



training notes

UNDERSTANDING STAINLESS STEEL AND ITS PROPERTIES

course content

The ISSF Stainless Steel Specialist Course is an advanced and effective tool to improve your knowledge of stainless steel, its properties, performance and uses.

It consists of modules delivered and marked online.

It is useful to anyone specifying, manufacturing or working with stainless steel and delivers a high level of knowledge across almost all types of stainless steel.

Whether you're an engineer, an architect, in sales or in manufacturing, the course can meet your needs.

There are 17 challenging and rewarding Training Notes covering a wide range of topics about stainless steel, from introductory to more complex material. Input from the industry has ensured that topics covered are relevant to the workplace.

An **Intermediate Certificate** is awarded on completion of five Training Notes and usually takes three months.

A **Full Certificate** is awarded on completion of twelve Training Notes and usually takes six months.

The cost of the course is US\$30 per Training Note. The titles are as follows:

1. **Introduction to Stainless Steel** – austenitic, ferritic, duplex, martensitic, and precipitation hardening stainless steels.

In this module you will learn the fundamentals of working with stainless steel. You will find out which type of stainless steel is suitable in different circumstances and what the advantages and limitations of the material are. This is the starting point of the ISSF Stainless Steel Specialist Course and is a compulsory unit for both levels of certification.
2. **Stainless Steel vs Corrosion: How stainless steel is affected by and resists corrosion** – corrosion process, passivity, general corrosion, galvanic corrosion, erosion/abrasion, intergranular corrosion, pitting corrosion, crevice corrosion, and stress corrosion cracking.

Stainless steel's resistance to corrosion makes it the product of choice for conditions other materials cannot withstand. However, stainless steel must be treated correctly to achieve corrosion resistance. This module gives you an understanding of corrosion mechanisms and how to use stainless steel to maximise its durability and prevent corrosion problems. It is critical to understanding stainless steel and is a compulsory unit for both levels of certification.
3. **Mechanical Properties of Stainless Steel** – mechanical properties, austenitic, ferritic, martensitic, duplex, and precipitation hardening stainless steels.

This module will give you knowledge about stainless steel's outstanding strength, ductility and other mechanical properties, giving you the ability to specify or supply the right material for a given application. It is a compulsory unit for both levels of certification.
4. **Surface Finish on Stainless Steels** – design, finish and fabrication, mill forms, fabrication and special finishing methods, pickling and passivation, cleaning stainless steel, care on site and erection, and routine cleaning and maintenance.

Both the durability and appearance of stainless steel are greatly enhanced by the most appropriate surface finish. This module gives you a wealth of knowledge about standard finishes, their uses and how they are achieved. As one of the key components of successful stainless steel use, this module is compulsory for the Full Certificate.

5. Fabricating Corrosion Resisting and Stainless Steels – corrosion resistance, storage, handling, forming and cutting, welding, fabrication, and passivating.

This module outlines the skills required and precautions to be taken in the fabrication process. Following the procedures explained here will maximise your ability to fulfil contracts to your clients' satisfaction

6. Cutting of Stainless Steels – mechanical cutting, thermal cutting, and new technology.

This module shows you how to eliminate problems with cutting stainless steel by explaining how stainless steel reacts to a variety of cutting techniques and how it differs from carbon steel.

7. Metallurgy of Stainless Steels – history, classifications, and characteristics of stainless steels.

You will achieve a thorough understanding of the chemical structure of stainless steel by completing this module, which is compulsory for both levels of certification. With this knowledge you will be able to make informed decisions that impact on your operation's bottom line.

8. Welding and Joining of Stainless Steels – nature of stainless steel, weldability, processes, shielding gases, dissimilar metals, and fume control.

This module will give you the knowledge to successfully weld and join stainless steel. This is a comprehensive module containing critical information for successful fabrication and is compulsory for the Full Certificate.

9. Machining Stainless Steels – tooling, cutting fluids, corrosion resistance, drilling, turning, tapping, die threading, thread rolling, reaming, and milling.

This is an important module for anyone involved in machining stainless steel. It is divided into two parts: Part 1 covers the properties of stainless steel and how these affect machining; Part 2 deals with the principles of mechanical machining processes and practical considerations.

10. Practical Considerations for Designing in Stainless Steel – resistance to environment, mechanical properties, fabrication, economic considerations.

This module will help you avoid costly failures by giving you the knowledge to develop designs which optimise the advantages of stainless steel while minimising fabrication problems and eliminating failures due to incorrect grade selection and poor design. This module is critical to the successful use of stainless steel at a design level and is compulsory for the Full Certificate.

11. Stainless Steel and Stainless Alloy Castings – processes, classifications, chemical composition, microstructure, heat treatment, machining, welding, mechanical properties, and applications of stainless steel castings.

This module explains the specialised area of manufacturing complex shapes by pouring molten stainless steel into a mould. You will learn how moulds are made, how stainless steel behaves chemically when it melts and solidifies, and how castings respond to welding.

12. Forging Stainless Steels – production of forging, starting stock for forging, heating for forging, cooling after forging, and post forging requirements.

Forging is the oldest method of shaping solid metal, using controlled impact or pressure usually at high temperatures. This module teaches you how the forging method, temperature, and grade of stainless steel are selected to achieve optimal results.

13. Stainless Steel Pipe and Tube – production manufacturing processes, welding processes, finishing operations, longitudinally welded vs seamless, forming, and applications.

This module will give you a solid understanding of how stainless steel tube is manufactured. You will learn how to bend tube while minimising wrinkling, buckling or flattening. Stainless steel tube applications and specifications are provided.

14. Cold Forming Stainless Steels – stainless steel formability and forming processes.

In this module you will learn about the different cold forming processes used in metal processing and how they need to be adapted for stainless steel. You will also learn how to select appropriate forming processes for the different grades of stainless steel.

15. Deep Drawing of Stainless Steels – properties and practical considerations for deep forming processes.

This module teaches you how to shape stainless steel sheet into cylindrical or box-shaped forms using punches and dies. You will learn how to avoid flaws, how to select for drawability, how to determine die and punch radii, what percentage reduction is possible and the reasons for using single or double action presses.

16. Stainless Steel and Stainless Alloys at High Temperature – mechanical properties and corrosion resistance.

This module will give you specialised knowledge about the behaviour of stainless steel and related stainless alloys when exposed to temperatures exceeding 650 degrees celsius.

17. Ferritic Stainless Steels

This module deals with the ferritic family of stainless steels. It examines properties, performance, availability and considerations for fabrication.