



Joining and Welding

ការភ្ជាប់ និងផ្សារ

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06.07.2026

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ជំពូកវិស័យវិស្វកម្មសម្ភារៈ និងបច្ចេកវិទ្យាផលិតកម្មឧស្សាហកម្ម

Experiences

Ethiopia, Indonesia, Malaysia, Cambodia,

Modern Mechanisation, Joining and Welding

យន្តការយន្តការម៉ាស៊ីន, ការភ្ជាប់ និងការផ្សារ



SmartAgri Cambodia: Advancing Sustainable Agriculture in Battambang

Training objectives:

- Understand the importance of welding and brazing (ភ្ជាប់ដោយលោហៈរលាយ) in agricultural engineering.
- Learn basic welding methods and applications (ការប្រើប្រាស់).
- Recognize common joint types and good welding practices (ស្គាល់អំពីការផ្សារភ្ជាប់ដែលប្រើប្រាស់តូចៗ និងការផ្សារដែលល្អ).
- Improve safety awareness when working with welding equipment.
- Prepare for practical welding exercises and brazing. (ភ្ជាប់ដោយលោហៈរលាយ)

Why Welding Matters in Agriculture

Welding is Everywhere. Agricultural machinery depends on reliable welded structures.

Examples include:

- Tractors
- Trailers
- Ploughs
- Cultivators
- Seeders
- Irrigation systems
- Greenhouses
- Storage facilities
- Farm gates and fences

Good welding means:

- Longer machine life
- Lower repair costs
- Improved safety
- Reduced downtime during the farming season (កាត់បន្ថយការខាតពេលដោយសារបញ្ហាកំប្លែងរំពឹង...)

Learning outcomes

By the end of this session you will be able to:

- ✓ Identify the main welding processes
- ✓ Recognize different joint designs (ការខ្ចីហ្សាញដំណាច់)
- ✓ Select appropriate welding methods for agricultural applications
- ✓ Understand the principles of oxy-fuel welding ការផ្សារដោយចំហេះខ្សែស្ពឺ and manual arc welding ផ្សារដោយអគ្គីសនី
- ✓ Follow basic safety rules

Safety First

Always remember:

- Wear appropriate PPE (Personal Protective Equipment).
- Protect your eyes and skin.
- Ensure good ventilation (មជ្ឈដ្ឋានខ្យល់ចេញចូល).
- Remove flammable materials.
- Check equipment before use.
- Never weld without proper training and supervision.

Safety is the first step to quality welding!

BOLTED JOINTS - Good Practice (ការពិភាក្សាល្អដោយប្រើប្រាស់)

nylon insert lock nut



Welding

Welding Under Pressure

Welding Under Heat and Pressure

Welding by Heat (Fusion)

