Federation of Myanmar Engineering Society

Welding is a Special Process

AGM 2022, Fed.MES

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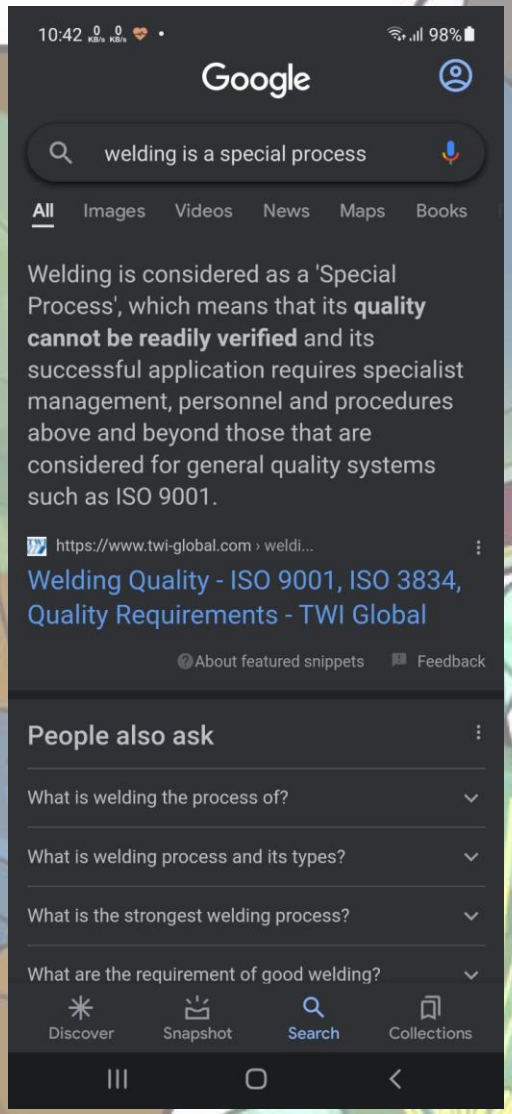
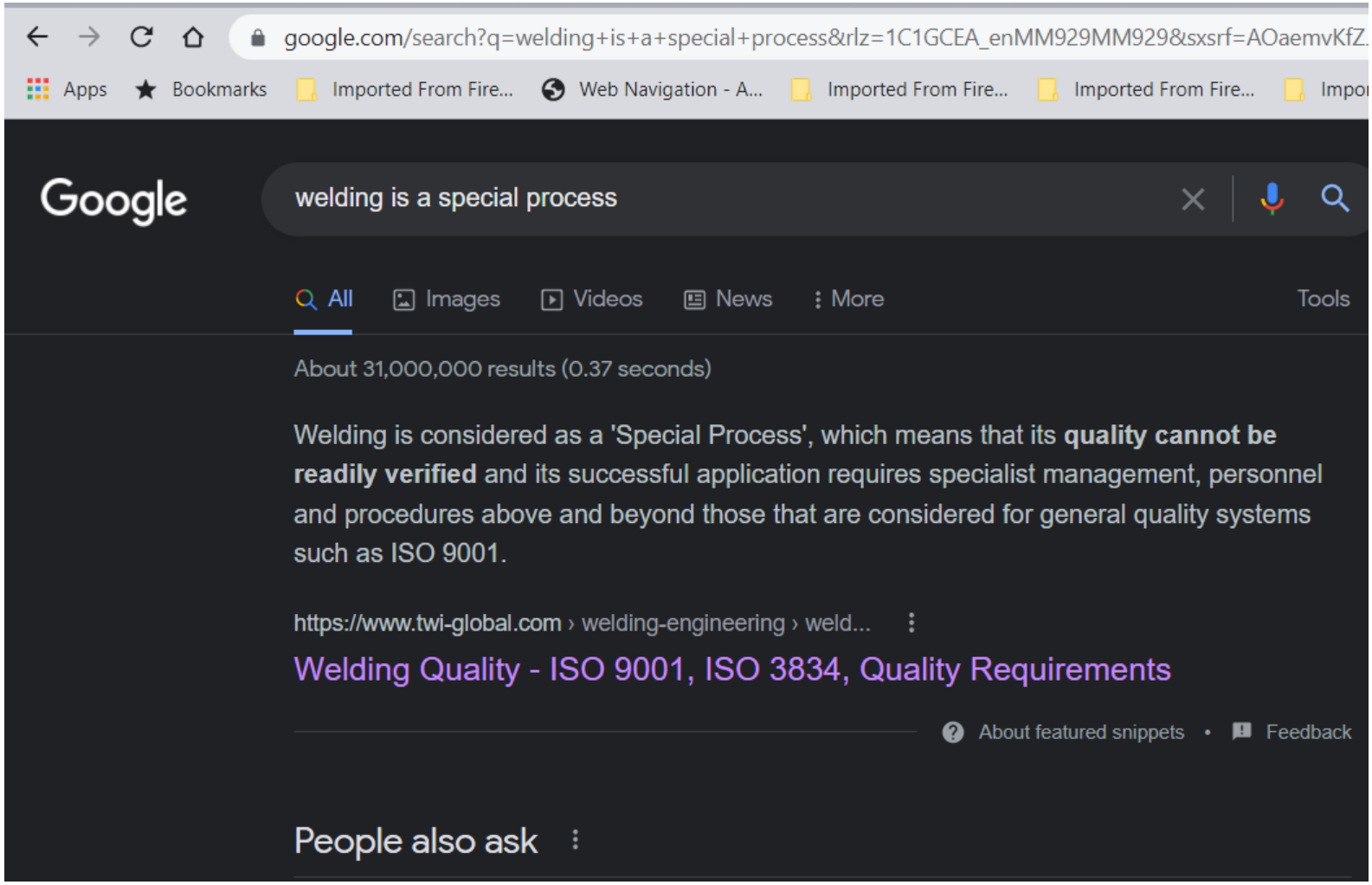
Presenter:

U Naing Thiha Soe

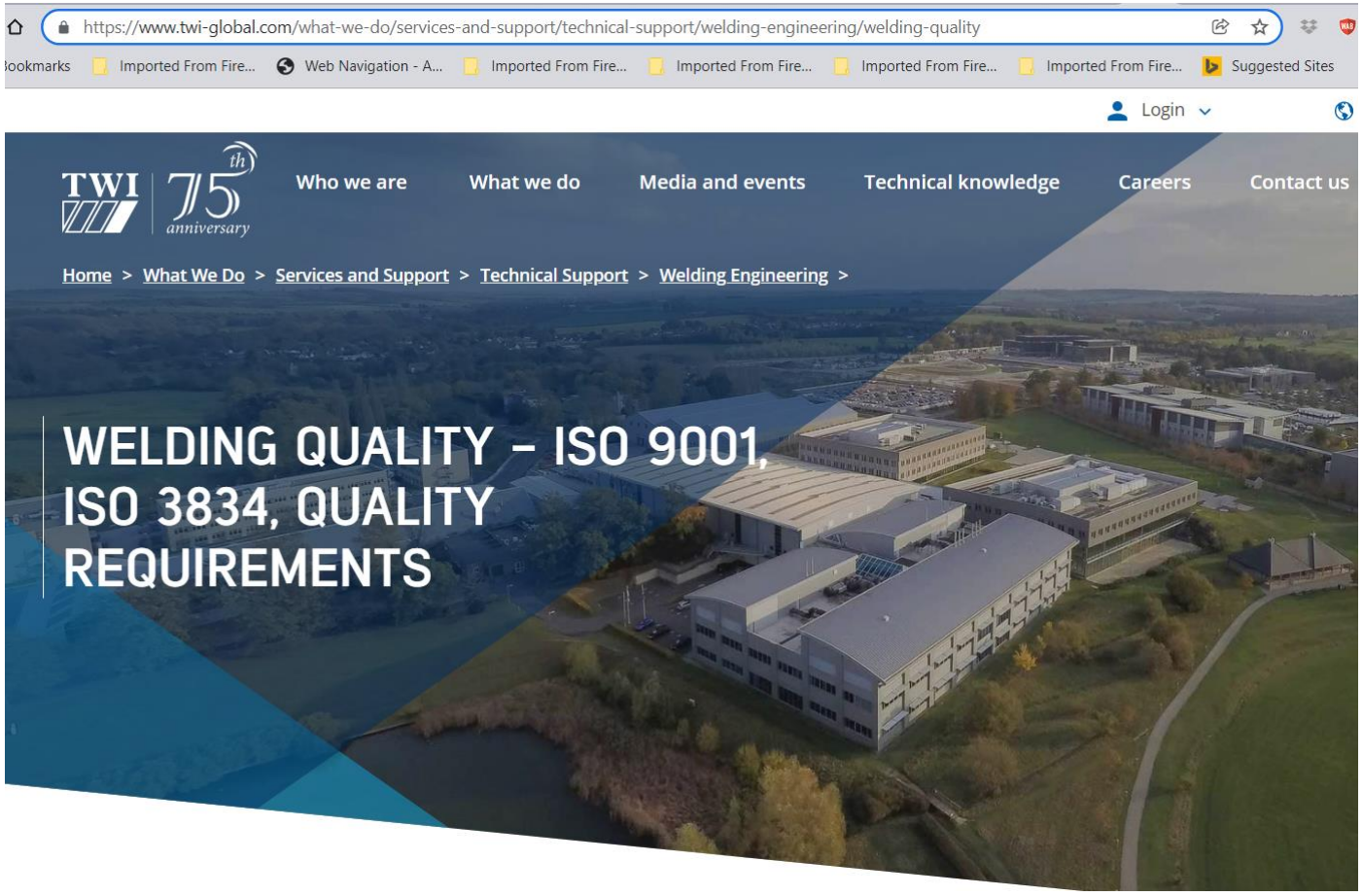
Welding is a Special Process



Welding is a Special Process



The Welding Institute (TWI)

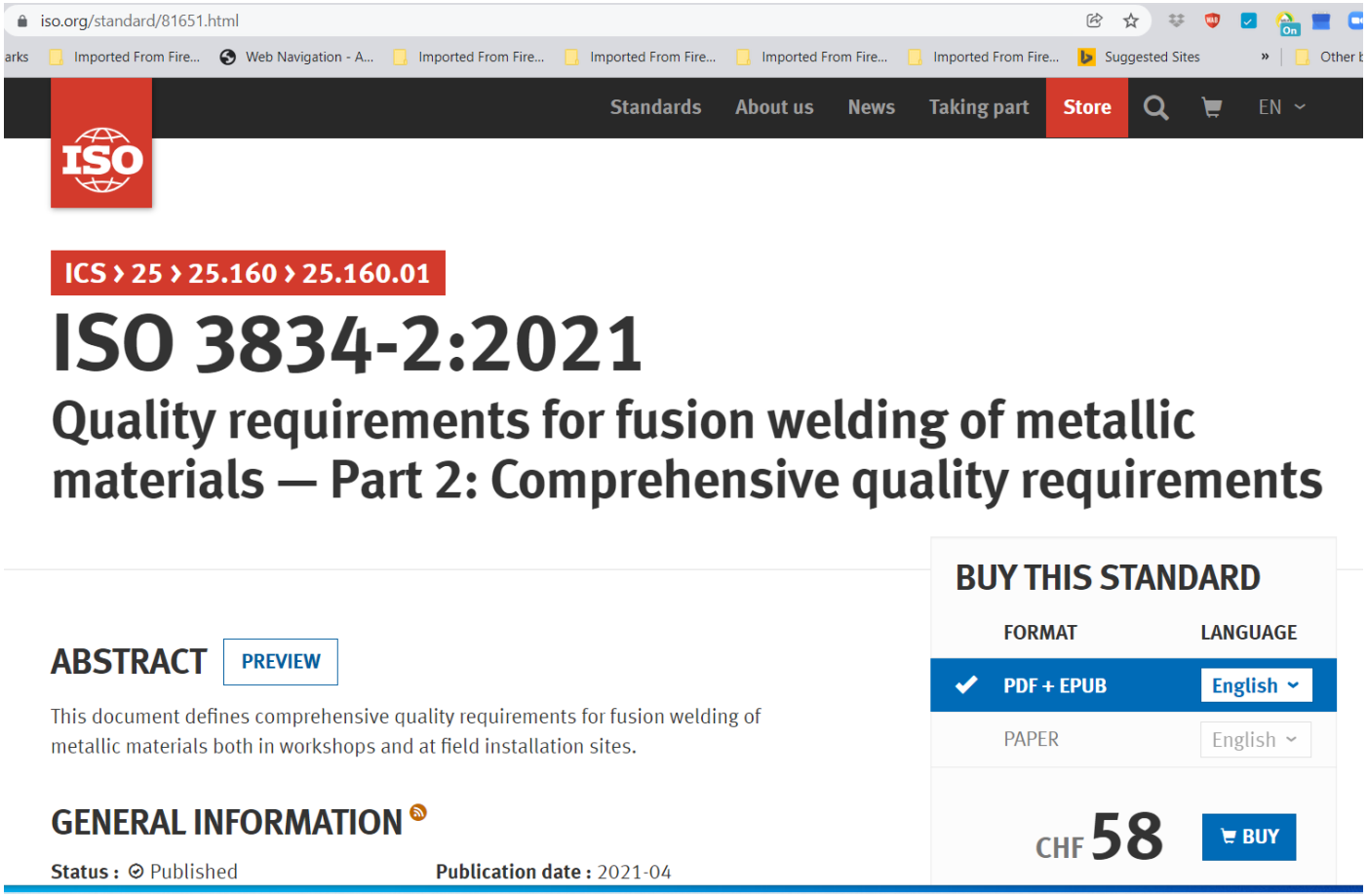


The Welding Institute (TWI)

- **Welding is considered as a 'Special Process', which means that its quality cannot be readily verified and its successful application requires specialist management, personnel and procedures above and beyond those that are considered for general quality systems such as ISO 9001. These requirements have led to a number of developments, notably the publication of ISO 3834; 'Quality requirements for fusion welding of metallic materials' (www.iso3834.org).**

- (https://www.twi-global.com/what-we-do/services-and-support/technical-support/welding-engineering/welding-quality)

ISO 3834-2 (Weld Quality Requirement)



ဂဟေဆိုတာ ....?

en.wikipedia.org/wiki/Welding

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Welding

From Wikipedia, the free encyclopedia

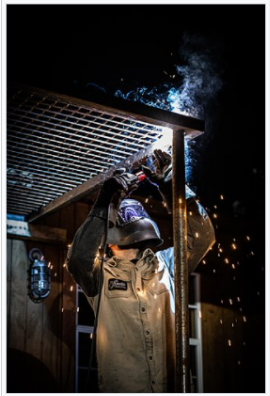
"Welded" redirects here. Not to be confused with Welded (play).

Welding is a fabrication process that joins materials, usually metals or thermoplastics, by using high heat to melt the parts together and allowing them to cool, causing fusion. Welding is distinct from lower temperature metal-joining techniques such as brazing and soldering, which do not melt the base metal.

In addition to melting the base metal, a filler material is typically added to the joint to form a pool of molten material (the weld pool) that cools to form a joint that, based on weld configuration (butt, full penetration, fillet, etc.), can be stronger than the base material (parent metal). Pressure may also be used in conjunction with heat or by itself to produce a weld. Welding also requires a form of shield to protect the filler metals or melted metals from being contaminated or oxidized.

Many different energy sources can be used for welding, including a gas flame (chemical), an electric arc (electrical), a laser, an electron beam, friction, and ultrasound. While often an industrial process, welding may be performed in many different environments, including in open air, under water, and in outer space. Welding is a hazardous undertaking and precautions are required to avoid burns, electric shock, vision damage, inhalation of poisonous gases and fumes, and exposure to intense ultraviolet radiation.

Until the end of the 19th century, the only welding process was forge welding, which blacksmiths had used for millennia to join iron and steel by heating and hammering. Arc welding and oxy-fuel welding were among the first processes to develop late in the century, and electric resistance welding followed soon after. Welding technology advanced quickly during the early 20th century as world wars drove the demand for reliable and inexpensive joining methods. Following the wars, several modern welding techniques were developed, including manual methods like shielded metal arc welding, now one of the most popular welding methods, as well as semi-automatic and automatic processes such as gas metal arc welding, submerged arc welding, flux-cored arc welding and electroslag welding. Developments continued with the invention of laser beam welding, electron beam welding, magnetic pulse welding, and friction stir welding in the latter half of the century. Today, as the science continues to advance, robot welding is commonplace in industrial settings, and researchers continue to develop new welding methods and gain greater understanding of weld quality.



Overhead stick welding.

