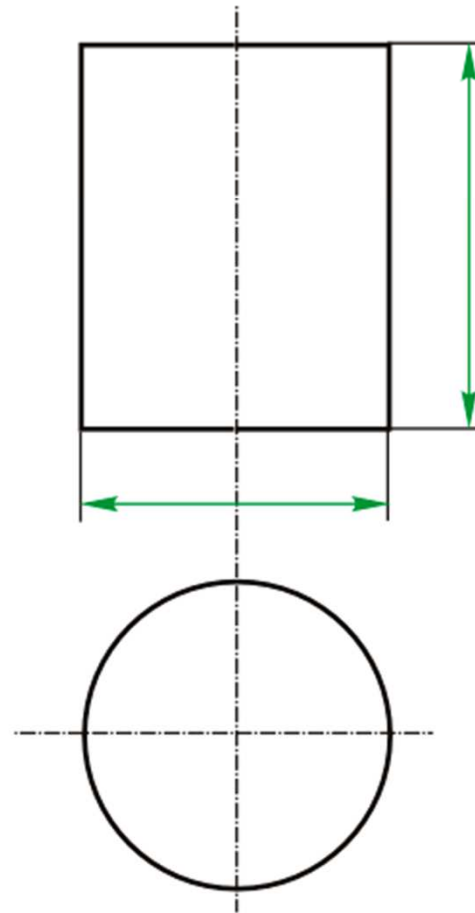


Egy geometriai egységet alkotó méretcsoportot
lehetőleg ugyanazon a vetületen adjuk meg

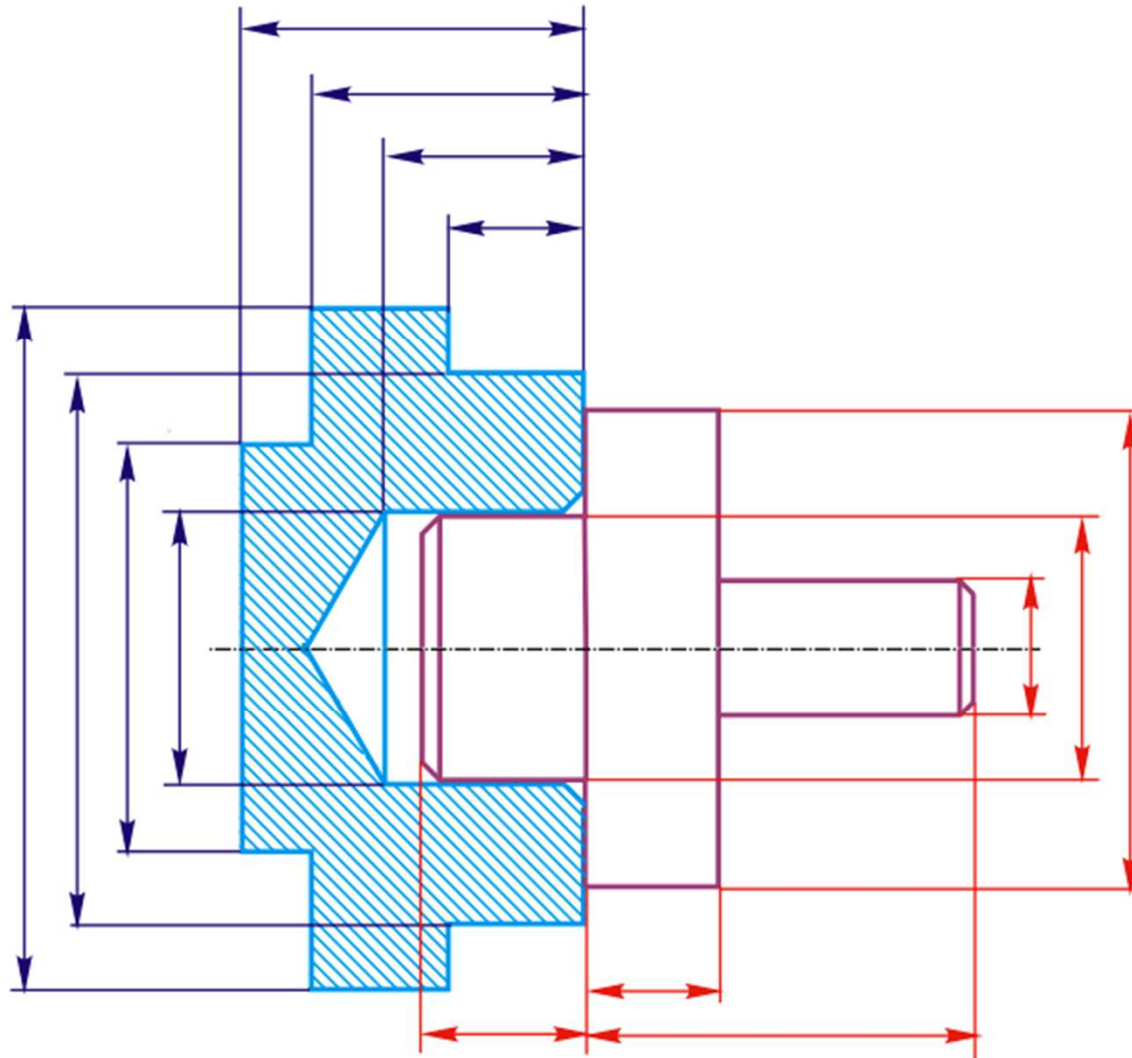
Helytelen



Helyes

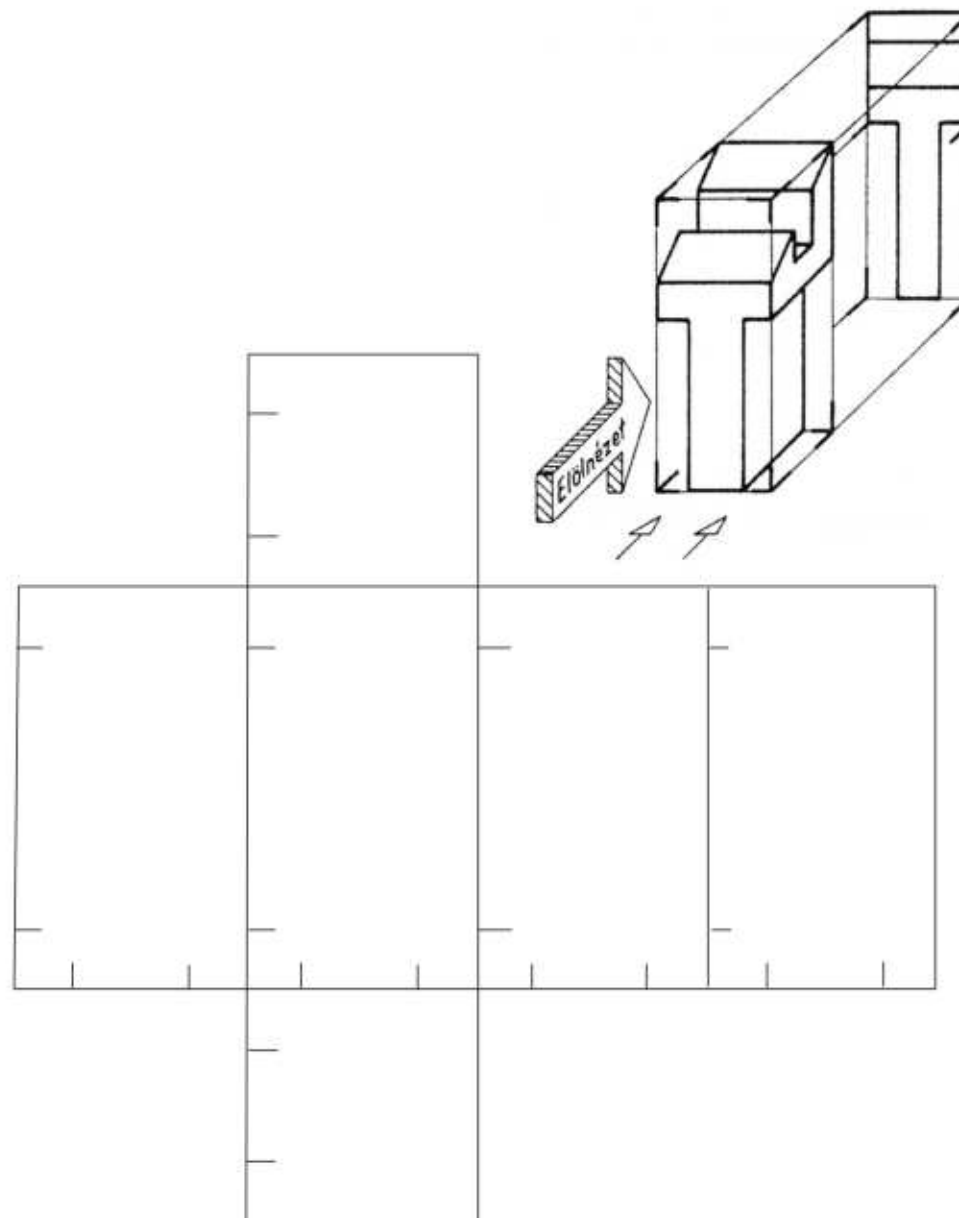


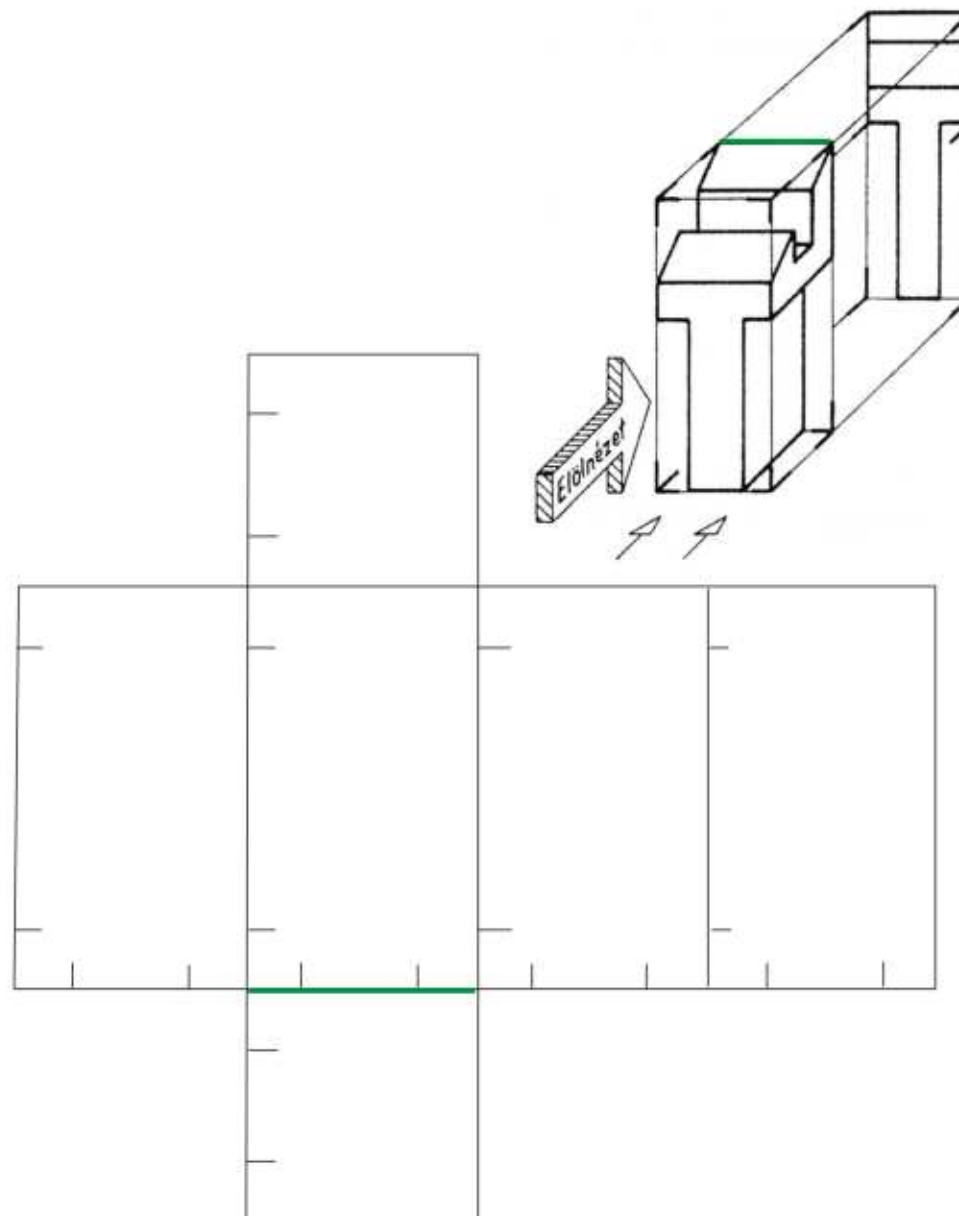
Összeállítási rajzon a különböző alkatrészek mérethálózata lehetőleg alkosson elkülönülő csoportokat

