

PAP PROJECTOR AUTOMATED PLATFORM

As part of an automation project at Tecnológico de Estudios Superiores de Coacalco (TESCo), a project conducted by students of the seventh semester of Mechatronics Engineering from this institution and members of the IEEE-Rama TESCo: Rodrigo Guadarrama Sánchez, Ramos Ferrara Ricardo Alberto and Salinas Rodriguez Felipe de Jesus, agreeing to implement an automatic system for the projector is located in the auditorium of Building "D" TESCo, which by means of an electro-pneumatic control from the cab this is actuated to project so if it is not used, remain hidden in the ceiling.

The first thing to do was to present the project to the authorities, with the fundamentals to promote the use of technology within TESCo, making the school auditorium has an automated system to make their projections and also replace the projector with a higher quality.

Once the project was approved, work meetings were held with students in charge of the project to define how the system would perform automation within the brainstorming meetings have combined their to define how and with what materials would manufacture, became the early designs of the system to implement and spoke of the possible types, being electromechanical first choice and second option as a system pneumatic.

The electromechanical system that would consist basically of two cubic structures, in which one would be the support and the other the base of projector, which have a vertical movement and would be generated by a motor-reducer and one worm screw.

Our second choice was a pneumatic system, which would consist totally pneumatic components, making use of two anti-rotation actuators and thereby anchored to the ceiling will have at the end of his career the base of the projector, at be operated the button "start" from the cab an electro valve active the pistons to make linear motion down and vice versa.

As main control element a PLC (Programmable Logic Controller) would be in charge of the operating logic of the two proposals, in addition to power buttons line, fired general, emergency stop, "start" and "stop". This control panel installed in the cab of auditorium control center will facilitate the manipulation of system.

To define what system to use, both the budget of was made, in the absence of existence much difference in terms of cost, this was discussed with the authorities of TESCo.



One of the objectives of the project is that it was an esthetic and innovative system for the institution, so he decided on the use of pneumatic technology with elements above control.

The materials used were:

- Aluminum Plate 40 x 91 ½ cm in thickness.
- Two anti-rotation actuators tires 400 mm stroke.
- 1 Solenoid 24V 5-way.
- 1 Power 24V to 3 A.
- 1 Box of 8 mm hose.
- 2 AMP regulator hose 8 mm rope eighth.
- 1 PLC Telemecanique.
- 2 Pins without retention with 2 NO and 2 NC contact points.
- 1 Reel for standard mounting.
- 10 Connectors 1/8 to 8 mm straight.
- 18 gauges cable.
- 1 Compressor Hp ¼ 110 V.
- 1 Tank 2 kg with volume 0.5cm³



Once defined the type of system and materials began with the manufacture of the main support and the functional testing of the system worth mentioning that everything was schemed in laboratories of Tecnológico.

The activities developed were:

- Appropriate measures were taken to space intended for the platform in the auditorium of Building "D" from TESCo.
- Recognition materials and system components control tire.
- Control cabinet is assembled by drilling necessary and the components of the

cabled.

- Programming was performed in steps of Telemecanique PLC using "Zelio" software.
- The system structure is devised.
- Testing the control box and PLC were performed.
- It is engineered with the router bases that hold the actuators.
- Compressor and tank were sanded and painted.
- The compressor tank, motor start capacitor was armed and air maintenance unit.
- Perforations were made in the roof of the auditorium to place the main base.
- The main structure is assembled and mounted on the ceiling of the auditorium.
- The control box and the hose was mounted in the cockpit air from cabin to the platform.
- Cabinet was performed for compressor system, this in order to give more beauty and order in the the cabin and assurance compressor.
- Installation chute for air hose.
- We performed the fit testing for both actuators come down and go up simultaneously.
- The projector is mounted on the base and final tests were performed image and projection angle.



Another very important point that should be taken into account in the implementation of any system or project is the safety, we with order to assure the system put four tensors to the main structure of the system, two at each end attached to the ceiling, we achieve with this a further tightening of system.

