

## **Linkage to face global challenges**

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### **Abstract**

As a result of this analysis, the need to develop a specialty in aviation module for racing mechanics and mechatronics is determined. The impact of this project has been of great importance for the institute for students in residences, professional practices, by making stays abroad, by making agreements with companies, external training, and development of research projects.

### **Linkage, globalization, education**

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## Introduction

Higher education has been a central institution in globalization processes given its direct connection with the production and dissemination of knowledge as well as science and technology development, while at the same time it is further recognized its contribution to the economy (Stromquist 2008).

Its plants of scientists and experts who support and promote much of the international mobilization and its coordination are key. The important role of Technological Institutes within the National Technological of Mexico (TecNM) has increased due to the need to have: "... a homogeneous global market that requires a uniform system of education and training based on a common set of qualifications" (Grediaga, 2006).

In accordance with the "National Technological of Mexico" (TecNM) objective to "Strengthen the quality of educational services" to foster and consolidate its international position established in the Institutional Program for Innovation and Development 2013-2018, and considering that currently more than 60% of the Mexican aerospace industry, is operating in the northwestern part of the country (Sonora, Chihuahua and Baja California), and approximately 85% of the industry's jobs are graduates of TecNM.

This paper describes the project of linking the Technological Institute of Mexico with the aerospace industry, from which a series of academic actions are derived, giving rise to institutional strategies in a more globalized knowledge society.

## Methodology

The methodology to address the changes within the organizations and used in this project, starts with a vision, followed by the integration of a work team that establishes an objective and implements the actions; With the aim of facing the challenges of globalization.

The Institution's vision was to have more relevance to the aerospace industry in order to satisfy the pressing competencies of the industry; since it represents one of the axes of greater impact in the economy of the country.

The team was integrated with teachers with experience in the aerospace industry, members of the institute's metal-mechanic academy and honorary members (technical experts) of the aerospace companies, in figure 1 some of the members of the team work:

- GKN Aerospace.
- UTC Aerospace.
- UTC Aerospace.
- Gulfstream Aerospace.
- Honeywell Aerospace.
- Honeywell Turbo Technologies.
- Collins, EMMSA.

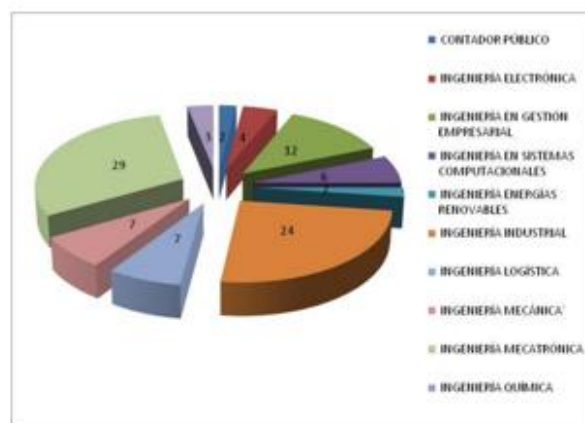


**Figure 1** Part of the team at the Air Force Aerospace Forum Mexico 2015

Teamwork began with a diagnosis to know how many students per career have made residences in the aerospace industry, according to historical data of the last year, which showed that the largest number of students were mechanics and mechatronics, results are shown in figure 1.

Based on this result, an analysis of the competences acquired by the students of the mechanics and mechatronics career and the skills and abilities required by the aerospace industry was continued. This analysis determines the need to design a new specialty in "Aeronautics" for these careers. Which complies with the skills and abilities required by the aerospace industry; in accordance with the current regulations in the National Technological of Mexico, established in the Guidelines for the Integration of Specialties (Lineamientos Académico Administrativos, 2011).

In this way the work team was given the task of reviewing the contents of the curricula of these careers and performing a gap analysis with the requirements of the aerospace industry, to determine what contents should have the new specialty.



**Figure 2** Number of IT Mexicali students per career in the aerospace industry

The document of the design of the new specialty, was integrated by the equipment according to the Guideline for Integration of Specialties (Lineamientos Académico Administrativos, 2011), with the following requirements:

Elaboration of the region diagnosis, considering the following aspects:

- Socioeconomic activities of the region.
- Public, social and private companies that operate in the area and that influence the environment.
- Development programs and projects of these agencies.
- Present situation of the production of goods and services.
- Characterization of regional natural resources.
- Prospects for development of the previous points.