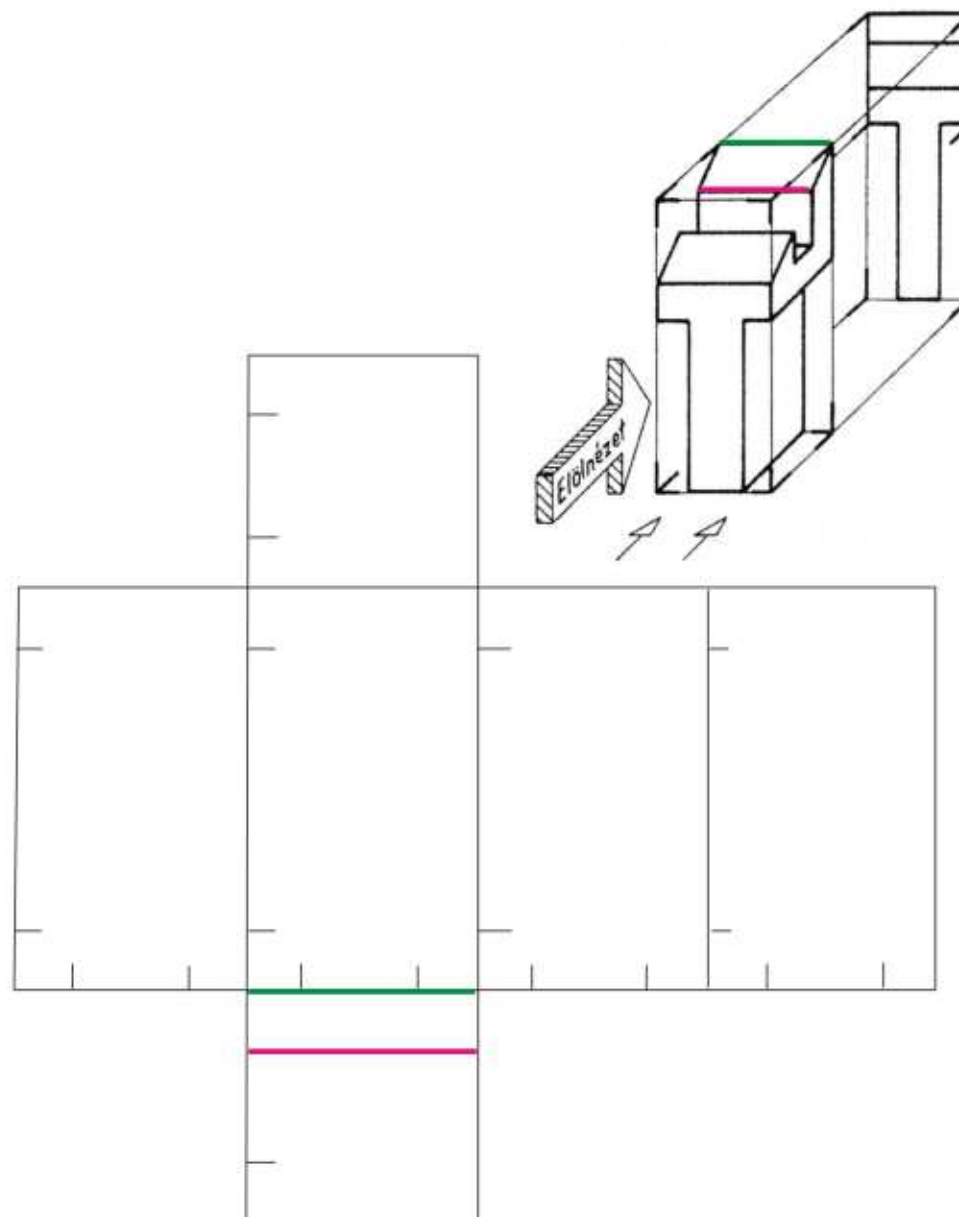


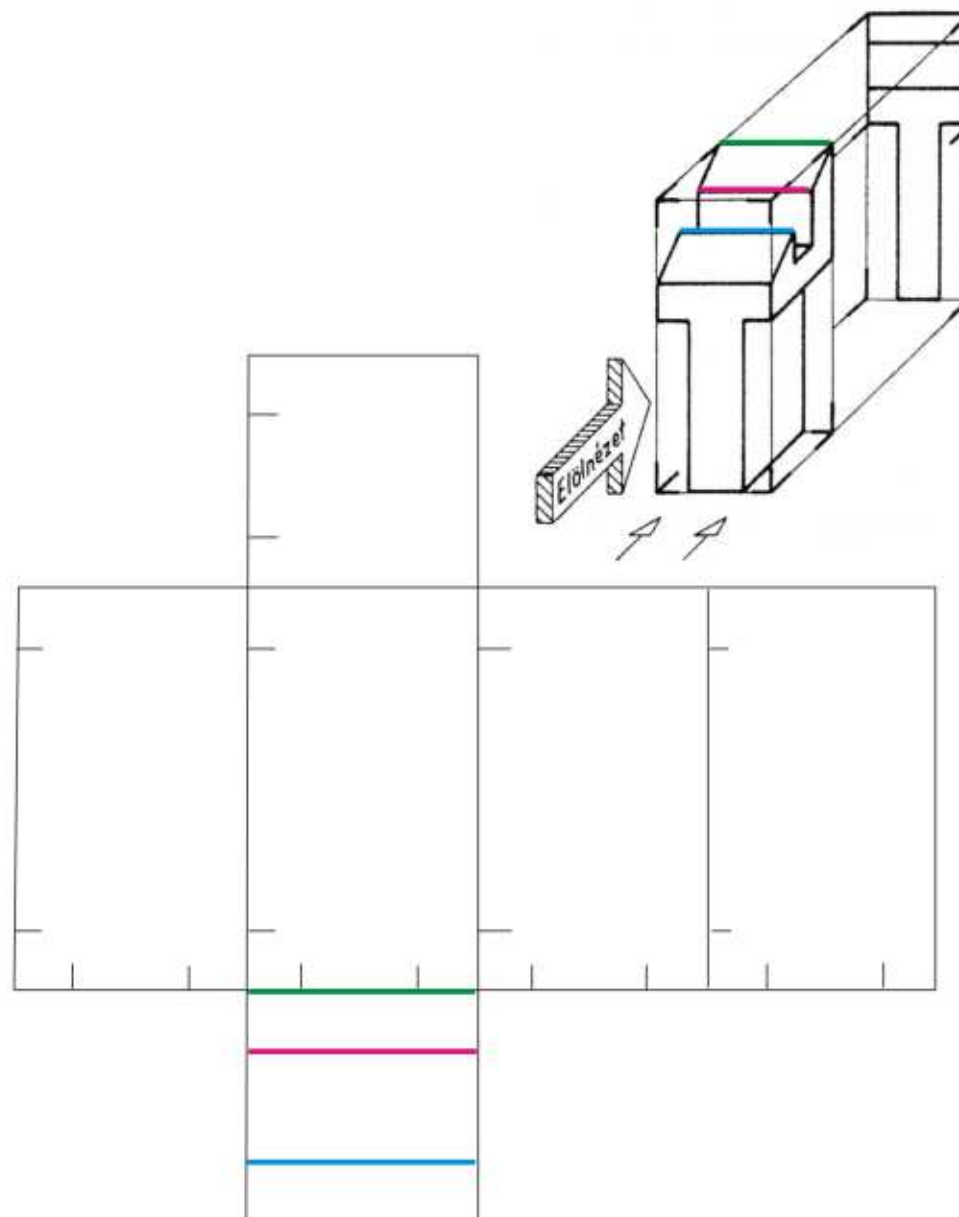
VETÜLETEK SZERKESZTÉSE

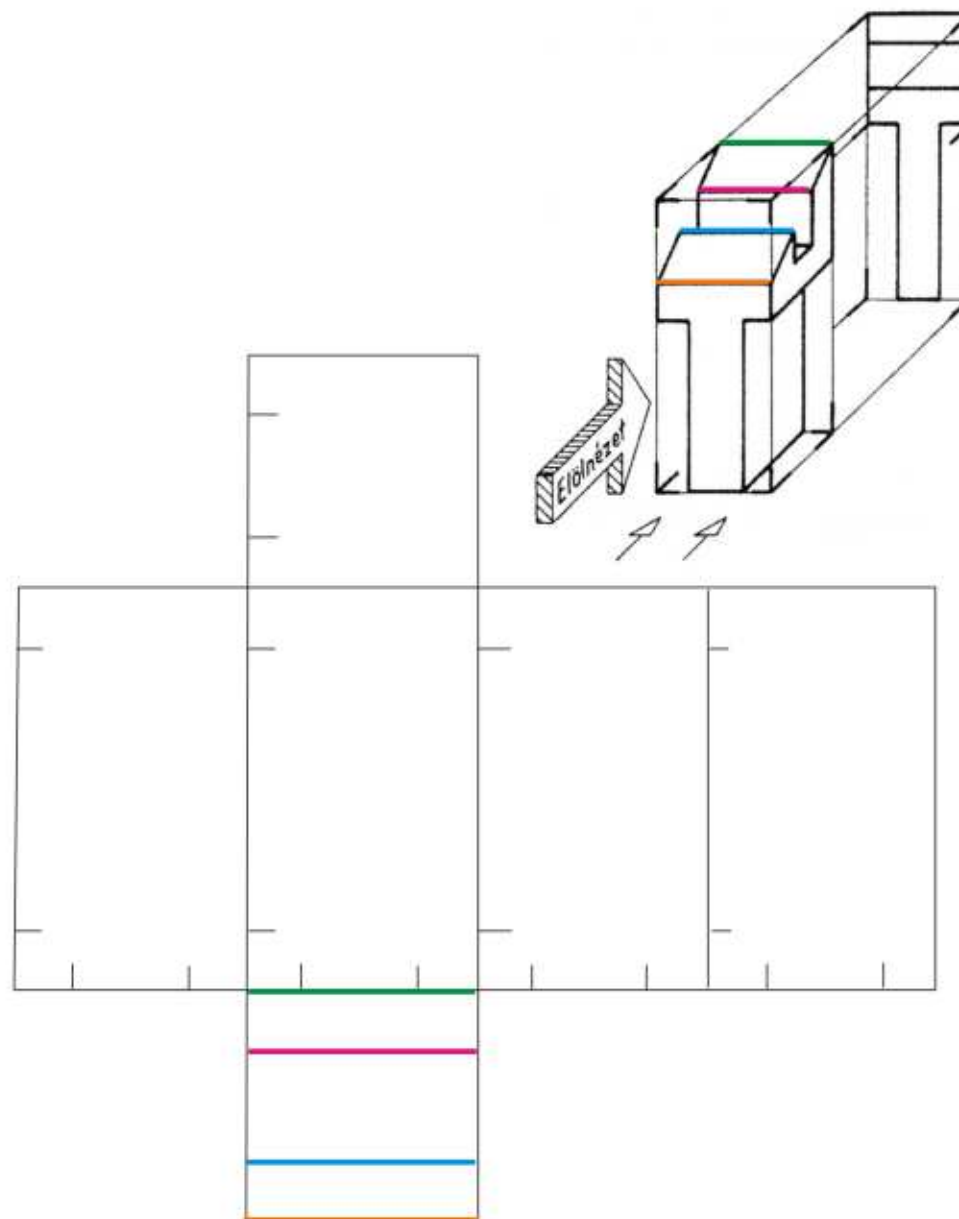
(a 4.1. feladat megoldása)

