

Postgraduate Certificate Hydrogen Fuel Cells



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- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: www.techtitute.com/pk/engineering/postgraduate-certificate/hydrogen-fuel-cells

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01

Introduction

Major automotive companies are currently working on the design of buses, trucks and, to a lesser extent, passenger cars that include hydrogen fuel cells. However, other sectors such as the energy sector are also betting on the generation of power plants based on this equipment. In both cases, the reduction of CO2 emissions is a determining factor in their choice and development. In this scenario, the specialized engineering professional will be able to progress in a booming sector. This is why TECH has designed this program, which offers the most exhaustive and advanced knowledge on the production of these electricity generators, the stack, the peripheral elements and the technical-economic analysis necessary for their implementation. All this in a 100% online academic format, with quality multimedia content, to which you will have access 24 hours a day, from an electronic device with an Internet connection.





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With this Postgraduate Certificate you will be able to integrate in 150 hours the most important concepts of the operation and integration of Hydrogen Fuel Cells”

Zero carbon emissions to the atmosphere and double the efficiency of traditional combustion are the main advantages of hydrogen fuel cells. This has led the mobility sector, in particular, to promote the creation of means of transport that use this equipment to generate electricity from the chemical reaction between hydrogen and oxygen.

Thus, major companies such as BWM, Hyundai, Toyota and Iveco are currently working on the development of models that perfect and integrate the fuel cell. In this race initiated by the transportation sector, other industries such as the energy sector are joining in, so that this energy vector is currently undergoing a process of promotion. Given this reality, there is no doubt that the engineering professional, who has specialized knowledge, has a wide range of possibilities to advance in a booming sector. That is why TECH has created this Postgraduate Certificate in Hydrogen Fuel Cells, which will allow the graduate to take a firm step forward in their professional career.

A program with a theoretical, but at the same time practical vision that will take you into the operation and composition of fuel cells, into the stack as the central element where the chemical reaction of electricity generation or the balance of plant occurs. For this purpose, you will also have access to multimedia didactic material, which will allow you to acquire a solid learning experience through a much more attractive and dynamic content.

Thus, these educational tools will lead you to a deeper understanding of fuel cells from a technical and economic point of view, so necessary for their integration in sectors that are currently seeking to continue producing in a sustainable way.

The professional has an excellent opportunity to prosper in this field, through a Postgraduate Certificate, which can be taken whenever and wherever they wishes. All you need is an electronic device (computer, tablet or cell phone) with an internet connection to consult, at any time, the syllabus hosted on the online platform. An academic option, moreover, compatible with the most demanding responsibilities.

This **Postgraduate Certificate in Hydrogen Fuel Cells** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ Case studies presented by engineering experts
- ♦ The graphic, schematic and eminently practical contents of the book provide technical and practical information on those disciplines that are essential for professional practice
- ♦ Practical exercises where the self-assessment process can be carried out to improve learning
- ♦ Its special emphasis on innovative methodologies
- ♦ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ♦ The availability of access to content from any fixed or portable device with an
- ♦ Internet connection



You will reduce the long hours of study and memorization with the Relearning method used by TECH in its programs"

“

A program that shows you through a theoretical and practical approach the operation and current development of Hydrogen Fuel Cells”

The program includes, in its teaching staff, professionals from the sector who contribute to this training with their work experience, as well as renowned specialists from reference societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

You have a flexible academic option that is compatible with your most demanding responsibilities.

Thanks to this Postgraduate Certificate you will master the key concepts in the generation of electricity from hydrogen.



02 Objectives

Upon completion of this Postgraduate Certificate, the engineering professional will master the generation of electricity from hydrogen, taking into account the different existing technologies and their end uses. In addition, you will have a thorough understanding of how fuel cells work and be able to model their behavior technically and economically. In order to achieve these goals, TECH will make available the most innovative pedagogical tools for academic teaching.