Contents [hide]

1 Etymology

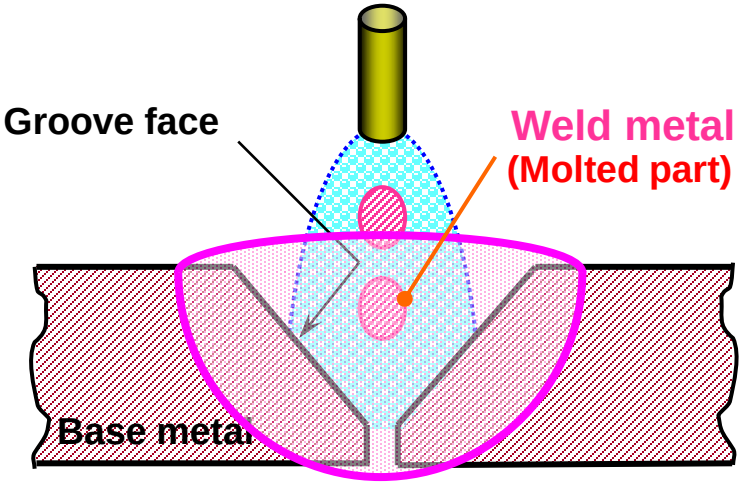
Welding is a fabrication process that joins materials, usually metals or thermoplastics, by using high heat to melt the parts together and allowing them to cool causing fusion.

Classification of joining methods of metals

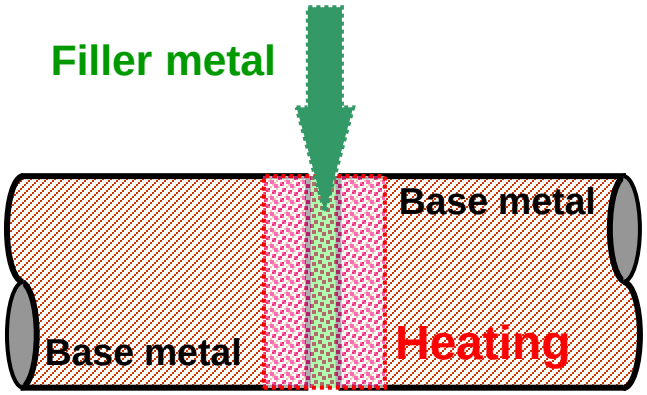
Joining method \ Energy source		Electrical energy	Chemical reaction energy	Mechanical energy	Optical energy
Mechanical joining				Riveting, Bolting, Folding	
Chemical joining			Adhesive bonding		
Welding	Fusion welding	Arc welding, Electro-slag welding, Electron beam welding	Gas welding, Aluminothermic welding		Laser welding
	Pressure welding	Resistance welding, Upset welding, Flash welding	Explosion welding	Cold pressure welding, Friction welding, Friction Stir welding, Ultrasonic welding, Diffusion welding	
	Brazing/ Soldering	Soldering, Induction brazing	Flame brazing		Laser brazing

ဂဟေဆက်ပေါင်းစည်းမှု(၃)မျိုး

(a) Fusion welding
အရည်ပျော်ပေါင်းစည်းခြင်း

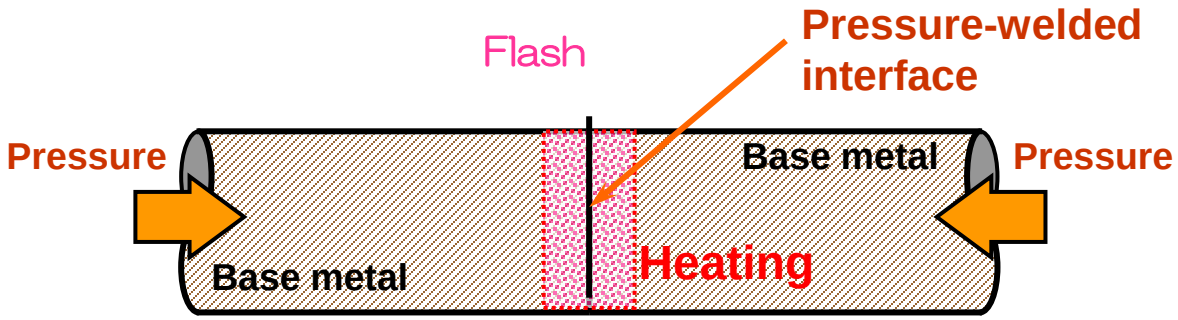


(c) Brazing (ကြေးဂဟေ)



Melting point: filler metal < base metal

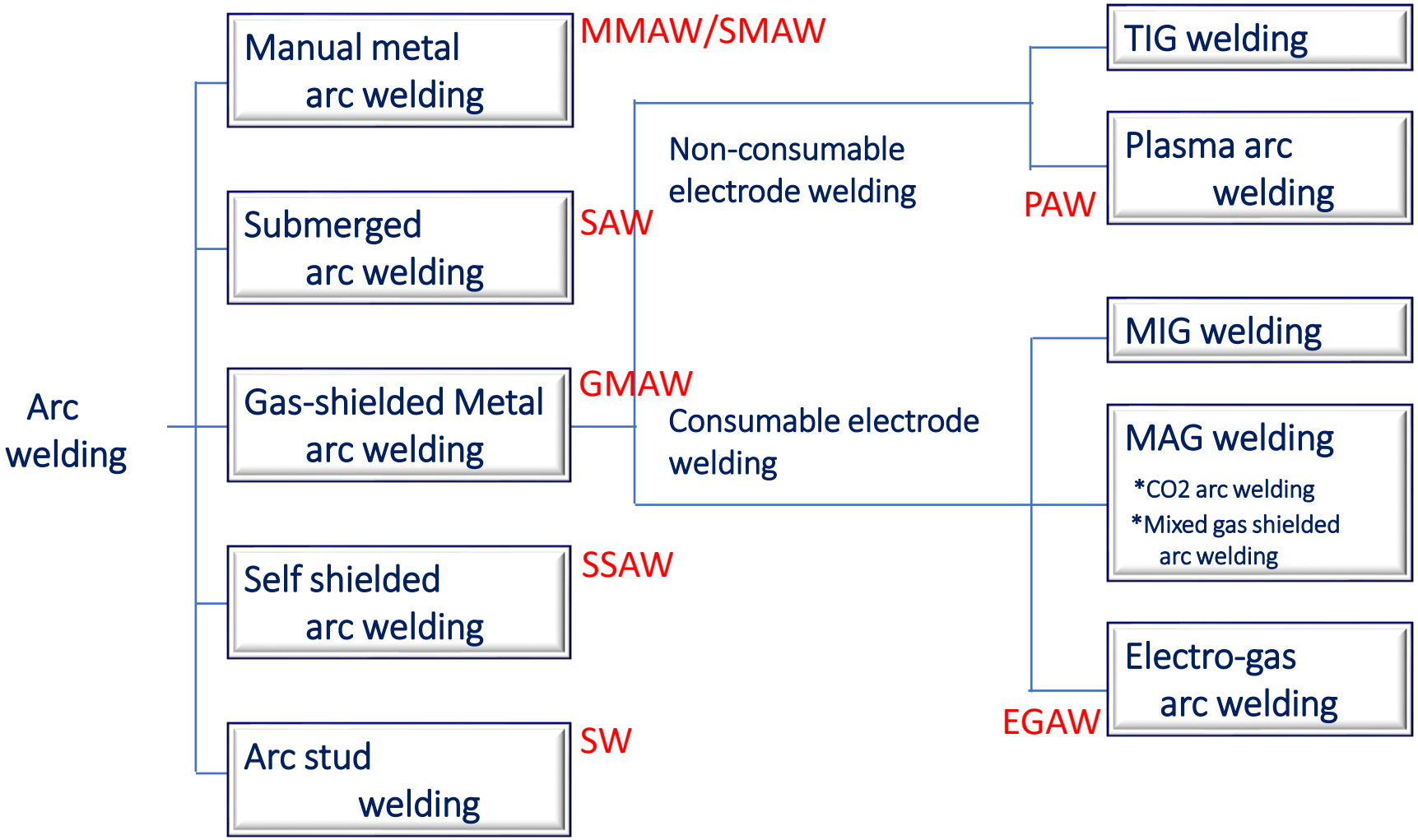
Brazing: filler temp>450°C
Soldering: temp<450°C



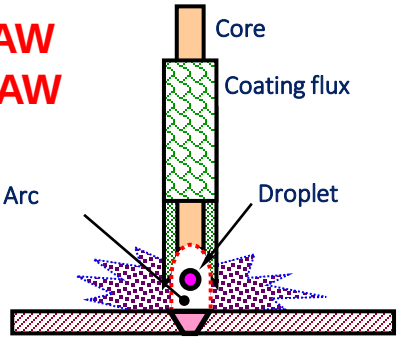
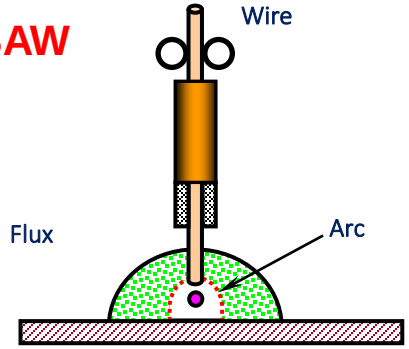
(b) Pressure welding
အပူနှင့်ဖိအားသုံးပေါင်းစည်းခြင်း

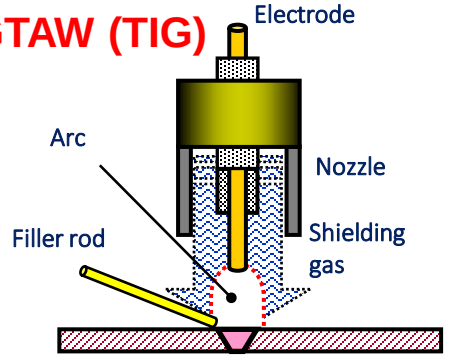
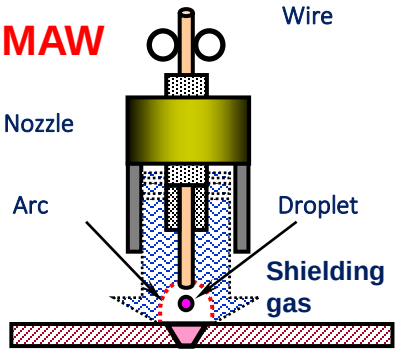
Ref: AWE Lecture Note ppt

ARC WELDING အမျိုးအစားများ



အသုံးများတဲ့ဂဟေဆွဲနည်းအချို့

Process	Electrode	Shielding
SMAW MMAW 	Consumable (Covered electrode)	Flux
		
SAW 	Consumable (Solid wire)	Flux

Process	Electrode	Shielding
GTAW (TIG) 	Non-Consumable (Tungsten electrode)	Gas
		
GMAW 	Consumable (Solid wire) (Flux cored wire)	Gas
MAG		MIG

Ref: AWE Lecture Note ppt

Welding by MMAW Process

Welding by GMAW Process (MAG)

Welding of TIG Process

ဂဟေဆက်ခြင်းလုပ်ငန်းတစ်ခုဖြစ်မြောက်ဖို့...

1) ဂဟေဆက်မည့်သူ (welder)
2) ဂဟေစက်နှင့်ဆက်စပ်ပစ္စည်းများ (welding equipment & accessories...)
3) ဂဟေဆက်ပေးရမည့်ပစ္စည်း (parent material)
4) ဂဟေဆက်ရာမှာအသုံးပြုမည့် ဂဟေချောင်း/ဂဟေဝါယာ
5) ဂဟေခေါင်းဆောင် Welding Leader/In-charge
6) ဂဟေဆွဲနည်းစဉ် Welding Procedure Specification (WPS)
7) ဂဟေစစ်ဆေးရေး Welding Inspection Personal
8) ဂဟေအင်ဂျင်နီယာ Welding Engineer

ဂဟေဆွဲနေစဉ် အရေးကြီး (၅)ချက်

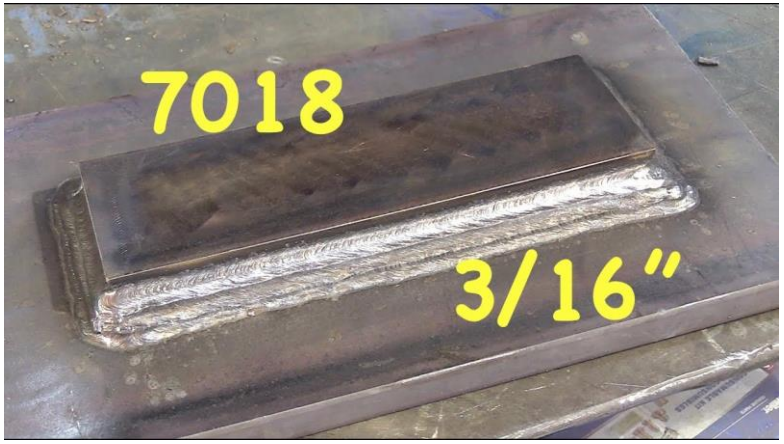
1) ဂဟေချောင်းအရွယ်အစားမှန်ကန်မှု (2.6 , 3.2, 4.0 ??? , 0.8, 1.2, 1.4, 1.6???)
2) မီးအားပမာဏ (Amp 60 ~ 250 ???)
3) လျှပ်ပန်းအကွာအဝေးနှင့် ဗို့အား (Arc Length & Voltage)
4) ဂဟေဆွဲနှုန်း (Travel Speed, 150 Mm/ Minute…)
5) ဂဟေချောင်းအစောင်းဒီဂရီ (Push, Pull, Incline???)

• (WPS အတိုင်းလိုက်နာဆောင်ရွက်ရန်လို)

ကောင်းမွန်တဲ့ ဂဟေသားဆိုတာ...

1) ဂဟေသားတလျောက်လုံးညီညာပြေပြစ်မှုရှိ
2) အက်ကွဲရာမရှိရ
3) ဂဟေသားဘေးတလျောက်မီးစားရာမြောင်းမရှိရ
4) ဂဟေသားမျက်နှာပြင်နှင့်အတွင်းမှာ လေခိုပေါက်/ချော်များမပါရ
5) သတ်မှတ်ဂဟေသားအရွယ်အစားအောက်ကို မလျော့နည်းရ
6) ဂဟေသားအဆုံးနေရာတွေမှာ ချိုင့်ခွက်ဖြစ်မနေရ
7) ဂဟေသားနှင့်ဂဟေဆက်ပစ္စည်းပေါင်းစည်းမှုကောင်း
8) ဂဟေဆက်ပစ္စည်းအတွင်းသို့ ထိုးဖောက်ဝင်ရောက်ပေါင်းစည်းမှုကောင်း