The projector that was used prior to our project will be simple and small, so it is proposed that it should be replaced with a higher quality, so who chose a BENQ projector with the following characteristics:

Native Resolution	XGA (1024 x 768)
Exhibition Technology	DLP® technology by Texas Instruments
Brightness	6000 ANSI Lúmenes
Lamp	200W / 3000 hours (normal / economic)
Contrast index	2000:1
Weight	11 Kg. (24 lbs.)
Operational noise	37/ 34 dB (normal / economic)
Dimensions	443 x 167 x 355 mm

Image Size (Diagonal)	31" a 300"
Zoom	Manual, 1.15:1
Lens	F=2.4 a 2.7 / f=38.87 a 46.63 mm
Colors	16.7 millones
Horizontal rate	31-82 kHz
Vertical rate	48 ~ 85 Hz
Input Terminals	<p>PC: RGB Análoga: D-Sub 15 pin x 1</p> <p>A/V: HDMI(v1.3) x1 Video por Componente RCA x3 S-Video Mini Din 4 pin x1 Video Compuesto RCA x1 DVI-D(soporta HDCP) x1</p> <p>Audio: Stereo mini jack x1</p>
Output Terminals	<p>Terminales de Salida PC -12V Trigger -RGB Análoga: D-Sub 15 pin x 1 AUDIO -5 Watt Speaker x 2</p> <p>Terminales de Control Conector serie RS232 8 pin MINI DIN Conector USB USB x1 (Type mini B) Wired Remote jack x1</p>
Video Compatibility	NTSC / PAL / SECAM
Power Consumption	280W x 2
Languages Menu	English / French / German / Italian / Spanish / Korean / Simplified Chinese / Traditional / Japanese / Russian / Czech / Portuguese / Dutch / Polish / Turkish / Swedish / Thai Chinese (17 Languages)
Functions	<ul style="list-style-type: none"> • Dual lamp (3 modes of projection) • 3D Color Management • Automatic signal search • Presentation Timer • BrilliantColor™ • Tone On or Off • Keypad Lock • Resolution Reminder • 11 Preset Picture Modes

- FAQ
- Autotune
- Image freezing
- Blank Page
- Rapid Cooling "Quick Cooling"
- Auto-Off
- Security Password
- High Altitude Mode
- Mute
- Compatible with HDTV
- Compatible con Mac

Accesorios (Incluidos)

- Quick Start Guide
- Manual on CD
- Remote Control
- Battery for Remote Control
- VGA Cable
- Power Cable

Screen Format

4:3 / 16:9 selectable

It should be mentioned that the dimensions of the platform is based on the projector. According to the model and system installation position the projection angle is shown in the following image:

BenQ Projection Calculator Check for updates

MODEL: Data Projector | SP920P

Calculate the Image Size (by projection distance)

Drag the projector below to your desired projection distance or enter the distance in the box to obtain the projected image size in the diagram and table to the right.

Max. distance: 10m
 Min. distance: 1m

10 m

52.58cm
 509.78cm

Calculate the Projection Distance (by image size)

Drag the diagonal line on the projected image or enter a desired image size in the box to obtain the projection distance in the diagram to the left.

609.6cm
 457.2cm
 762cm

Image Size Range for a Given Distance

	Max.	Min.
Diagonal	762 cm <input type="text" value="GO"/>	662.61 cm
Width	609.6 cm <input type="text" value="GO"/>	530.09 cm
Height	457.2 cm <input type="text" value="GO"/>	397.57 cm

UNITS

Imperial
 Metric

ASPECT RATIO

4 : 3 16 : 10
 16 : 9 15 : 9

LOCATION

Floor
 Ceiling

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As project monitoring sensors were placed on the platform, and governed by the PLC will verify that the projector position is adequate and allow the platform to upload, if this condition is not met, the platform will not upload, this as measure of security for the same projector.

For the team that developed this device was a great learning experience and having performed a functional project for TESCo, which will deal for future presentations and also increases the quality of the facilities. Having applied knowledge as a pneumatics, electrical and PLC programming helped us to improve the development of this project.

The automation of Auditorium continues, we will continue with the control of lighting for "scenes" and videoconferencing system, similarly, students of the IEEE-Rama TESCo will be involved in the implementation of these improvements.

We appreciate the support of Dr. Francisco Plata Olvera, Director of TESCo, as well as directors and Academic Administration and Finance for their support and trust in us to the realization of this project.