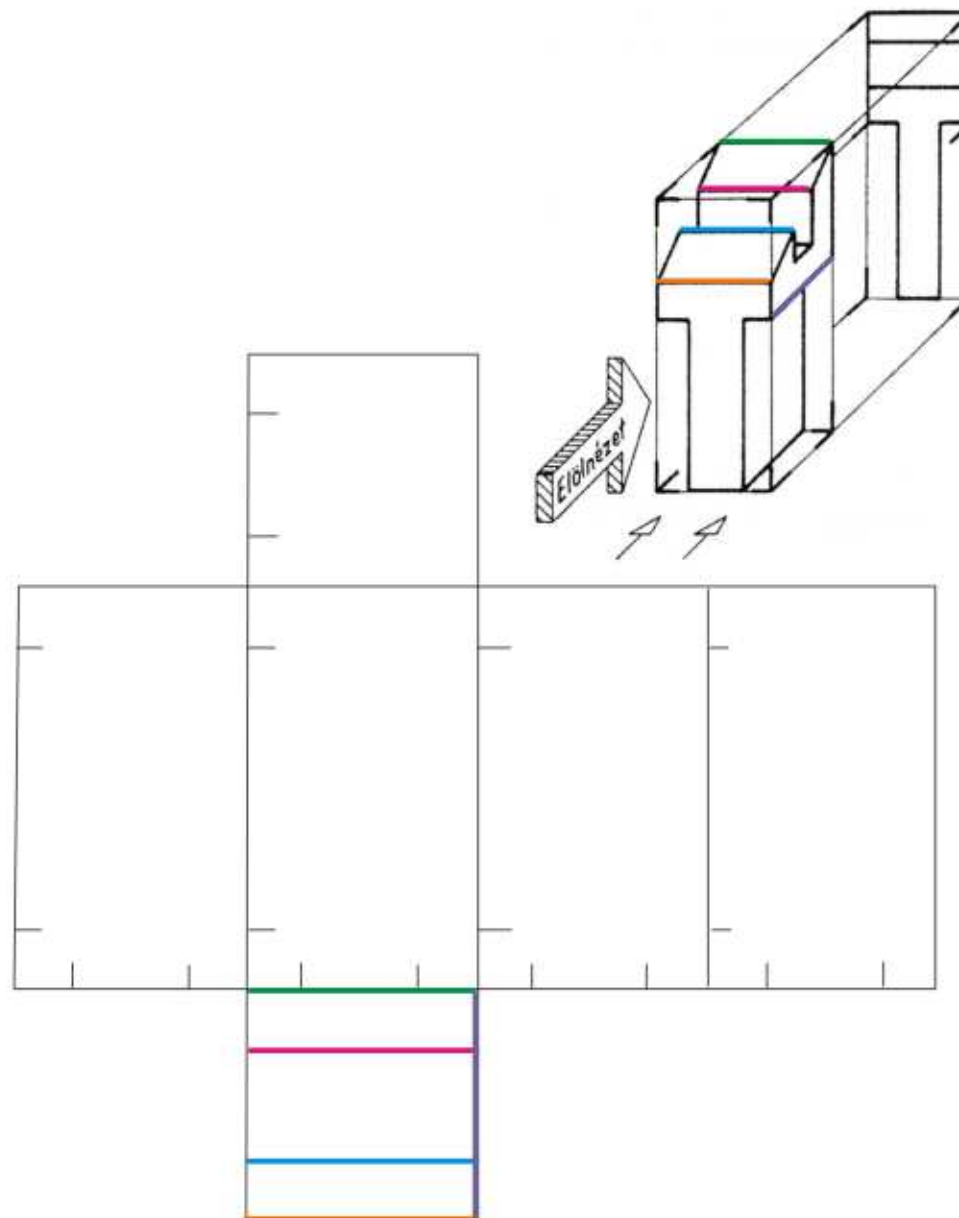


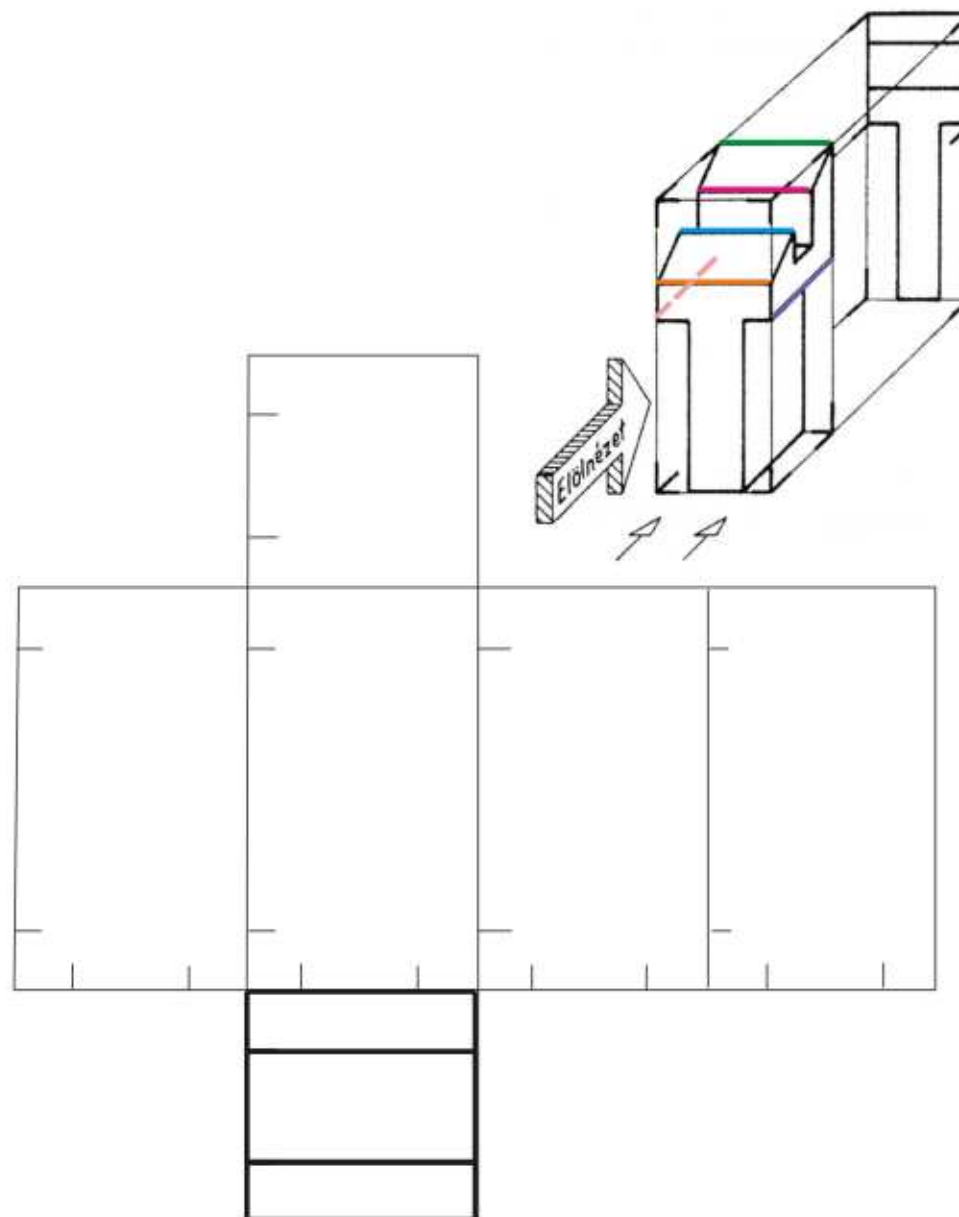


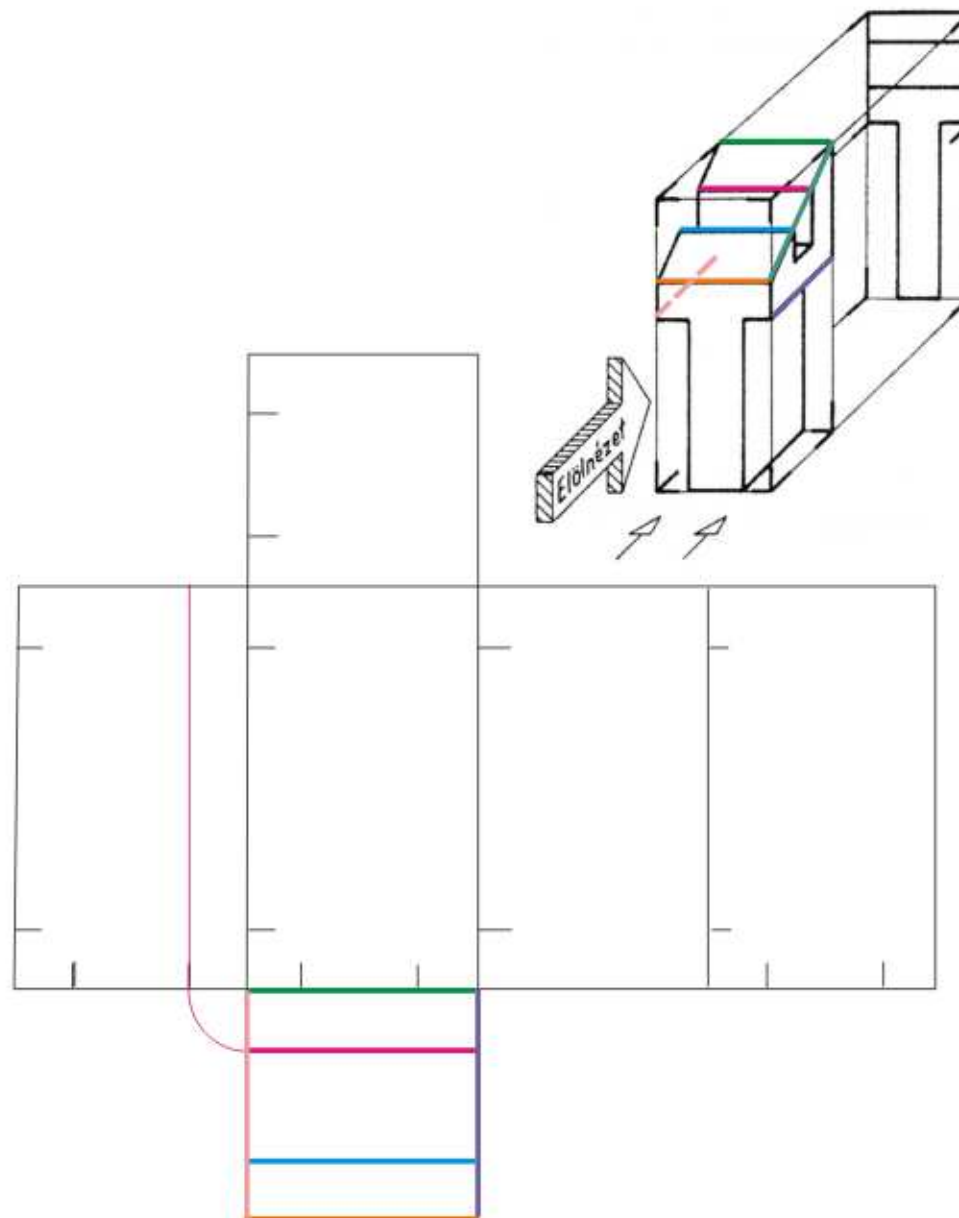


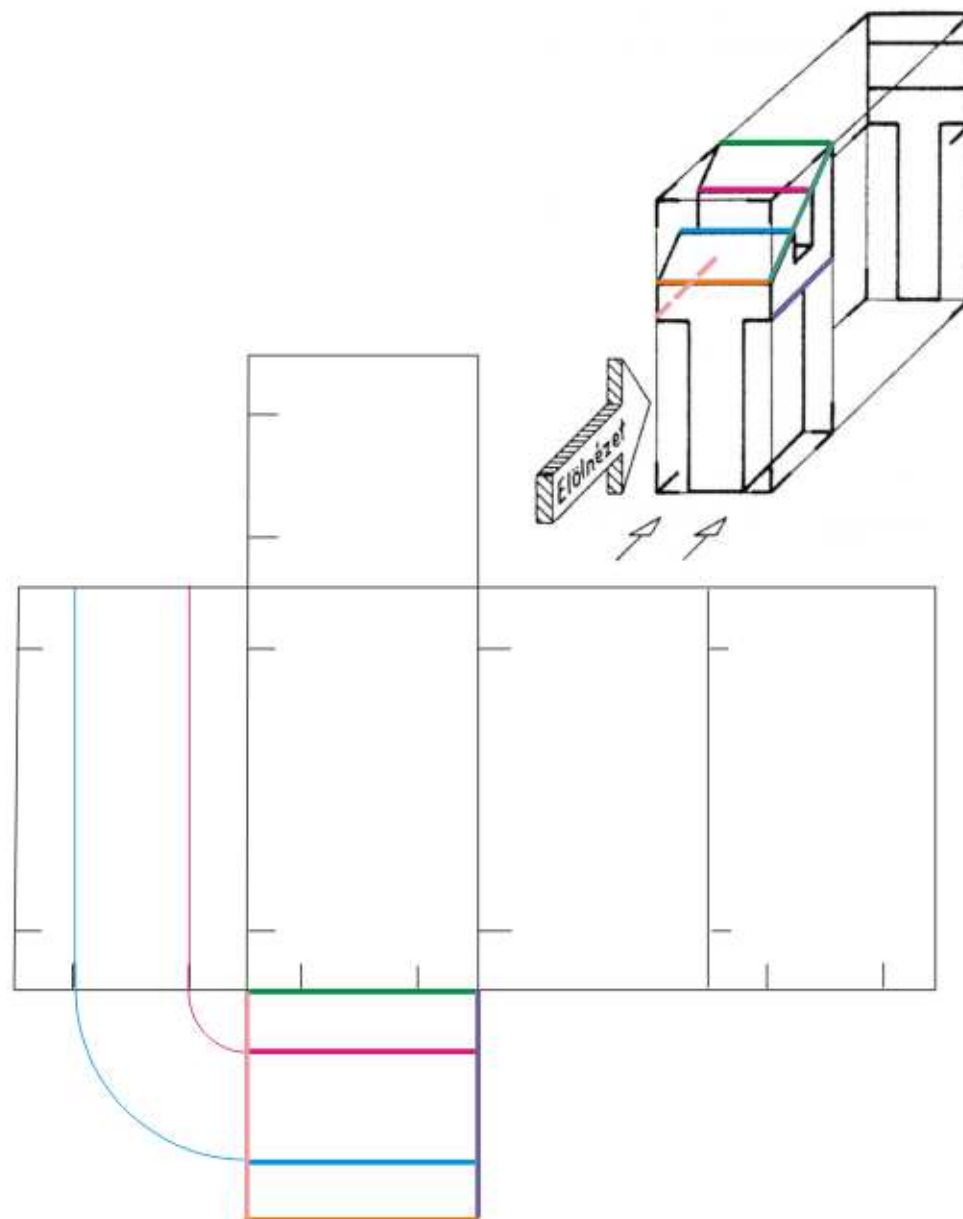


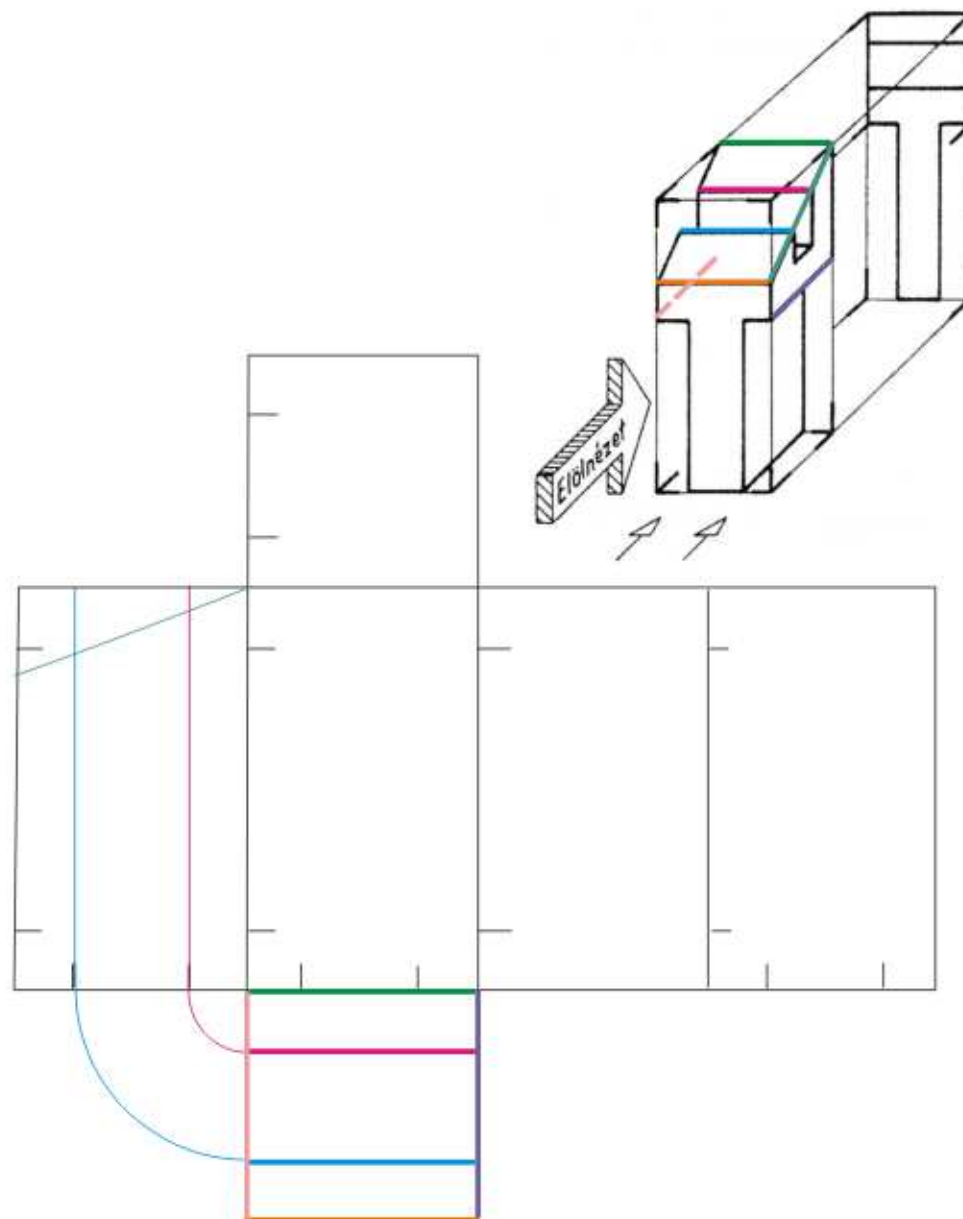


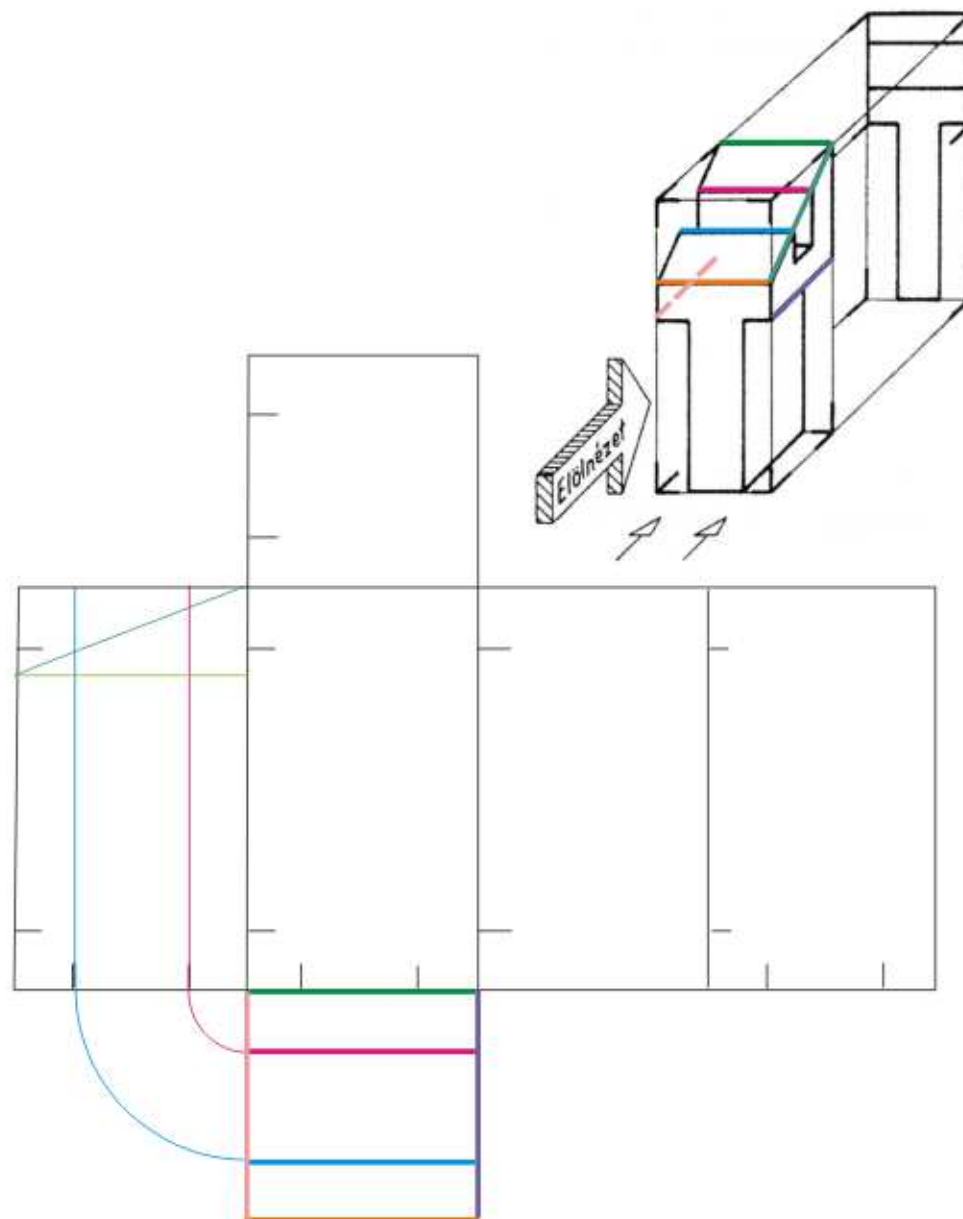


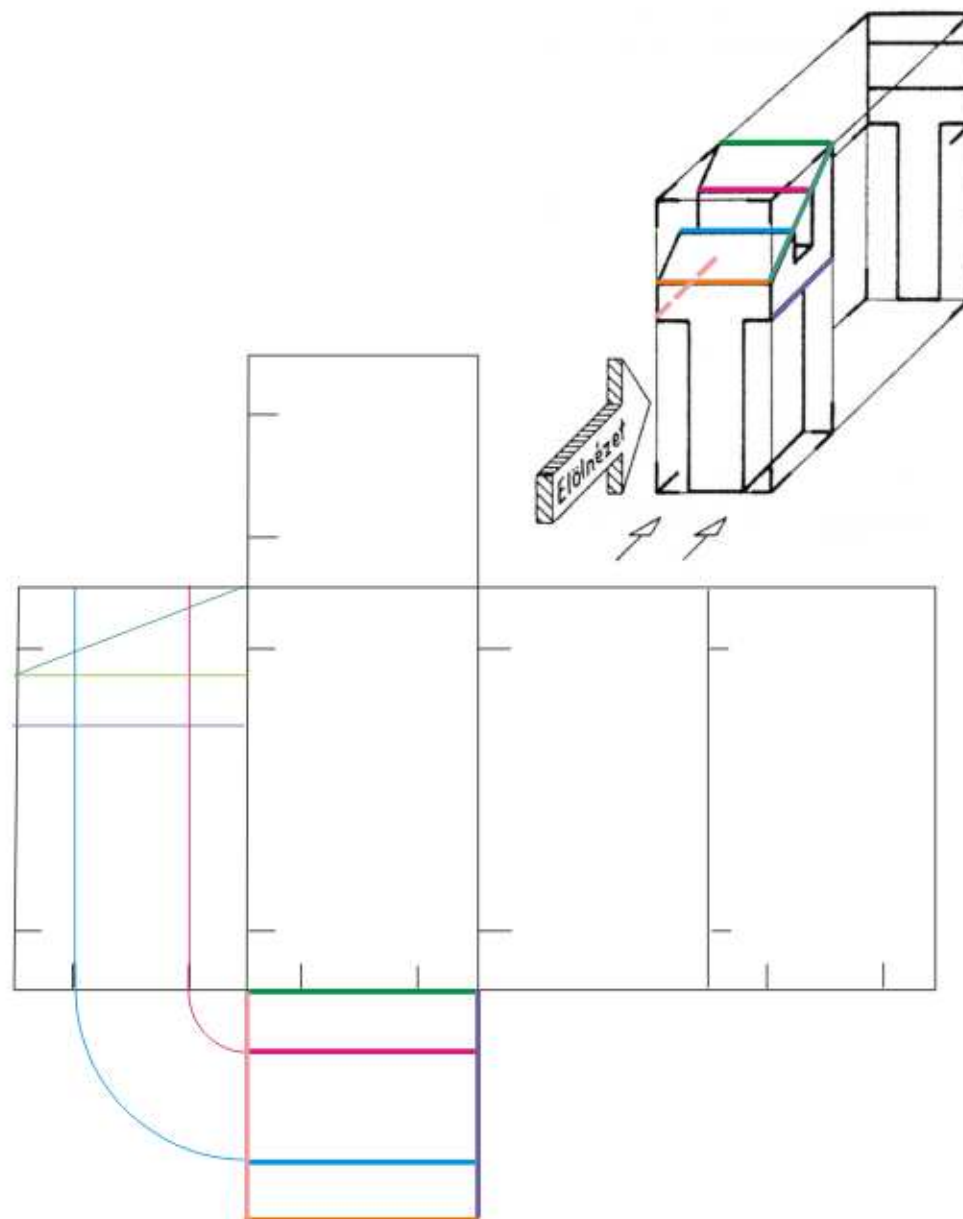


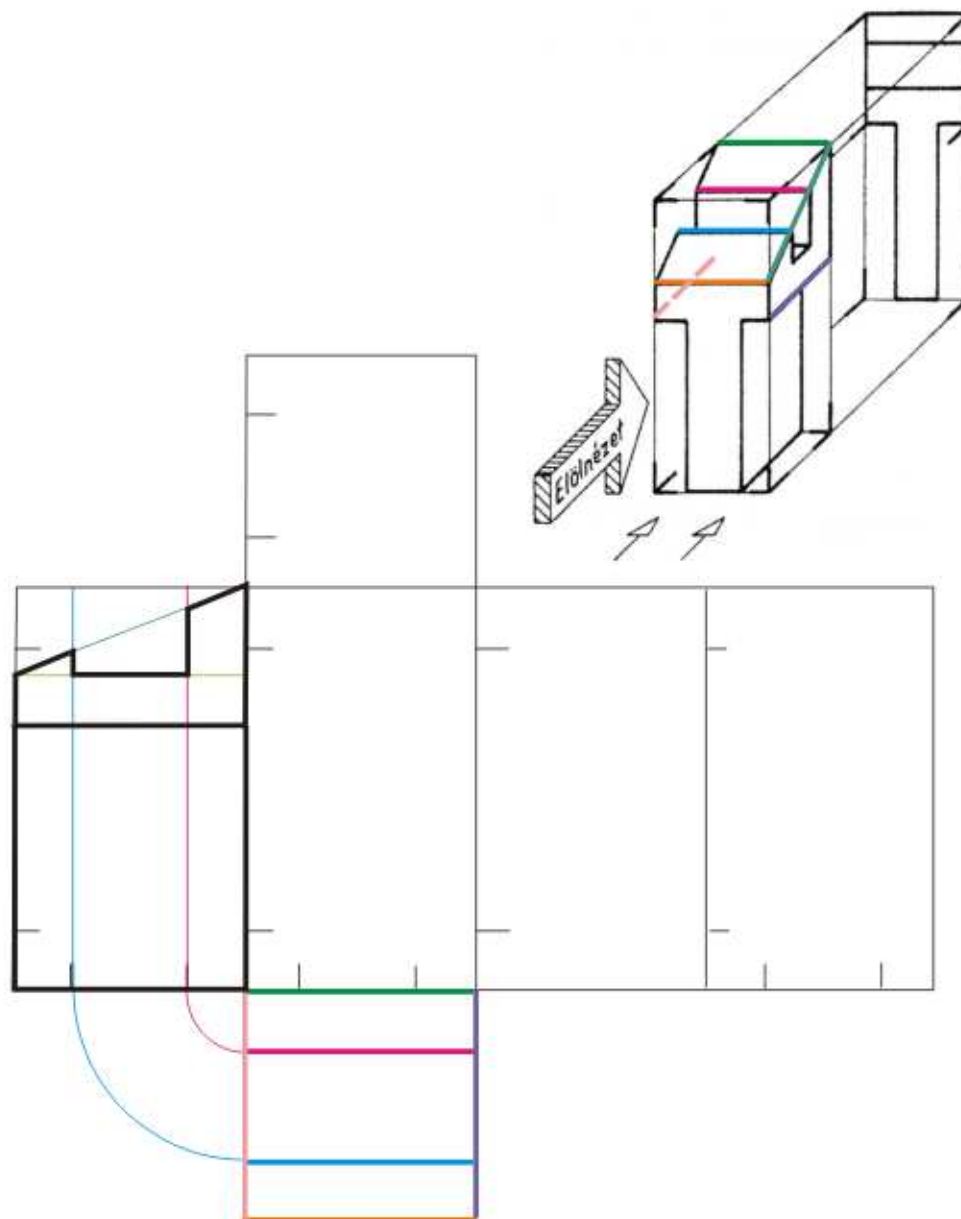