ပုံမှန်ကောင်းမွန်တဲ့ဂဟေသားအချို့နမူနာ



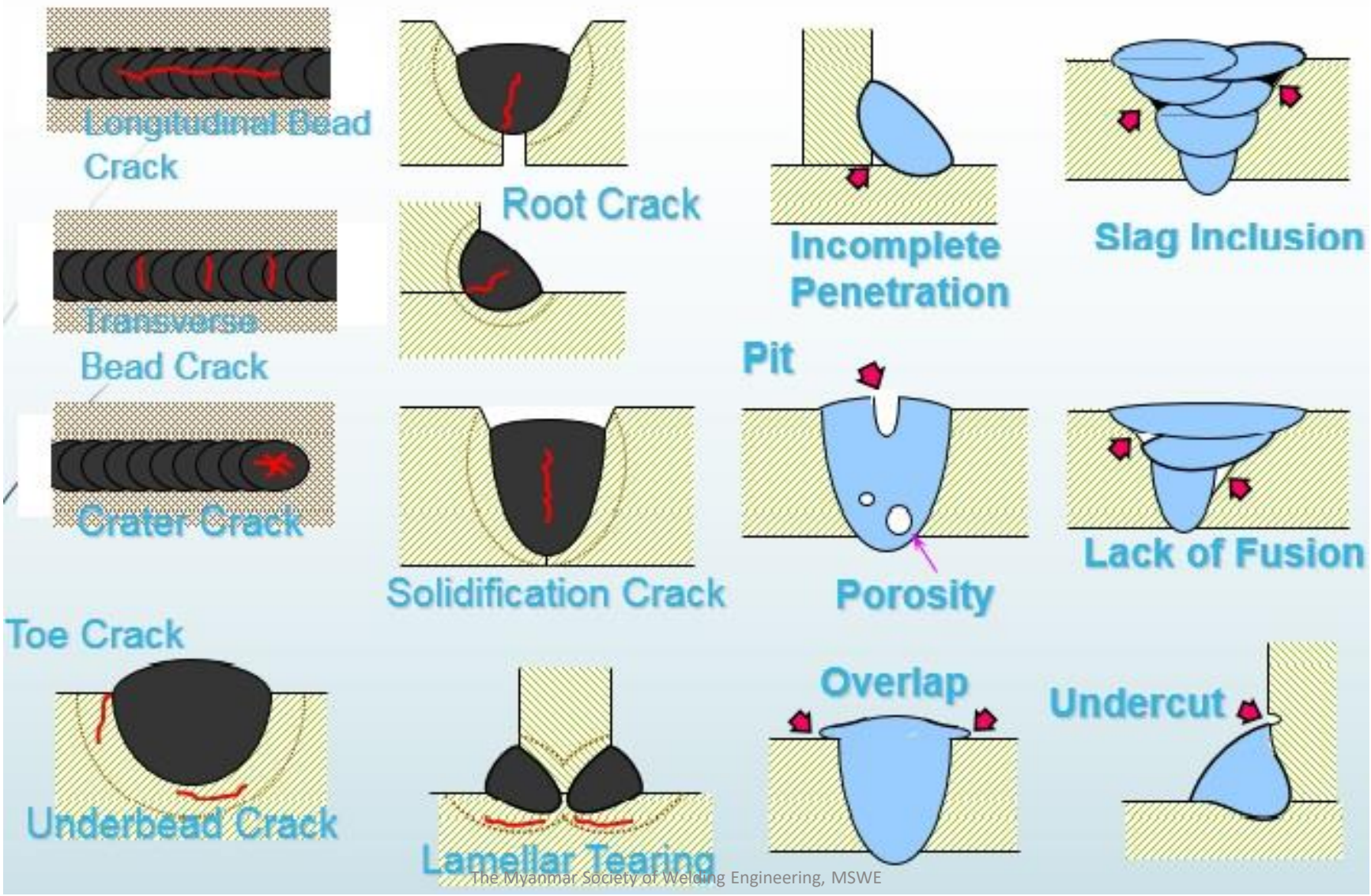
ကောင်းမွန်ခြင်းမရှိတဲ့ဂဟေသားအချို့နမူနာ

ကောင်းတဲ့ဂဟေနဲ့ ညံ့တဲ့ဂဟေ

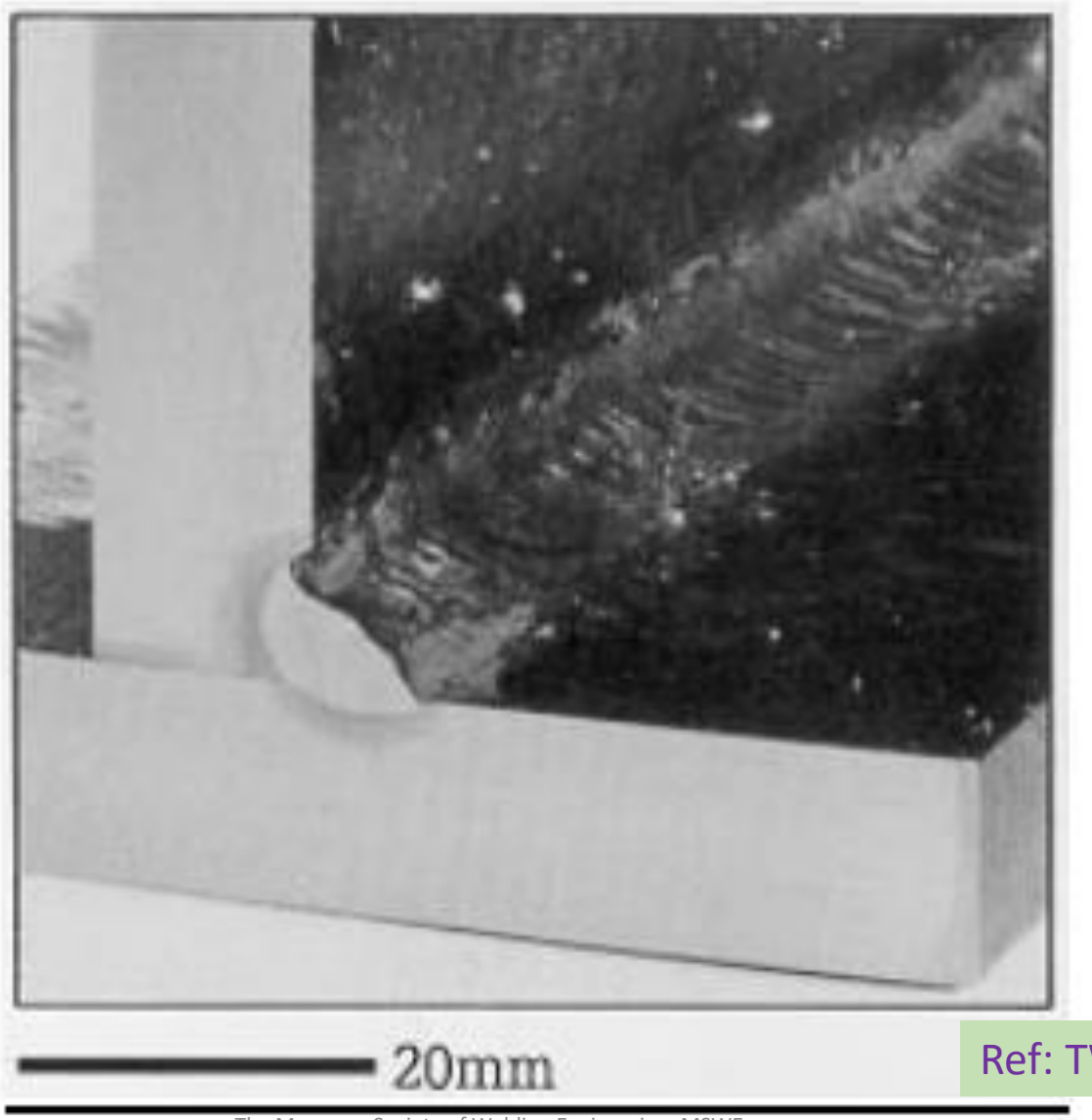
ဖြစ်လေ့ရှိသောဂဟေ ပြစ်ချက်များ

1) မီးစားခြင်း (Undercut)
2) သံရည်စက်များစင်ထွက်ခြင်း (Spatter)
3) အက်ကွဲခြင်း (Crack)
4) လေခိုပေါက် (Blow Hole, Pit, Porosity)
5) သံရည်သားတွဲကျ/တင်/ထပ်နေခြင်း (Overlap)
6) ဂဟေသားညီညာပြေပြစ်မှုမရှိခြင်း (Unevenness)
7) ဂဟေသားမို့မောက်လွန်းခြင်း (Excessive weld bead)
8) ချော်ဝတ်ခြင်း (Slag Inclusion)
9) အရည်ပျော်ပေါင်းစည်းမှုအားနည်းခြင်း (Lack Of Fusion)
10) ထိုးဖေါက်ဝင်ရောက်မှုအားနည်းခြင်း (Lack Of Penetration)
11) မီးတို့စမ်းခြင်း/မီးခေါ်ခြင်း (Arc Strike)

Typical Weld Defects

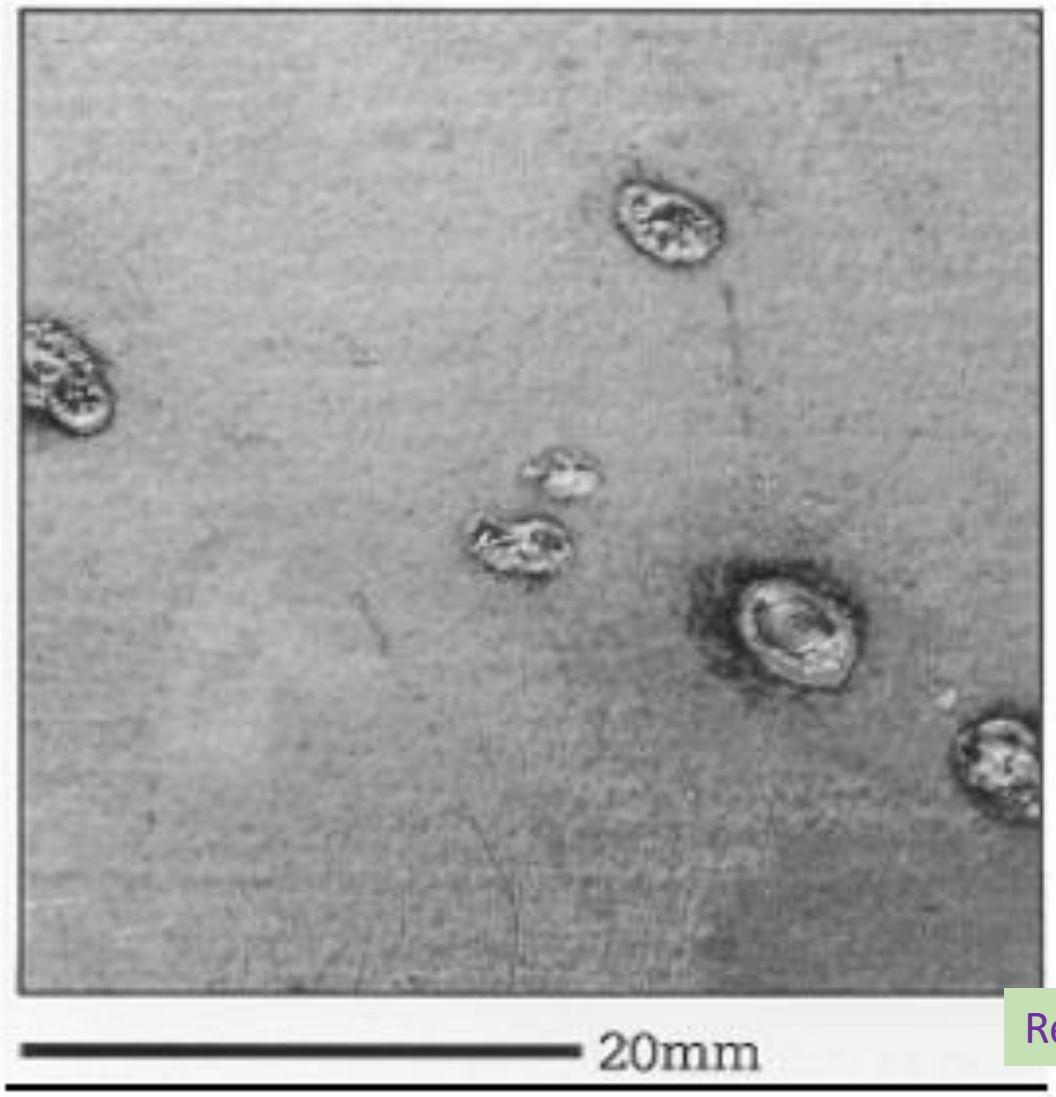


မီးစားခြင်း (Undercut)



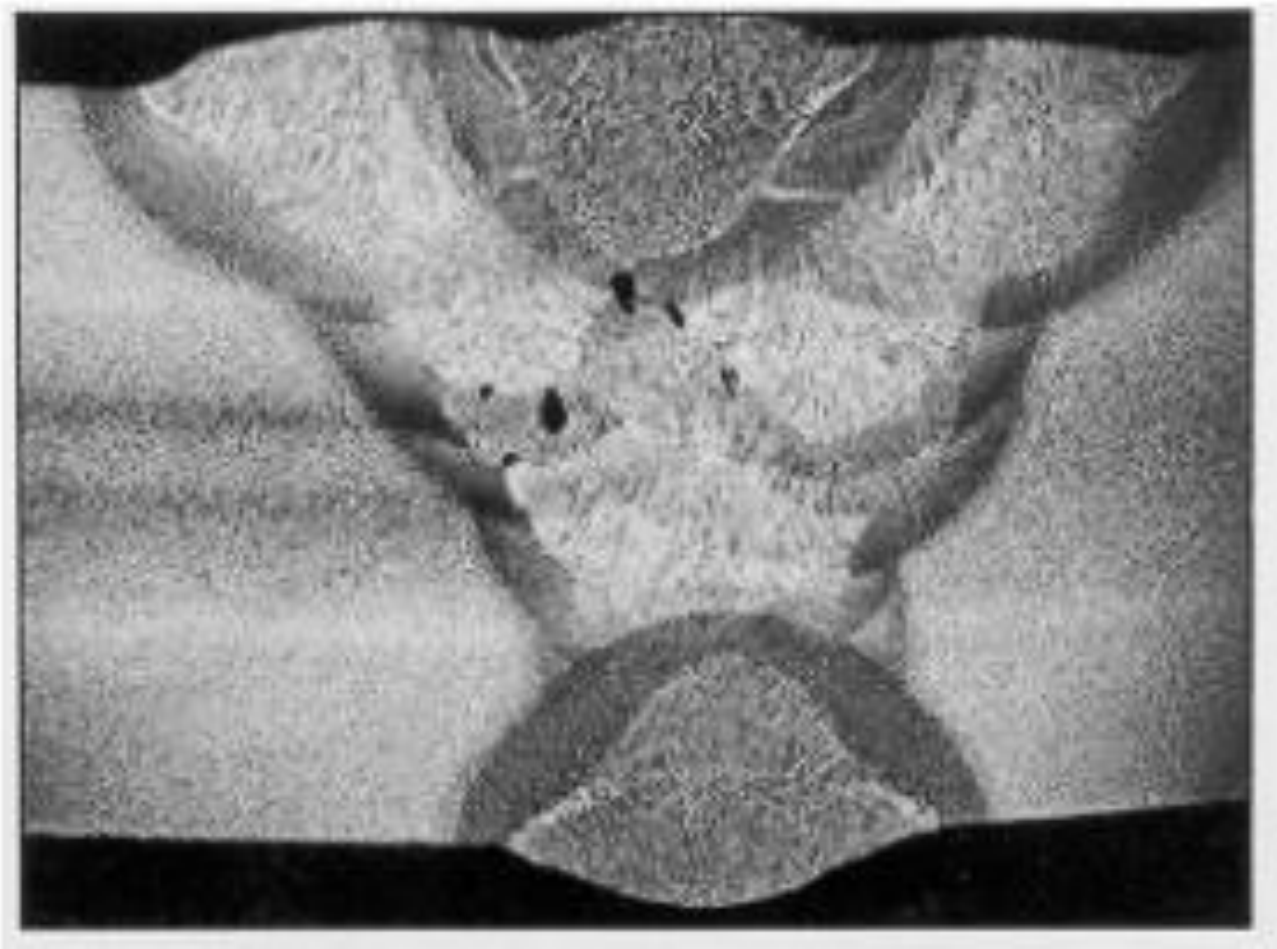
Ref: TWI WIS5 Book

မီးခေါ်ရာ/ မီးတို့ရာ (Arc Strike)



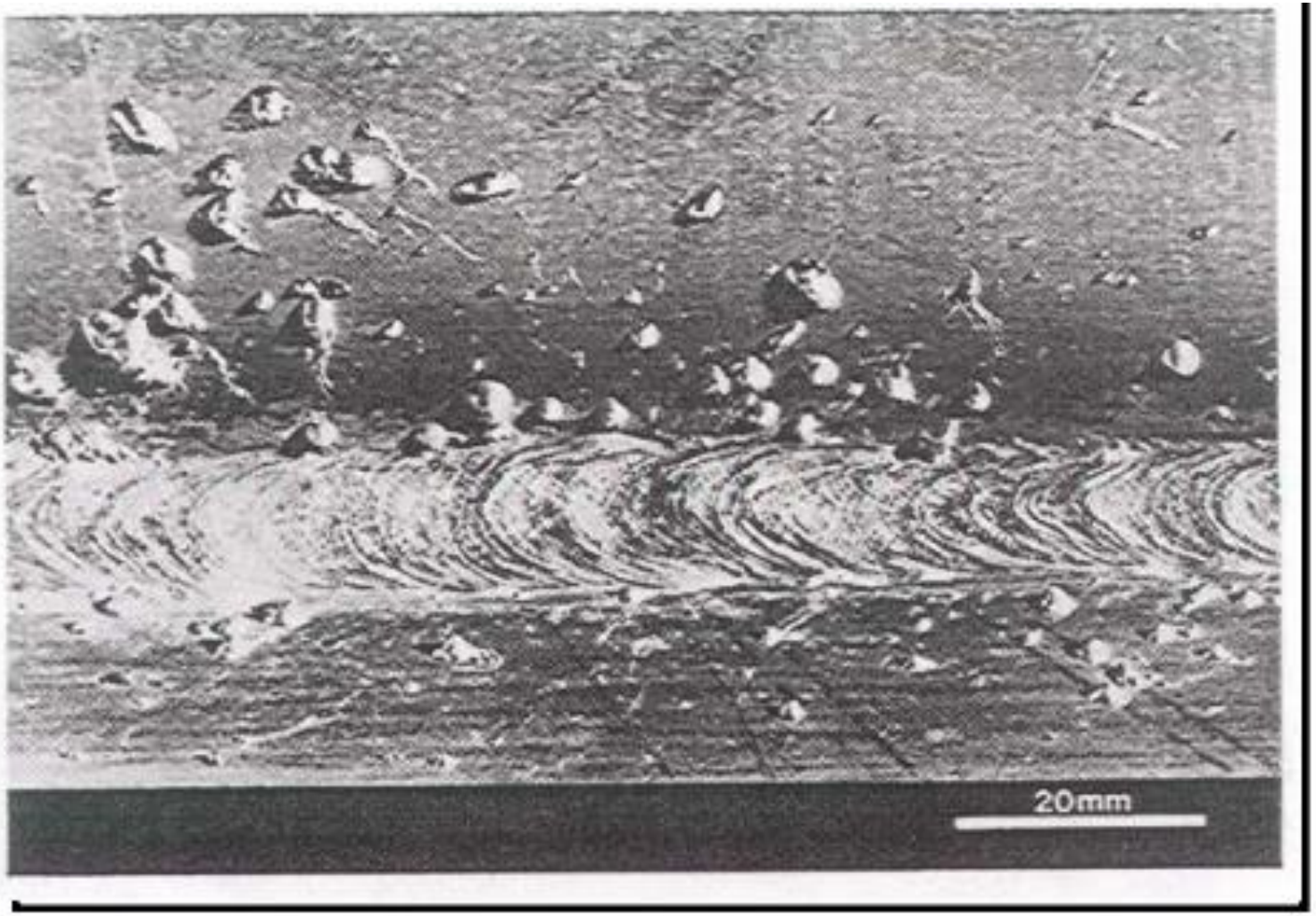
Ref: TWI WIS5 Book

လေခိုခြင်း (Porosity)