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With the case studies you will get a practical insight into techno-economic modeling in fuel cell application”

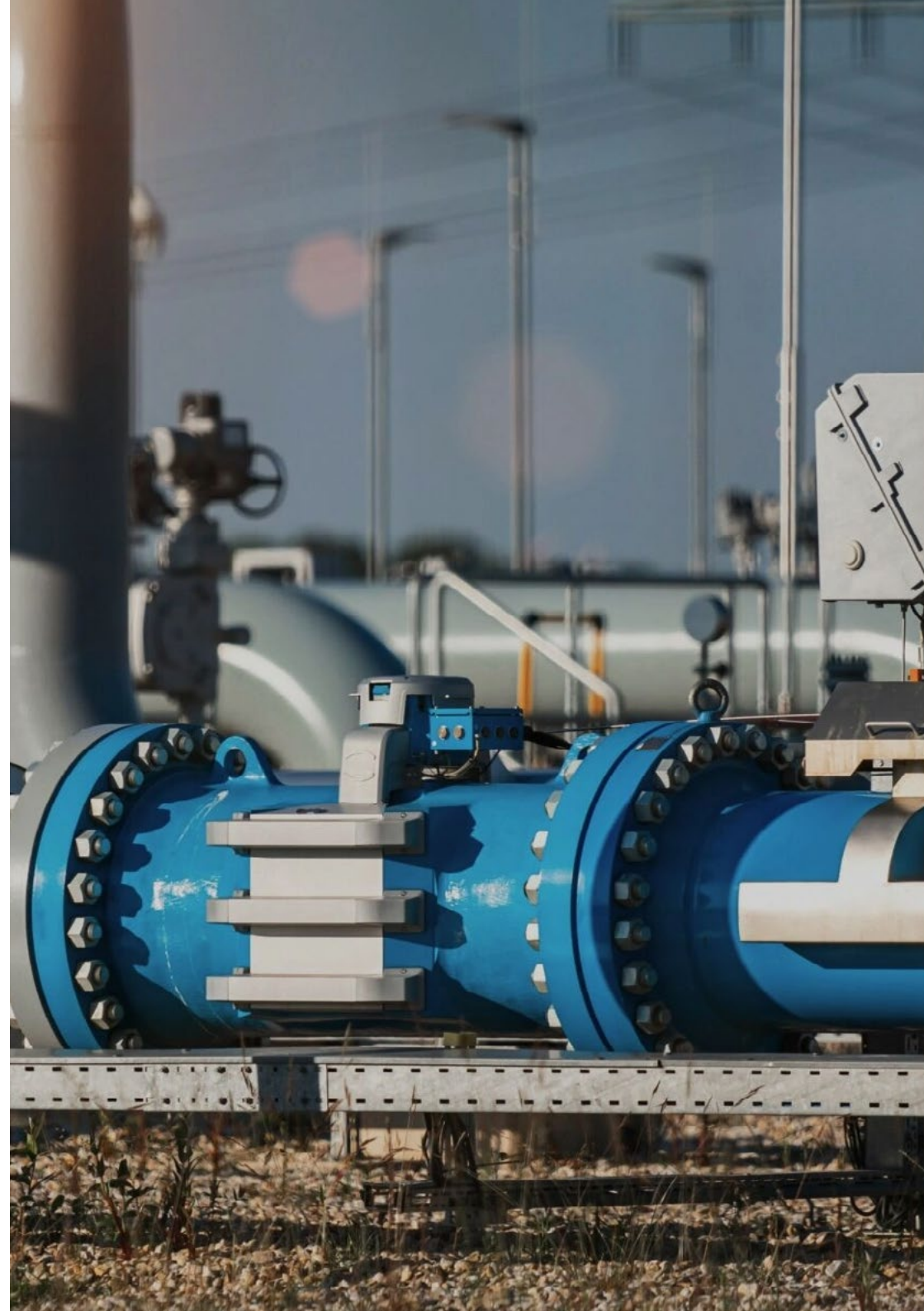


General Objectives

- ♦ Generate specialized knowledge on the operation of the different fuel cell technologies
- ♦ Examine the integration of the peripherals that make up the balance of plant
- ♦ Model the operation of a fuel cell according to its use



This program will enable you to master the key concepts of how the stack works"





Specific Objectives

- ♦ Analyze the chemistry that governs the operation of PEMFCs
- ♦ Designing the membrane-electrode assembly in PEMFC
- ♦ Understand the operation of the PEMFC fuel cell stack
- ♦ Analyze the characteristics of other types of fuel cells
- ♦ Establish the sizing of the fuel cell system according to the end-use application
- ♦ Determine fuel cell integration by end-use
- ♦ Perform techno-economic modeling of fuel cell operation

03

Structure and Content

The effectiveness of the Relearning method, based on the reiteration of content, has led TECH to use it in each of its programs. This will allow students to advance in a much more natural way through the operation of PEMFC fuel cells, the stack, SOFC fuel cells and their different current applications. In addition, the library of multimedia resources complements this syllabus and will facilitate the acquisition of advanced learning, with the aim of advancing the professional in a growing sector.