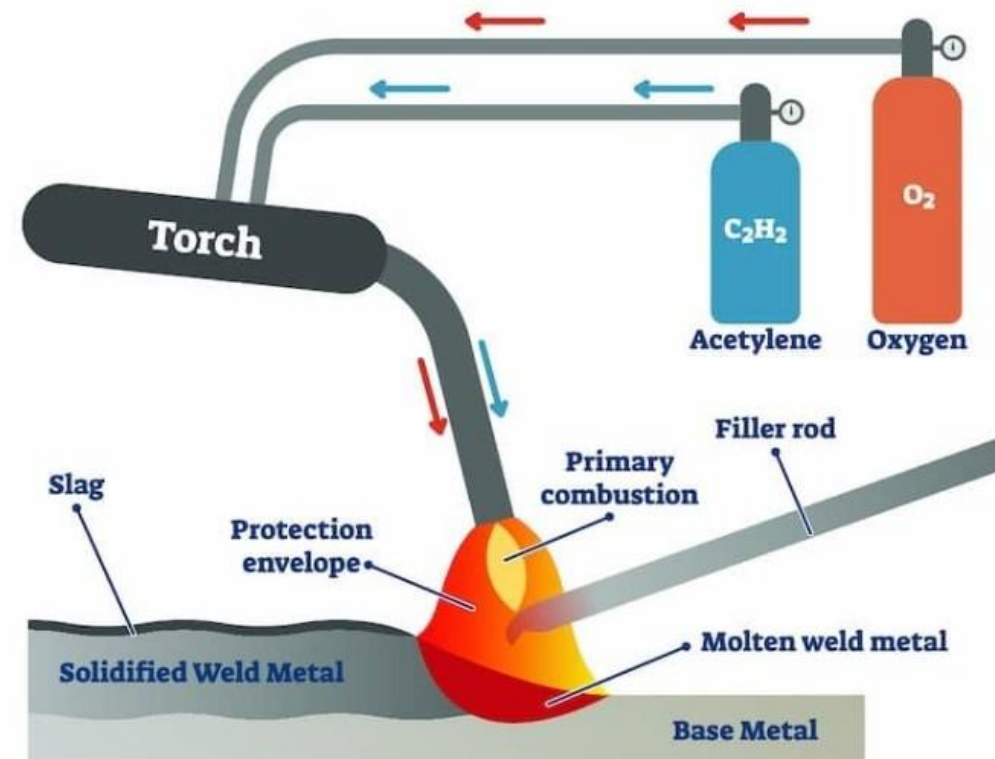
- **Electric Arc Welding**
 - Carbon electrode ឆ្នុបផ្សារដែលមានស្រោបដោយកាបូន (ឆ្នុបមិនរលាយ មិនត្រូវការ inert gas ខែលឡស្ទីន)
 - **Coated electrode (MMA=Manual Metal Arc Welding)** (ឆ្នុបរលាយ ស្រោបដោយលោហៈដូចជាអាលុយមីញ៉ូម, ក្រូម, ទង់ដែង, ស័ង្កសី, សំរិទ្ធ, លង្ហិន, ម៉ង់កាណេស)
 - Non-consumable electrode in an inert gas atmosphere (WIG) (ឆ្នុបមិនរលាយ)
 - Bare electrode in a protective atmosphere (MIG, MAG) (ឆ្នុបផ្សារមិនមានស្រោបអ្វីផ្សេង ពេលផ្សារវានឹងរលាយ)

Welding

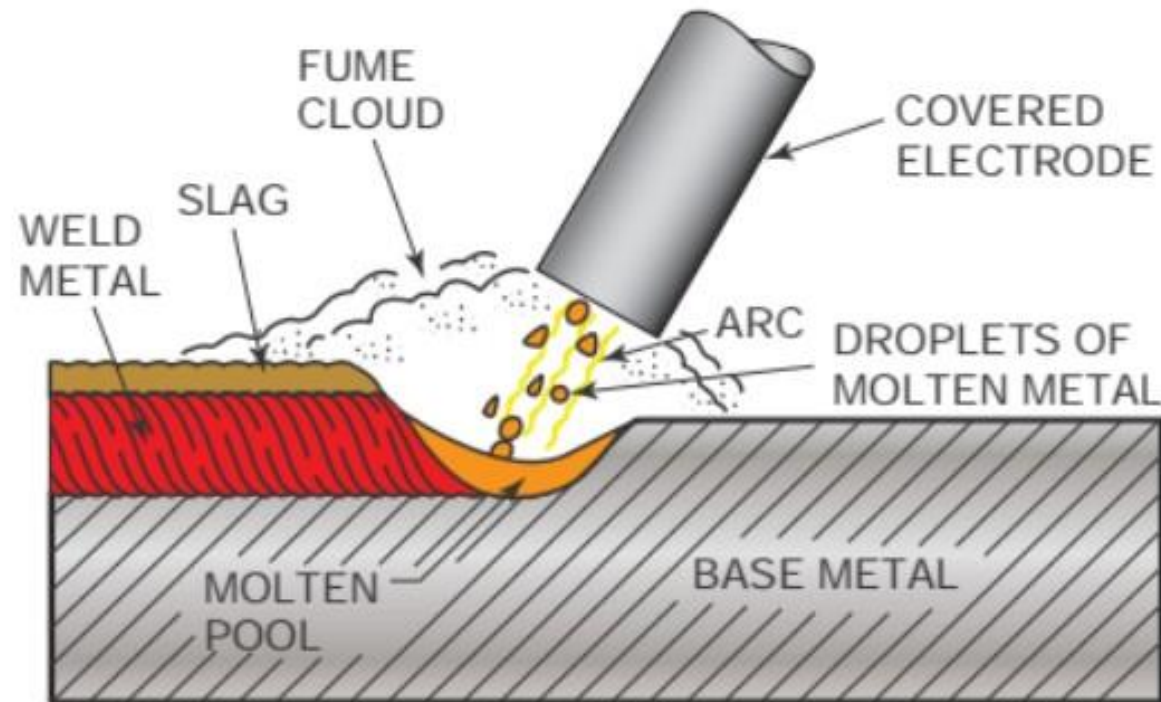
Welding by Heat (Fusion)