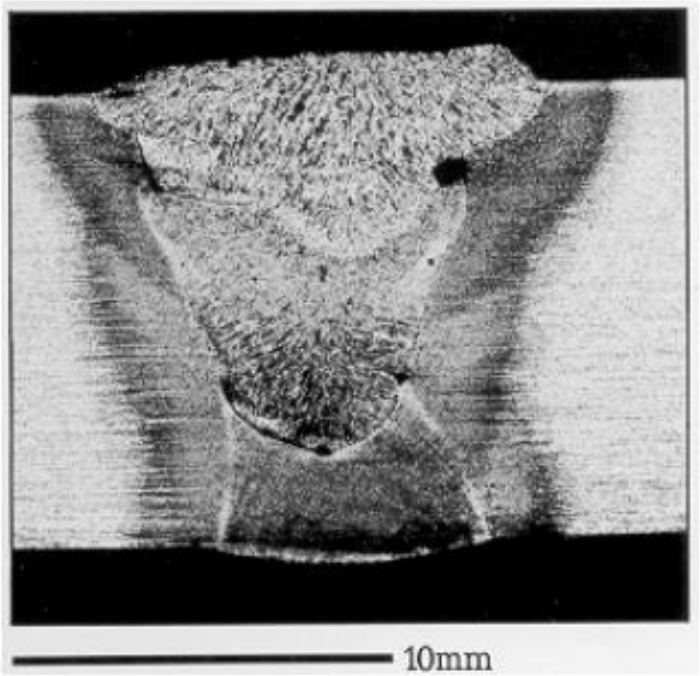
Ref: TWI WIS5 Book

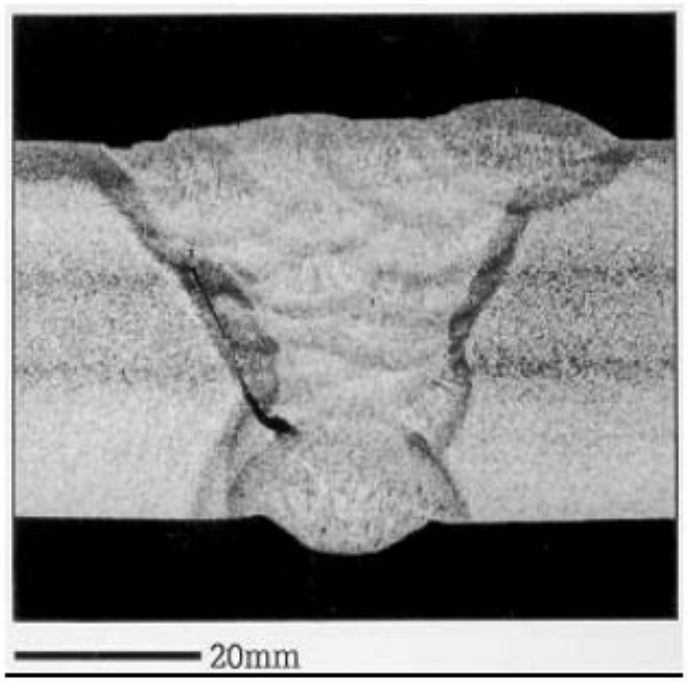
သံရည်စက်များစင်ထွက်ခြင်း (Spatter)

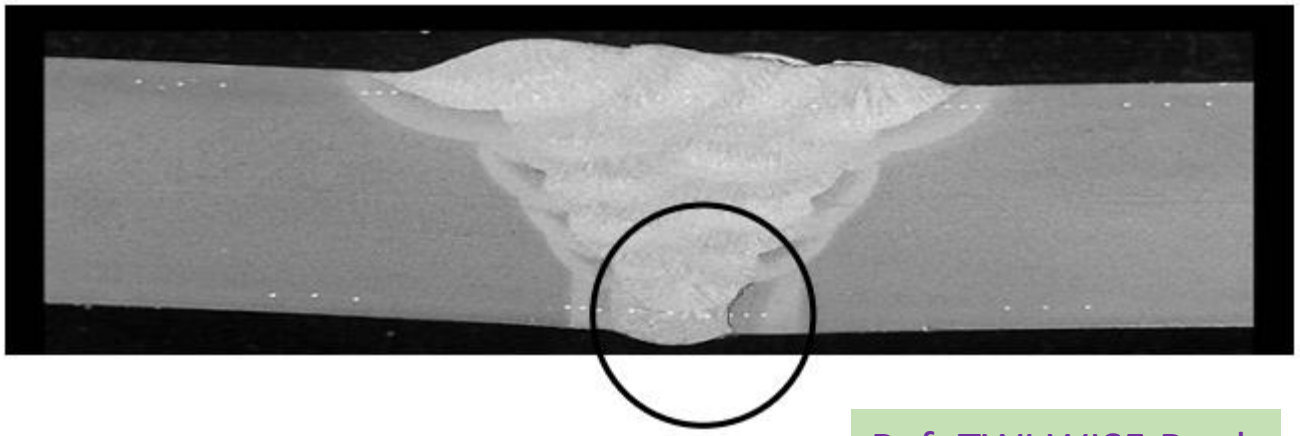


Ref: TWI WIS5 Book

အရည်ပျော်ပေါင်းစည်းမှုအားနည်း (lack of fusion)

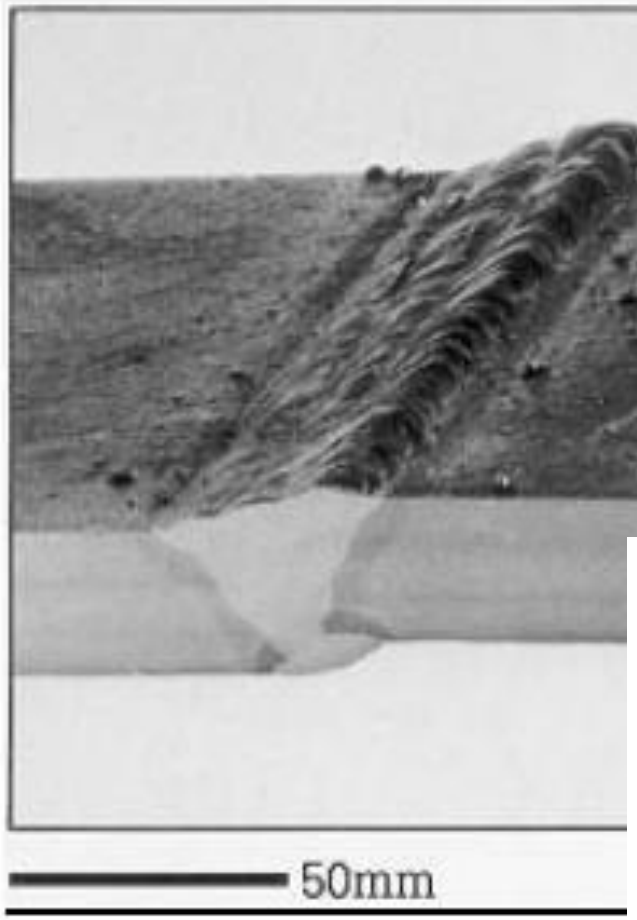


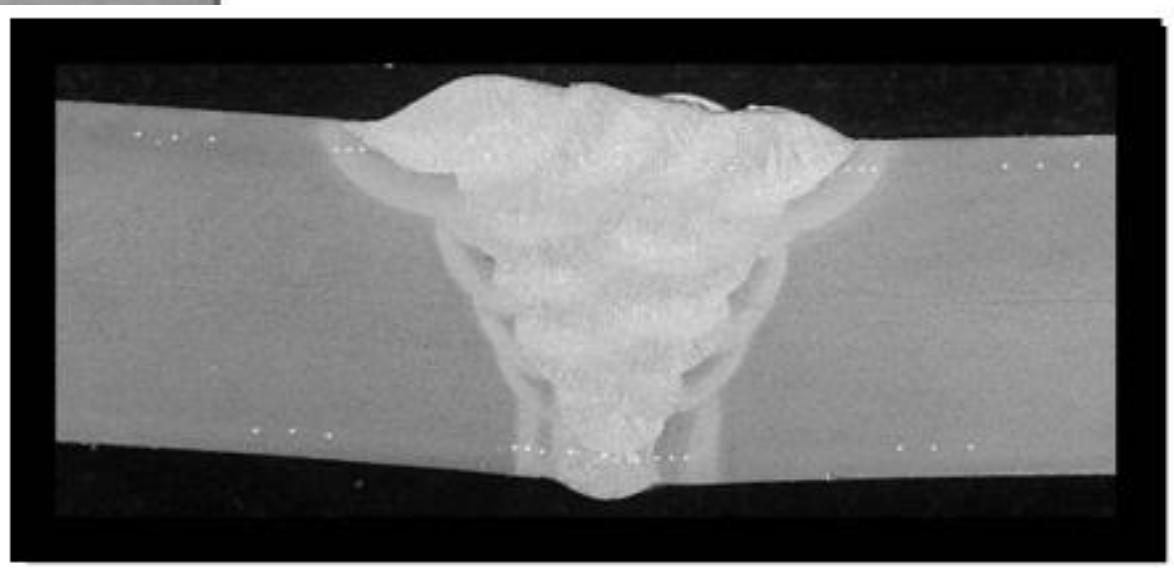




Ref: TWI WIS5 Book

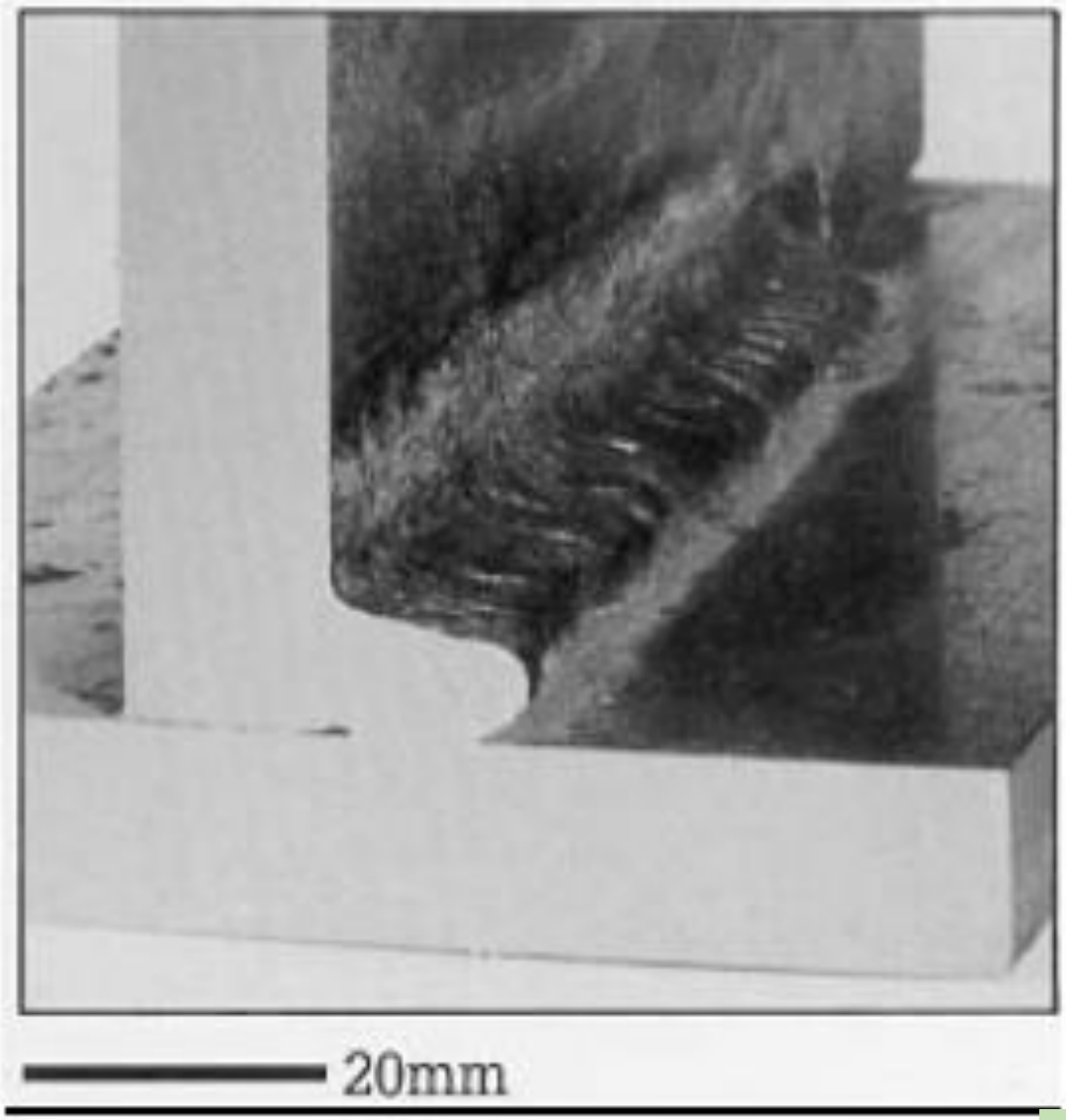
တော့လွဲခြင်း (Misalignment)





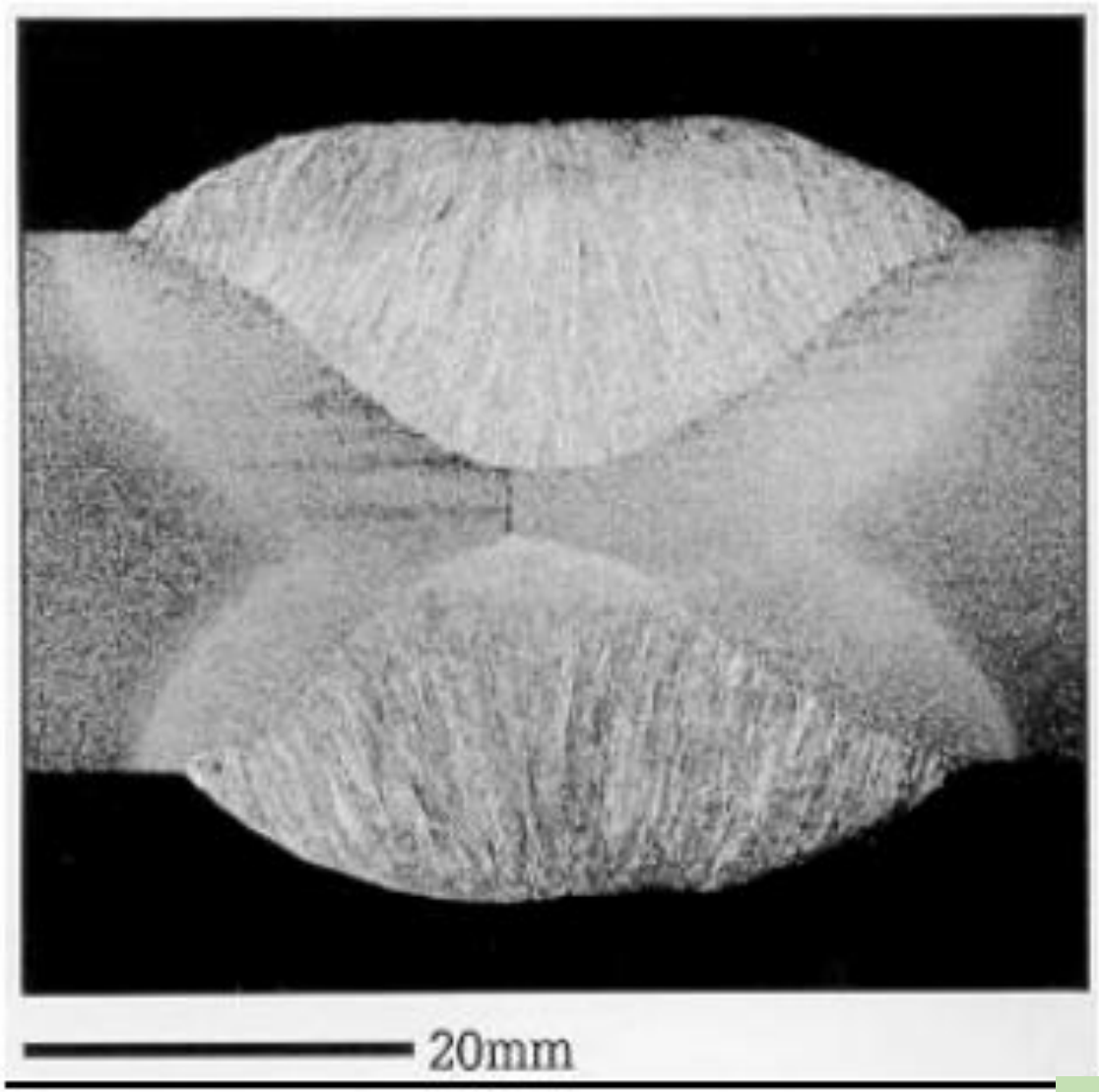
Ref: TWI WIS5 Book

သံရည်သားတွဲကျ/တင်/ထပ်နေခြင်း (Overlap)