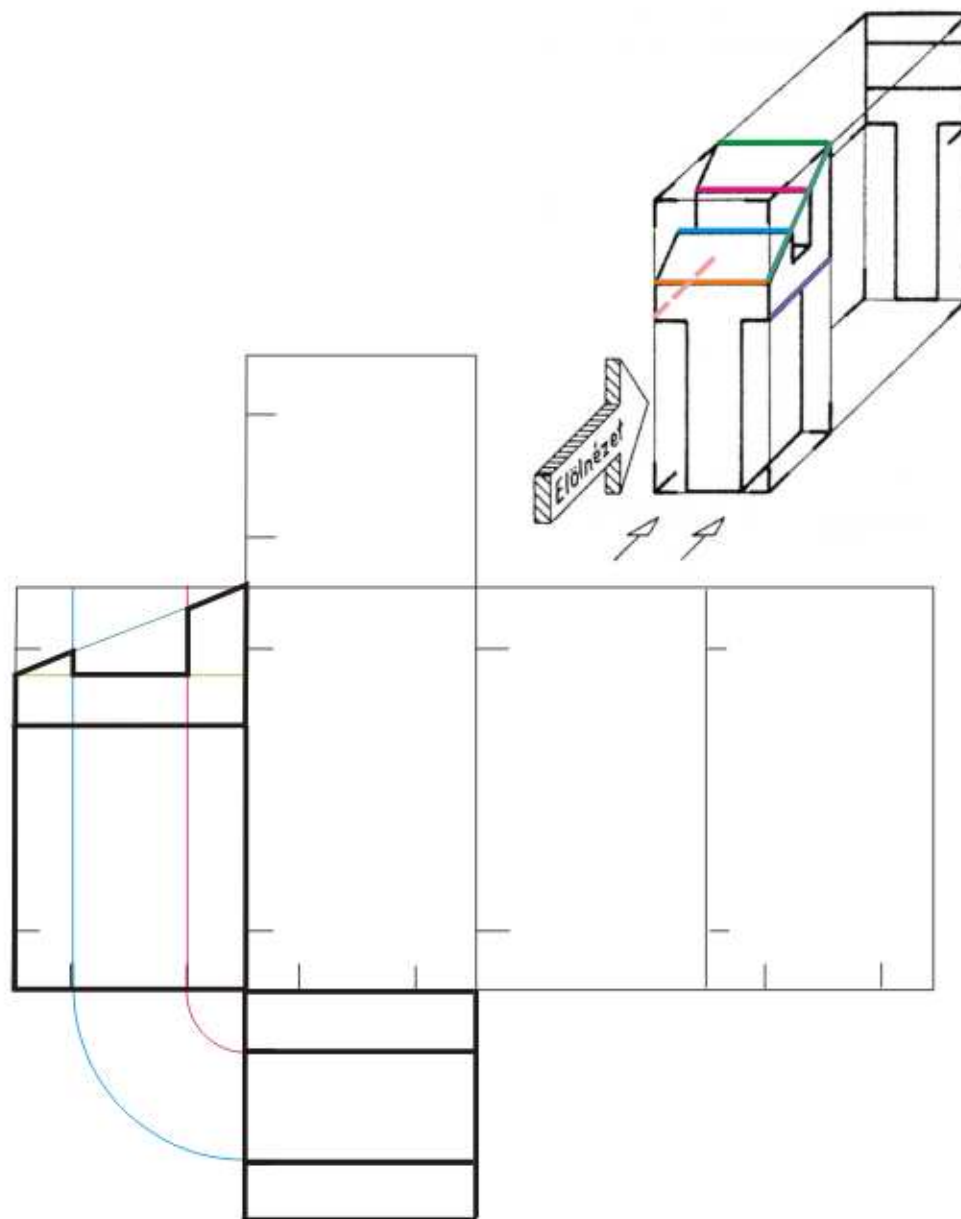


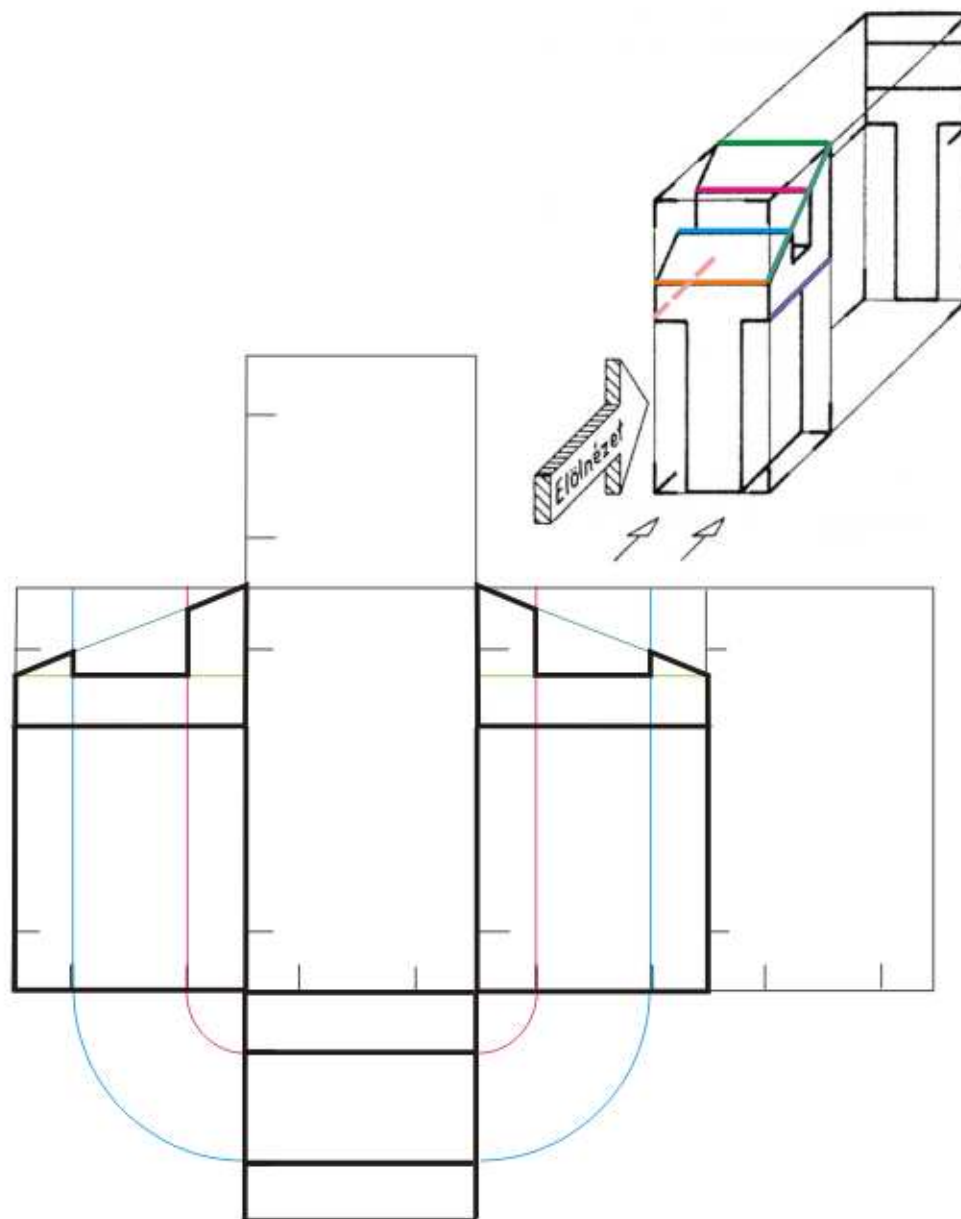


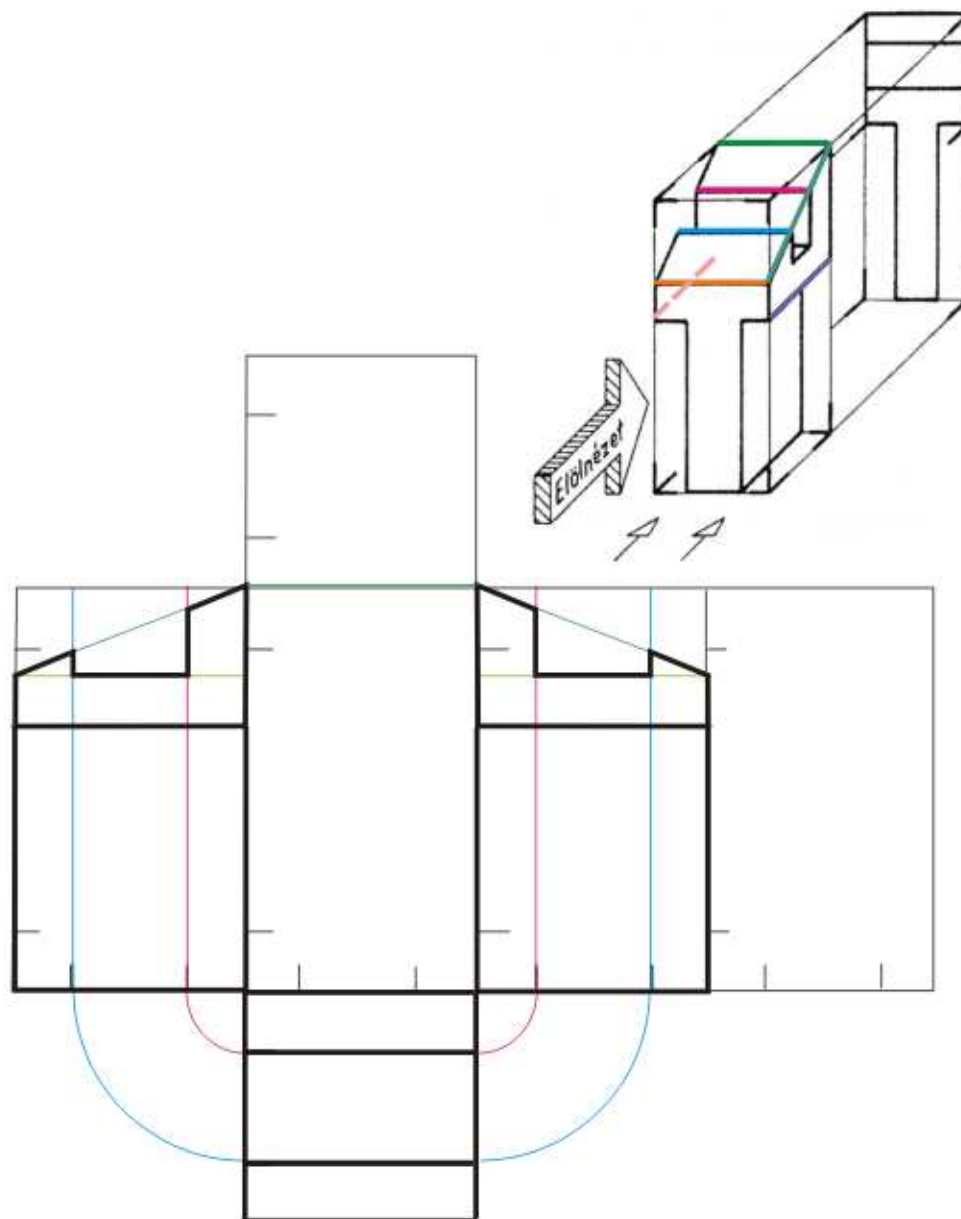


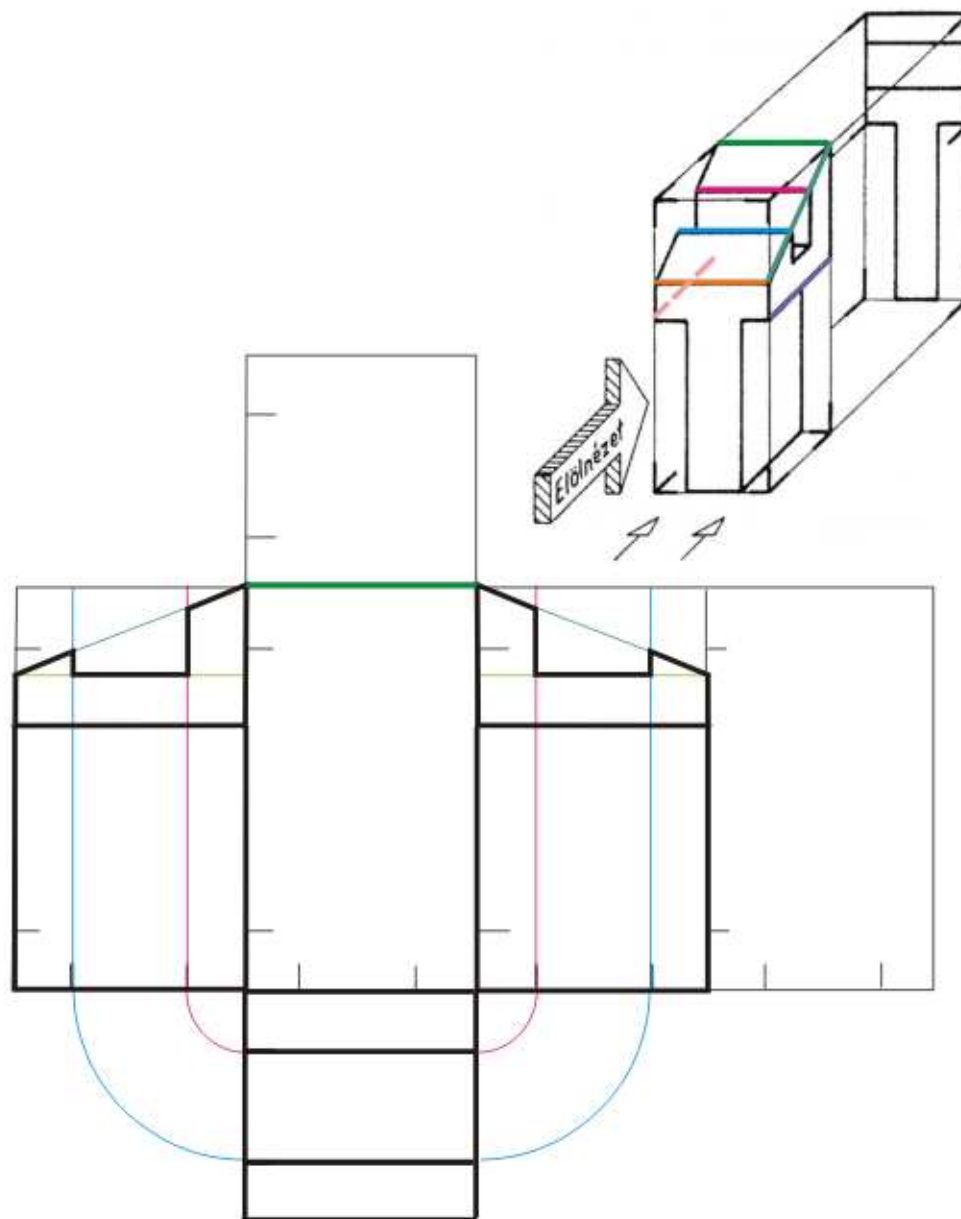


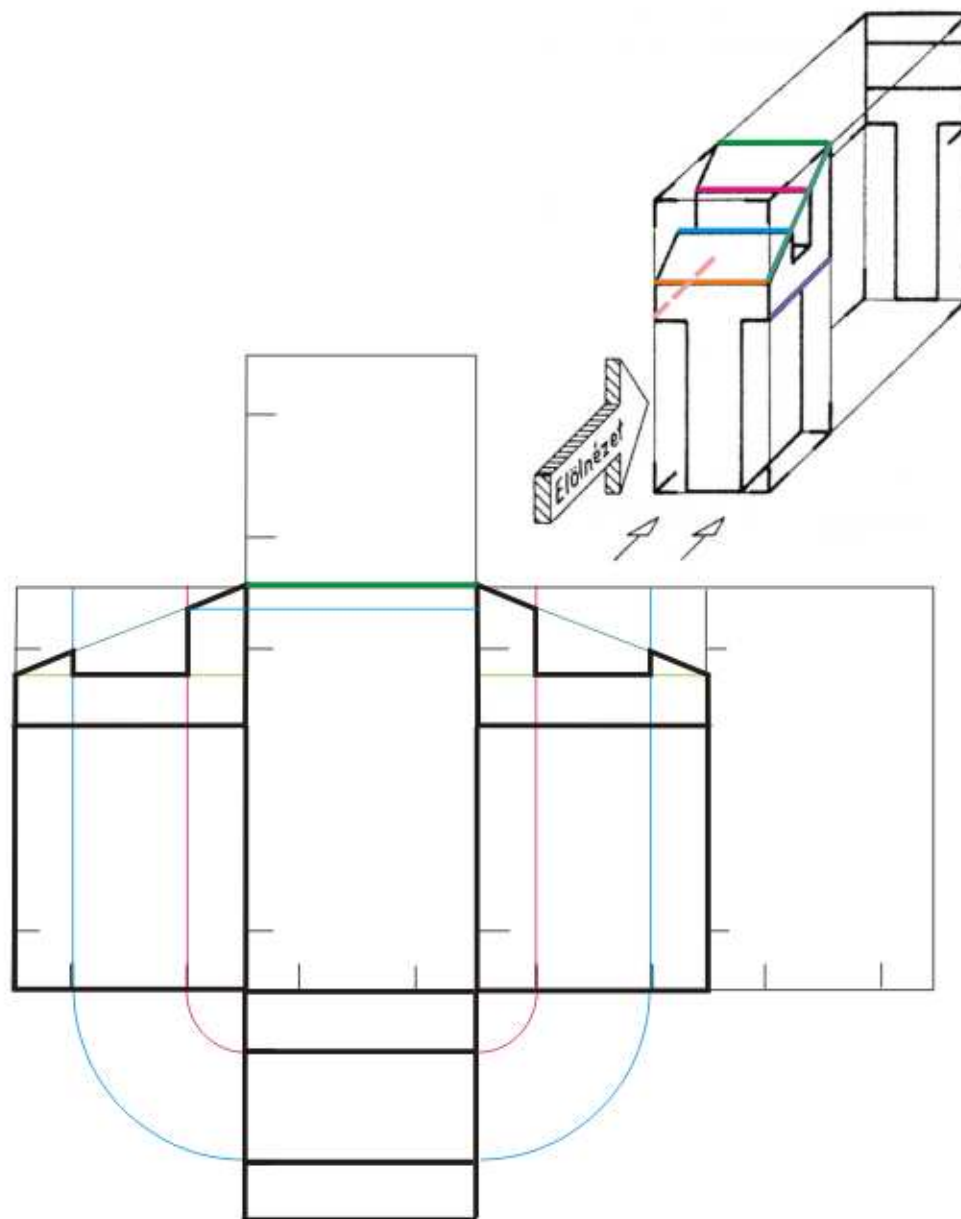


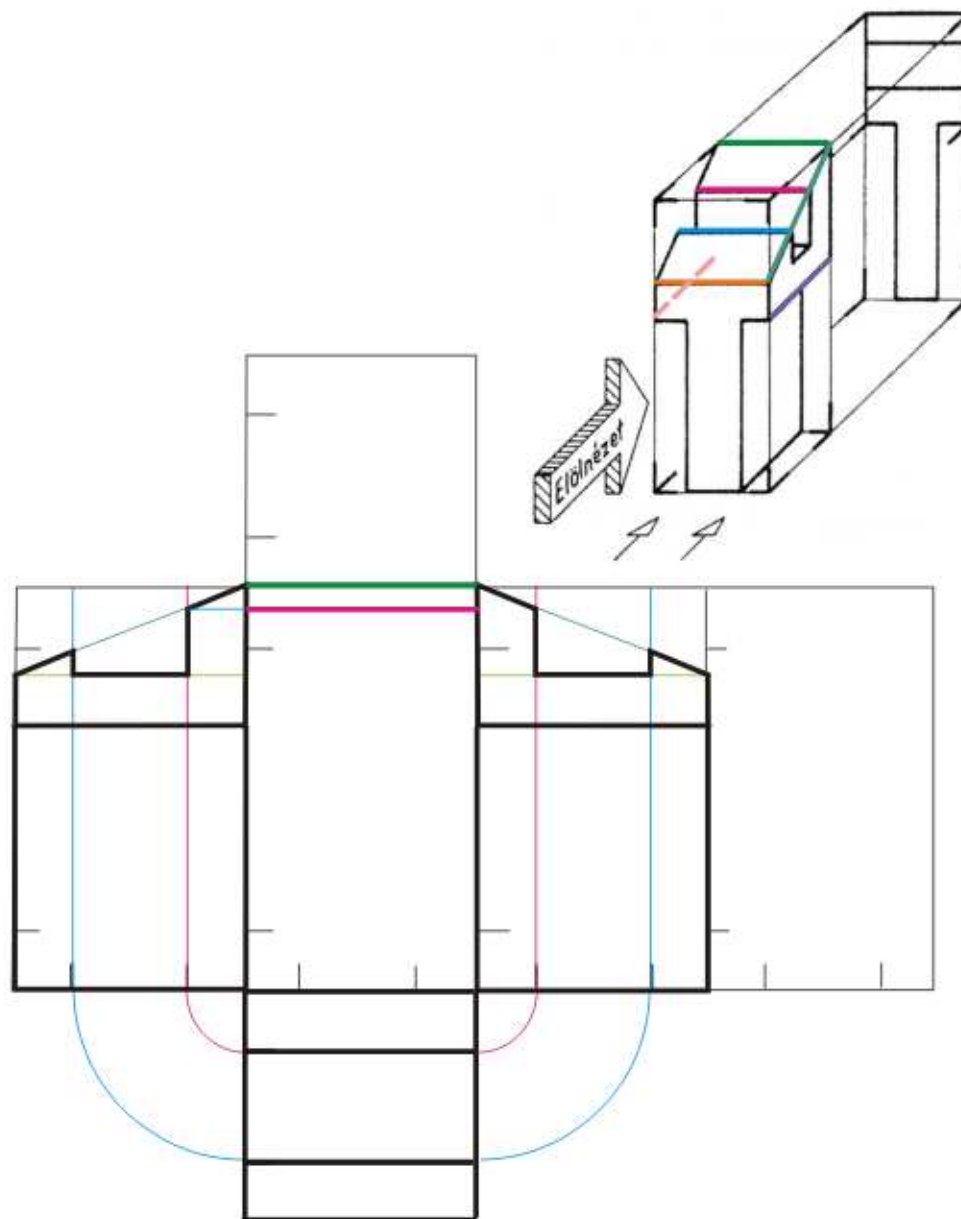


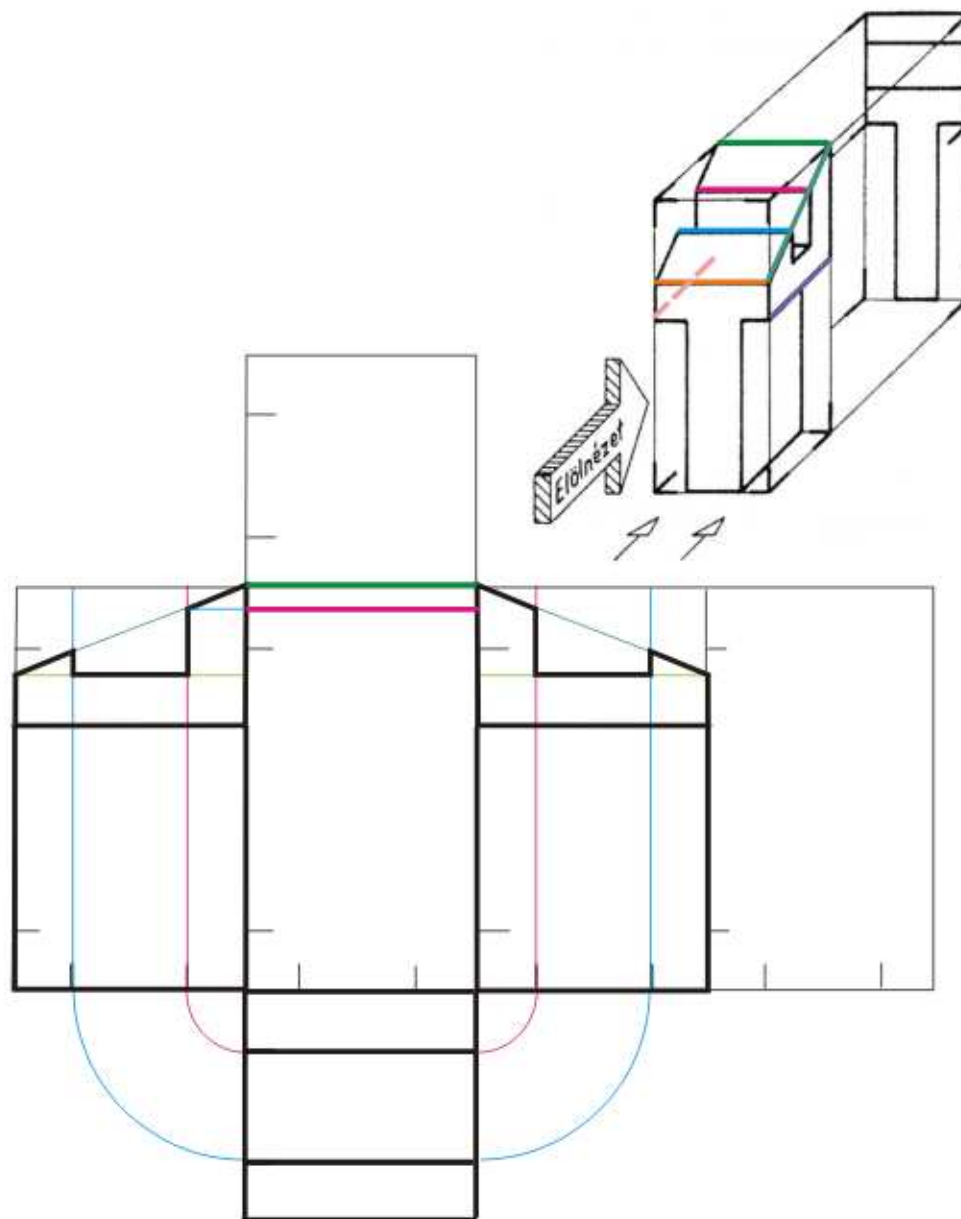


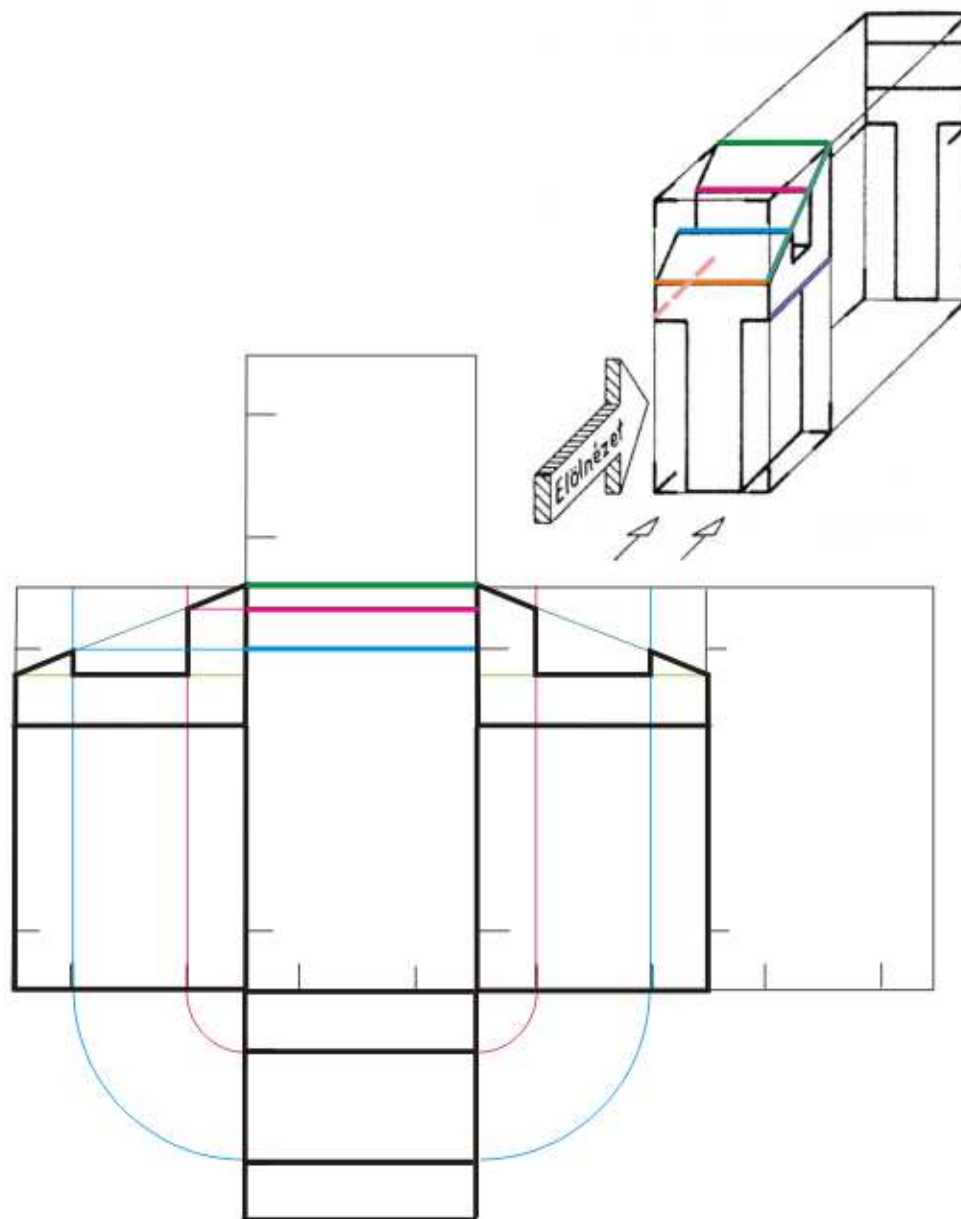


