

Lay-out Proposal in Capstone Project, Supported by Virtual Reality to get the K ABET Outcome

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Abstract: The final outcome for ABET says: “An ability to use the techniques, skills and modern engineering tools necessary for engineering practice”. Taking this sentence as a reference, we can say that all the Engineer Programs should look for developing to their students the ability to adaptation to any environment. Nowadays we are being part of a cultural change in industry, this change has been called “Industry 4.0”, and all the use of software has become necessary for elaborating proposals by any Engineer. We think that Industrial Engineer has to improve products or propose new products taking reference from all the supply chain, so lay-out becomes a very important component because we define all the intern process; adding to it the use of the Virtual Reality for making a better impact for all the team members. CAD software help to support this step of the project, we usually request Google Sketch Up, because is free-cost and easy to understand for any engineer student, but if the students find another software that allow them to make a practical lay-out, we support their project in this tool. We can see the evolution of the abilities and skills for the new generation of engineers in this kind of projects and engineer tools, this way we can guarantee our students are getting the K outcome for ABET.

Keywords: Virtual reality, ABET, CAD

1. Introduction

ABET is the best accreditation nowadays for an Engineering Program, so we can say that all the standards they set and the quality they guarantee, inspires confidence in those who aim to build a better world—one that is safer, more efficient, more comfortable and more sustainable. Having said the above, we have gotten the ABET since 2015, but always we are working for improving all the concepts involve in our program and nowadays the principal idea is Industry 4.0 (Figure 1).

A program as Industrial Engineer has his principal participation at Big Data Analytics, but also can participate at Augmented Reality, 3D Printing and Internet of things.

The students of engineering have to be ability to use software of CAD, giving a preview to Virtual Reality (VR). All the members of the engineering programs we should interact with this ability to take an advantage for the students for making integrative proposals for new product or process.

At our Capstone course we try to develop a new product with the guarantee that all the concepts of Industrial Engineer are covered. This final course includes lay-out and we take advantage of this and we are developing this one as VR.



Figure 1. Industry 4.0

2. Methodology

When the students of the Industrial Engineer and Management Program get into last semester of their career, they should take the capstone course. This project allows the student proposes the creation of an innovative product, the product feasibility of conducting manufacturing as its justification is shown based on economic engineering and social context of the acceptance of the proposed product. There is a proper use of marketing tools for the justification of the demand for the product, and ensure proper use of the available platforms to advertise the proposed product. Appropriate tool uses to determine customer needs and critical features of the product that will impact the use thereof by the consumer tools. right-oriented strategic planning to visualize opportunities, threats, strengths and weaknesses of the organization tools use. Correct application of techniques of industrial engineering and quality engineering to determine the design of production and quality control in the process.

This course has an assessment for guarantee to get five outcomes for ABET, which are:

- c) An ability to design a system, component or process to meet the needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- e) An ability to identify, formulate and solve engineering problems.
- h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.
- j) A knowledge of contemporary issues.
- k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

We can be sure to get these outcomes when we read the project objective: “Develop creativity and innovation through the development of a product or service that allows application of the knowledge acquired in management, design engineering, manufacturing processes, engineering cost, work study, ergonomics, statistics and Taguchi engineering, economics, industrial safety, facility design and material handling systems, marketing, maintenance management, business strategies, quality management systems and world-class manufacturing. With this theoretical and practical application of industrial engineering with a global, entrepreneurial and creative in developing a product or service approach is ensured; as it takes into account all aspects of new product development, which we can mention as forms of development work, optimize production systems, managing quality systems, managing maintenance of equipment, alternative infrastructure, design logistics systems , to group activities, detect and develop human talent, all this for proper decision-making through the proper interpretation of the results that throw us all of the above”.

First of all, they design a product process and support it with flow chart and other engineer tools (Figure 2). This last year we have included the requirement of a VR lay-out, obviously trying to improve the profile of our students and strength the K outcome for ABET. We are using new technology for making a proposal including all the concepts of Industrial Engineer

being supported by VR, also we are a public university we do not have the funds to acquire a software package for making test, so we have found Google SketchUp, free cost and easy to learn for the students.

