High Technology and Associated Specialties

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Abstract: *The short life cycle of technology based production of goods and services is pushing more and more the needs to train flexible minded highly specialized technician to deal with high technology. Academic institutions and training centers, are always far behind to catch up this scenario of fast changing. The graduates from those institutions are unable to fulfill the minimum requirement of ability to perform the tasks demanded by high technology business. This paper intends to illustrate how the course program aiming to train specialized technician can be designed and applied to an existing schools of technology to minimize the cost of infrastructure required.*

1. Introduction

The ever growing of technology development in the second half of this Century has taken an astonishing dimension never experienced in the previous centuries. All the fields of knowledge were dramatically transformed added to a previous discoveries, have contributed to build the new society for the comfort and social welfare. It is noticeable that recent discoveries have incorporated to the products and consumer goods, rationalizing the usage of materials, energy and the time. These discoveries in the field of medicine, biochemistry, electronics, new materials, etc. are known as frontier or high technology newcomers.

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2. Applications of high technology

High technology is extensively applied in manufacturing industry, energy generation, transportation, civil engineering, commerce, communications, social services, law, and defense.

In manufacturing industries, high technology is applied in the computer integrated manufacturing (CIM), fabrication of special metal alloys, products of pulp and papers, automobile products, electromechanical products, health care apparatus, mechatronics, among others.

In the commerce and business this is largely applied in banking and financial services, money market business, offices automation systems, tourism, leisure business, and merchandising systems.

In the energy sector and commerce, it is applied to instruments for operation and control of electricity generation plants, control of energy distribution.

In the transportation, it is applied to control airports systems, highways systems, railways systems, seaport systems, urban transportation systems, among others.

In the civil engineering, it is applied in the systems to control materials, testing, inspection, control systems for heating and cooling the buildings, systems for process management in civil engineering .

High technology is also largely applied in military and civil communication systems, radio and TV broadcasting, in the publicity, in advertisement and graphic presentations, in corporate systems for communications and services, integrators of voice in communications, video information, and so on.

It is also applied in social services, in education, in health services, government services of law and order, and several activities of different nature.

3. Features of modern technician

Modern technician to perform the professional role applying high technology must have a solid background in basic science subjects, as to:

1. understand the systems concepts, operation and the use of analytical tools: mathematics, physics, information science, and system analysis.

2. have a strong interdisciplinary experience, pursuing the combination of abilities and specialization in:

a - electromechanical systems

b - electronic subsystems - analogic and digital

c - fluid subsystems - hydraulics and pneumatics

d - thermal subsystems - heating and cooling

e - microcomputer systems - chip microprocessors and distributed systems

4. Tasks and abilities of modern technicians

Modern technician must have a solid training for tasks of specialized nature demanding to have a multidisciplinary ability and experiences to perform the job properly.

a. Tasks

Tasks of modern technician can have a multidisciplinary features in his career, such as to:

a - perform the testing of devices or mechanical systems, optics, hydraulics, pneumatics, electric, thermal, digital electronics, and to writing up an appropriate technical reports.

b - collect, select, compile, use of technical information from measuring instruments, electronic recording and presentation.

c - prepare or interpret drawings engineering sketch, report writings, work procedures, and detailed specification of equipment.

d - design and develop or modify products, design the laboratory or industrial application techniques.

e - plan, supervise or assist the set up of scientific apparatus, computer and control systems.

f - use computers for analysis and to interpret information

g - operate, keep running or repair apparatus and equipment incorporated to computer systems

h - advise, plan and assess cost estimation, as the field representative of manufacturers or distributors of technical apparatus for products and services.

i - apply the knowledge on mathematical science while working as a direct technical assistant to physicists or engineers.

b. Abilities

Modern technician to perform satisfactorily his job applying advanced technology in the chain of production sector, requires special abilities such as:

a - ability to apply and use the principles, concepts of basic laws of physics and technology;

b - facility to manipulate mathematical formula, including the ability to use algebra, trigonometry, analytical geometry as a problem solution tools.

c - understanding advanced mathematics including the computer language and the calculus requested;

d - ability to analyze, problem solving, repair systems made of subsystems in various fields such as: electronic, electric, mechanics, thermal, fluids, and optics.

f - knowledge and understanding on engineering applications in industrial process and advanced technology;

g - ability to use computers to manage information, process control, equipment and design;

h - ability in communication including the capacity to record, analyze, interpret, synthesize, transmit objectively the facts and ideas - orally, written or in graphical forms.

5. Curricula for modern technologies

Curricula to train technician to work on high technology must present a scope of disciplines adequately selected and grouped in cores according to the nature of contents and the objective of this in the program. This cores may be classified as: basic core and technical core for the basic formation of technician, and core of high technology for the specialized formation of technician.

a. basic core

Disciplines of this core are to develop fundamental knowledge and are composed by mathematics, physics, materials science, communication, computers science and general studies.

b. technical core

Disciplines of this core are to develop the knowledge on technical principles and are composed by electric circuits, electronics technology, graphical representation, mechanics, electromechanical, fluids, thermal science, materials for engineering, control systems and systems for computers.

c. high technology core

Disciplines of this core are for specialized courses elected by the technician, enabling him to advance in his skills. Depending on the field of specialty, just to mention few of them, it can be:

a - for **electro-optical** technician, typical disciplines are: laser technology, optical communication, optical electronics, and holography.

b - for **instrumentation and control** technician, typical disciplines are: transducer technology, process control fundamentals, digital process control, and distributed control system.

c - for **robotics** technician, typical disciplines are: robotics system, shop automation, mechanical vision, CAD/CAE/CAM, and computer networks.

d - for **micro-electronic** technician, typical disciplines are: micro-electronic technology, VLSI automation, graphics, and software systems.

e - for **automation** technician, typical disciplines are: office automation technology, local area network, desk top edition, development of software systems, and expert systems.

6. Key features

Some key features of mechanisms and advanced technology systems must be considered to implant

courses aiming to train specialized technicians in high technology:

a . the complexity of program requires a great number of subsystems;

b. sophisticated electronic subsystems with large application of mechatronic in intelligent machines;

c. high density of electronic logic circuits in the mechanisms package.

7. Conclusion

The design of any program to train technician in high technology requires a sound experience and reflection over a prospective nature of data available to enable to identify the trends of technology flows in terms of life cycle. Budgeting on high technology programs must be well planned as the cost to run courses of this nature is very expensive. Existing schools of technology, vocational technical schools, and specialized skill training centers, can be the places to offer such program, minimizing the cost by using a part of infrastructure already in use.

8. References

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