

The technical drawing

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1. Definition of the technical drawing

The technical drawing is a detailed representation of an object before its construction.

Its purpose is to provide the information necessary to analyze the object, to help in its design and to facilitate its construction or handling.

The technical drawing can be developed with the help of computers; some software allow projections and calculations to facilitate the drawing. Regarding manual instruments, as it is quite possible to do it with a pencil, the most usual are the straightedge, the square and the compass.

The technical drawing must respect several strict rules: respect of a scale, correspondence of the views, use of continuous or dotted lines; and the goal of this small tutorial is to remind it.

This will greatly facilitate the making, the understanding of the piece, as well as the discussion around a project. As they say: a picture is worth a thousand words.

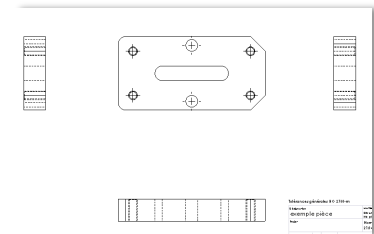
Basic rules

There are 3 distinct parts to a drawing:

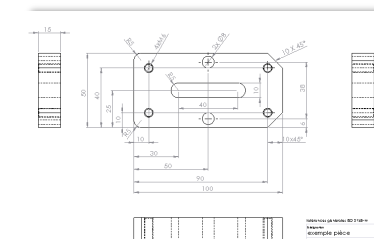
1. The cartridge

Tolérances générales ISO 2768-m			
Désignation: exemple pièce		Matériau : acier inox 1.4301	
Projet		Dimension : 150x50 ép.15	
		Nb. pièce : 5	
		Nom : Chevalley Luc	
		21.04.2020	
Echelle 1:1		Client: luc.chevalley@epfl.ch +41 21 693 4532	Edition 00
EPFL		IPHYS-GE	Atelier

2. The drawing itself



3. The quotation



2. Basic rules

The cartridge

The first part is called the cartridge (usually located at the bottom of the sheet). It informs the reader about 5 essential elements:

1. the name of the piece
2. the number of piece to be made
3. the material of the piece
4. the scale used for the drawing
5. the name of the designer and his laboratory

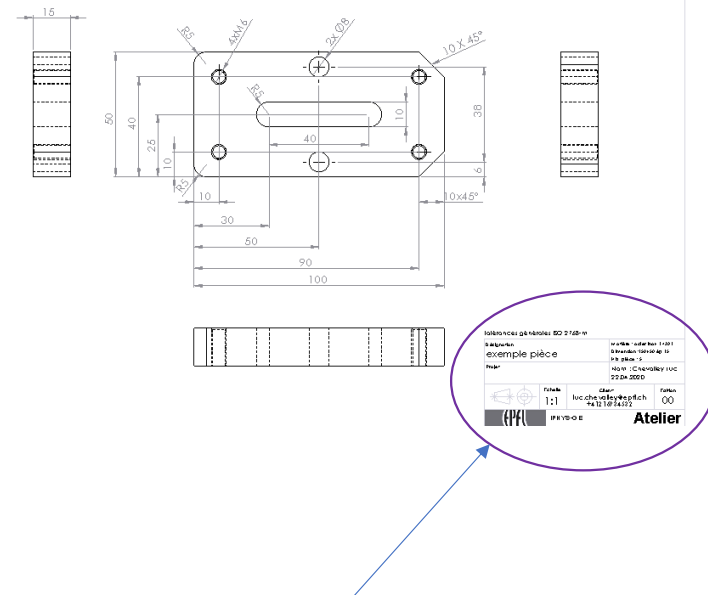
The cartridge may of course have other information but the 5 points above are basic.