- Oxy-fuel welding (OFW)

ផ្សារដោយប្រើចំហេះឧស្ម័ន

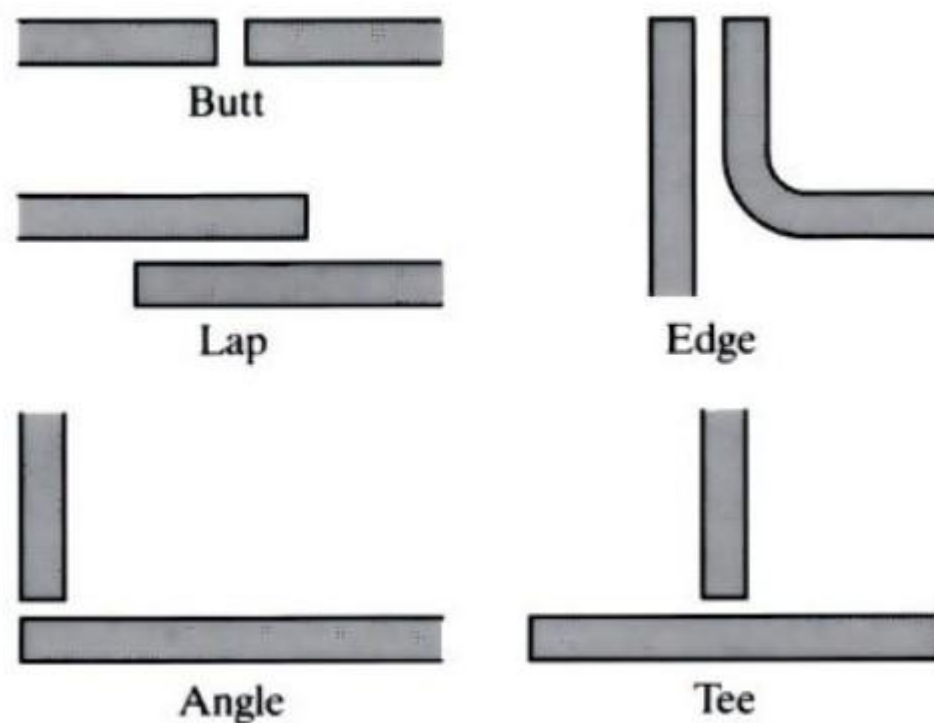


Manual metal arc welding (MMA)