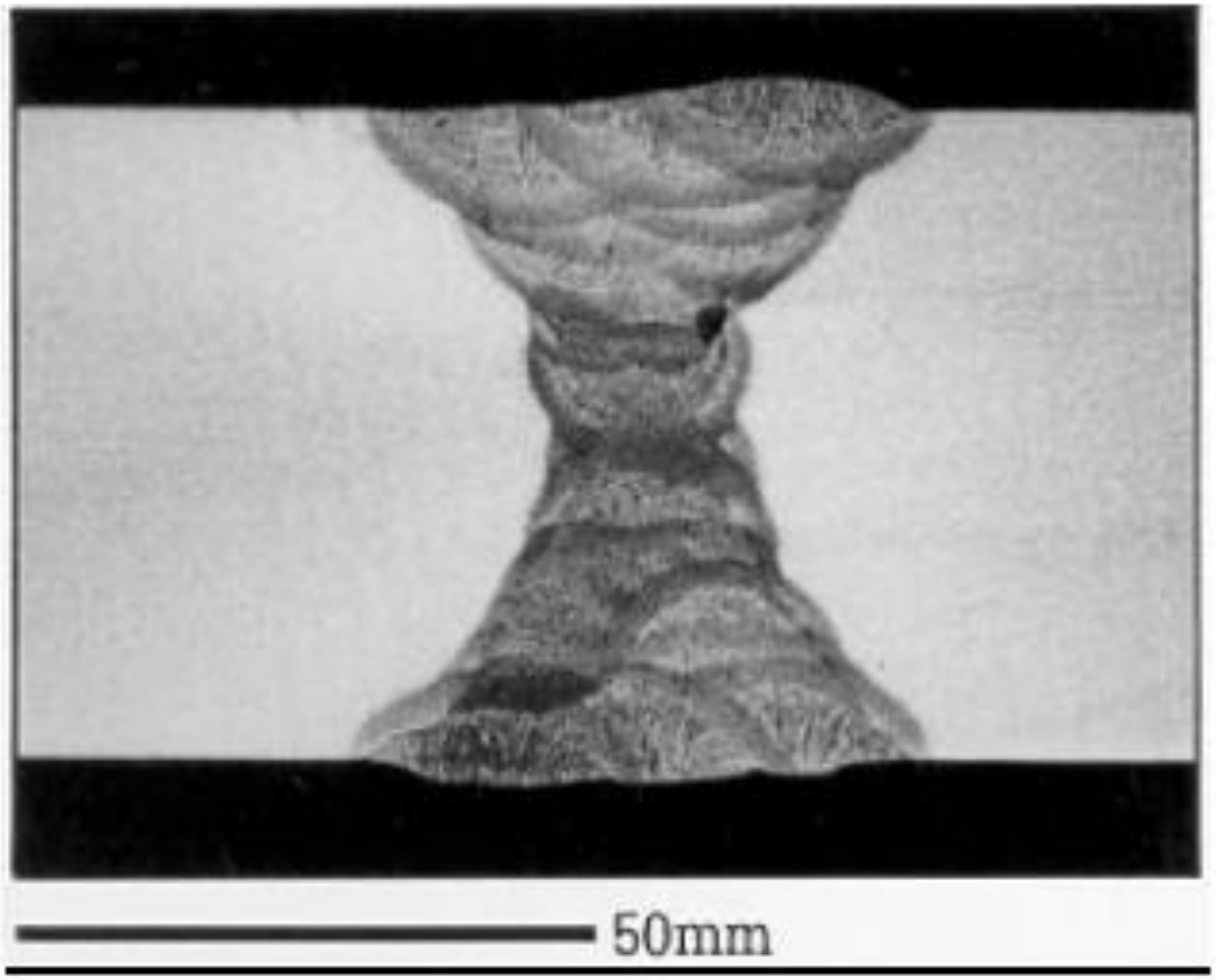
Ref: TWI WIS5 Book

ထိုးဖေါက်ဝင်ရောက်မှုအားနည်းခြင်း



Ref: TWI WIS5 Book

ချော်ဝတ်ခြင်း



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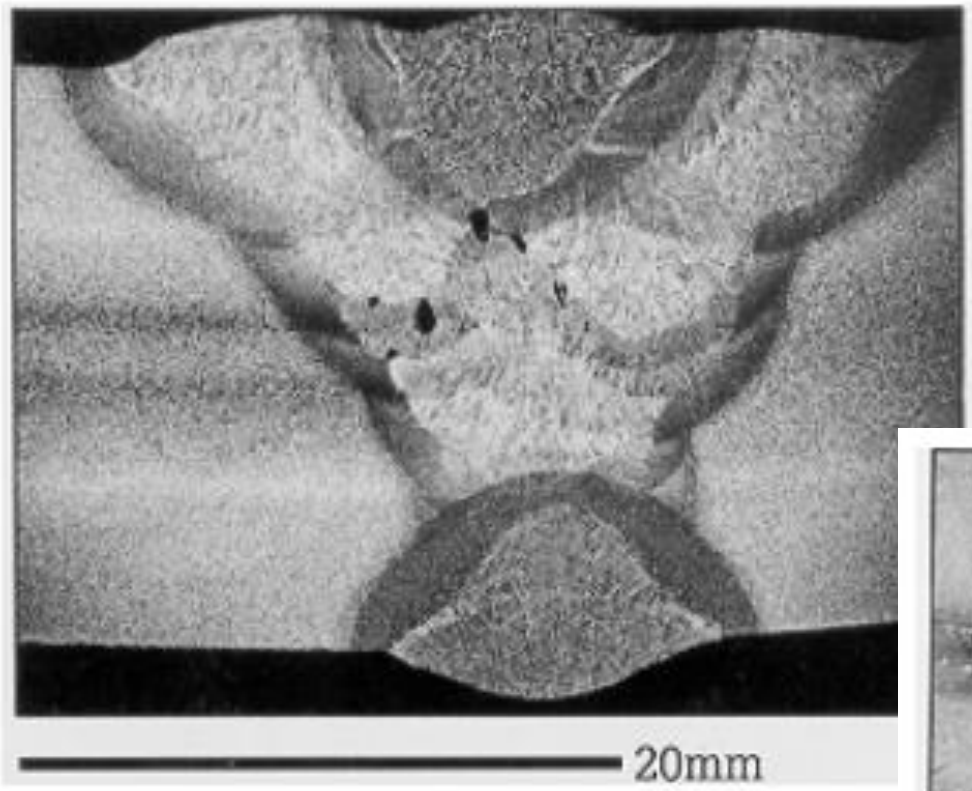
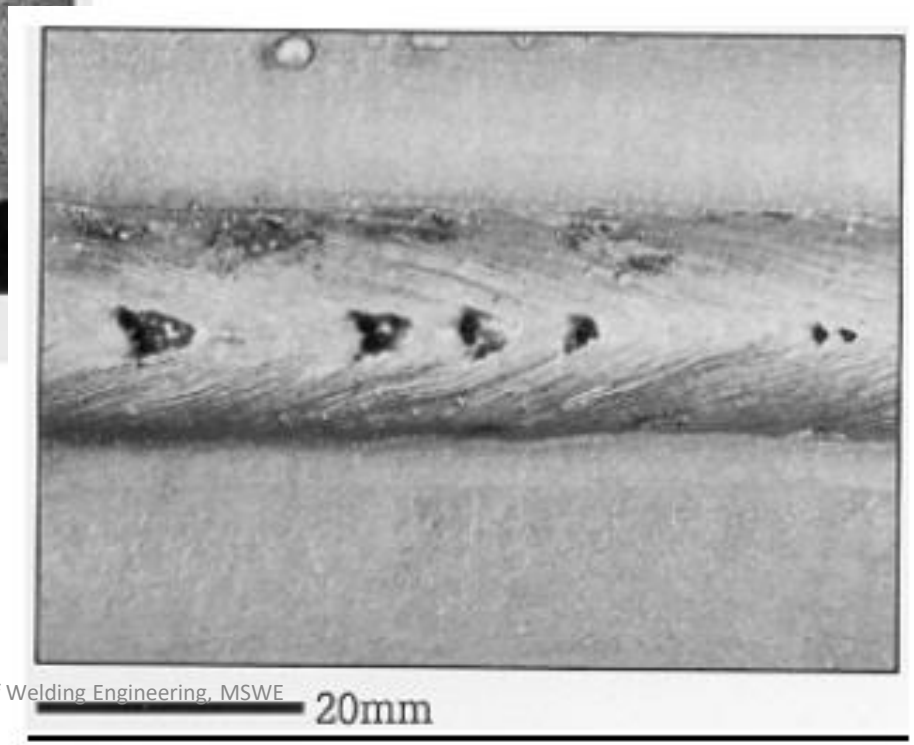
လေခိုပေါက် (Porosity)





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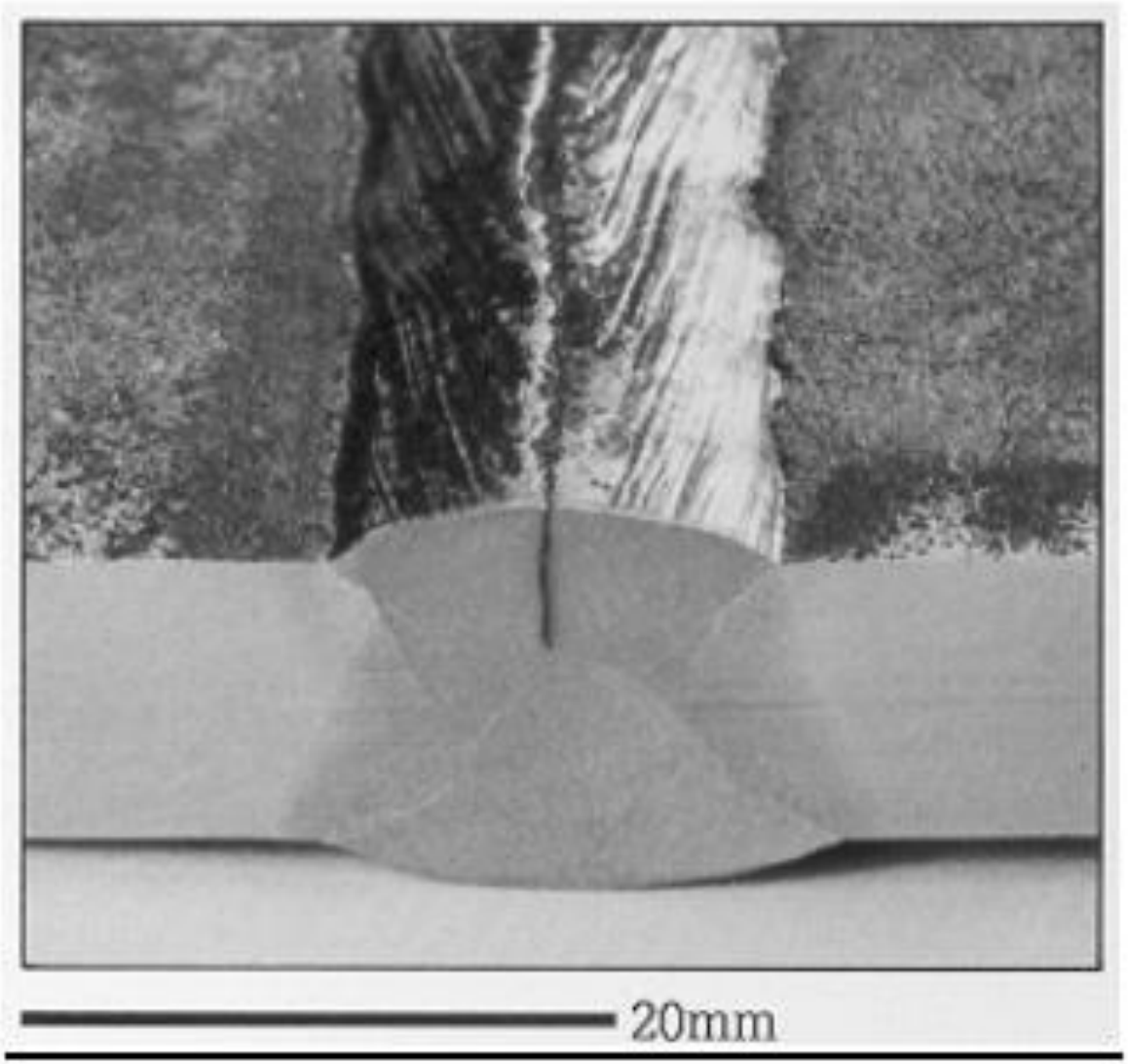
အက်ကွဲခြင်း



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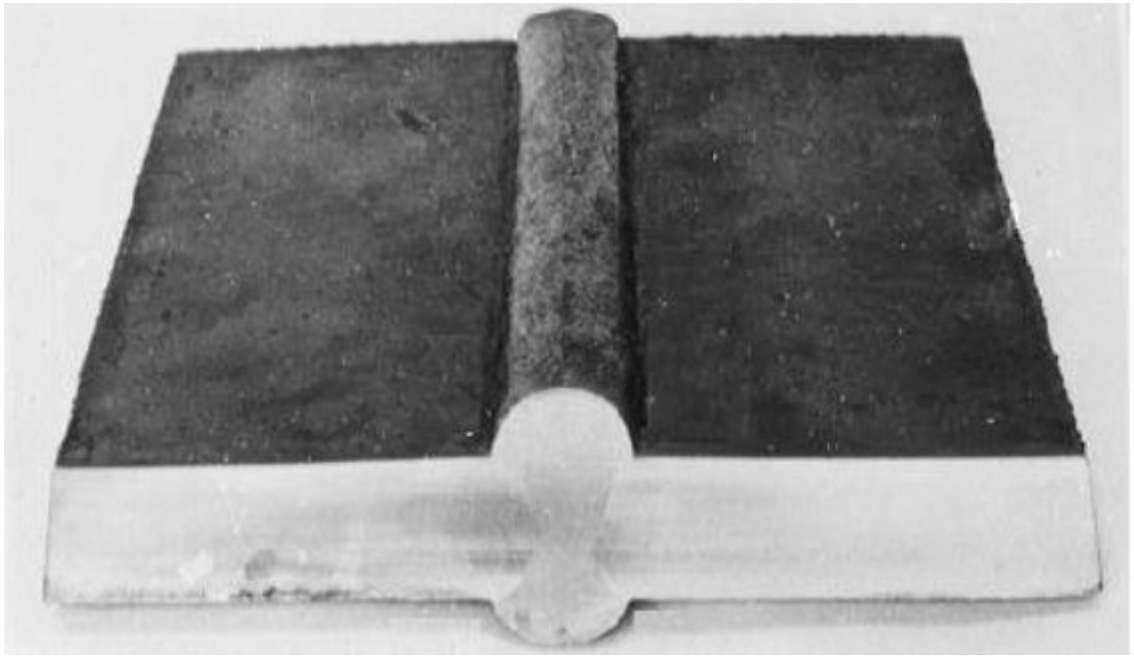
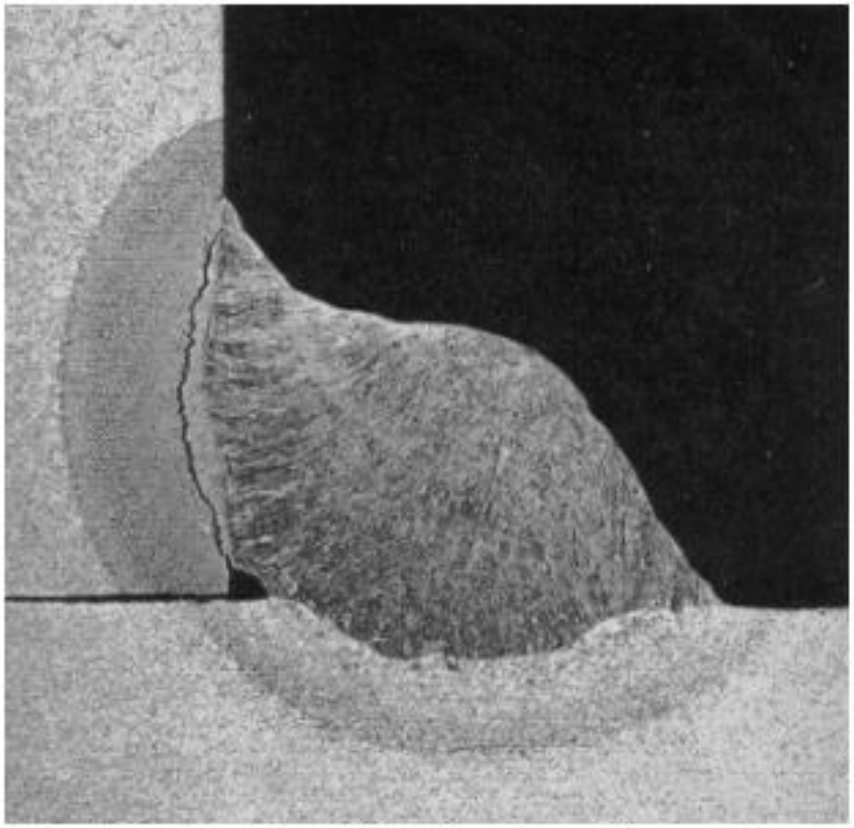
ဂဟေသားမို့မောက်နေခြင်း

