

Proposal to redesign a process flow through the use of Augmented Reality

J.M. Hernández-Ramos, C. Solís-Peña, J.A. Chi-Tapia, I.G. González-Palomo, S.G. Elizondo-Arroyave, and J. Cuellar-Celestino

School of Chemistry
University of Nuevo Leon
Nuevo León, México

Corresponding author's Email: jmanuelhdz10@live.com.mx

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Abstract: With the incursion of Industry 4.0 several concepts have grown popularity and have evidently worked. In the area of engineering design, two concepts that have taken great importance are virtual reality and augmented reality; both concepts that in the beginning were linked with video games and leisure, today are a necessary tool to provide robust proposals in the design area. Evidently both concepts are supported for CAD software engineering, as is AutoCAD and in this case Google SketchUp; both tools allow us to visualize design proposals made by students to businesses in Monterrey's metropolitan area, generating a high impact in the tools to carry on with the proposed. To help CAD software's that deliver virtual reality, we used HP Reveal to incorporate the augmented reality and strengthen the weight of our proposal in the exposition for the improvement of the business. This proposal is parts of its final Project of the learning unit of "Design of facilities and material handling systems", that pretends to guarantee that the students of the Industrial Engineer Administrator obtain the competence to design a process that satisfies the proposed requirements within realistic restrictions, for example, in the health and safety aspects, of manufacturing capacity and sustainability. Besides acquiring the previously mentioned competence, the students are adapting the basic knowledge an Industrial Engineer must have for all the new technologies.

Keywords: Virtual Reality, Augmented Reality, Engineering's Design

1. Theoretical Framework

Ivan Sutherland (1968) created the first head-mounted display that rendered simple wireframe models for the viewer's changing pose. This invention laid the foundations for the technologies we now call Virtual Reality (VR) and Augmented Reality (AR). Nowadays, any engineer has to be capable to identify and understand the concepts of Computer Aided Design (CAD) for making propose that solves problems in the organizations. CAD must be seen like a tool that support projects of lay-out design, for this reason we have to try all the students in Engineer Programs have to get the outcome to perform this kind of software, because nowadays this skill is necessary to make proposals. People often identify VR with videogames, but at least, in Engineer field can be a great tool for developing a lot of projects.

Taking advantage of the CAD, we introduce the concept of VR, we can define this concept like a computer system that creates an artificial world in which the user has the impression to be inside, also the user can navigate and manipulate objects in this fiction world. The last decade we have had a lot of software package to develop VR, in our class of "Lay-Out Design & Materials Management Systems" we use the Google SketchUp to support all the projects since 2009; obviously the Google SketchUp has been improving through the years and it has been very productive for us and our students.

Talking about VR, the principal kind of VR that help us is immersive; immersive virtual reality provides an immediate, first-person experience; when you are designed a lay out plant, you have to convince to all the team that the spaces and objects will be right with your proposal, this kind of VR support it in a great way.

Now, a variation of immersive VR is AR where a see-through layer of computer graphics is superimposed over the real world to highlight certain features and enhance understanding.

For this paper, we use the HP Reveal, because is a free app for iOS and Android-based mobile devices that provides a platform for anyone to explore AR. It enhances our projects into an interactive display of animations, audio snippets, videos, graphics, and it let us to introduce this concept (AR) in an easy way to the students.

2. Methodology

All the students of the Industrial Engineer and Management Program should get the outcome to design a lay-out for different kind of process; this objective has an important relevance in the topic “Lay-Out Design & Materials Management Systems” where the students have to develop a project of lay-out design for a plant. With this approach the student contributes to strategies that enable sound decision-making by interpreting the information gathered to develop innovative proposals and to start distribution in manufacturing world class.

The student identifies areas with a high sense of analysis, supported with real, hard data that allow them to set criteria for prioritizing the needs of the organization. The mainly involved concepts are: plant layout, receipt of materials, work instructions, industrial processes, hazardous waste management and some other concepts that are related to the discipline of Industrial Engineering. After that students make a situation diagnosis where opportunity for improvement is found, involving proposals based on data and linked to the discipline of industrial engineering tools. They also carry a financial and operational assessment, clearly stating the impact of their proposals to confirm the feasibility of the project realization.

Mentioned the above, we will focus in the part of engineer design; we have the support with AutoCAD or another software for making some proposals (Figure 1 & 2) and show the flow (Figure 3) and make some improvements for a best performance. The students design also the work cells (Figure 4), and all the flow for showing the impact of all the positions for the final process.