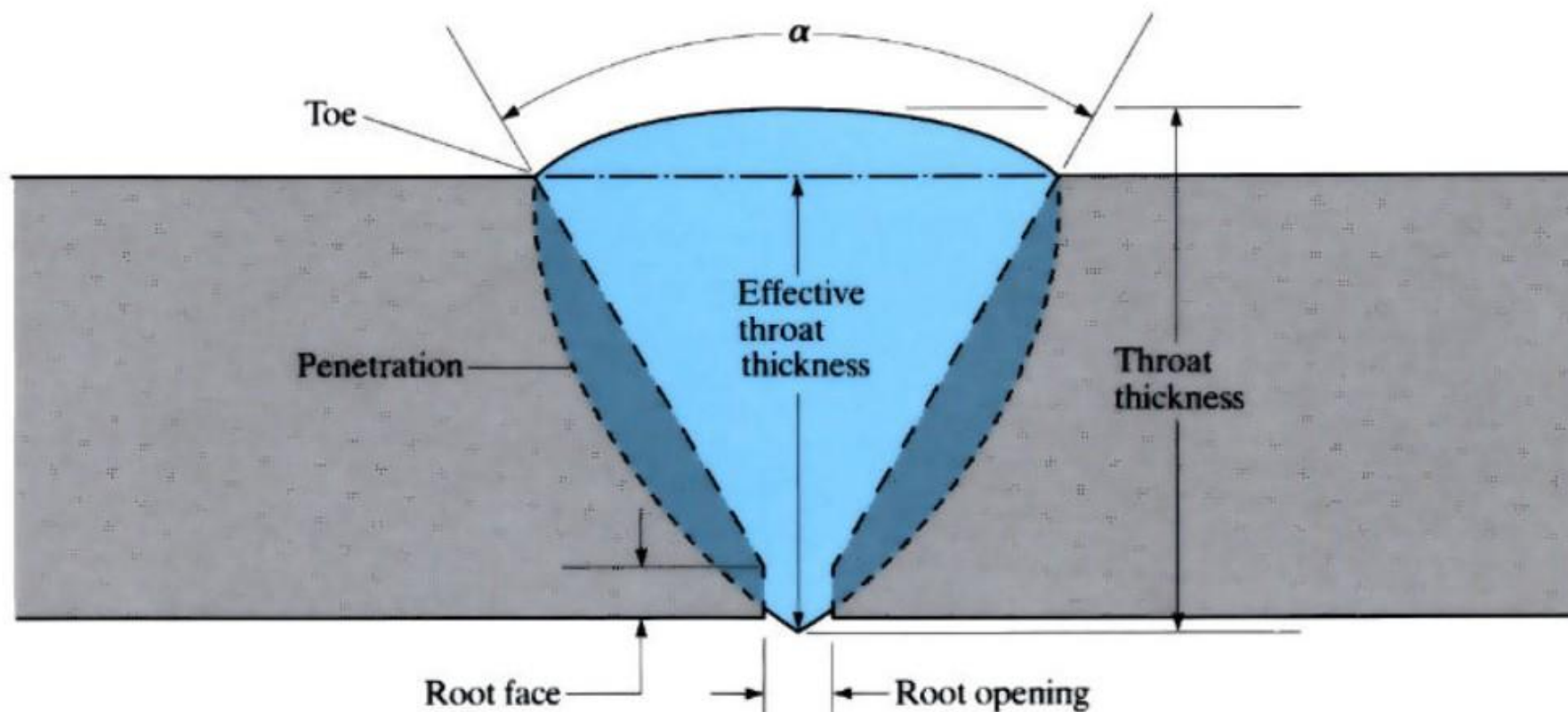


Manual metal arc welding (MMA) ផ្សារដោយអគ្គិសនី

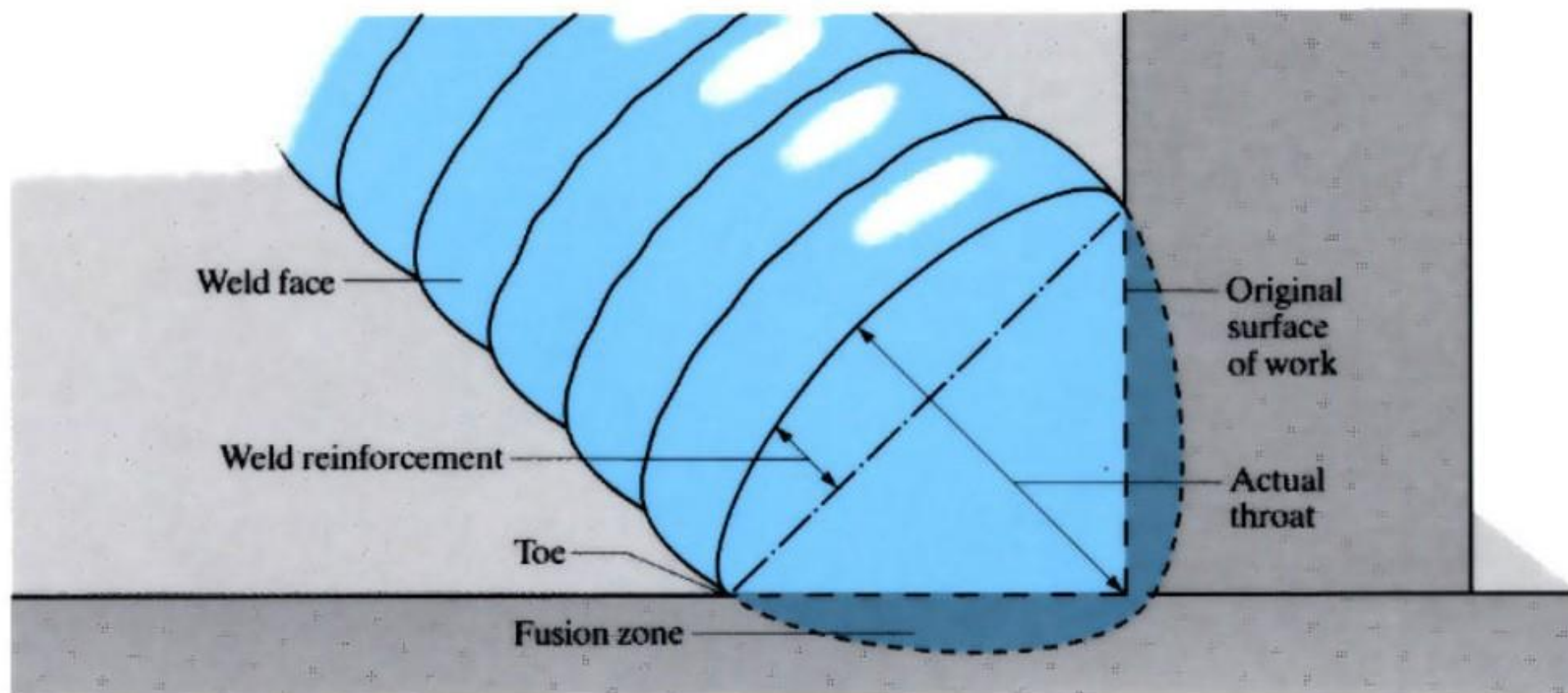
There are five main types of welded joint (តំណផ្សារ): butt, corner (angle), edge, fillet (or tee) and lap joints.