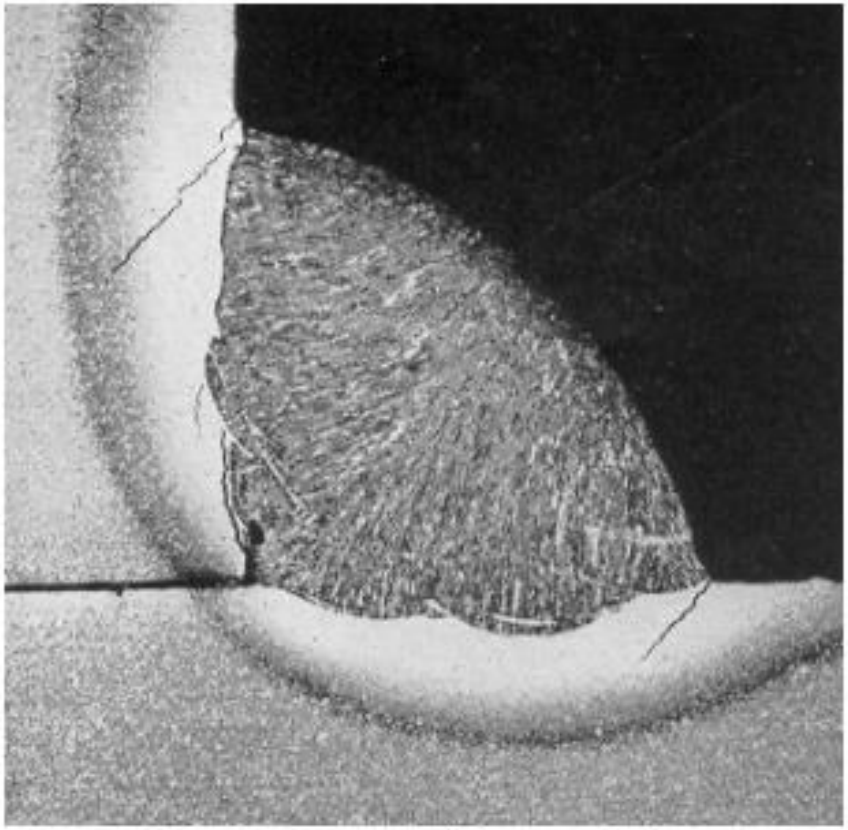


Ref: Kobelco

အက်ကွဲခြင်း (Hydrogen Induced Crack)



Root (underbead) crack



Toe crack

Ref: TWI WIS5 Book

သမိုင်းတွင်ဖြစ်ပျက်ခဲ့သော ပျက်ဆီးဆုံးရှုံးမှုအချို့

သမိုင်းတွင်ဖြစ်ပျက်ခဲ့သော ပျက်ဆီးဆုံးရှုံးမှုအချို့

1936：Fall of Hasselt Bridges （Belgium）

Crack initiated in the weld of lower chord member of gusset

High Restraint stresses、 Residual Stress etc.

1940：Shipwrecking of Wartime Standard Ships （USA）

Brittle Crack initiated caused 1000 ships to fail

Poor fabrication、 Low toughness of steels etc.

1954： Shipwrecking of Tanker “World Concord”(North Atlantic)

Crack initiated in the cross of long. member and bulkhead

Low toughness of steel, Poor criteria of low toughness, etc.

1968：Failure of LNG Spherical Tank （Japan）

Brittle Crack initiated in weld bond of 780N/mm^2 High Tensile Steel

Embrittlement of weld bond by high welding heat input

1974： Failure of Large Cylindrical Oil Storage （Japan）

Failure of Fillet Joint at the Tank Bottom by Oil Hydraulic

Oversight of design load for the filled joint

1995：Failure of Building Steel Structure by Great Earthquake

Brittle Fracture of Building Steel Structure by Earthquake

Cyclic Dynamic Loading, Weld Defects, Weld deformation etc.

Welding is a Special Process (ISO 9001:2000)

Table 4.3 Requirements for special process (JIS Q 9001/ISO 9001:2000)

7.5.2 Validation of processes for production and service provision

The organization shall validate any processes for production and service provision where the resulting output cannot be verified by subsequent monitoring or measurement. This include any processes (such as a special process, noted by the author) where deficiencies become apparent only after the product is in use or the service has been delivered.

Validation shall demonstrate the ability of these processes to achieve planned results.

The organization shall establish arrangements for these processes including, as applicable

a) defined criteria for review and approval of the processes

b) approval of equipment and qualification of personnel

c) application of specific methods and procedures

d) requirements for records, and

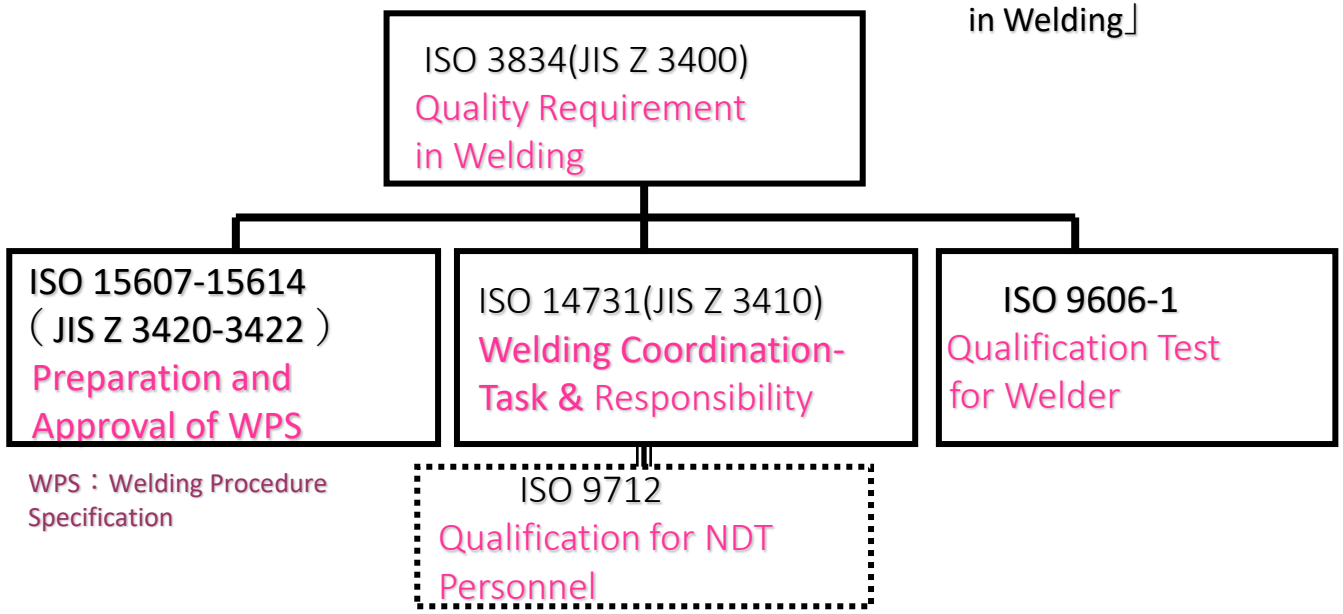
e) revalidation

Quality Requirement in Welding

Requirement of ISO9001:2000

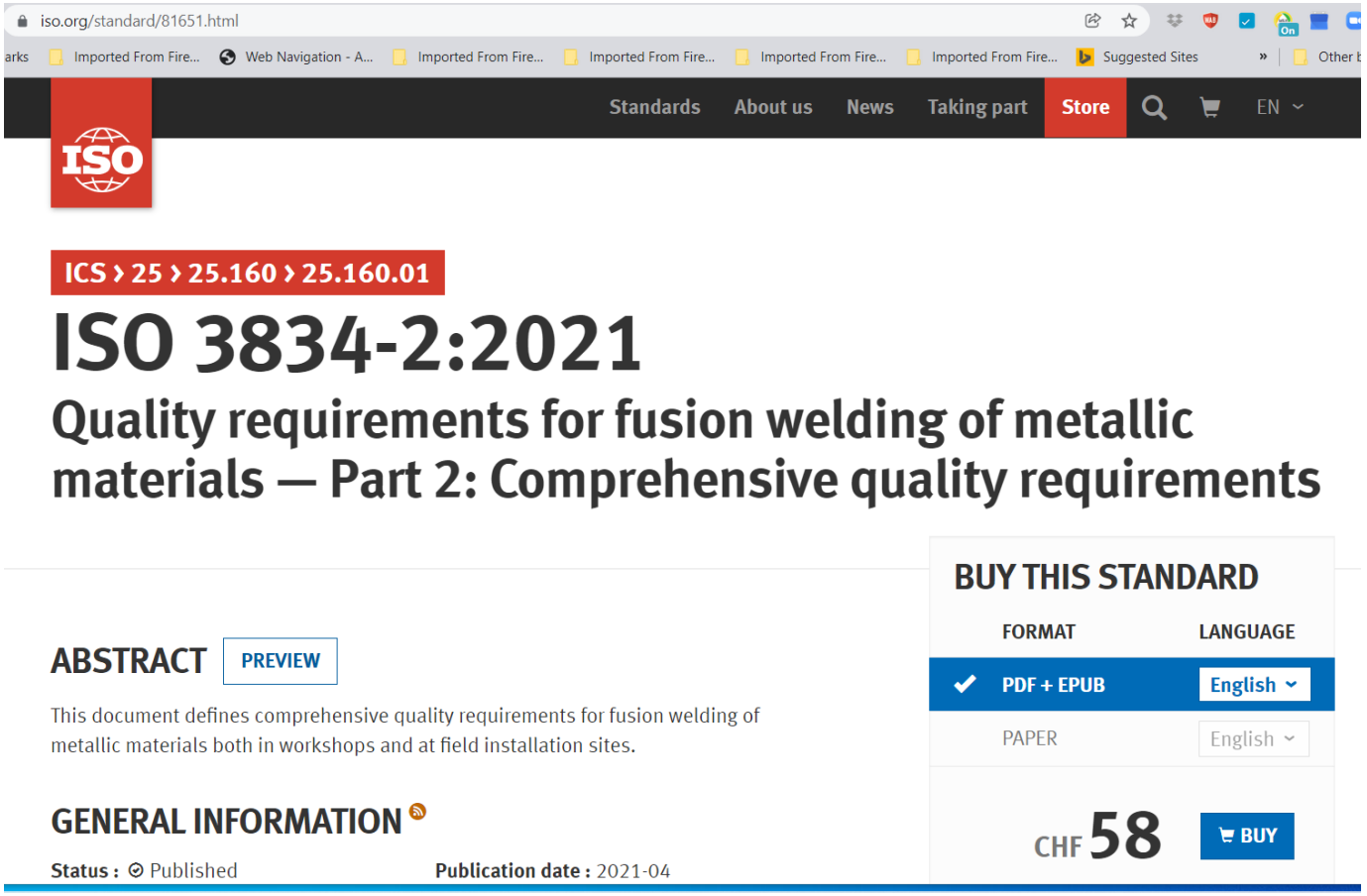
① Defined Criteria for Review and Approval of Processes
② Approval of Equipment and Qualification of Personnel
③ Application of Specific Methods and procedures
④ Requirements for Records
⑤ Requirements for Revalidation

ISO 3834
「Quality Requirement in Welding」

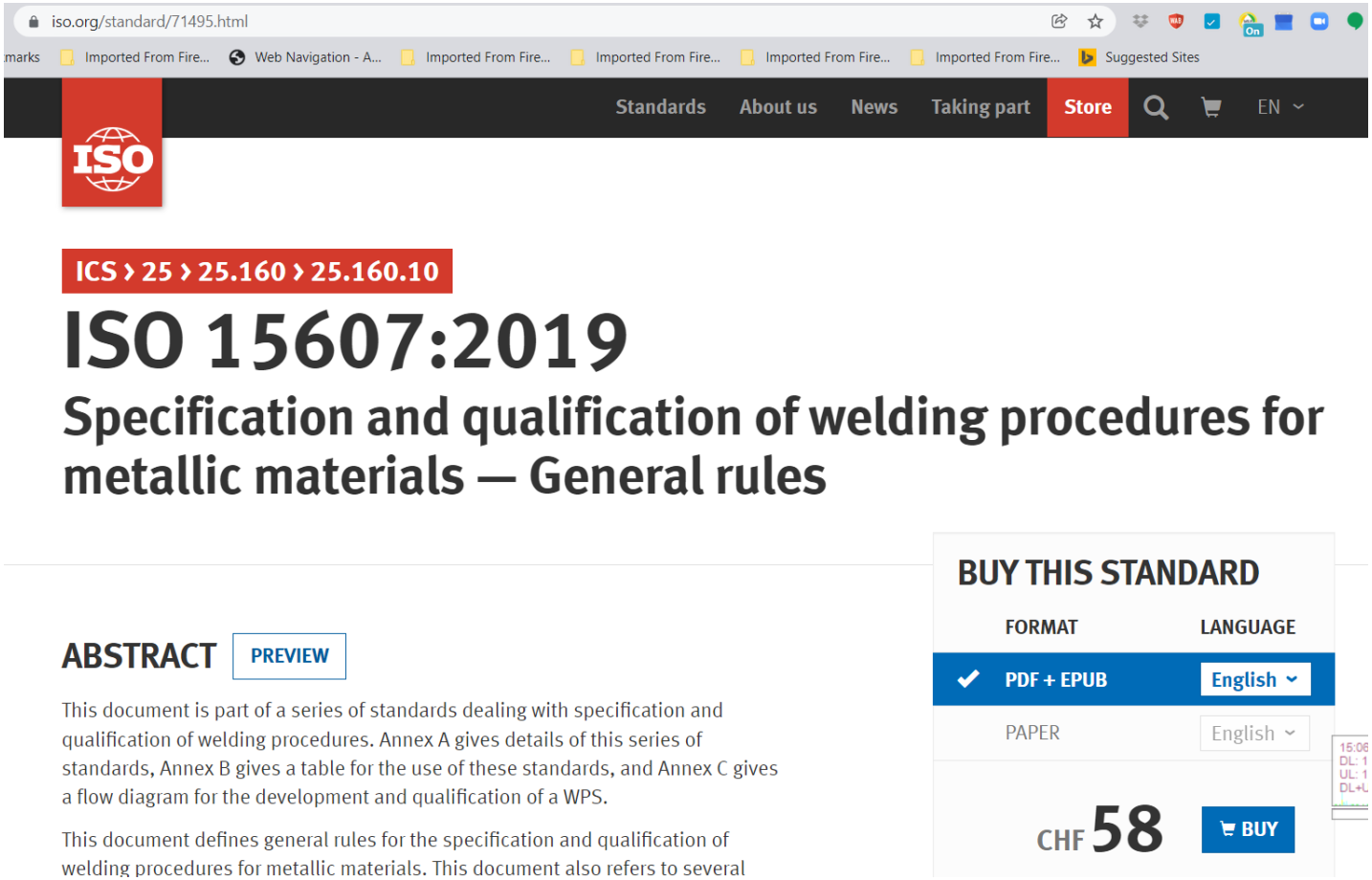


WPS：Welding Procedure Specification

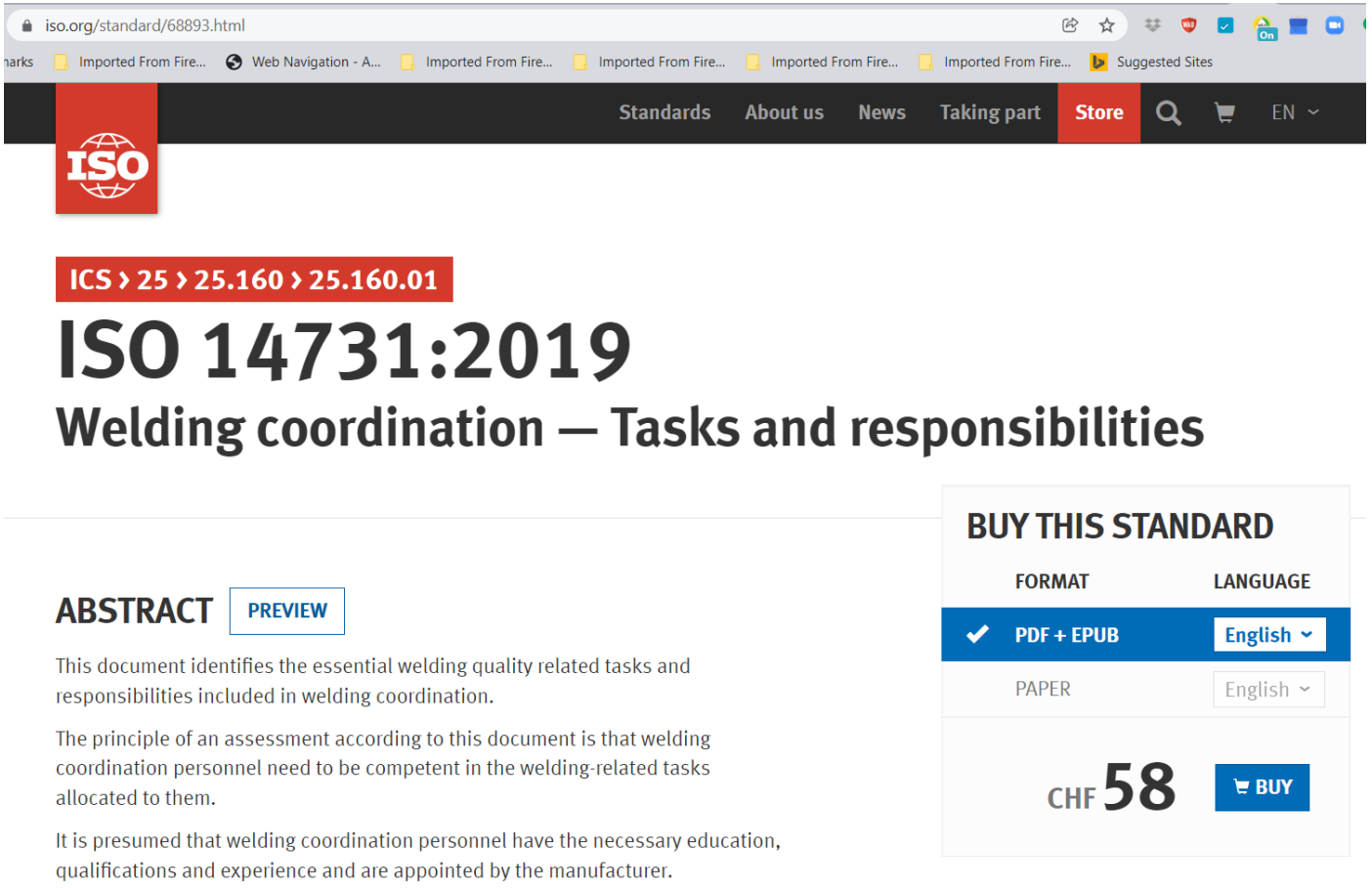
ISO 3834 (Weld Quality Requirement)