Example of a cartridge:

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General tolerances			
Part designation Example piece		Material : Stainless steel 1.4301	
Project		Part number : 5	
		Name : Chevalley Luc 21.04.2020	
	Scale 1:1	Name of the laboratory IPHYS- AT-PH	Edition 00
EPFL			

The drawing




Several types of lines are used in a technical drawing:





- Continuous lines
- Interrupted
- Mixed

These can be of different thicknesses depending on their function:

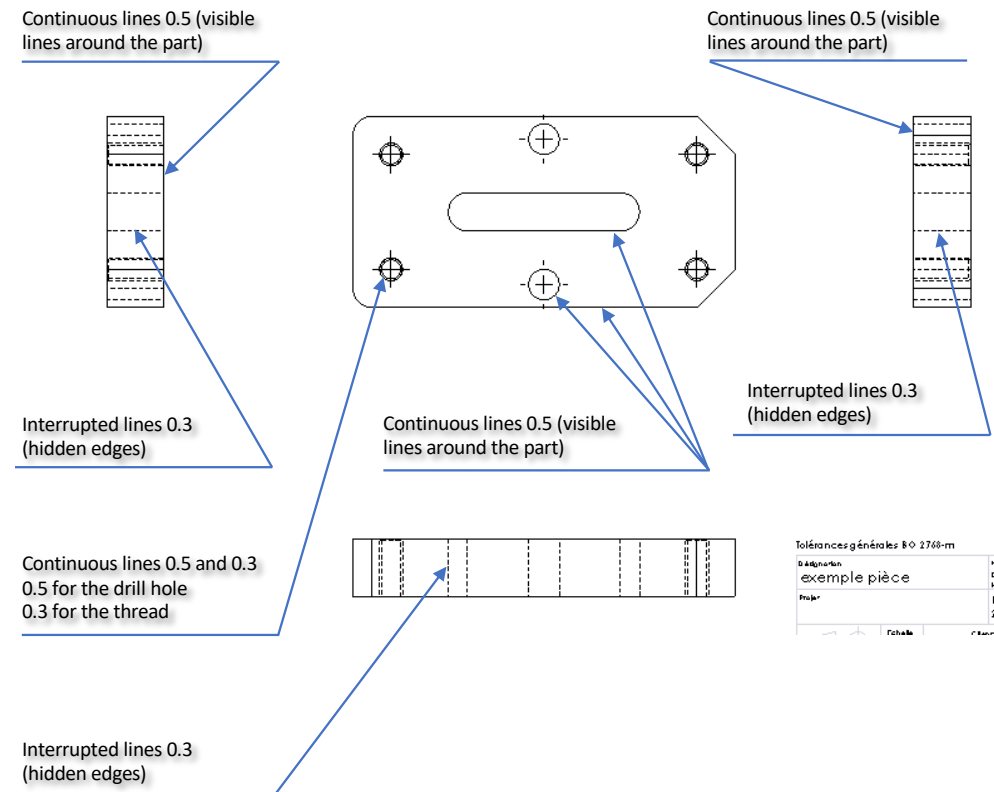
- Thick line 0.5 mm
- Thin line 0.3 mm)

Here is a small summary table for your information:

Line	Désignation	General applications	Thickness
	Continu thick	<ul style="list-style-type: none"> Contours view Arrests views 	0,5
	Continu thin	<ul style="list-style-type: none"> Geometric constructions Dummy edges Dimension lines Attachment lines Marker lines Hatching Folded section outlines 	0,3
	Interrupted	<ul style="list-style-type: none"> Hidden contours Hidden edges Hidden geometric constructions 	0,3

Line	Designation	General applications	Thickness
	Mixed thin	<ul style="list-style-type: none"> Axes of revolution Drawing of symmetrical planes Trajectories 	0,3
	Mixed thick	<ul style="list-style-type: none"> Indications of surface lines subject to particular specifications 	0,5
	Continuous thin by hand	<ul style="list-style-type: none"> Hidden contours Removals of views 	0,3
	Contnu thin straight zigzag		0,3

Example of lines on a drawing



The quotation

It allows to transmit the dimensions of the drawing without taking direct measurements on the plan and thus avoid errors due to the printing scale of the drawing or simply measurement errors.

It is thus essential for the good realization of the part.

It is essential to dimension each element of the drawing so that it does not miss a dimension or a positioning during the manufacturing of the part.

If a value is missing, this will delay the production of the part. We will have to stop the machining of the part and contact the designer again so that he can provide us with the missing value.

It is best to proofread and double-check your design to save time later on.