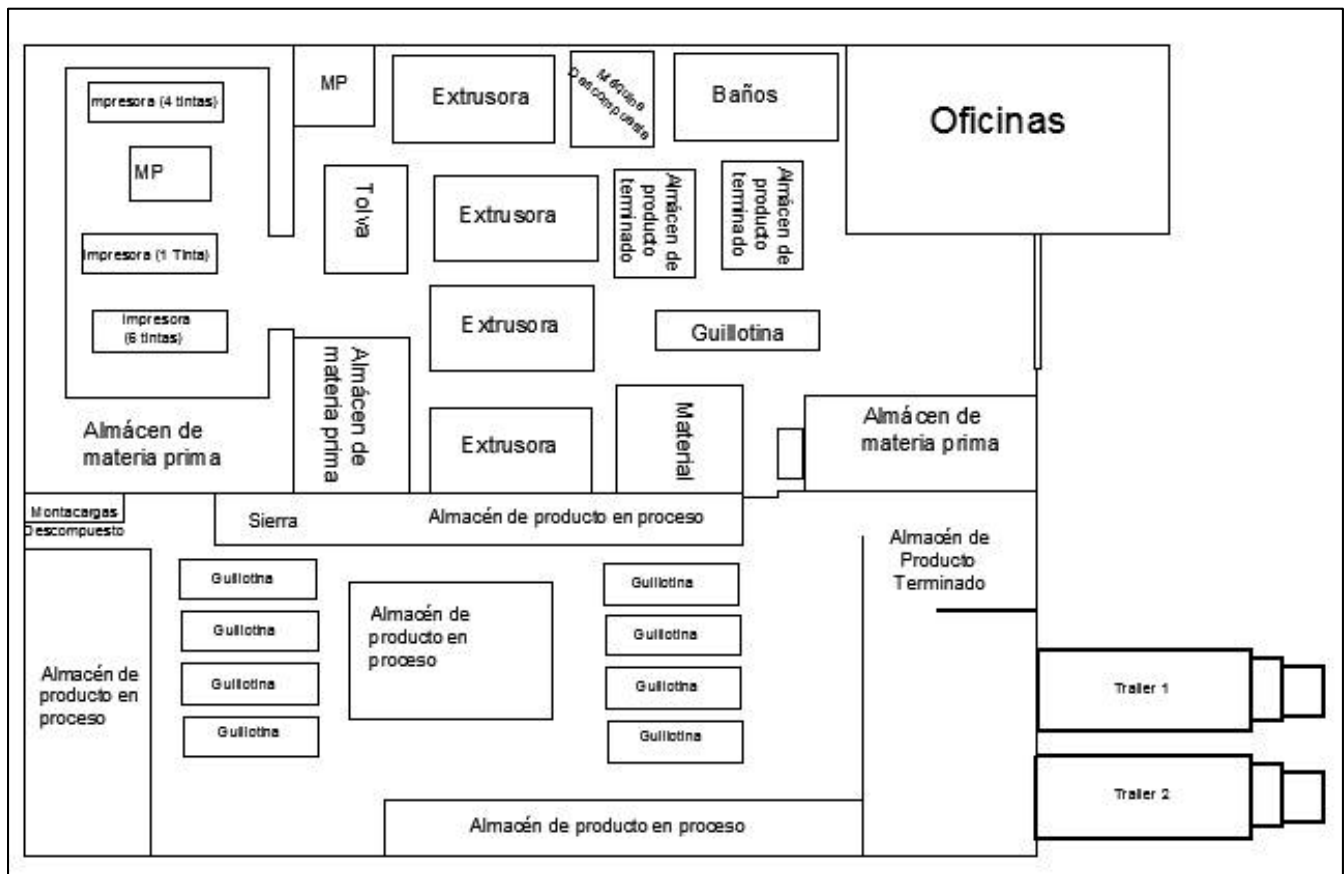


Figure 1. Lay-out design supported by Office Power Point

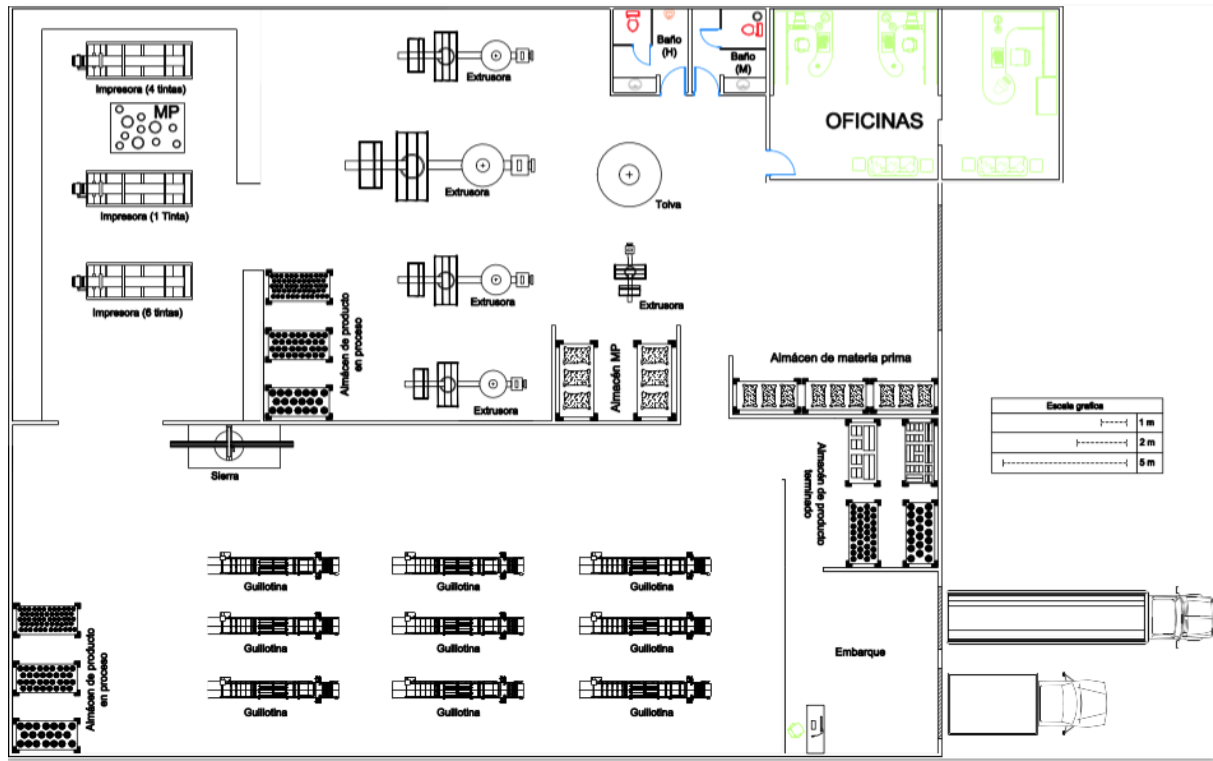


Figure 2. Lay-out Design supporting by AutoCAD