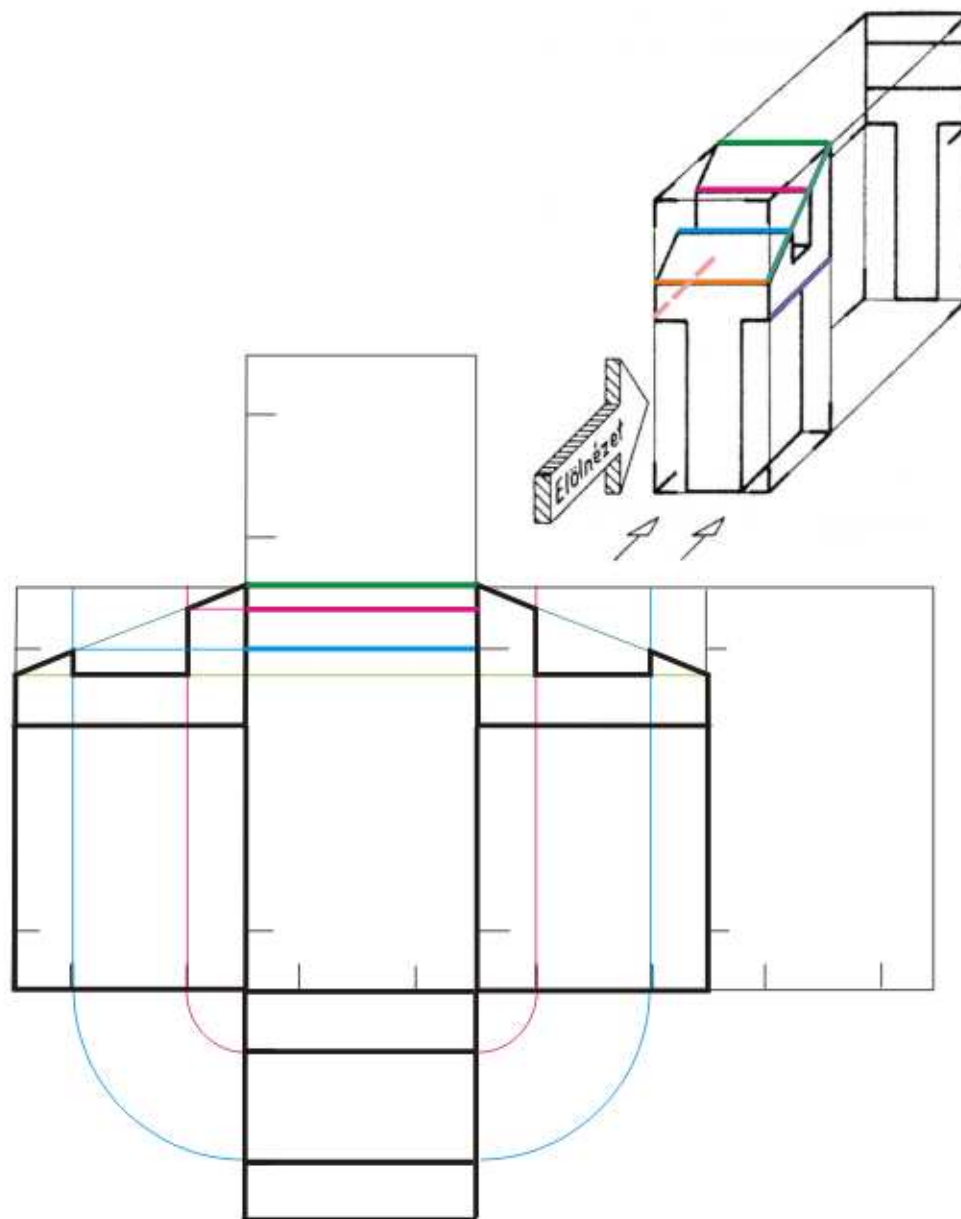


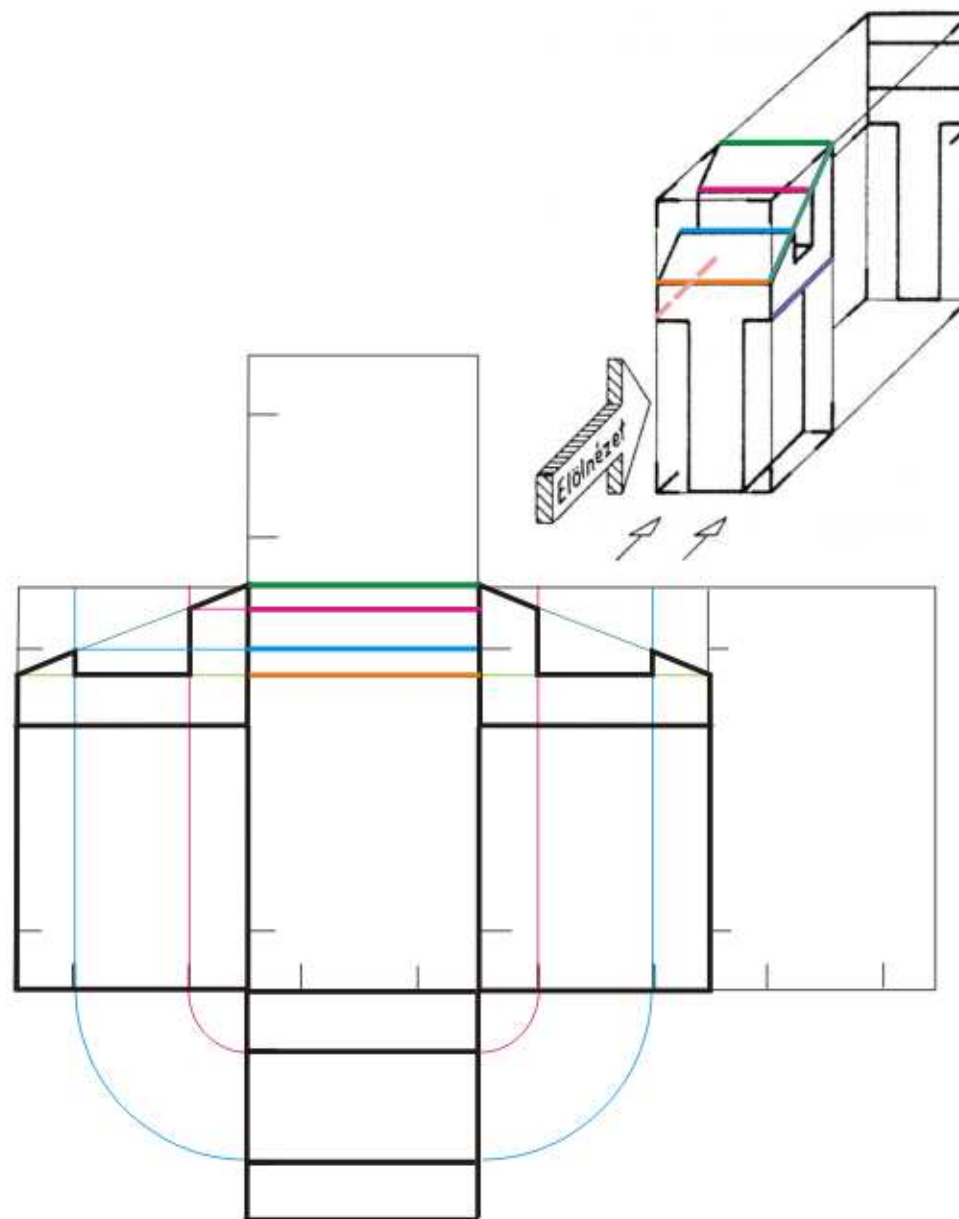


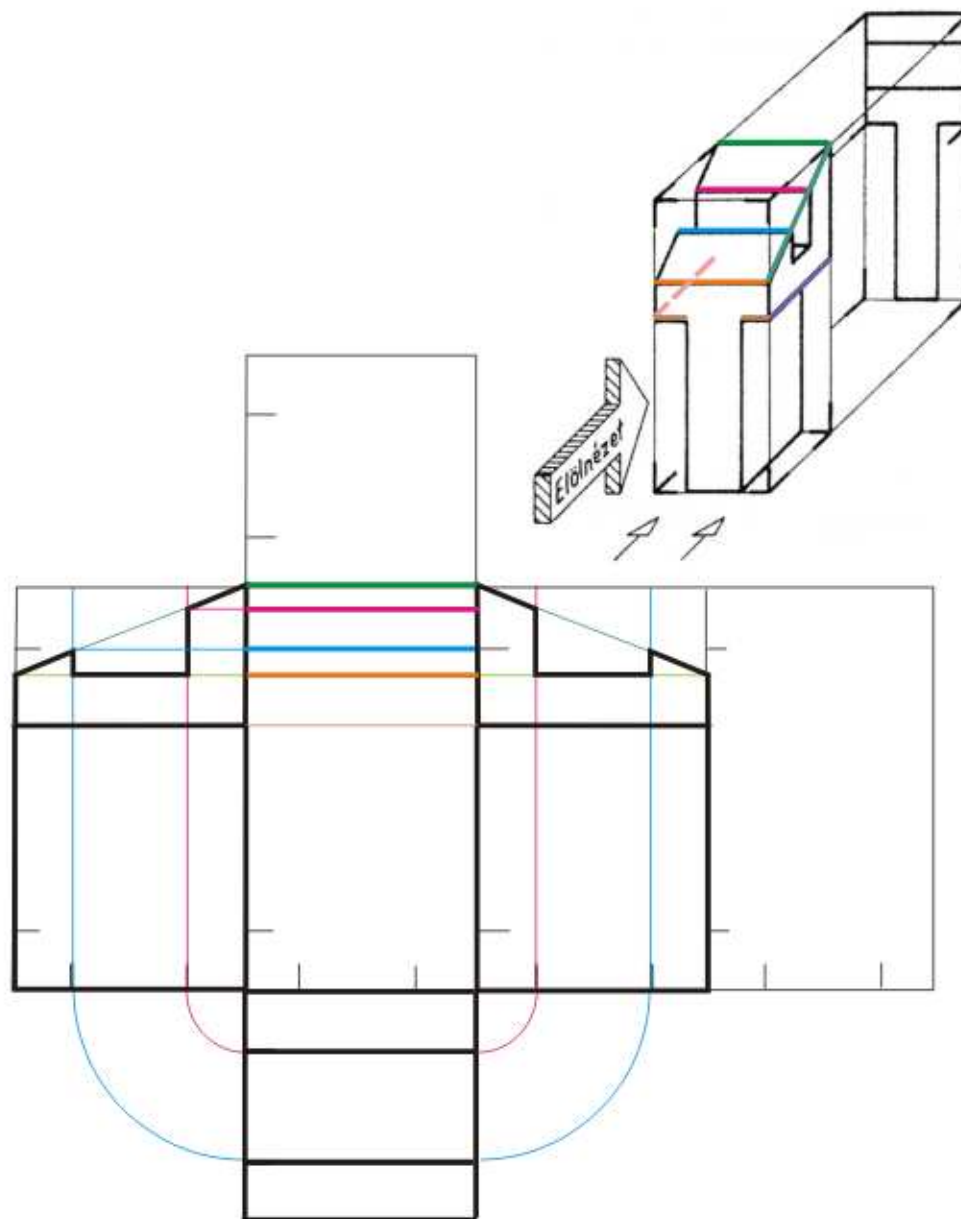


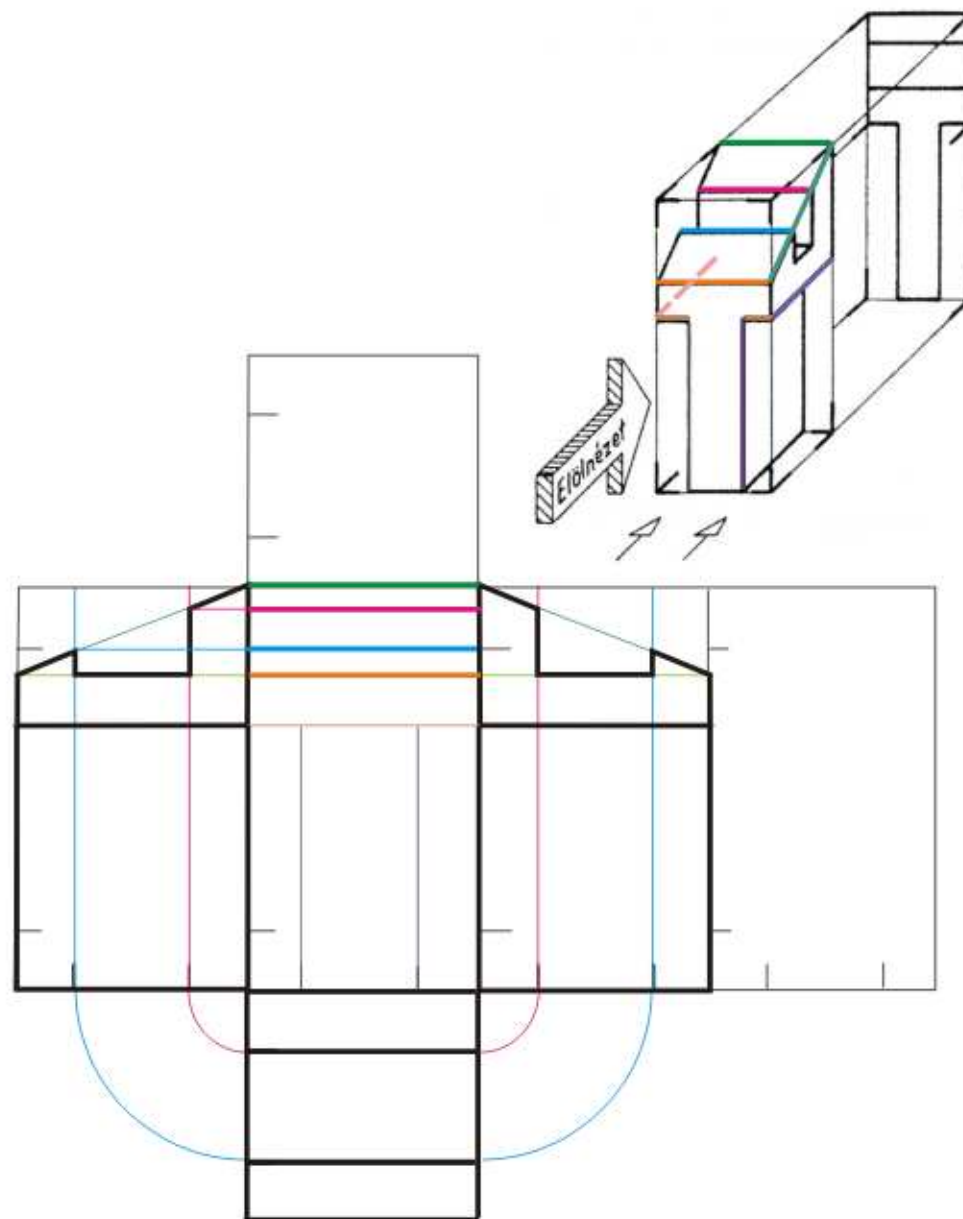


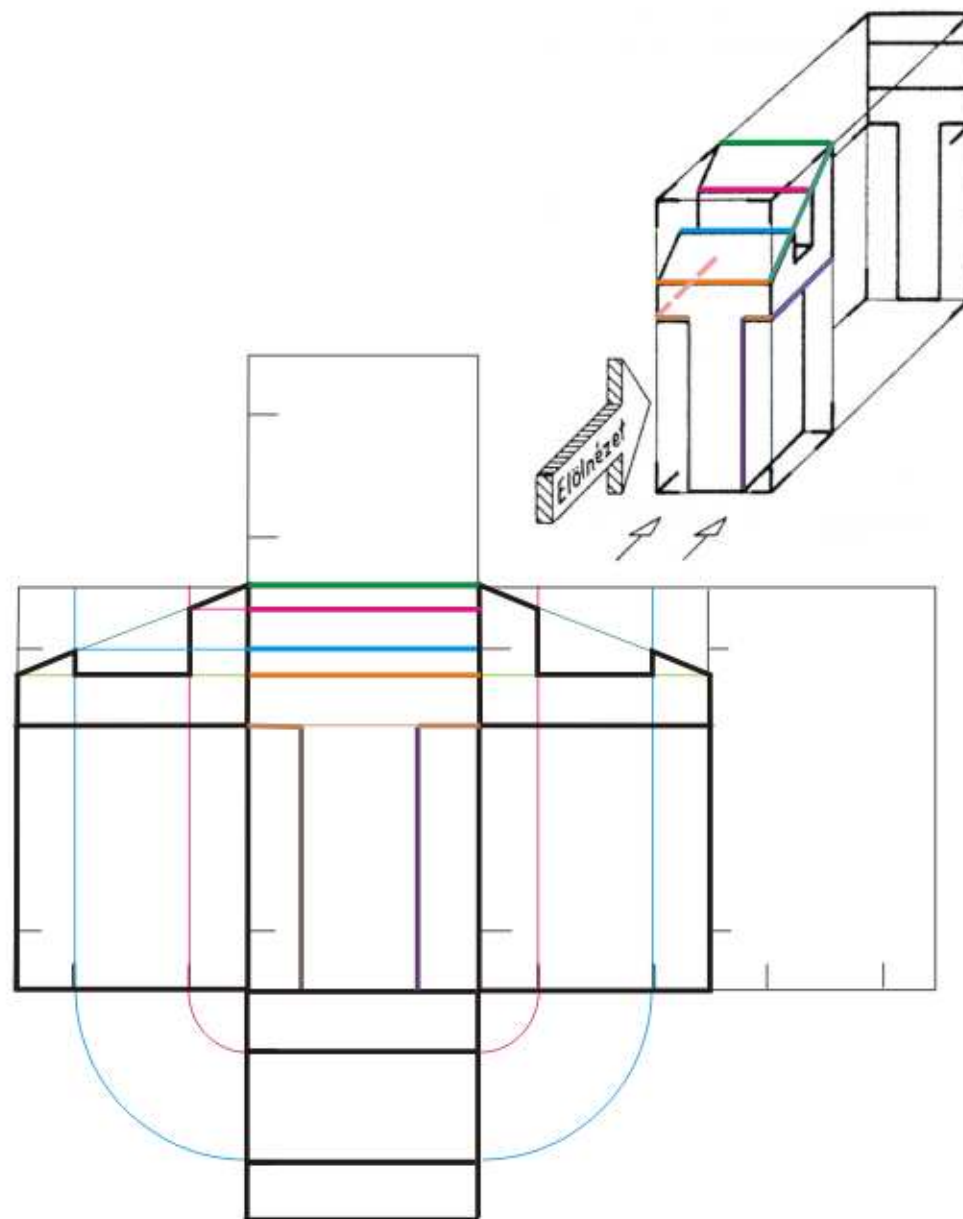


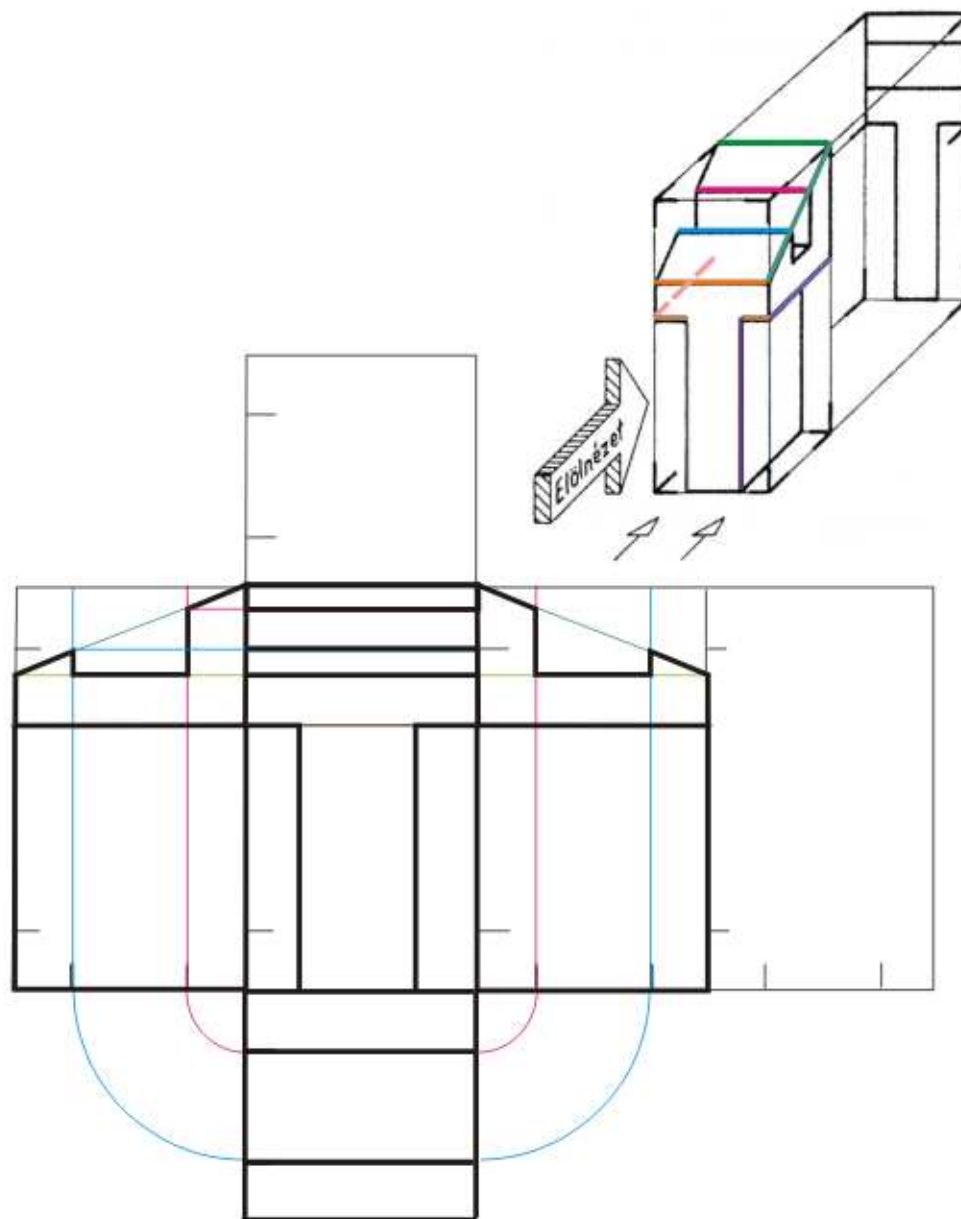


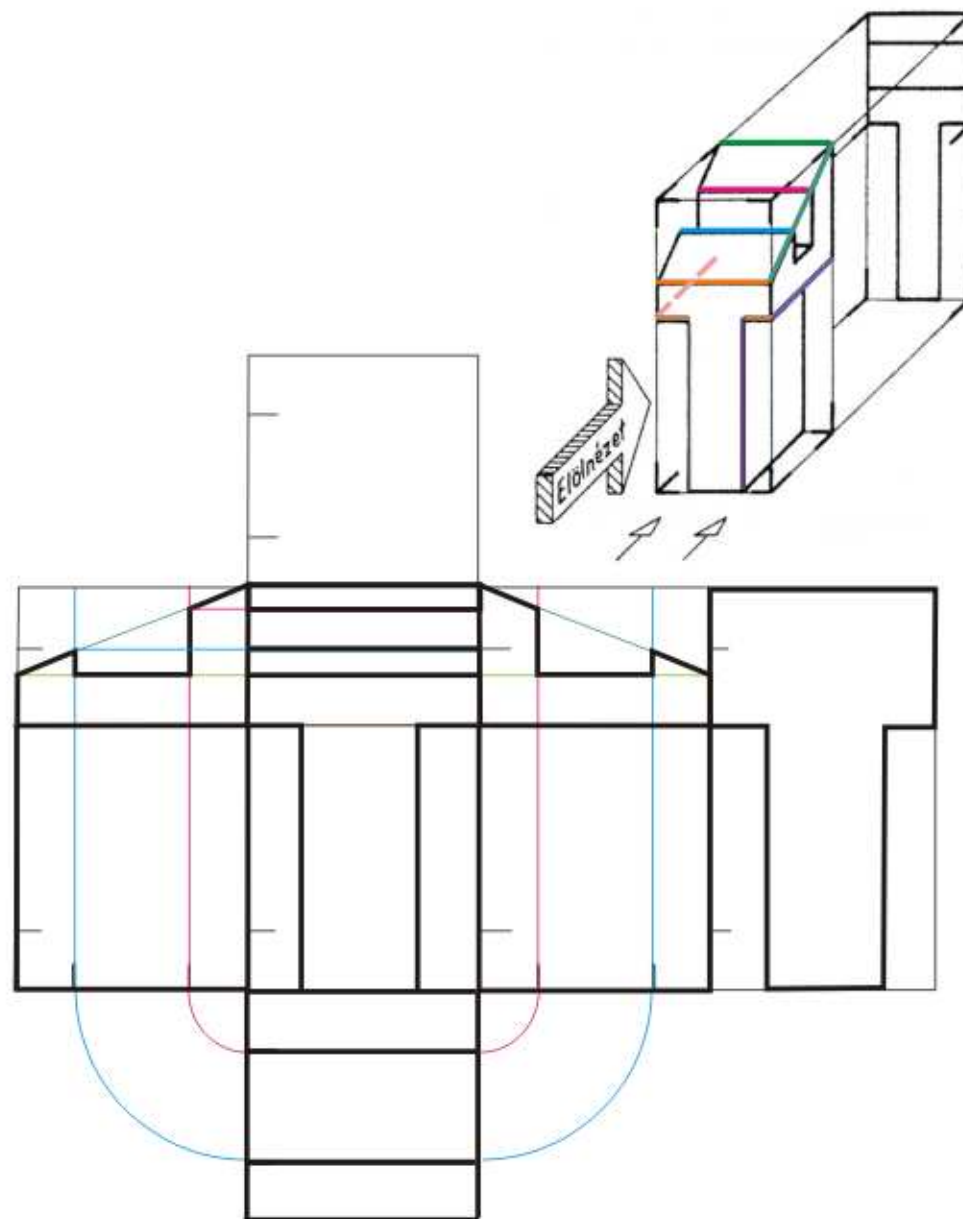