- g. Development of the current and emerging disciplines in the local, regional, national and international environment, related to the curricula offered by the Technological Institute.
- h. Needs for professional skills in the environment.

Study of the Institute's capacities, listed below:

- a. Number of students in the generic structure curriculum.
- b. Failure and desertion indexes.
- c. Socioeconomic conditions as well as training and work expectations of the students.
- d. Academic staff: profile, as well as professional and teaching experience.
- e. Technical and administrative personnel. Indicating the personnel in charge of laboratory, administrative and support personnel to the specialty.
- f. Physical infrastructure: classrooms, laboratories, rooms and adequate spaces that encourage student learning. Technical infrastructure: laboratory equipment, audiovisual equipment, specialized computer systems, specialized software, sources of information and specific requirements for the operation of the specialty.
- g. Prospective analysis of the increase or decrease of each of the previous aspects.

Development of the contents of the subjects that integrated the specialty, was developed based on the results of the gap analysis previously done by the academy and technical experts of the aerospace industry.

Design of the specialty contemplated the following aspects:

- Definition of the specialty profile and its contribution to the egress profile of the educational program.
- Definition of the generic and specific competences of the subjects that make up the specialty.

The content of the subjects established by the team, which make up the specialty, and in this case were:

- Aeronautical structures and dynamic systems.
- Special materials and processes in aeronautics.
- Aircraft systems.
- Quality systems in aeronautics.
- CAD applied to aeronautics.
- Advanced aeronautics manufacturing.

Elaboration of the subjects of the specialty; Considering its integration with the generic structure of the curriculum from the sixth semester onwards, with the current methodology for the design of plans and curricula by professional competencies, and the generic structure of the curriculum shown in figure 2.



<b>HONEYWELL AEROSPACE DE MEXICO S. DE R.L. DE C.V.</b>	<b>66</b>
Practitioner	51
Resident	15
<b>INTERIORES AEREOS S.A. DE C.V. (GULFSTREAM)</b>	<b>1</b>
Resident	1
<b>IVEMSA (DIV. GKN AEROSPACE CHEM-TRONICS MEXICALI)</b>	<b>7</b>
Practitioner	6
Resident	1
<b>LMI AEROSPACE</b>	<b>1</b>
Practitioner	1
<b>SKYWORKS SOLUTIONS DE MEXICO, S. DE R. L. DE C. V.</b>	<b>11</b>
Practitioner	4
Resident	7
<b>SUNTEK MANUFACTURING TECHNOLOGIES</b>	<b>2</b>
Resident	
<b>TT ELECTRONICS</b>	<b>1</b>
Resident	1
<b>UNITED TECHNOLOGIES AEROSPACE SYSTEMS (GOODRICH AEROSPACE DE MEXICO)</b>	<b>2</b>
Resident	2
<b>UTC AEROSPACE</b>	<b>3</b>
Practitioner	3
<b>Total Residents</b>	<b>65</b>
<b>Total Practitioners</b>	<b>31</b>
<b>TOTAL STUDENTS IN AEROESPACIAL INDUSTRY</b>	<b>96</b>

**Table 1** Number of Residents and Practitioners in the aerospace industry with a specialty in aeronautics

## Conclusions

Since one of the trends within the program of improvement of the Higher Education Institutions (HEIs) of today is the internationalization of higher education; was the engine that generated this project inside the institute, but its expression is the result of a more comprehensive and universal transformation, walking towards globalization, as a process of interconnection of the world today.

In this context, the project described in this paper proposes a linking strategy, as an example for the institutions of higher education to replicate and join this universal historical phenomenon called globalization, which leads to the development of nations, science and technology.

The effects of globalization on higher education, as we have seen in this project, have allowed us to increase the linkage of institutions with regional, national and global environments, improving knowledge, has also been a stimulating factor for the acquisition of languages as a component of professional profile and the essential element of employment.

Globalization in higher education is largely related to academic mobility, which undoubtedly is the training of professionals who require countries to work and direct the processes of change towards sustainable development that has as a center the human being (Domínguez, 2004).

The context of global openness and globalization in which we develop, as well as the greater dependence of our economy with the American (mainly) test our structures and processes. The challenge is to become competitive and develop in a world with much wider borders. The modernization effort of the system includes the updating of methods, technology, teachers and links with the productive system, in addition to responding to the growth of educational demand and the improvement of administration (Sánchez 2004).

The challenge of globalization calls for the educational model to be more complete, with a long-term vision, open, dynamic and effective, linking the student in both his personal and social dimension; without leaving aside technological updating.

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