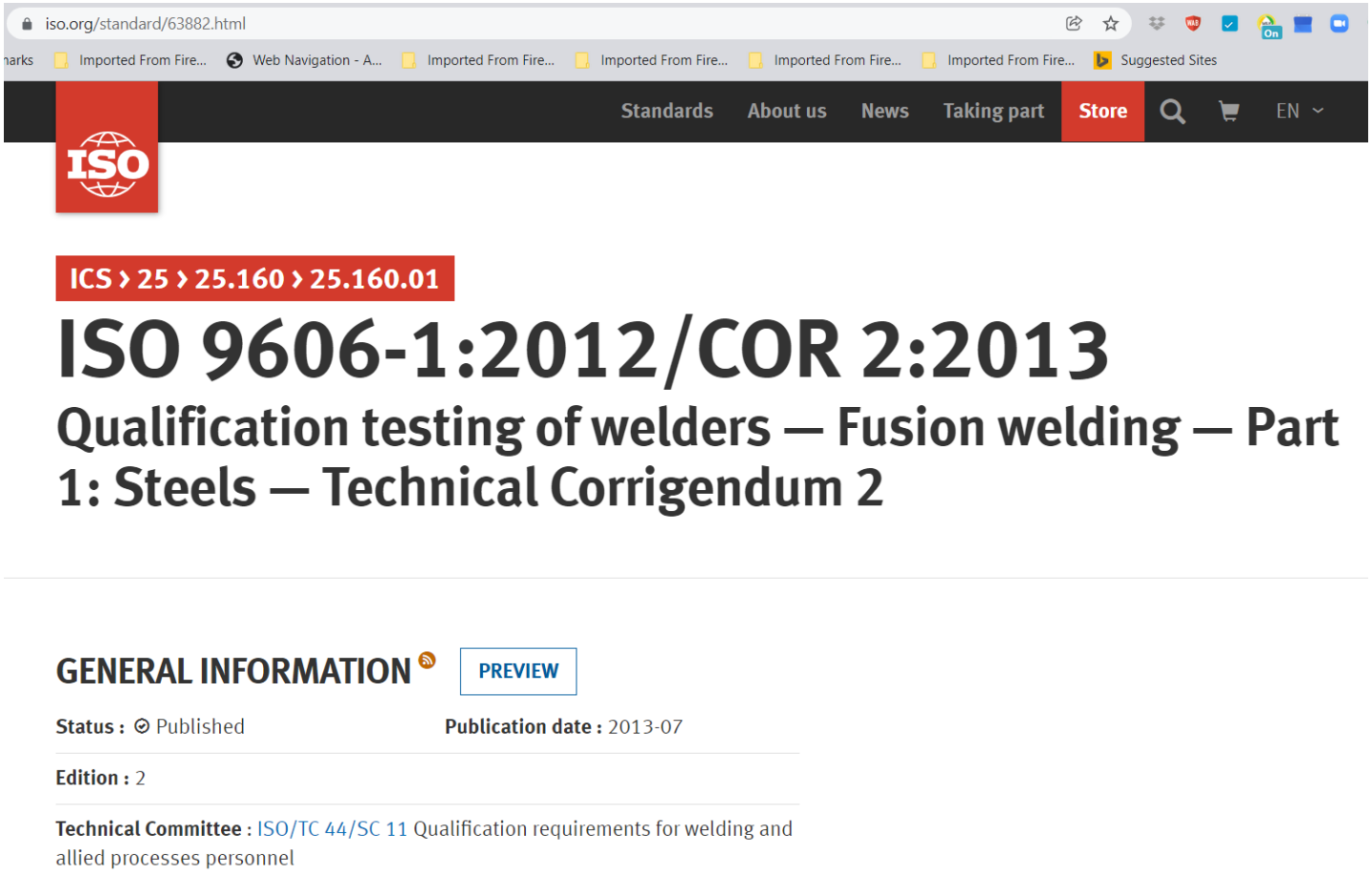
ISO 15607 (Welding Procedure Specification)



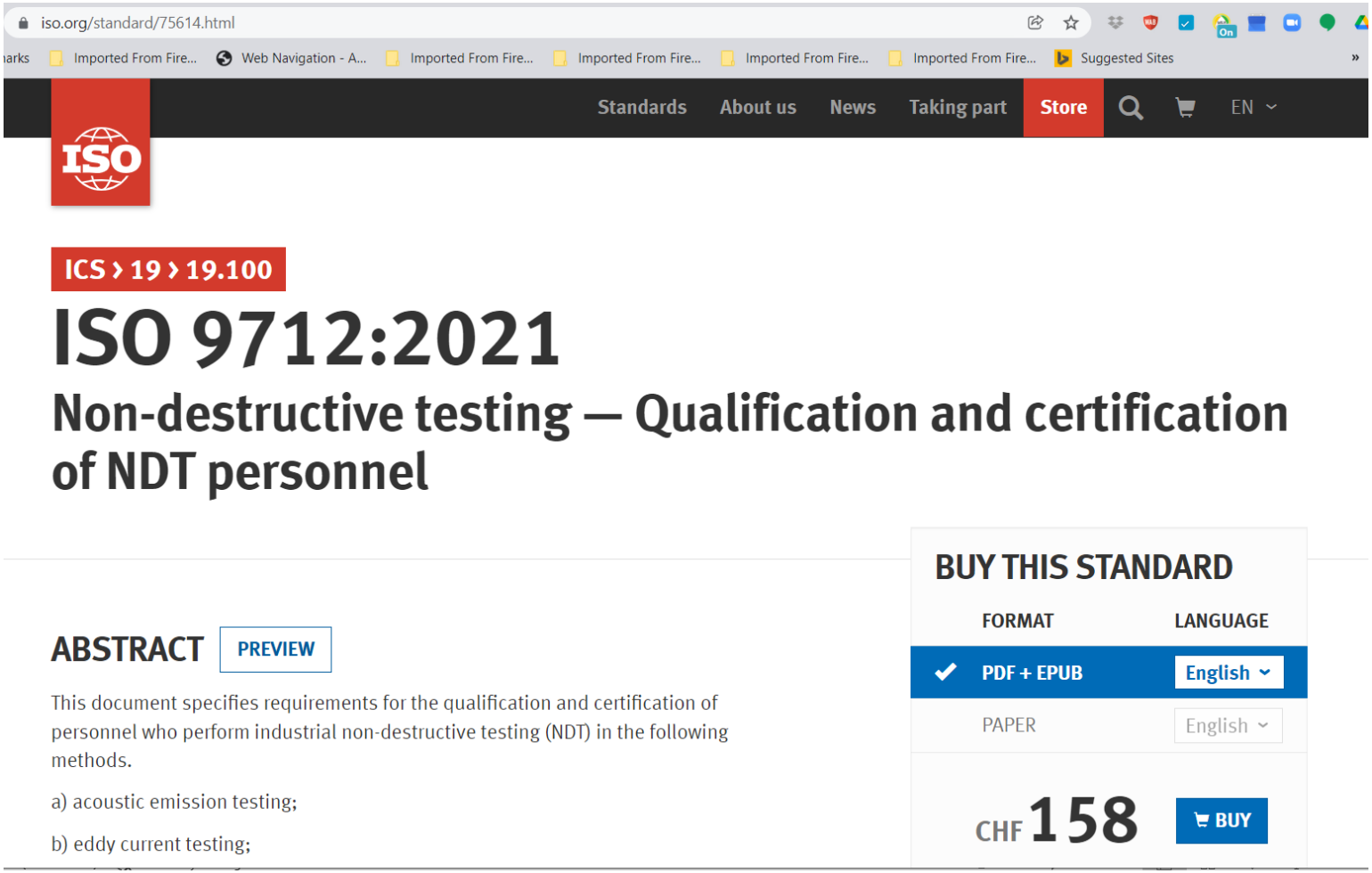
ISO 14731 (Welding Coordinators)



ISO 9606 (Welders Qualification)



ISO 9712 (NDT Personnel)



INTERNATIONAL STANDARD

ISO 3834-2

Second edition
2005-12-15

Quality requirements for fusion welding of metallic materials —

Part 2: Comprehensive quality requirements

Exigences de qualité en soudage par fusion des matériaux métalliques —

Partie 2: Exigences de qualité complète

Reference number
ISO 3834-2:2005(E)

Contents of ISO 3834-2

Contents

Page

Technical Review (ISO 3834)

5.3 Technical review

Technical requirements to be considered shall include the following:

a) parent material(s) specification and welded joint properties;

b) quality and acceptance requirements for welds;

c) location, accessibility and sequence of welds, including accessibility for inspection and for non-destructive testing;

d) the specification of welding procedures, non-destructive testing procedures and heat-treatment procedures;

e) the approach to be used for the qualification of welding procedures ;

f) the qualification of personnel;

g) selection, identification and/or traceability (e.g. for materials, welds);

h) quality-control arrangements, including any involvement of an independent inspection body;

i) inspection and testing;

Technical Review (ISO 3834)

j) sub-contracting;

k) post-weld heat treatment;

l) other welding requirements, e.g. batch testing of consumables, ferrite content of weld metal, ageing, hydrogen content, permanent backing, use of peening, surface finish, weld profile;

m) use of special methods (e.g. to achieve full penetration without backing when welded from one side only);

n) dimensions and details of joint preparation and completed weld;

o) welds which are to be made in the workshop, or elsewhere;

p) environmental conditions relevant to the application of the process (e.g. very low-temperature ambient conditions or any necessity to provide protection against adverse weather conditions);

q) handling of non-conformances.

Welding , Inspection & Testing Personnel (ISO 3834)

7 Welding personnel

7.1 General

The manufacturer shall have at his disposal sufficient a
and supervising of the welding production according to s

7.2 Welders and welding operators

Welders and welding operators shall be qualified by an a

The ISO documents to which it is required to confor
ISO 3834-5:2005, Table 1, for arc welding, electron bea
in ISO 3834-5:2005, Table 10, for other fusion welding p

7.3 Welding coordination personnel

The manufacturer shall have at his disposal appropriate
responsibility for quality activities shall have sufficient a
The tasks and responsibilities of such persons shall be c

8 Inspection and testing personnel

8.1 General

The manufacturer shall have at his disposal sufficient and comp
supervising the inspection and testing of the welding production

8.2 Non-destructive testing personnel

The non-destructive testing personnel shall be qualified. For
required. When a qualification test is not required, competence

The ISO documents to which it is required to conform to fu
ISO 3834-5:2005, Table 3, for arc welding, electron beam weld
in ISO 3834-5:2005, Table 10, for other fusion welding processe

Welding Application Controls (ISO 3834)

-Before Welding

-During Welding

-After Welding

Before Welding (ISO 3834-2)

14.2 Inspection and testing before welding

Before the start of welding, the following shall be checked:

— suitability and validity of welders' and welding operators' qualification certificates;

— suitability of welding-procedure specification;

— identity of parent material;

— identity of welding consumables;

— joint preparation (e.g. shape and dimensions);

— fit-up, jigging and tacking;

— any special requirements in the welding-procedure specification (e.g. prevention of distortion);

— suitability of working conditions for welding, including environment.

During Welding (ISO 3834-2)

14.3 Inspection and testing during welding

During welding, the following shall be checked at suitable intervals or by continuous monitoring:

— essential welding parameters (e.g. welding current, arc voltage and travel speed);

— preheating/interpass temperature;

— cleaning and shape of runs and layers of weld metal;

— back gouging;

— welding sequence;

— correct use and handling of welding consumables;

— control of distortion;

— any intermediate examination (e.g. checking of dimensions).

After Welding (ISO 3834-2)

14.4 Inspection and testing after welding

After welding, the compliance with relevant acceptance criteria shall be checked:

— by visual inspection;

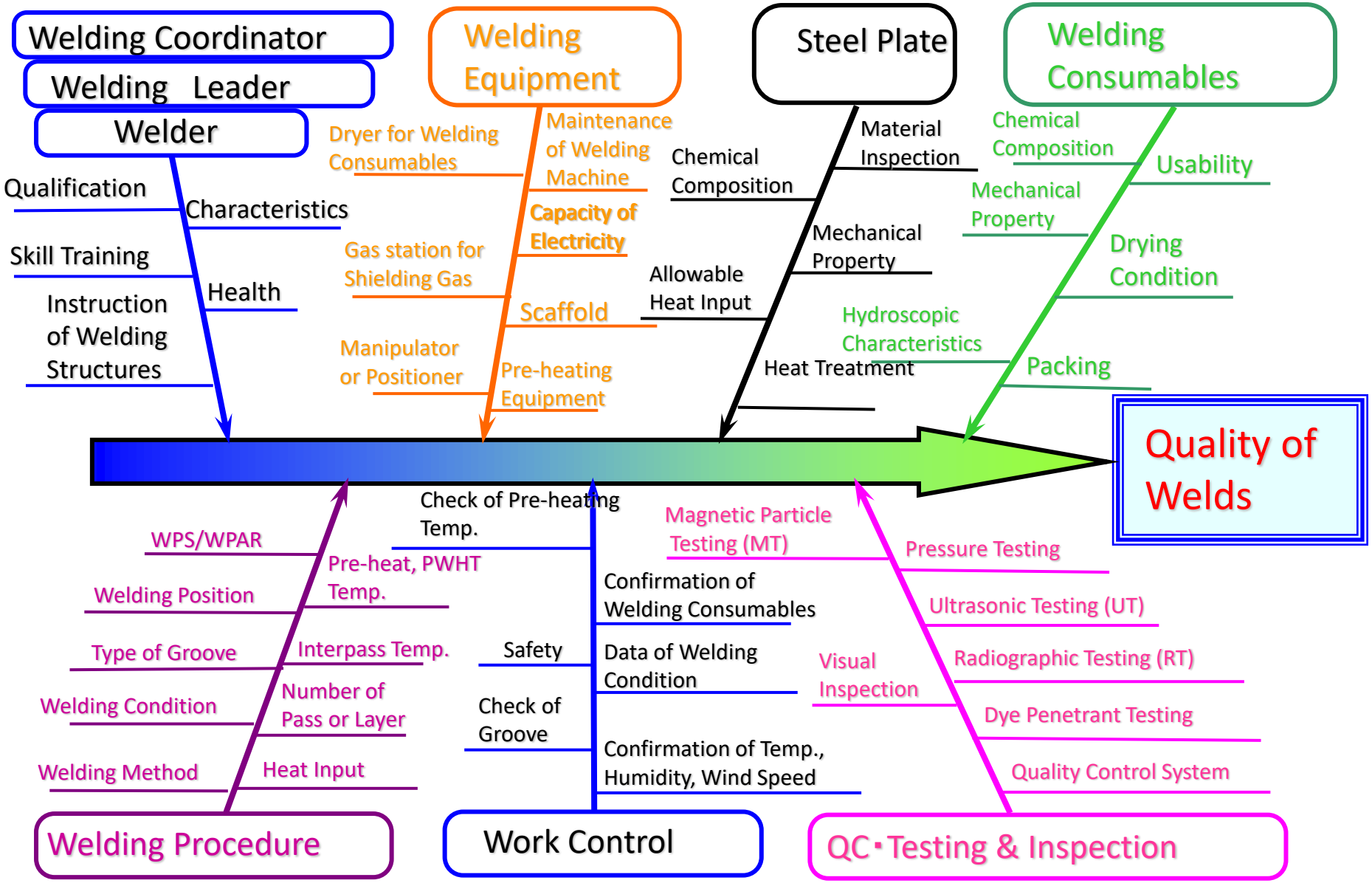
— by non-destructive testing;

— by destructive testing;

— form, shape and dimensions of the construction;

— results and records of post-weld operations (e.g. post-weld heat treatment, ageing).