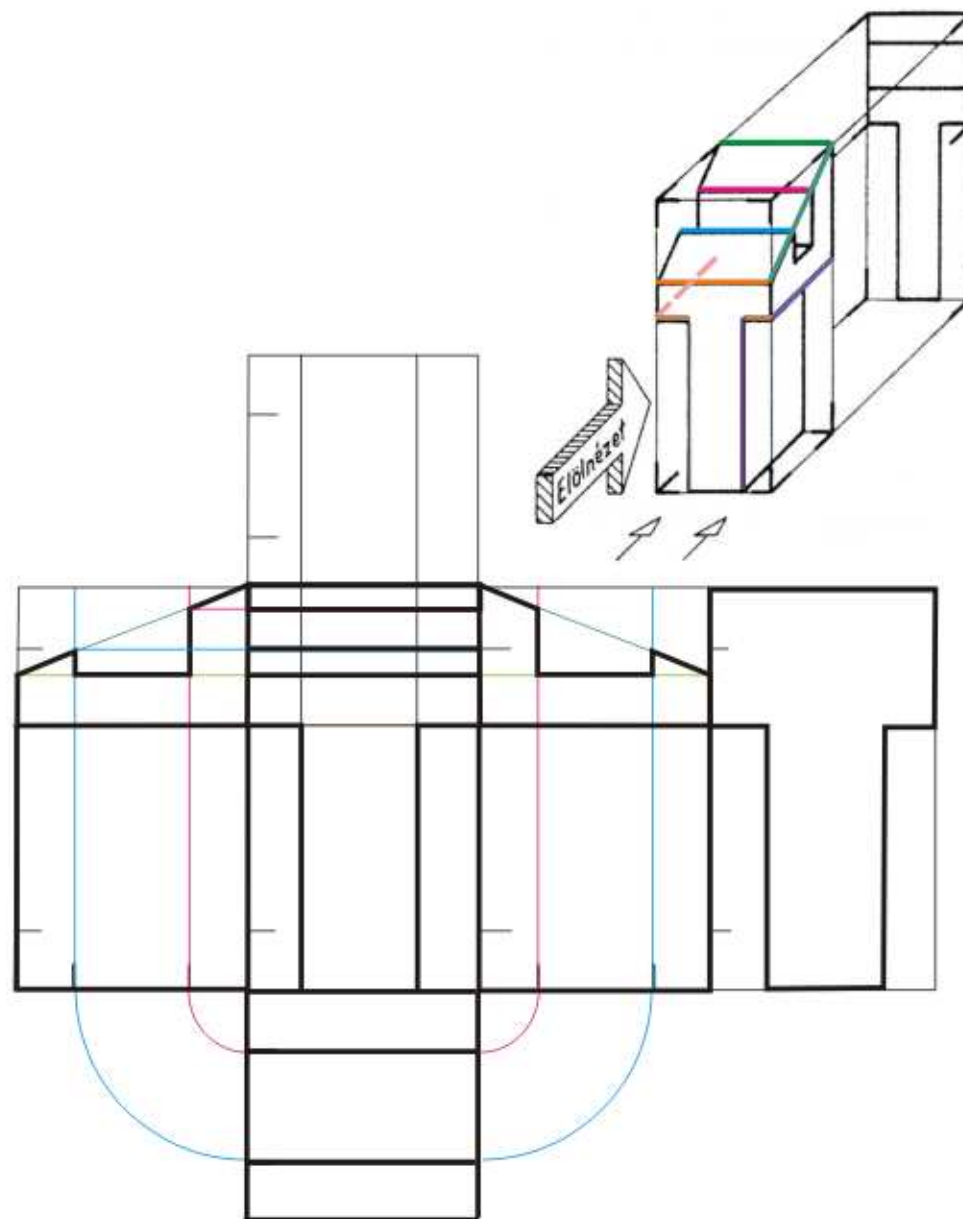


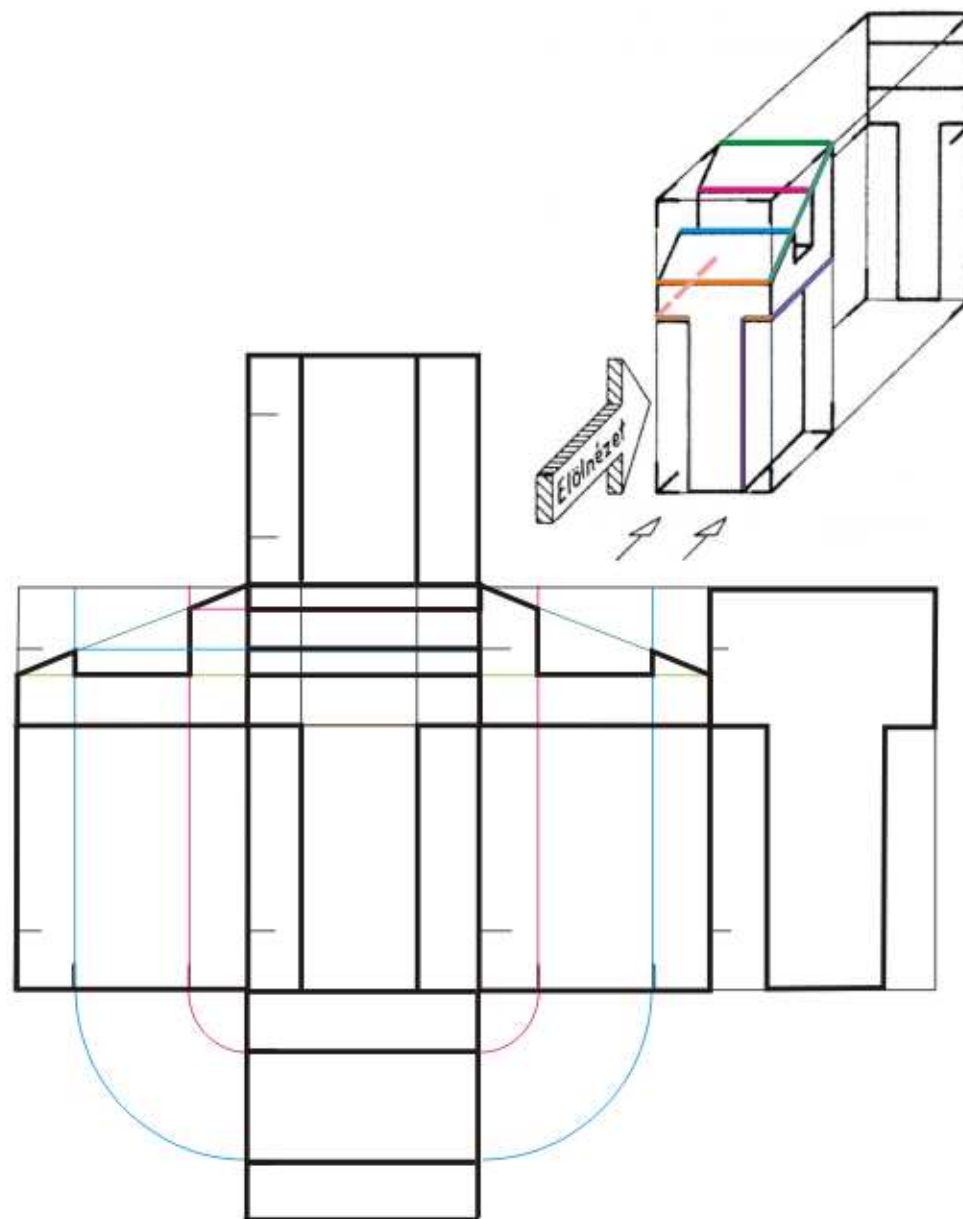


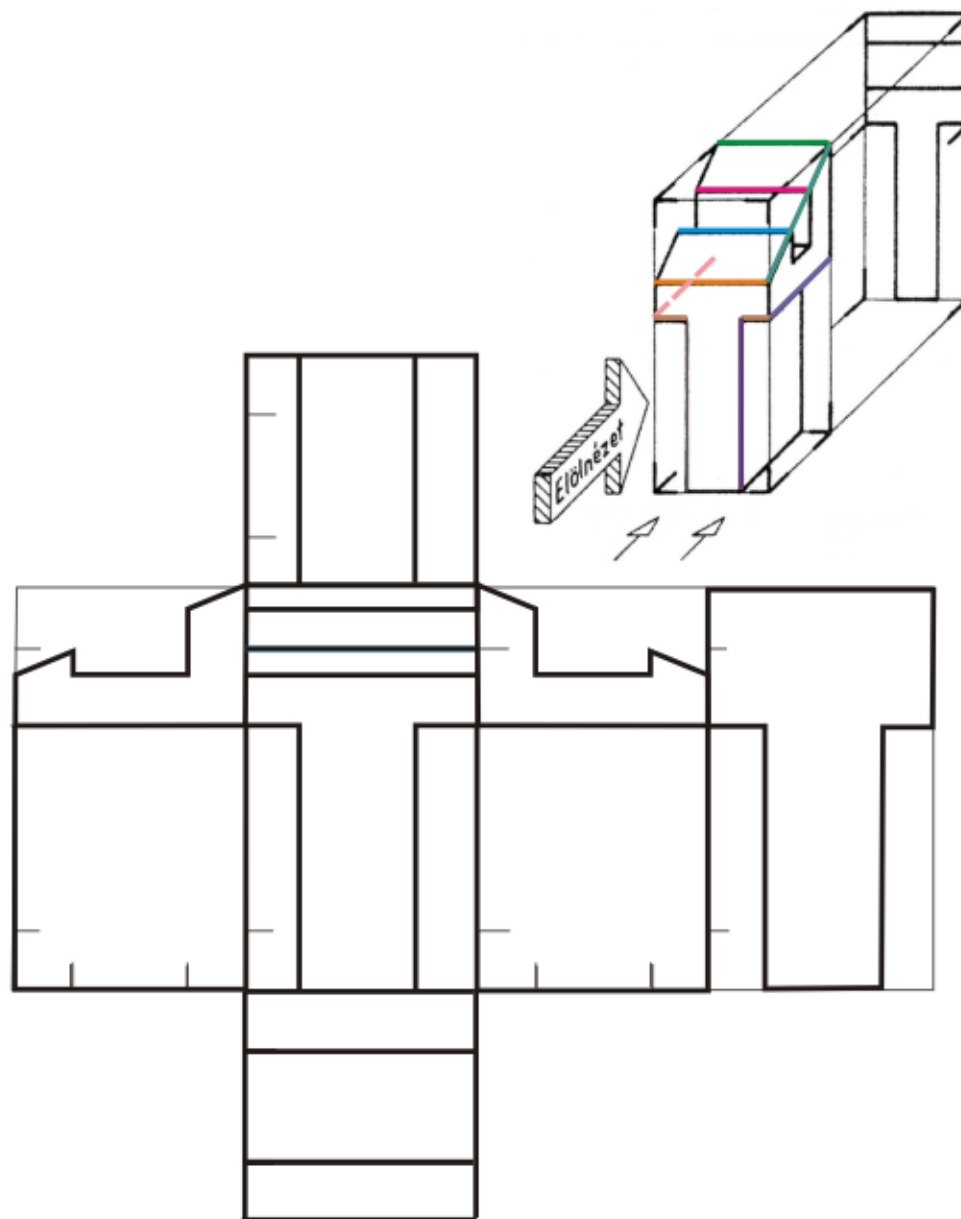








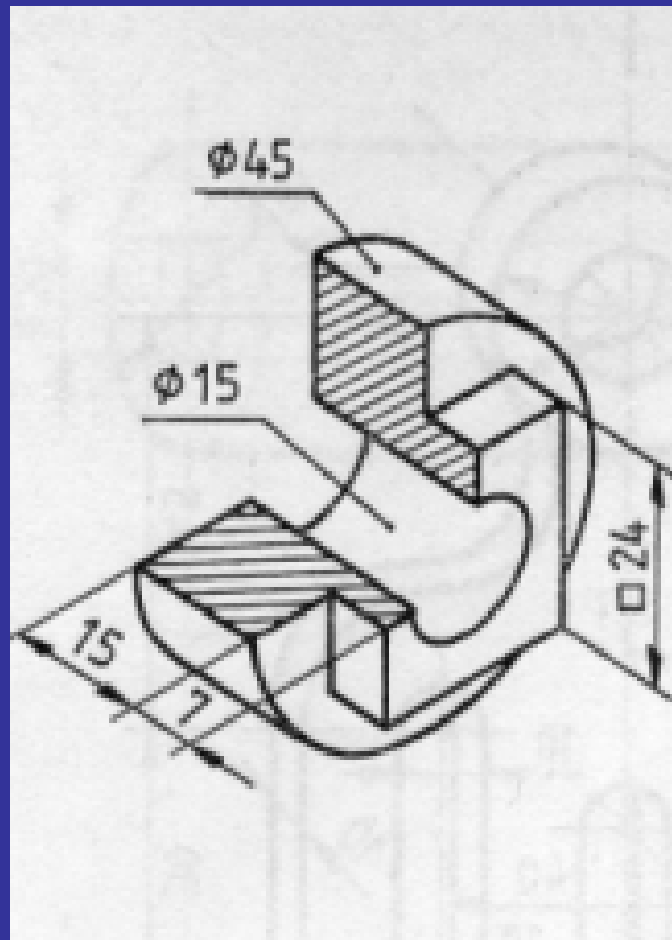


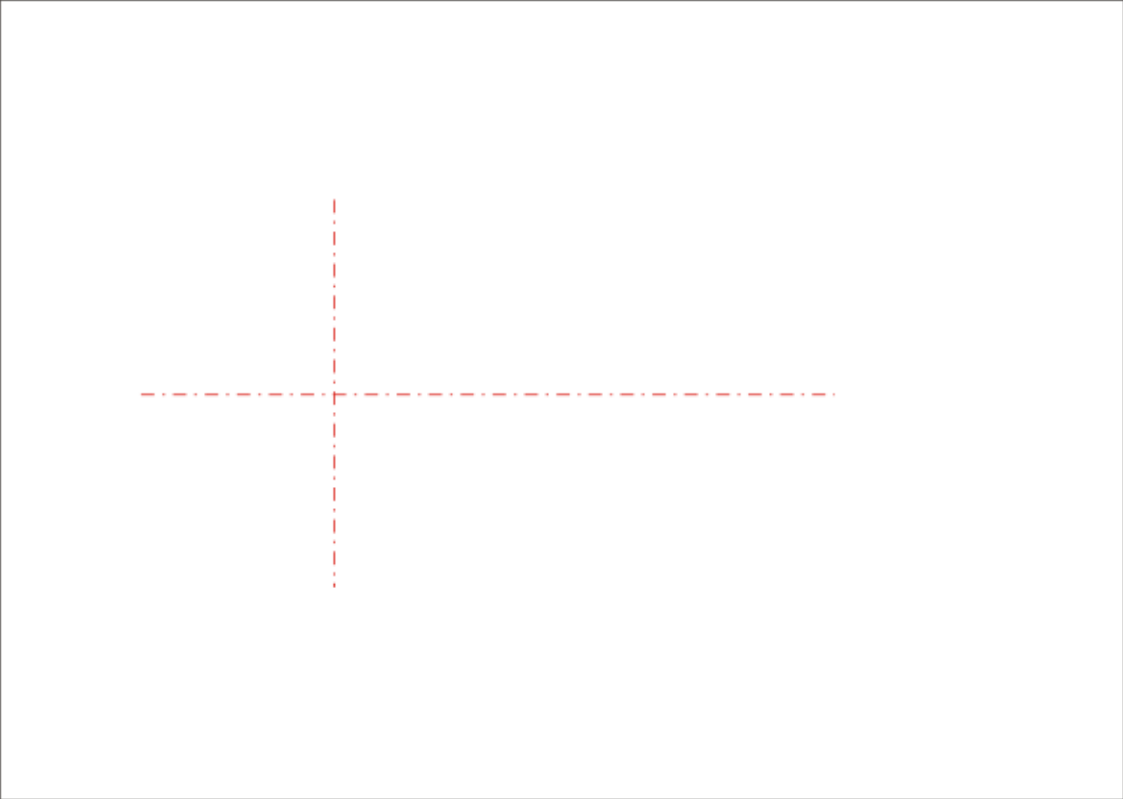


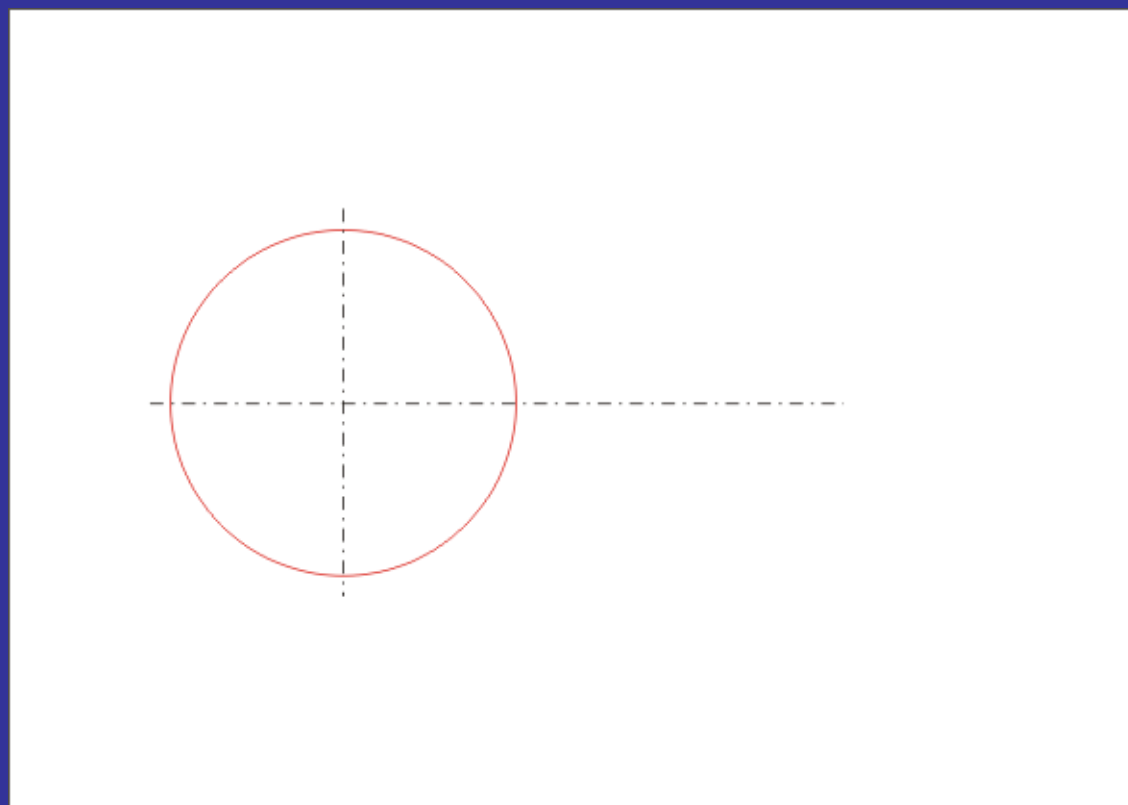
FÉLNÉZET-FÉLMETSZET SZETKESZTÉSE

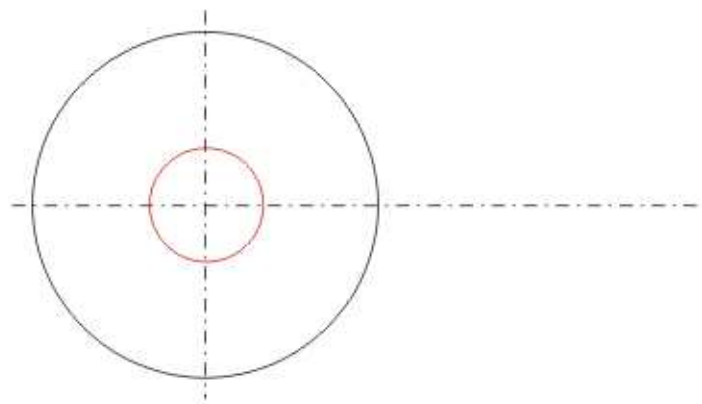
(a 4.3.a. feladat megoldása)

