

## INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

First School Year

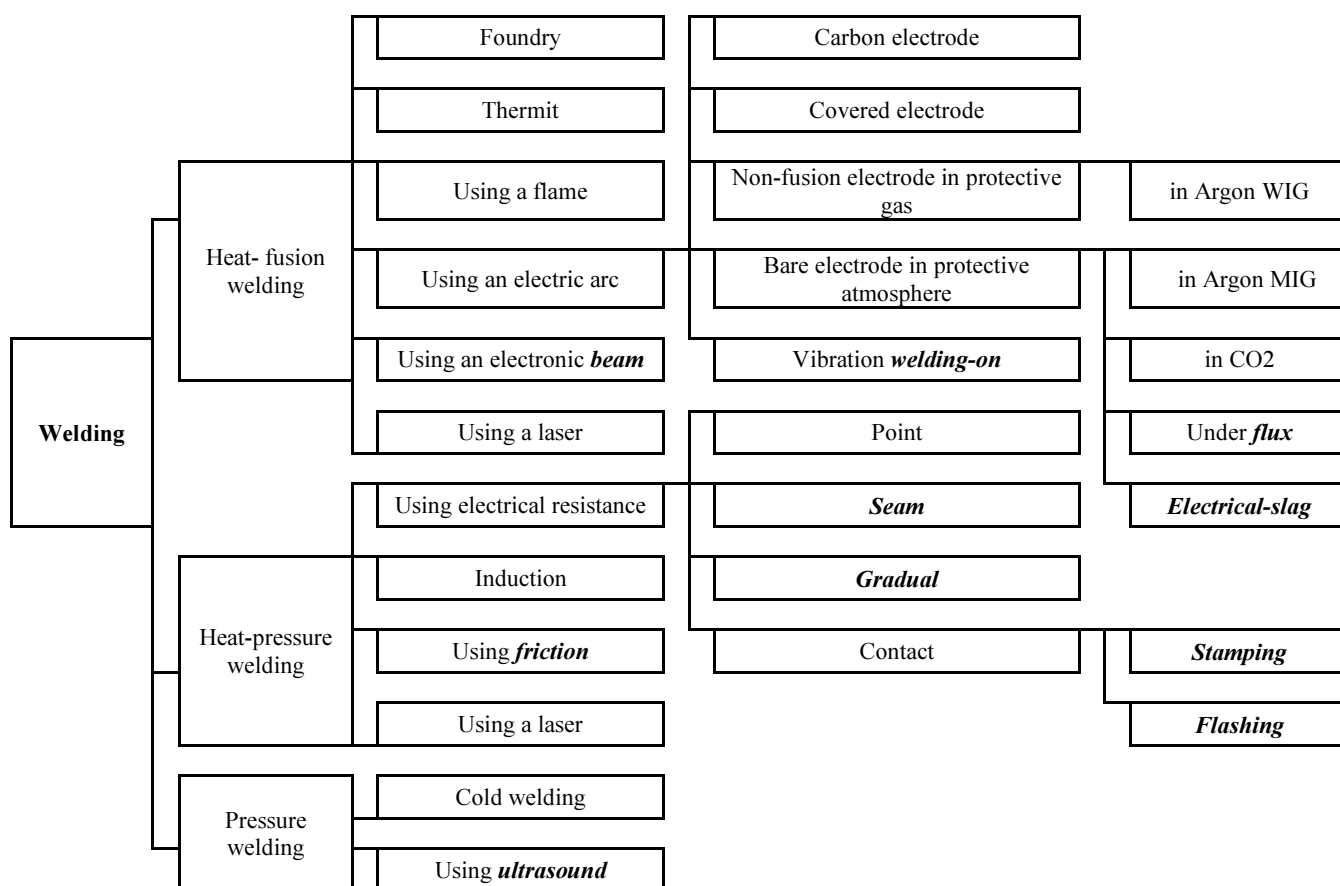
### DEFORMATION AND TYPES OF WELDS

Welding is a technological process, which leads to the formation of the *non-detachable* connections of mechanical parts and complete structures from the parts of simple forms. These parts are mostly from metallurgical semi-products (*bars, strips, sheets, profiles*) and even sometimes from *castings* and *forgings*.

**The advantages of welded joints are:** *durability*, high strength, *tightness*, great work productivity, simple structure.

**The disadvantages of welded joints are:** the need for qualified staff, a change in the structure and mechanical properties of welded joints, the formation of internal *tension* and deformation.