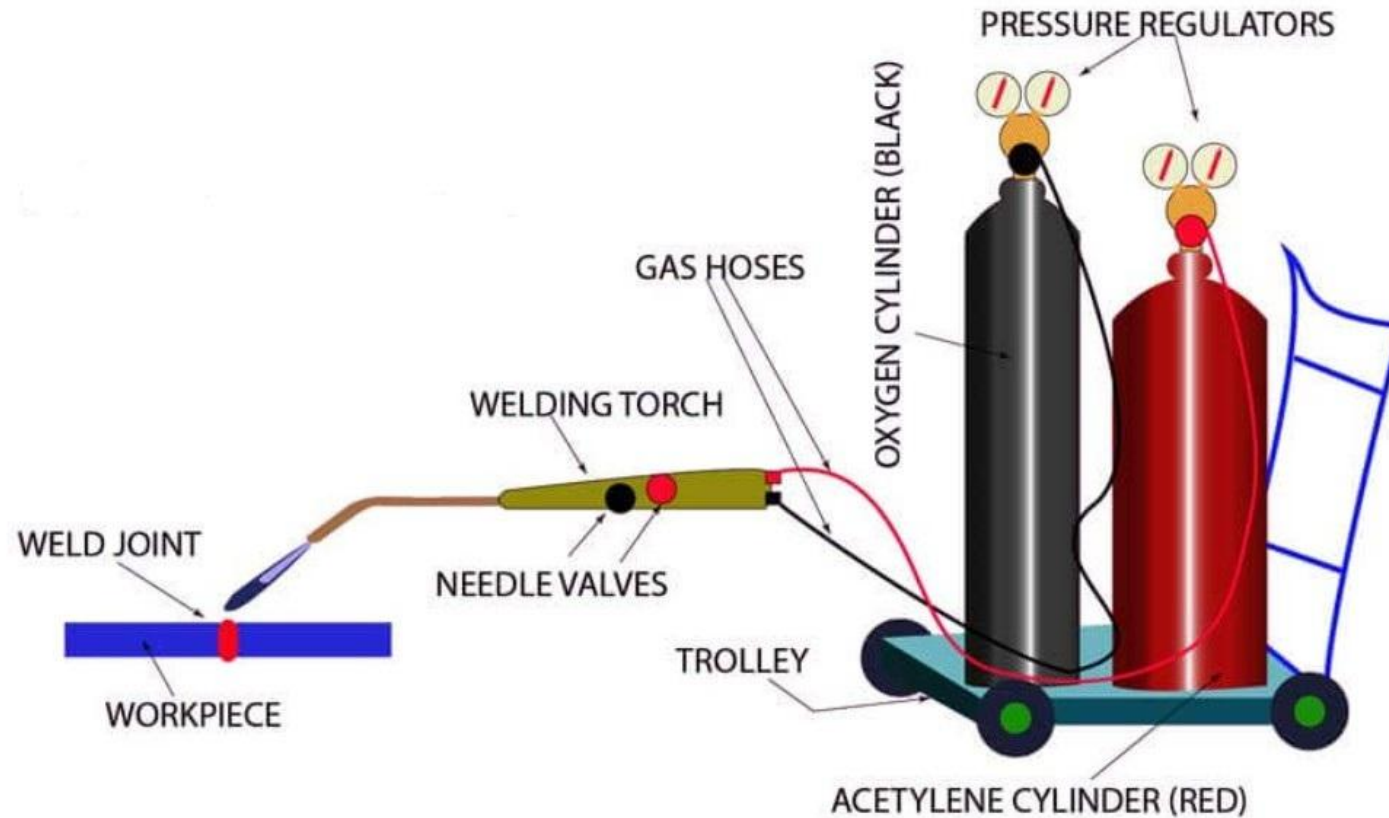
Manual metal arc welding (MMA)



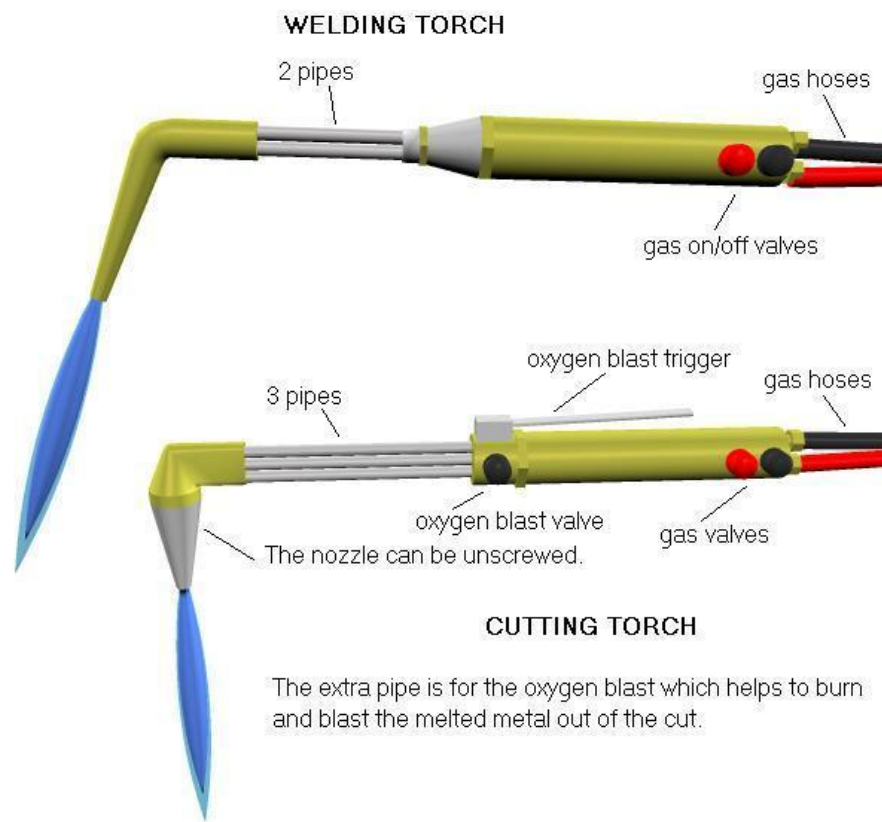
Manual metal arc welding (MMA)