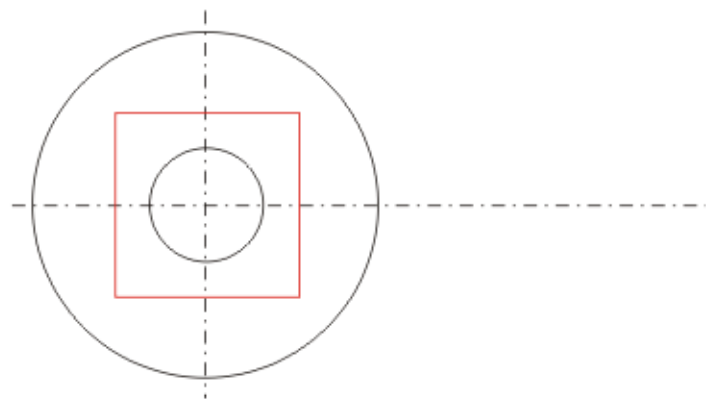
A feladat

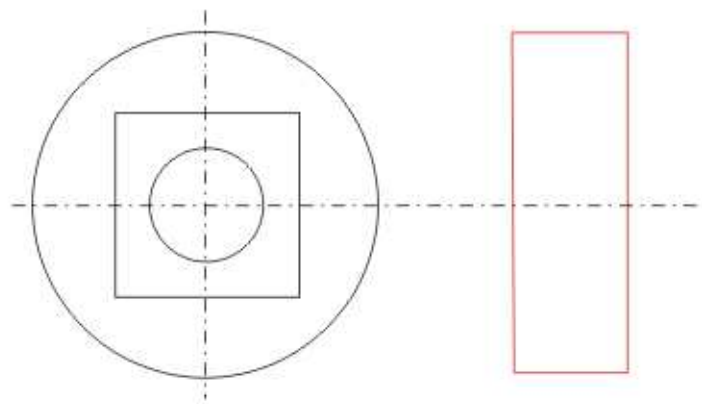


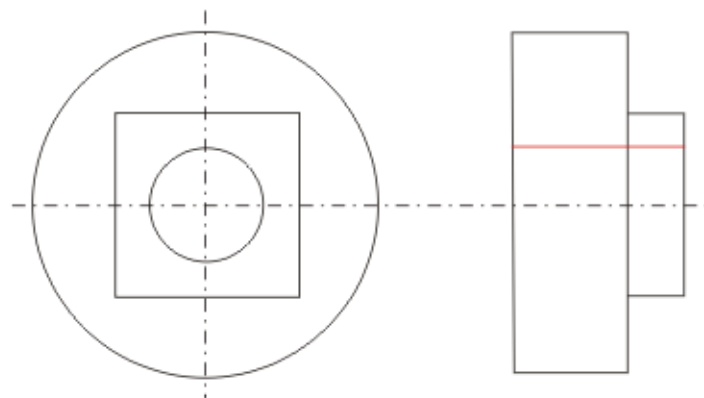


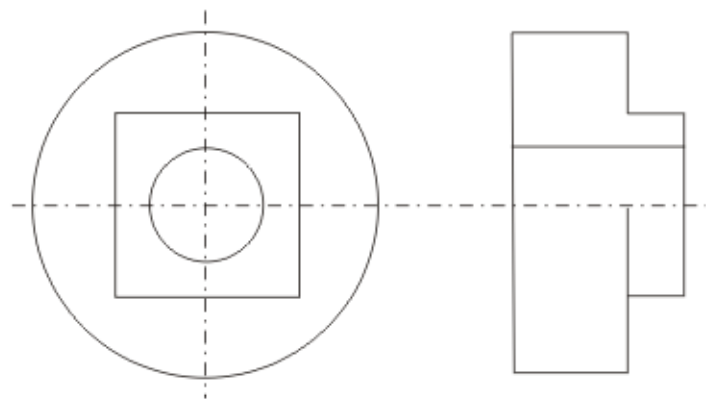


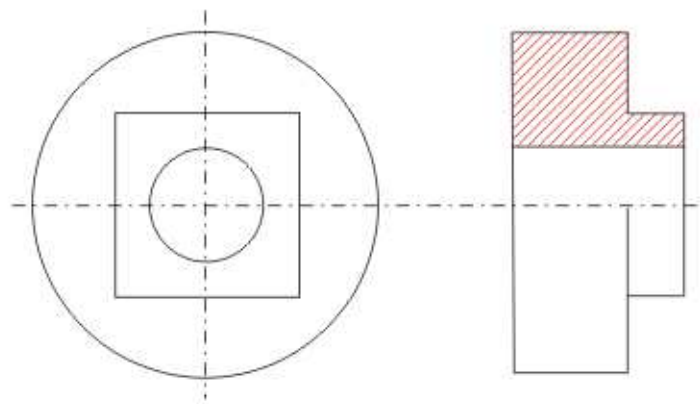


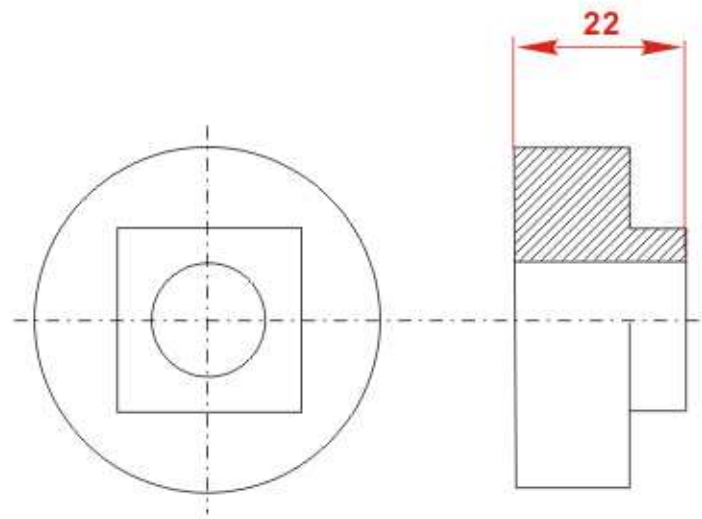


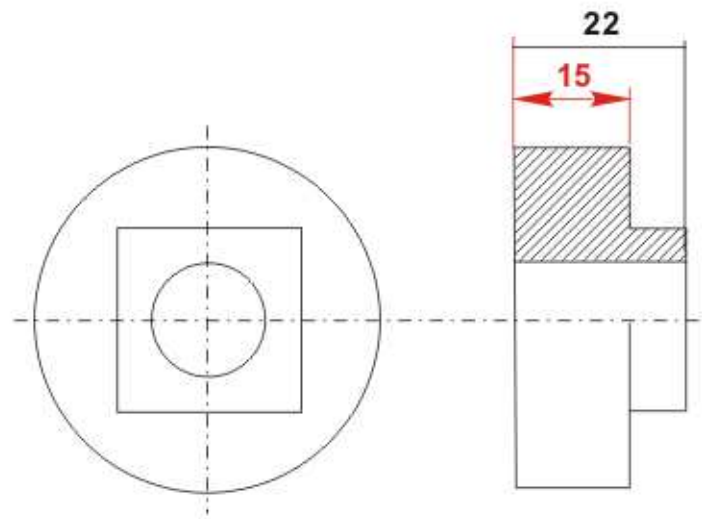