#### Welding classification diagram:



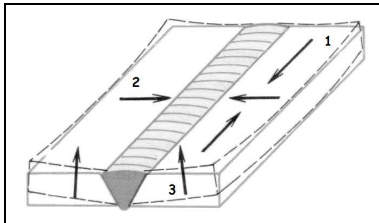
#### Deformation and types of welds

Deformations, which *arise* during welding, are the direct *consequence* of the contraction of welded metals when hardening and cooling. The base material prevents the contraction of a welded metal and this causes the formation of *tensile stress*. In regards to this, a welded metal contracts in all directions in the same way. Internal *stress* works similarly.

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The following *stresses* have importance in practise:

- **longitudinal stress:** is formed by the contraction of weld length
- **cross stress:** is formed by the contraction of weld width
- **angular stress:** it is formed due to the fact that in the upper weld part there is more welded material than in the roots and that is why there is greater contraction, which causes a **twisting** of material



1. **Longitudinal stress**
2. **Cross stress**
3. **Angular stress**

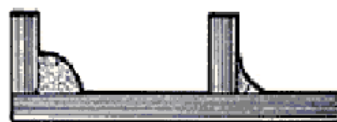
### Basic weld classifications

We can classify welds into 2 basic types: **fillet and butt welds**

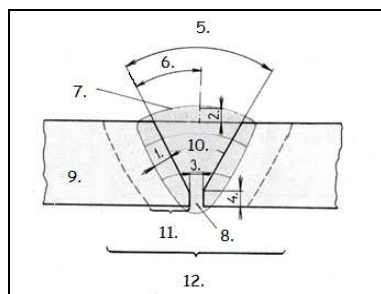
**Fillet welds**– they are used where welded parts are pressed into a right angle together. They are single or double sided and are used up to a thickness of 3 mm. Smaller thicknesses are welded towards the front, and bigger thicknesses are welded towards the back.

**Butt welds** – for these welds welded material has to be suitably put into a certain shape before welding. According to the shape we can distinguish for example, an **edge weld**, a **square butt weld**, a **V-butt weld**, and a **double-V butt weld**. We can find an overview of these welds in Czech Norms and Standards.

**Concave and convex fillet welds:**



**Butt weld:**



1. Depth of **penetration**
2. Weld **reinforcement**
3. Rooted gap
4. **Blunting** height
5. Opening angle
6. **Bevel** angle
7. Weld face
8. Weld root
9. Base material
10. Thermally affected area
11. Weld and thermally affected area

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### VOCABULARY

<b>angular</b>	úhlový	<b>forging</b>	odlitek
<b>arise</b>	vznikat	<b>friction</b>	tření
<b>bar</b>	tyč	<b>gradual</b>	výstupkový
<b>beam</b>	paprsek	<b>longitudinal</b>	podélný
<b>bevel</b>	zkosení	<b>non-detachable</b>	nerozebiratelný
<b>blunting</b>	ztupení, otupení	<b>penetration</b>	závar
<b>butt</b>	tupý	<b>reinforcement</b>	převýšení
<b>casting</b>	výkovek	<b>seam</b>	švový
<b>concave</b>	vypouklý	<b>sheet</b>	plech
<b>consequence</b>	důsledek, následek	<b>square butt weld</b>	I svar
<b>contraction</b>	smrštění	<b>stamping</b>	pěchovací
<b>convex</b>	vydutý	<b>stress</b>	napětí
<b>cross</b>	příčný	<b>strip</b>	pás
<b>double-V butt weld</b>	X svar	<b>tensile</b>	tahový
<b>durability</b>	trvanlivost	<b>tension</b>	napětí, pnutí
<b>edge weld</b>	lemový svar	<b>tightness</b>	těsnost
<b>electrical-slag</b>	elektrostruskový	<b>twisting</b>	kroucení
<b>fillet</b>	koutový	<b>ultrasound</b>	ultrazvuk
<b>flashing</b>	odtahovací	<b>V-butt weld</b>	V svar
<b>flux</b>	tavidlo	<b>welding-on</b>	navarování

### COMPREHENSION QUESTIONS

1. What is welding?
2. What metallurgical semi-products do you know?
3. What are the advantages and disadvantages of welded joints?
4. How do we define the longitudinal stress?
5. Can you name 2 basic types of welds?