ဂဟေအရည်အသွေးထိန်းသိမ်းမှုကားချပ် Cause and Effect Diagram



Welding & Inspection Personnel's Qualification

- လုပ်သက်
- အတွေ့အကြုံကောင်း
- ကျွမ်းကျင်မှု
- ဗဟုသုတ
- သင်တန်း
- စိတ်နေစိတ်ထားနှင့်အစွမ်းအစအရည်အချင်း
- ကျွမ်းကျင်မှုလက်မှတ်
- -Fillet Joint Position (1F, 2F, 3F, 4F) (NC L-1)
- -Butt Joint Position (1G, 2G, 3G, 4G) (NC L-2)
- Class Welders (3G, 4G) (LR, ABS, NK, BV, etc..)
- Welding Inspector (NSSA, AWS-CWI, IIW-IWI, TWI-CSWIP)
- NDT Personnel (ASNT-NDT Level-1, Level-2, Level-3 in RT,UT,MT,PT)
- Welding Engineer (IIW-IWE, AWS-CWE, JWES-AWE)

NSSA

National Skill Standards Authority

မြန်မာနိုင်ငံ လုပ်သားများ ကျွမ်းကျင်မှု "စံ" သတ်မှတ်ပြဌာန်းရေးအဖွဲ့

(အလုပ်သမားဝန်ကြီးဌာန)

NC Level-1 ဂဟေ အောင်လက်မှတ်

The Republic of the Union of Myanmar

National Skills Standards Authority

National Certificate of Occupational Competency

This is to certify that

Aung Min Htun

NRC No. 12/DaGaNa(N)036214 has been assessed

in accordance with the relevant

National Occupational Competency Standard and is competent

in the Occupation of Manual Metal Arc Welder at Level 1

Registration No. NC.AW.1.A00040 Date of Issue: 15.2.2015

President
Myanmar Engineering Society

Chairman
Skills Assessment and Certification Committee

Chairman
National Skills Standards Authority

Welder Qualification Test Certificate for NC Level-1
(E-7016)

Qualification: Codes/Standards: **AWS D1.1M:2006** WPS-Reference No:2014/NC/WPS/F-002&004
Examiner or examination body- Reference No: EB-004
Date of Test : 28 November 2014
Welder's Name : **Aung Min Htun**
National I.D Number : 12/DaGaNa(N)036214
Weld Test I.D Number : 12
Welder's Date & Place of Birth : 24January 1993
Employer / Company (if any) : Myanma Shipyards
Job knowledge : Satisfactory
Welding Details

3F+4F Position Qualification Test with E-7016		
Variables	**Weld Test Details**	**Range of Approval**
Welding process	SMAW/MMAW	SMAW/MMAW
Plate or pipe (fixed/rotated)	Plate	Plate , Pipe
Type of welded joint	Fillet	Fillet
Parent material group(s)	Group (I)	Group (I)(See Table 3.1 for detail)
Filler material (Designation)	F4	F1, F2, F3, F4
Test piece thickness (mm)	12mm	3mm to Unlimited
Pipe Outside diameter (mm)	NA	NA
Welding position	3F (upward) + 4F	4F, 3F (upward), 2F, 1F
Gouging/backing	NA	NA
Welded (one/both sides)	NA	NA
Other		

Additional information is available on attached sheet and /or welding procedure specification number:
Test Results (state satisfactory, unsatisfactory or not applicable)

Type of tests /Assessment	Performed and accepted	Not tested
Visual	Satisfactory	
Macro examination	Satisfactory	
Fillet weld fracture	Satisfactory	
Other*		NA

* Append separate sheet if required.

(SOE AUNG KYAW)
Director
Kabar Services Company Limited

Win Htun
International Welding Engineer (IIW)
JP-IWE-000061S
International Welding Inspector (IIW)
JP-IWIS-000030S (Standard Level)

Ohn Myint
Chairman
Welding Occupational Competency Standard Subcommittee

(Mr. Naing Thiha Soe)
Welding Engineer (IIW) JP- IWE -000040S
Welding Inspector (IIW) JP-IWIS-000010S

U Lin
Chairman
Myanmar Welding Engineering Development Committee
Myanmar Engineering Society

The Myanmar Society of Welding Engineering

MSWE

နှင့်

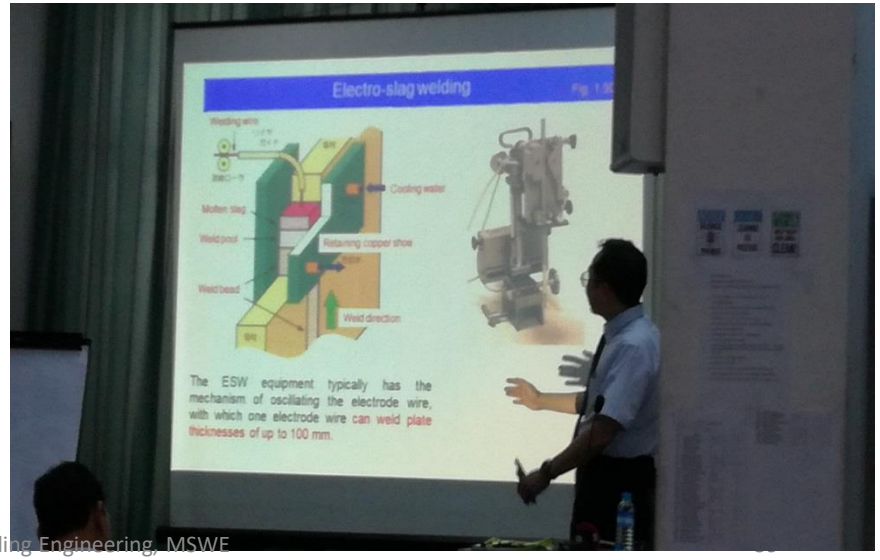
The Japan Welding Engineering Society

JWES

ပူးပေါင်းဖွင့်လှစ်သော

ဂဟေအင်ဂျင်နီယာသင်တန်းများ

ဂဟေအင်ဂျင်နီယာသင်တန်းများဖွင့်လှစ်ပို့ချခြင်း



ဂဟေအင်ဂျင်နီယာသင်တန်းတွင် ပို့ချသောဘာသာရပ်များ

- Ch-1: Welding Process & Equipment (AWE, WE)
- Ch-2: Materials And Their Behavior During Welding (AWE, WE)
- Ch-3: Design And Construction (AWE, WE)
- Ch-4: Fabrication & Application Engineering (AWE, WE)
- Ch-5: Welding Design And Fabrication Of Frame Structures (SWE)
- Ch-6: Welding Design & Fabrication Of Vessels (SWE)

ဂဟေအင်ဂျင်နီယာအောင်လက်မှတ်များချီးမြှင့်ခြင်း

1) (Associate Welding Engineer) (AWE)

2) (Welding Engineer) (WE)

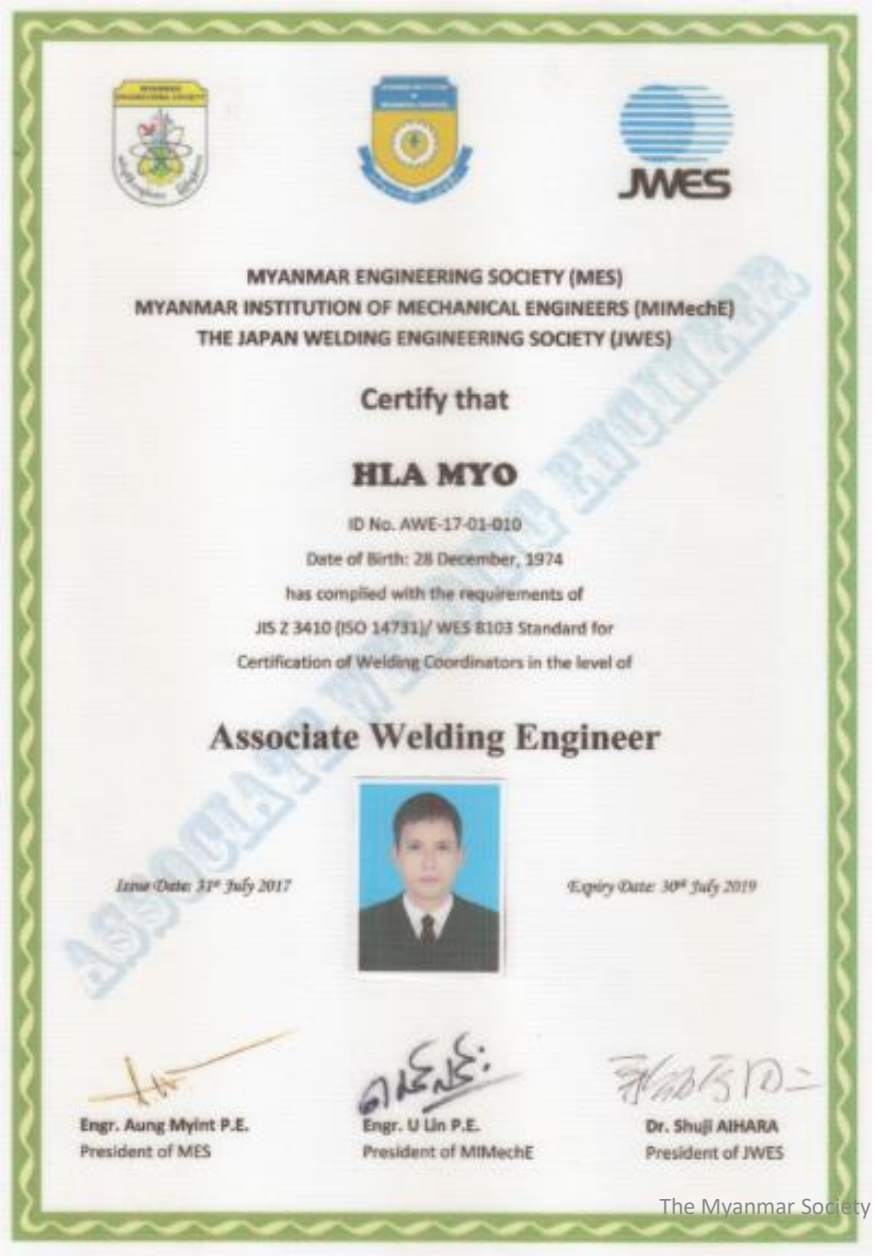
3) (Senior Welding Engineer) (SWE)

By Collaboration of
Federation of Myanmar Engineering Society (Fed.MES)
The Myanmar Society for Welding Engineering (MSWE)
The Japan Welding Engineering Society (JWES)

(Every June & December Annually)

ဂဟေအင်ဂျင်နီယာအောင်လက်မှတ်များချီးမြှင့်ခြင်း

ဂဟေအင်ဂျင်နီယာ အောင်လက်မှတ်



MYANMAR ENGINEERING SOCIETY (MES)
MYANMAR INSTITUTION OF MECHANICAL ENGINEERS (MIMechE)
THE JAPAN WELDING ENGINEERING SOCIETY (JWES)

Certify that

HLA MYO

ID No. AWE-17-01-010

Date of Birth: 28 December, 1974

has complied with the requirements of

JIS Z 3410 (ISO 14731)/ WES 8103 Standard for

Certification of Welding Coordinators in the level of

Associate Welding Engineer

Issue Date: 31st July 2017

Expiry Date: 30th July 2019

Engr. Aung Myint P.E.
President of MES

Engr. U Lin P.E.
President of MIMechE

Dr. Shuji AIHARA
President of JWES

MYANMAR ENGINEERING SOCIETY (MES)
MYANMAR INSTITUTION OF MECHANICAL ENGINEERS (MIMechE)
THE JAPAN WELDING ENGINEERING SOCIETY (JWES)

Certify that

HTAIN LIN OO

ID No. WE-18-01-009

Date of Birth: 29 November, 1967

has complied with the requirements of

JIS Z 3410 (ISO 14731)/ WES 8103 Standard for

Certification of Welding Coordinators in the level of

Welding Engineer

Issue Date: 20th July 2018

Expiry Date: 19th July 2020

Engr. Aung Myint P.E.
President of MES

Engr. U Lin P.E.
President of MIMechE

Prof. Dr. Shuji AIHARA
President of JWES

နိုင်ငံအလိုက် ဂဟေအင်ဂျင်နီယာစာရင်း

The number of Certificate Holders in Each Country

As of Apr. 1, 2019

Country	Inaugural Year	Levels			Total (persons)
		SWE	WE	AWE	
Thailand	2005	32	35	-	67
Philippines	2006	6	148	56	210
Indonesia	2007	12	238	264	514
Malaysia	2010	17	87	75	179
Singapore	2015	-	16	-	16
Taiwan	2017	5	25	-	30
Myanmar	2017	-	28	173	201
Total		72	577	568	1,217

WE (Tasks & Responsibilities)

Roles of Welding Coordinators in accordance with ISO 14731 "Welding coordination-Tasks and responsibilities"

1) Review of requirements,
2)Technical review,
3) Sub-contracting,
4) Welding personnel,
5) Equipment,
6) Production Planning,
7) Qualification of the welding procedures,
8) Welding procedure specifications,
9) Work instructions,
10) Welding consumables,
11) Materials,
12) Inspection and testing before welding,
13) Inspection and testing during welding,
14) Inspection and testing after welding,
15) Post-weld heat treatment,
16) Non-conformance and corrective actions,
17) Calibration and validation of measuring, inspection and testing equipment,
18) Identification and traceability,
19) Quality records

ဂဟေနှင့်ဆက်စပ်လုပ်ငန်းများ

- သံ၊ အလူမီနီယမ်၊ သံမဏိ၊ သံကြိုပ်၊ လောင်းသံ ပစ္စည်းများဆက်စပ်ခြင်း
- သံပန်း၊ သံတခါး၊ ပန်းကန်စင်၊ ကုလားထိုင် စသောအသေးစားစက်မှုလုပ်ငန်းများ
- စက်ရုံအလုပ်ရုံလမ်းတံတားတည်ဆောက်ရေးလုပ်ငန်းများ
- မြို့ပြအဆောက်အဦး Steel Structure ဆောက်လုပ်ရေးလုပ်ငန်းများ
- ဓါတ်ငွေ့ပိုက်လိုင်း၊ ရေပေးဝေပိုက်လိုင်း တည်ဆောက်ရေးလုပ်ငန်းများ
- ရေအားလျှပ်စစ်တည်ဆောက်ရေးလုပ်ငန်းများ
- သဘော်ဘတည်ဆောက်ရေး ၊ ပြုပြင်ရေးလုပ်ငန်းများ
- ကား၊ရထား၊လေယာဉ်၊ဂြိုလ်တုတည်ဆောက်ရေးလုပ်ငန်းများ
- ကမ်းလွန်ရေနံရှာဖွေရေးတွင်းတူးစင်လုပ်ငန်းများ
- ဘွိုင်လာအိုး၊ ဓါတ်ငွေ့ရည်အိုး၊ နူးကလီးယားဓါတ်ပေါင်းဖို တည်ဆောက်မှုလုပ်ငန်းများ
- အခြားသော ဂဟေဆက်စပ်လုပ်ငန်းများ

Ship


Shield machine


Railcar


Motorcycle

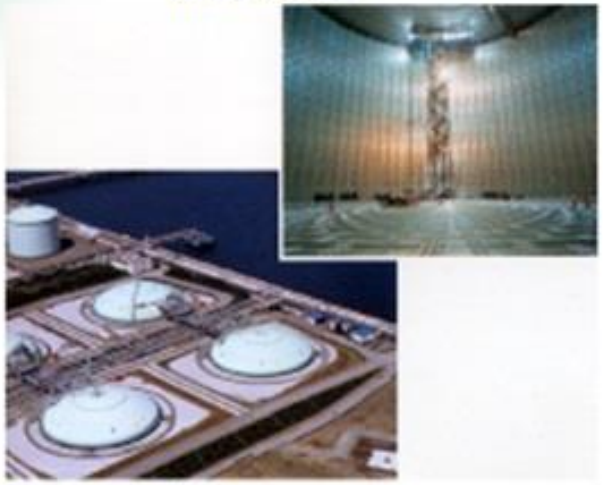
Welding

Common & Basic Manufacturing Technology


Wheel loader


Jet engine


Bridge


Storage tank

ကျေးဇူးအထူးတင်ပါတယ်

THANK YOU FOR YOUR ATTENTION

E-mail: **naingthiha.soe@gmail.com**