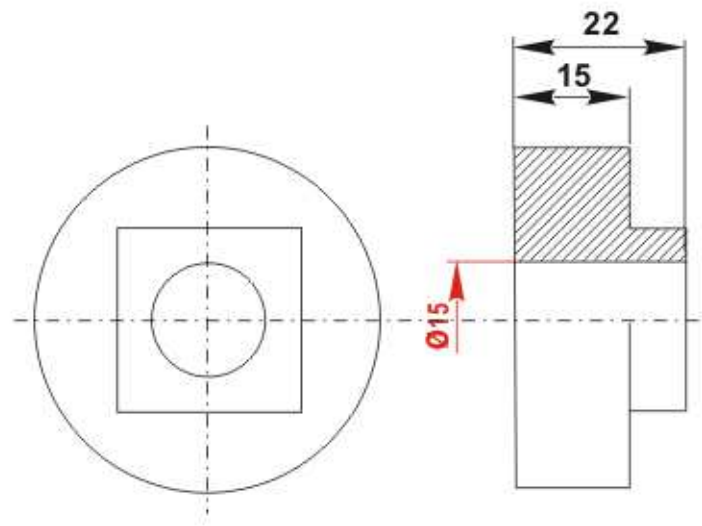


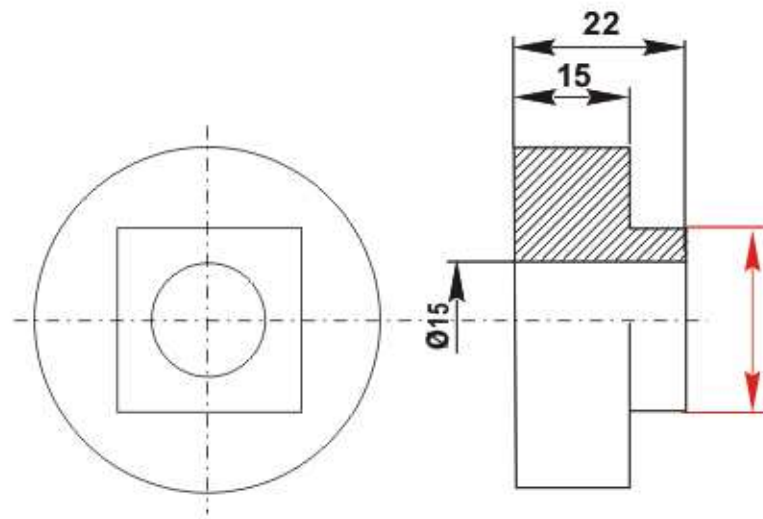


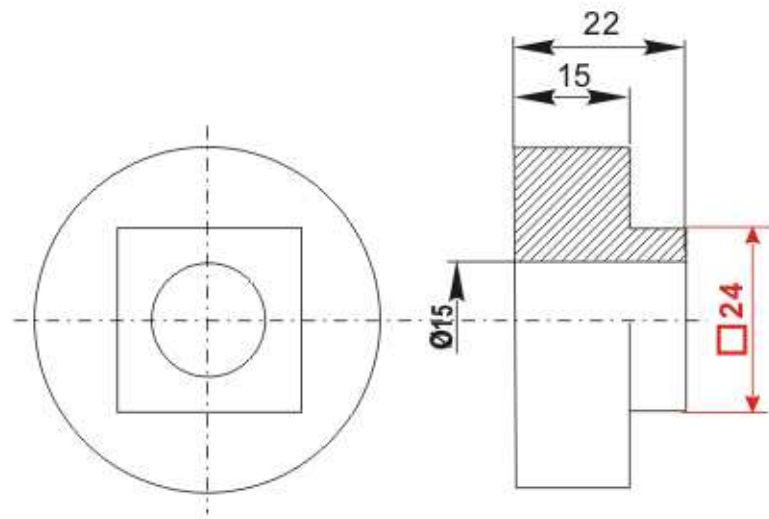


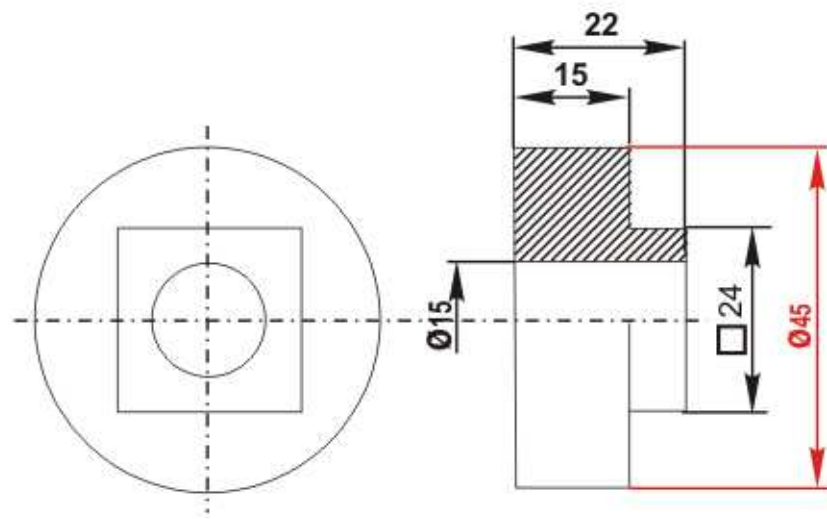


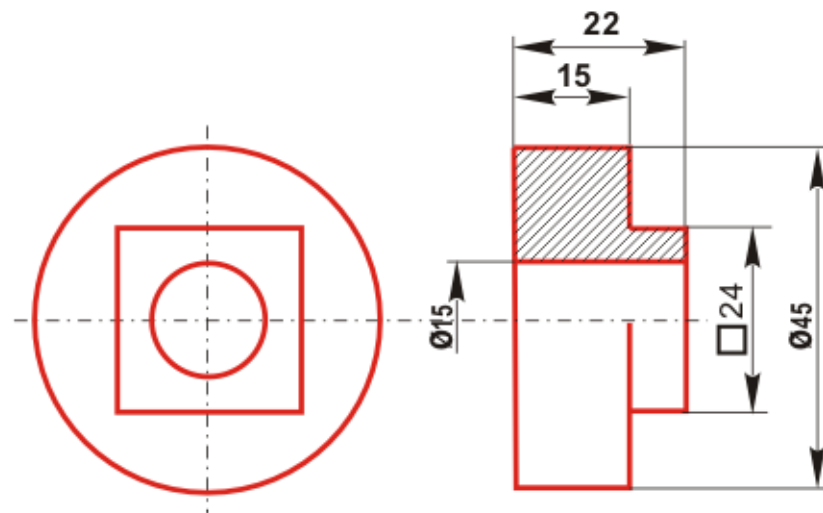


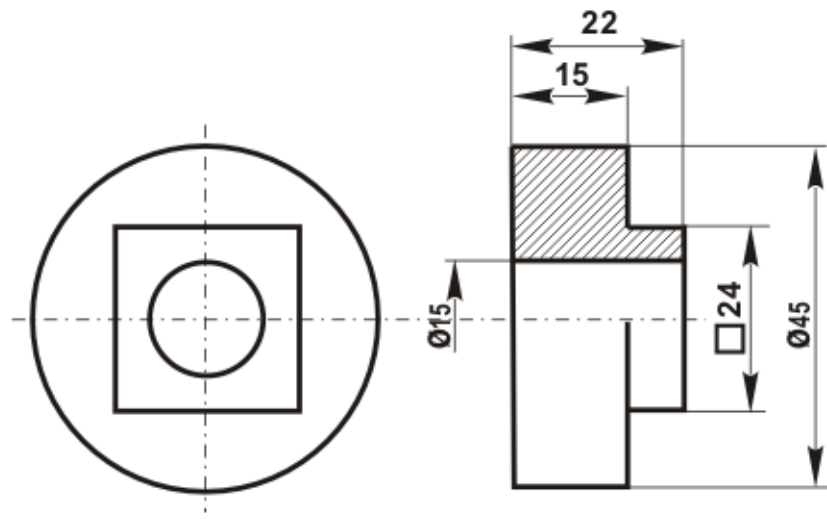












LÉPCSŐS METSZET KÉSZÍTÉSE

(a 4.6. feladat megoldása)

A feladat megfogalmazása