Before getting the VR lay-out, they have to design a lay-out using AutoCAD, which one is the principal software for making this kind of proposals, after this step, the students can elaborate their VR proposal, actually they can take AutoCAD like a basis

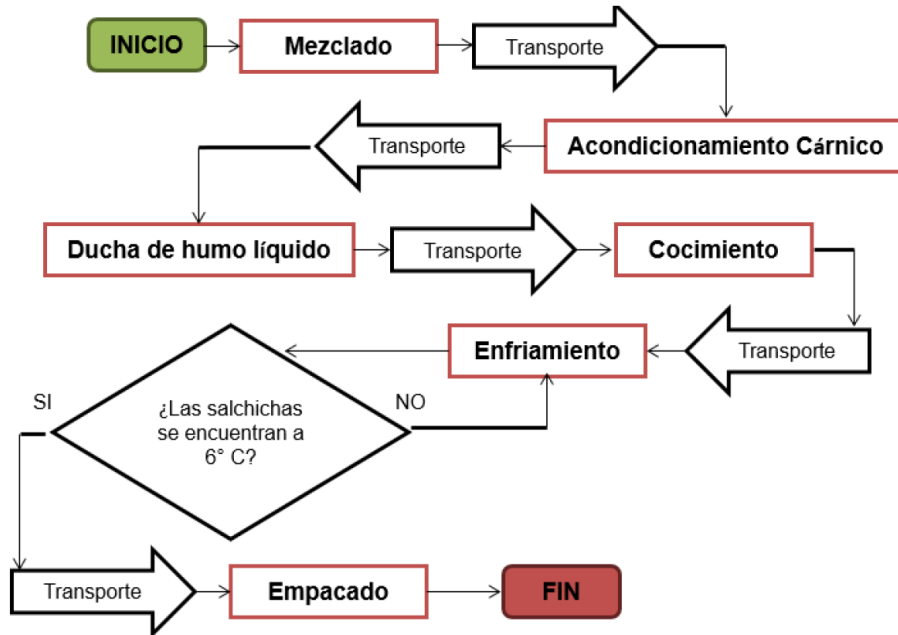


Figure 2. Flow Chart

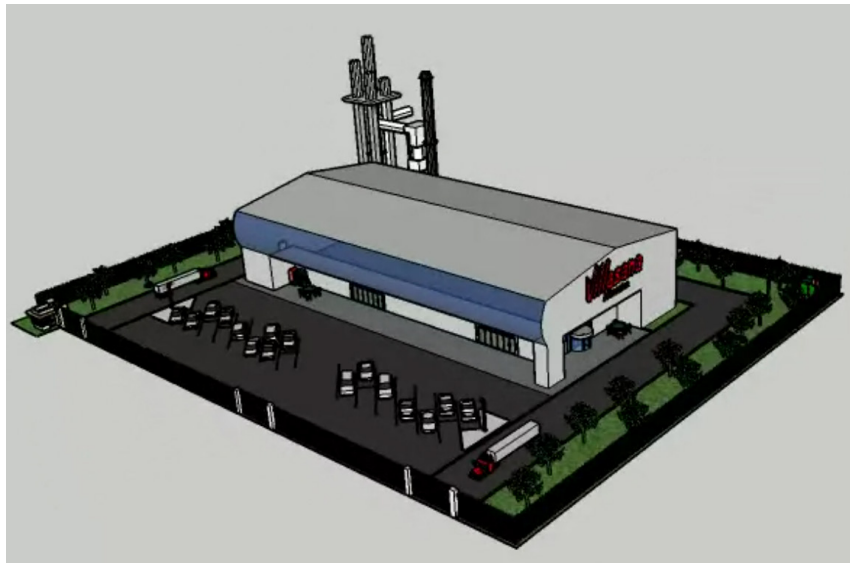


Figure 3. Lay-Out AutoCAD

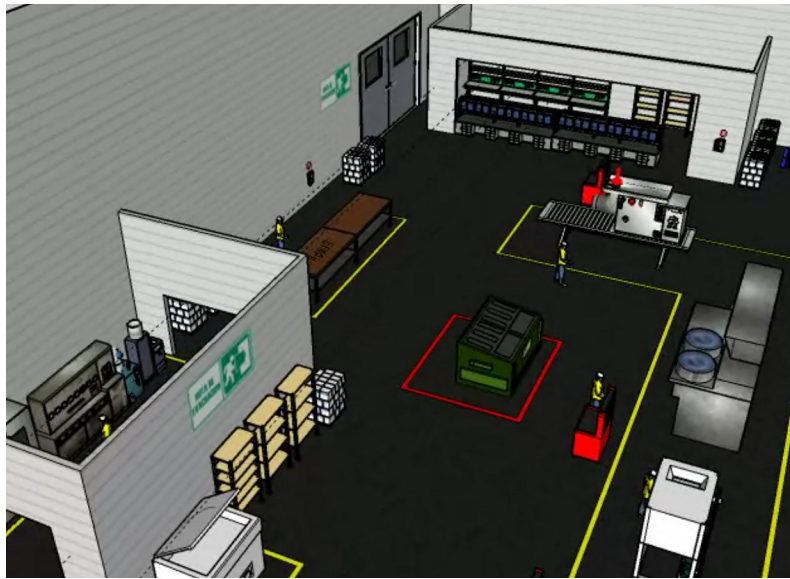


Figure 4. Lay out by VR, powered by Google SketchUp

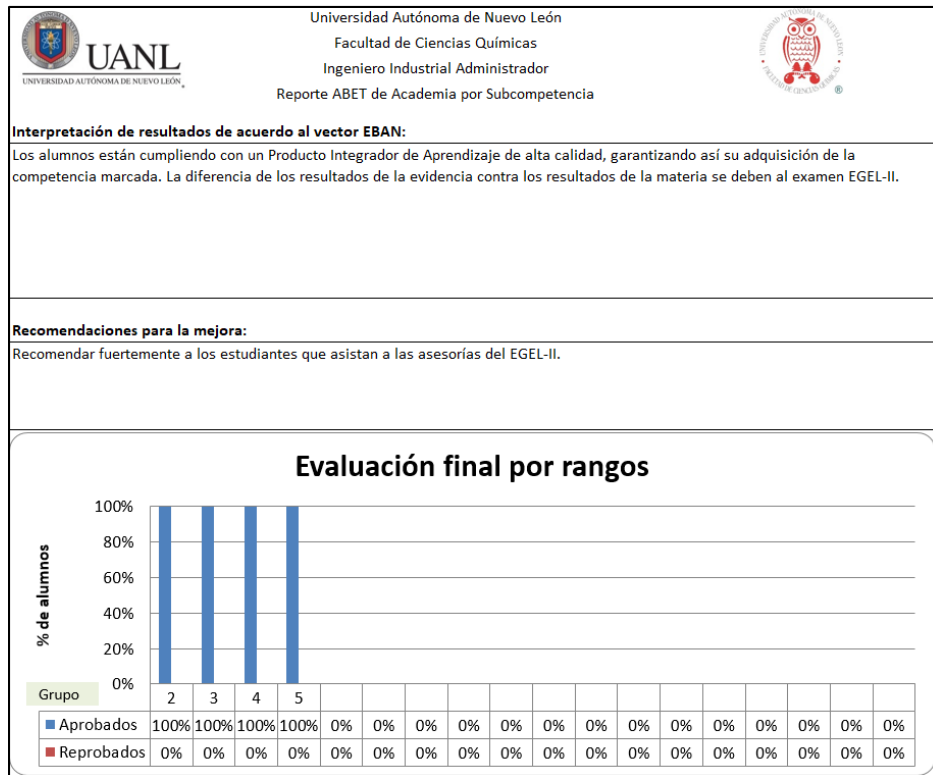
3. Results

The students have gotten demonstrate can use the VR for making innovative proposals, also can support all the analysis they have done for guarantee their project with the common tools for industrial engineering, so we can guarantee they are getting the K outcome for ABET.

All the students are getting the highest evaluation in the outcome K (Figure 5), so we can say the final project is well done and they are using their tools as Industrial Engineers.

4. Conclusions

All the programs should look for new technologies and fearless to challenge with new software, also they have to motivate to students to look for new ways to get the final result. All our students are being recognized by companies because they are getting abilities for adaptation to a new environment.



Competencia ABET:
k) La capacidad de utilizar las técnicas, las habilidades y las herramientas de la ingeniería moderna necesarias para la práctica de la ingeniería.

Subcompetencia:
3. Utilizar las técnicas, las habilidades y las herramientas de la ingeniería moderna en la práctica de la disciplina

Nombre de la evidencia con que se evalúa la subcompetencia
PRODUCTO INTEGRADOR DE APRENDIZAJE

Grupo	Calificación promedio de la evidencia	Cantidad de alumnos por rango de calificaciones de la evidencia (Vector EBAN)				Total
		90-100	80-89	70-79	<70	
2	95	45	0	0	0	45
3	98	45	0	0	0	45
4	97	48	0	0	0	48
5	95	45	0	0	0	45

Figure 5. ABET Report for outcome K

5. References

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