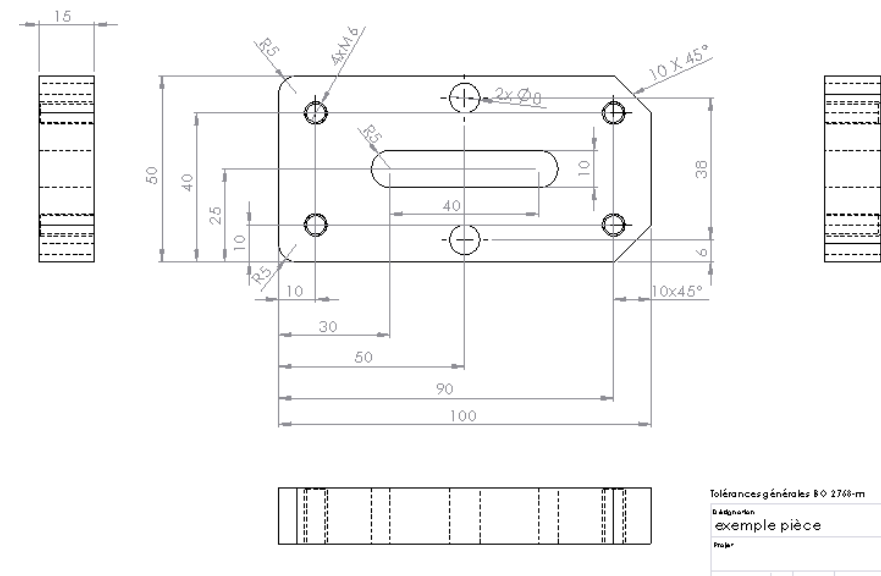
It should be noted that, when dimensioning, it is imperative to enter the geometric tolerances that you want, whether linear, angular, shape tolerances, etc.

Without this, the person who will make your piece will not know the function of the piece and will not know how to adjust the elements between them.

The remarks, annotations or quotations are made with continuous lines of 0.3 mm.

Try to spread out the dimension lines so that the design remains readable.

Example of dimensioning on a drawing



3. Drawing softwares

Computer aided design (CAD)

There are many different drawing programs, there is no one better than another and we will not dwell on the subject.

It is important to note that at the IPHYS mechanical workshop, we mainly use Solidworks. In this sense, if you send drawings that do not come from this software, please convert them to Parasolid format (.stp). This way it will be well supported by Solidworks.

Sketches and hand drawings

The handmade sketch is a kind of simplified technical drawing but just as effective if you take the time to do it properly and intelligently.

It is often used directly in the workshop or for the retouching of an existing part that has no drawing.

Just because it is a simplified design does not mean that the rules of usage should be forgotten.

Sketching is therefore done with a straightedge, a compass or something else if possible.

Dimensioning can be simplified by indicating the rating or tolerance by an annotation without having to make rating lines, arrows, etc.

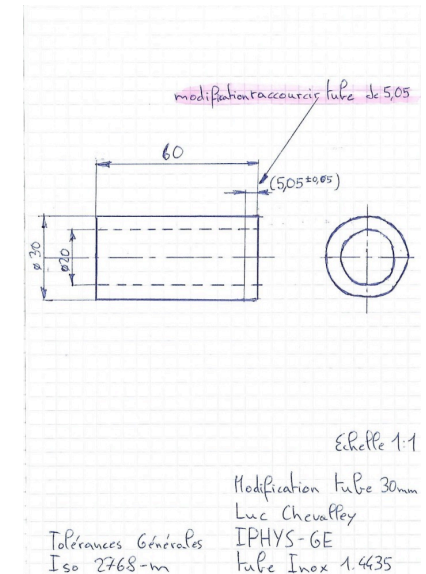
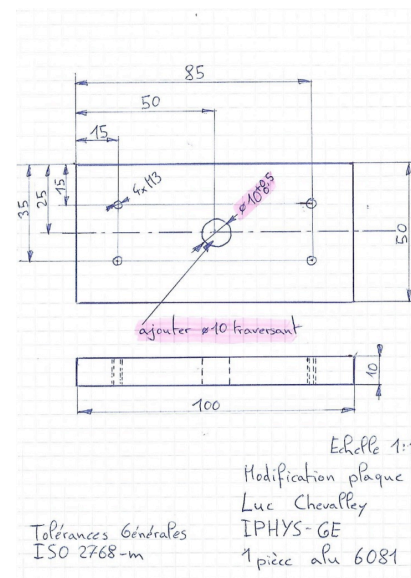
4. Sketches and hand drawings

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Examples of simplified drawings (sketches)



Examples of handmade parts and assembly drawings

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