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**EXERCISE**

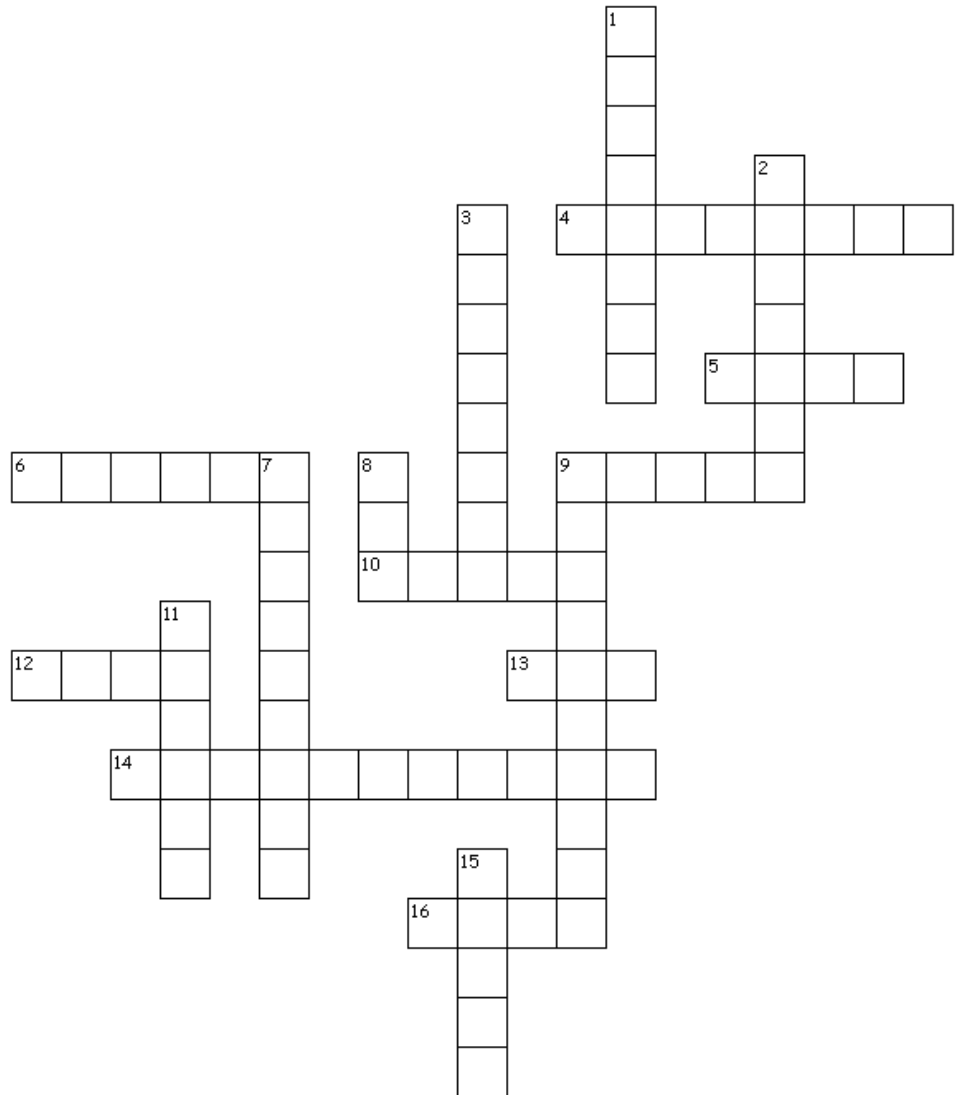
**Criss Cross Puzzle** - 17 words were placed into the puzzle.

**Across**

- 4. pevnost
- 5. tavidlo
- 6. koutový
- 9. horní
- 10. plech
- 12. tupý
- 13. tyč
- 14. závar
- 16. svar

**Down**

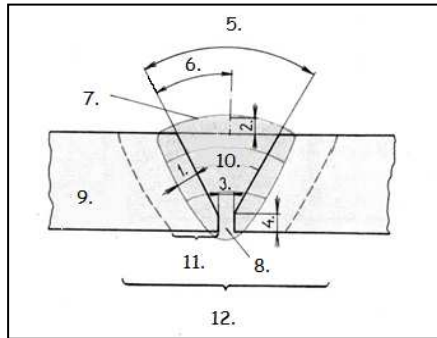
- 1. tření
- 2. úhlový
- 3. tlak
- 7. těsnost
- 8. plyn
- 9. ultrazvuk
- 11. napětí
- 15. zkosení



## INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

### 2. Describe the picture below:

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_
- 7 \_\_\_\_\_
- 8 \_\_\_\_\_
- 9 \_\_\_\_\_
- 10 \_\_\_\_\_
- 11 \_\_\_\_\_



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

**EXERCISE – KEY FOR TEACHERS**

**1. Criss Cross Puzzle**

**Across**

4. strength
5. flux
6. fillet
9. upper
10. sheet
12. butt
13. bar
14. penetration
16. weld

**Down**

1. friction
2. angular
3. pressure
7. tightness
8. gas
9. ultrasound
11. stress
15. bevel

**2. Butt weld**

1. Depth of penetration
2. Weld reinforcement
3. Rooted gap
4. Blunting height
5. Opening angle
6. Bevel angle
7. Weld face
8. Weld root
9. Base material
10. Thermally affected area
11. Weld and thermally affected area