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A syllabus with a theoretical-practical approach to provide you with the most useful and advanced knowledge on Hydrogen Fuel Cells to provide you with the most useful and advanced knowledge about Hydrogen Fuel Cells”

Module 1. Hydrogen Fuel Cells

- 1.1. PEMFC (Proton-exchange membrane fuel cell) fuel cells
 - 1.1.1. Chemistry Governing PEMFCs
 - 1.1.2. Operation of the PEMFC
 - 1.1.3. PEMFC applications
- 1.2. Membrane-Electrode Assembly en PEMFC
 - 1.2.1. MEA Materials and Components
 - 1.2.2. PEMFC Catalysts
 - 1.2.3. Circularity in PEMFC
- 1.3. Stack in PEMFC Stacks
 - 1.3.1. Stack architecture
 - 1.3.2. Assembly
 - 1.3.3. Power Generation
- 1.4. Balance of Plant and System in PEMFC Piles
 - 1.4.1. Balance of Plant Components
 - 1.4.2. Balance of Plant Design
 - 1.4.3. System Optimization
- 1.5. SOFC (Sodium Oxide Fuel Cell) Fuel Cells
 - 1.5.1. Chemistry Governing SOFCs
 - 1.5.2. SOFCs Operation
 - 1.5.3. Applications
- 1.6. Other types of Fuel Cells: Alkaline, Reversible, Direct Metastatic
 - 1.6.1. Alkaline Fuel Cells
 - 1.6.2. Reversible Fuel Cells
 - 1.6.3. Direct Methanation Fuel Cells
- 1.7. Fuel Cell Applications I. In Mobility, in Power Generation, in Thermal Generation
 - 1.7.1. Fuel Cells in Mobility
 - 1.7.2. Fuel Cells in Power Generation
 - 1.7.3. Fuel Cells in Thermal Power Generation





- 1.8. Fuel Cell Applications II. Techno-economic modeling
 - 1.8.1. Technical and Economic Characterization of the PEMFC
 - 1.8.2. Capital and Operating Costs
 - 1.8.3. Technical Characterization of the Operation of a PEMFC
 - 1.8.4. Techno-economic modeling
- 1.9. Dimensioning of PEMFC for Different Applications
 - 1.9.1. Static Modeling
 - 1.9.2. Dynamic Modeling
 - 1.9.3. PEMFC Integration in Vehicles
- 1.10. Stationary Fuel Cells Grid Integration
 - 1.10.1. Stationary Fuel Cells in Renewable Microgrids
 - 1.10.2. System Modeling
 - 1.10.3. Techno-economic Study of a Fuel Cell in Stationary Use



Enter into a program that will bring you up to date with the latest advances in the development of the Fuel Cell in stationary use"

04

Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





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Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

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At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"



You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.



The student will learn to solve complex situations in real business environments through collaborative activities and real cases.

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.



Our program prepares you to face new challenges in uncertain environments and achieve success in your career”

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



This program offers the best educational material, prepared with professionals in mind:



Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



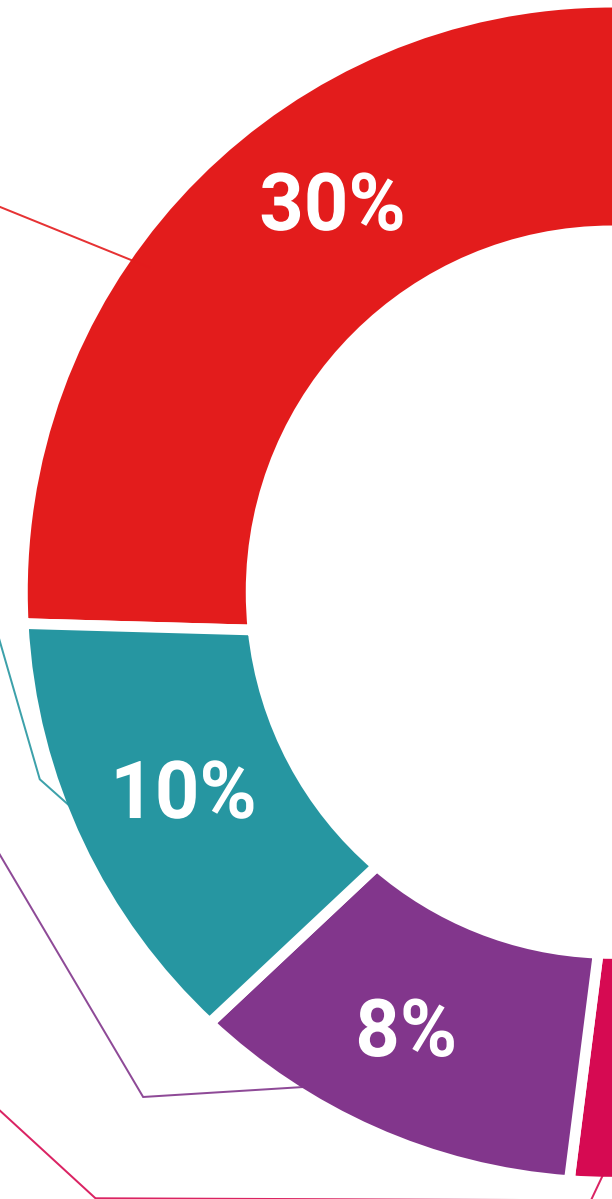
Practising Skills and Abilities

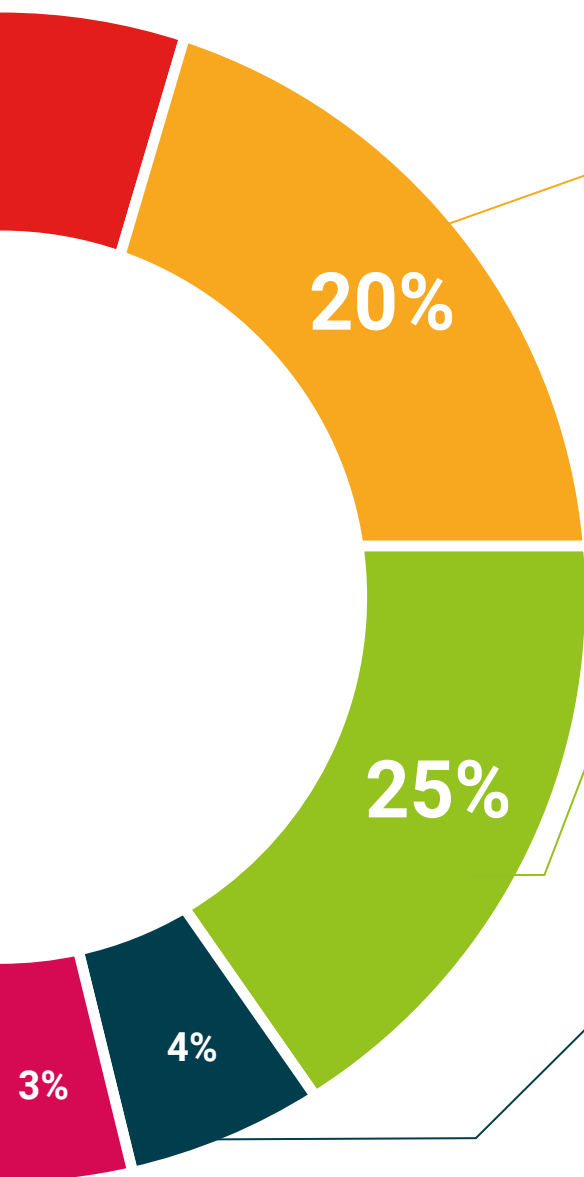
They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.



**Case Studies**

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

**Interactive Summaries**

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

**Testing & Retesting**

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



05 Certificate

The Postgraduate Certificate in Hydrogen Fuel Cells guarantees, in addition to the most rigorous and updated training, access to a Postgraduate Certificate program issued by TECH Technological University.



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*Successfully complete this program
and receive your university qualification
without having to travel or fill out
laborious paperwork"*

This **Postgraduate Certificate in Hydrogen Fuel Cells** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Certificate in Hydrogen Fuel Cells**

Official N° of Hours: **150 h.**



*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

future
health confidence people
education information tutors
guarantee accreditation teaching
institutions technology learning
community commitment
personalized service innovation
knowledge present quality
development languages
virtual classroom



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