Oxy-fuel welding (OFW)

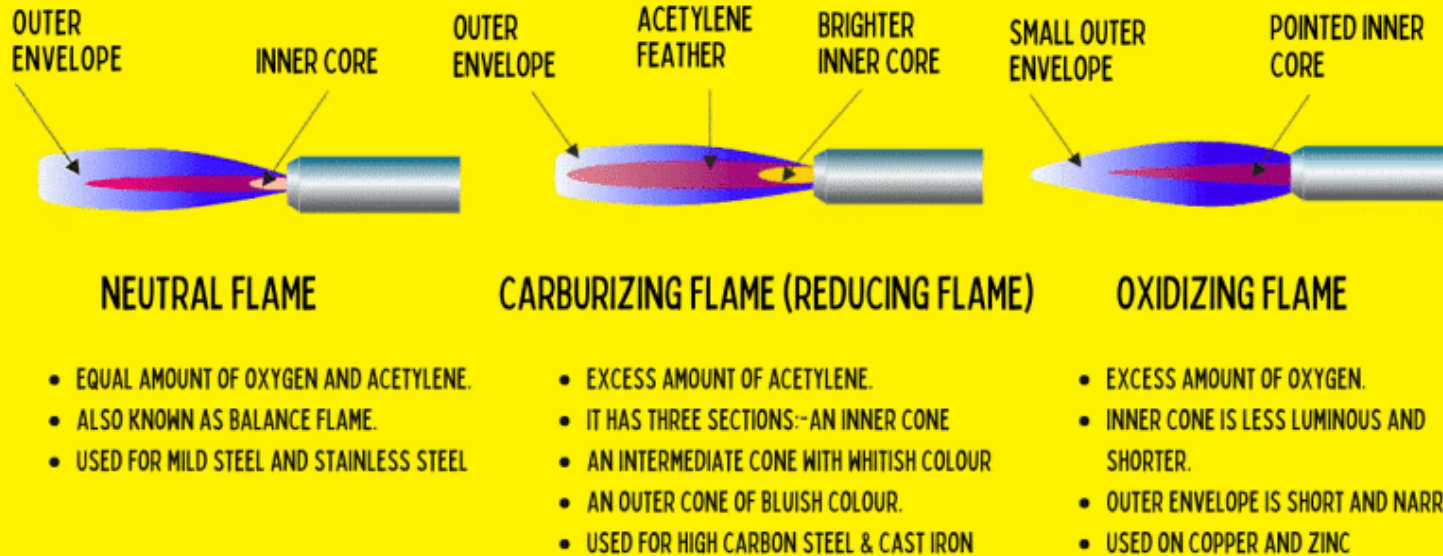


Oxy-fuel welding (OFW)



Oxy-fuel welding (OFW)

TYPES OF WELDING FLAMES



BRAZING

A flame is also used for brazing
ផ្សារទងដែង ជាមួយអ៊ីណុក



BRAZING

What do we need for brazing?

- the material to be brazing យើងចង់យកអ្វីមកផ្សារតភ្ជាប់គ្នាដែរ?
- a heat source
- solder (brass): ផ្សាររបស់ស្រោលៗ រលាយនៅកំដៅក្រោម ៨៥០c
- flux