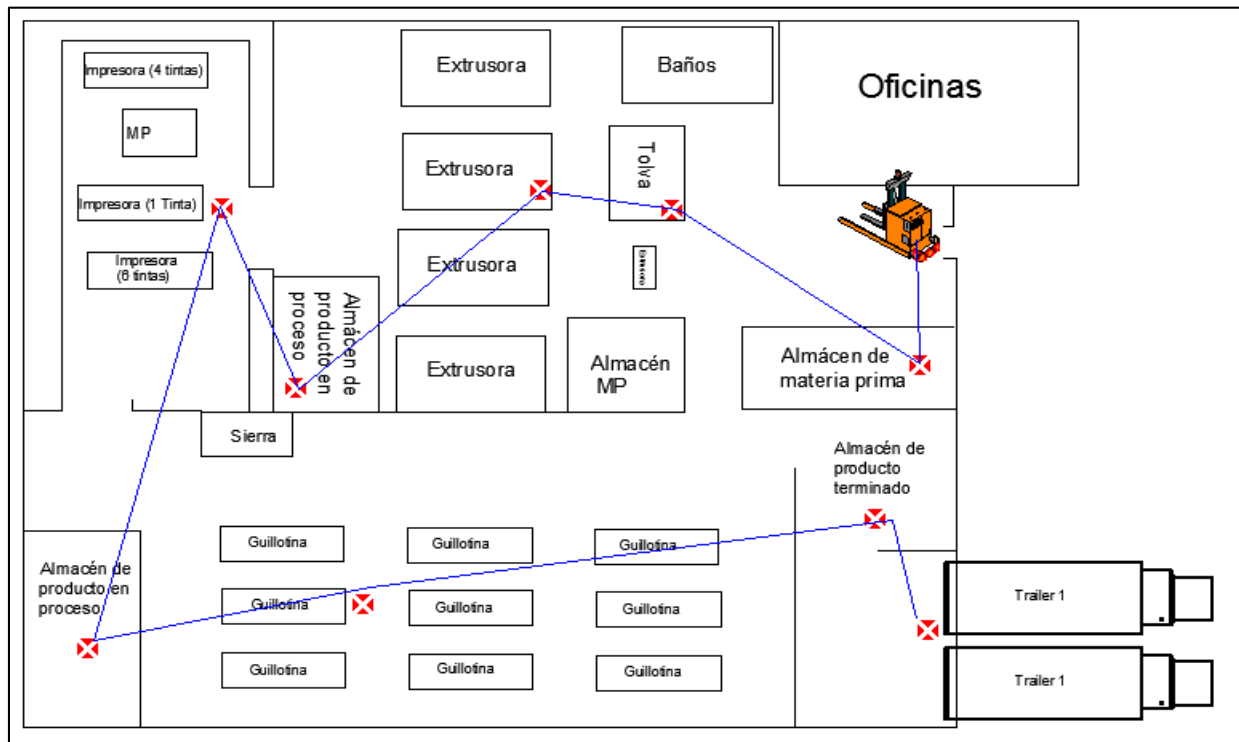


Figure 3. Lay-out material handling

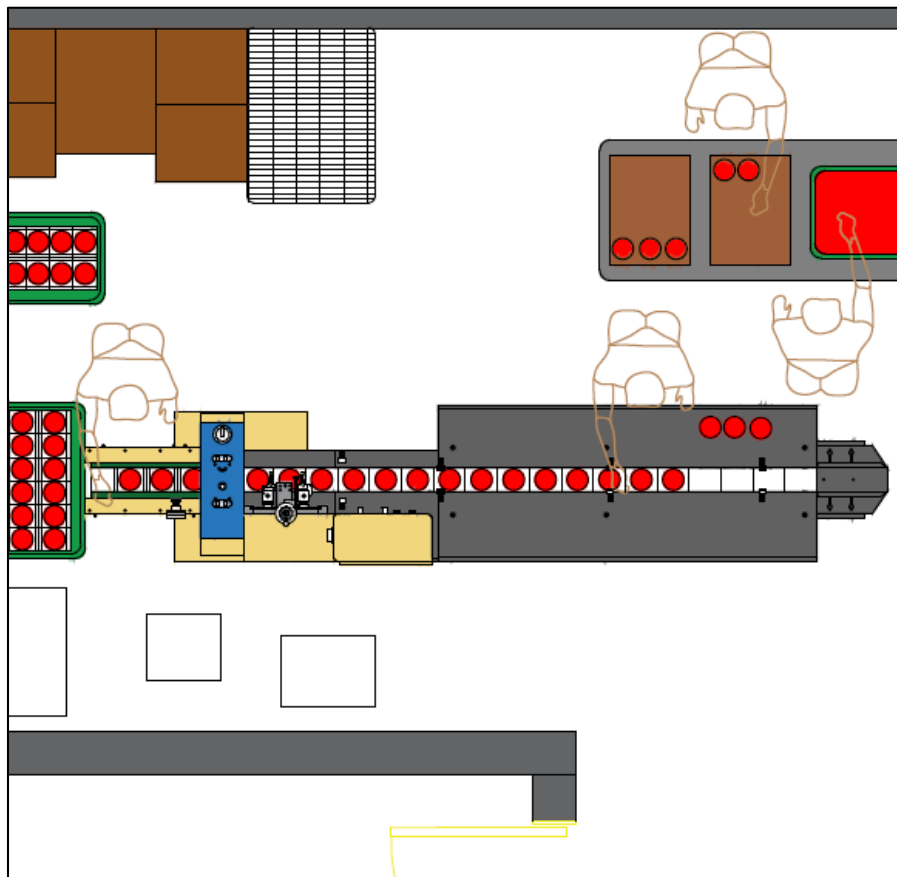


Figure 4. Work cell lay-out

Once that they have demonstrated the feasibility to make their proposal, teacher helps the student to make an VR lay-out for making shocking. For making the VR lay-out we used the software Google SketchUp.

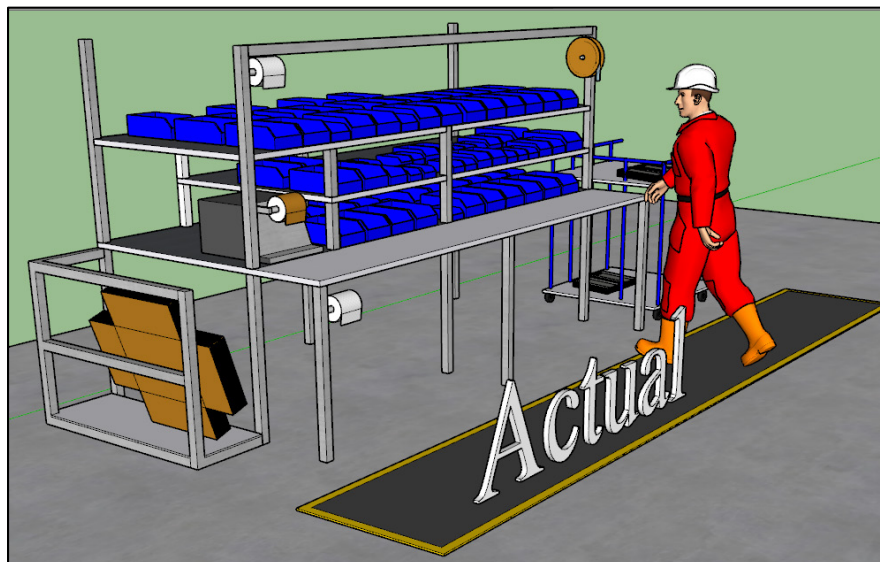


Figure 5. Work cell lay-out VR, supported by Google SketchUp

3. Results

We can mention that students can show in a better way their proposals when they use VR for making lay-outs. The student fulfills exposing the project, respecting the times set for it. They prepare a video that they uploaded to a drive for sharing when they use the HP Reveal (Figure 6).

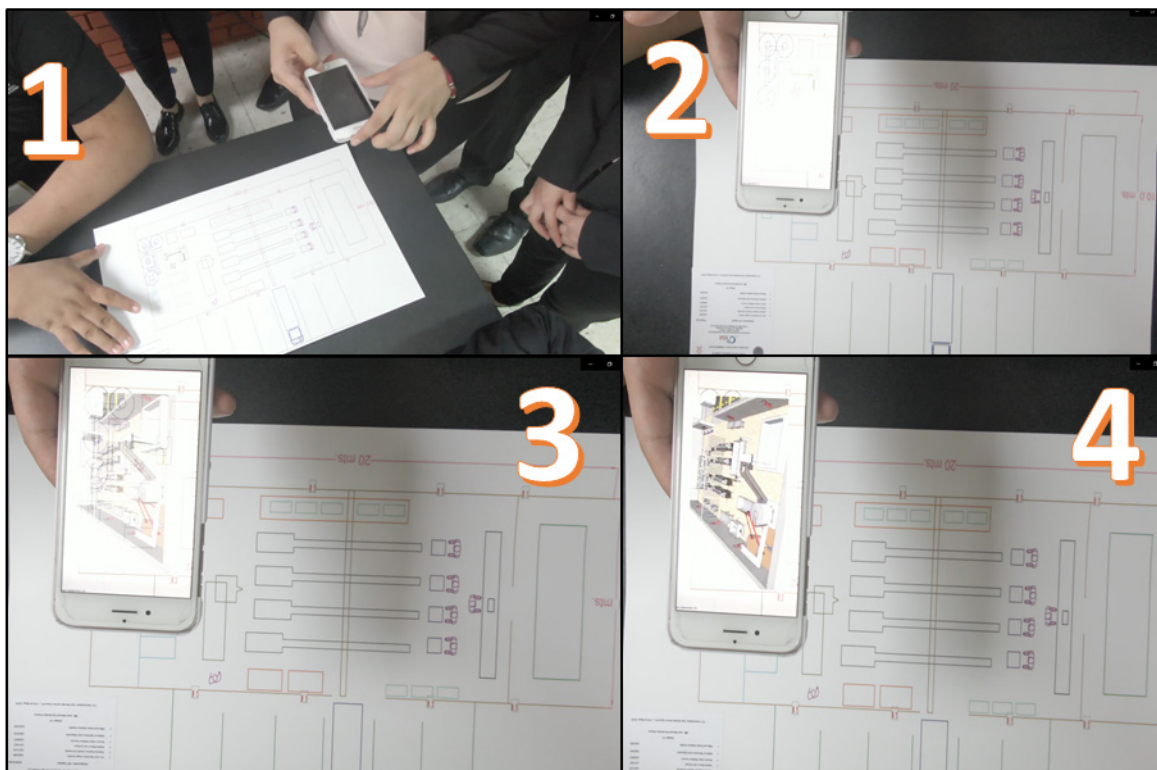


Figure 6. Exposing project helped by HP Reveal

The results obtained with this project is that the student get the outcome C for ABET, and we are giving a great context to the industry 4.0 and the Industrial Engineer Profession.

3. Conclusions

With the previously developed it is concluded that there is very important that all the programs of engineering take the challenge to involve industry 4.0 to his performance, all the university programs and mainly all the engineer programs have to incorporate this concept because the technology is a tool for making difference in professional performance.

4. References

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