



**VI JORNADAS sobre
TECNOLOGÍAS y SOLUCIONES PARA
LA AUTOMATIZACIÓN INDUSTRIAL**
Vigo, 3 al 7 de NOVIEMBRE de 2014

Universidade de Vigo | Escola de
Enxeñaría Industrial



5^a SESIÓN

**Rockwell
Automation**

MIÉRCOLES 5, 16:00-17:10

**Nuevas tendencias en automatización
de maquinaria**

Ponente:



- **D. Sergio López**
**(Ingeniero comercial Arquitectura Integrada,
ROCKWELL AUTOMATION)**



Un tipo con suerte



Información general Rockwell Automation

Rockwell
Automation

Líder global proveedor de soluciones automatización industrial y sistemas de información

- Ventas anuales: 7.000 millones US\$
- Sede: Milwaukee (Wisconsin) EE.UU
- Símbolo bursátil: ROK
- Oficinas: + 450 en más de 80 países
- Empleados: Aprox. 21.000

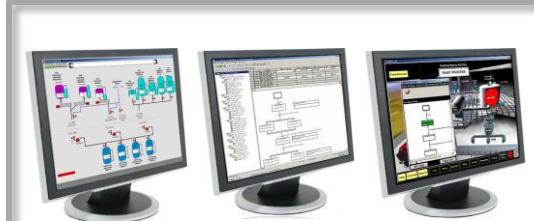


Oferta Rockwell Automation

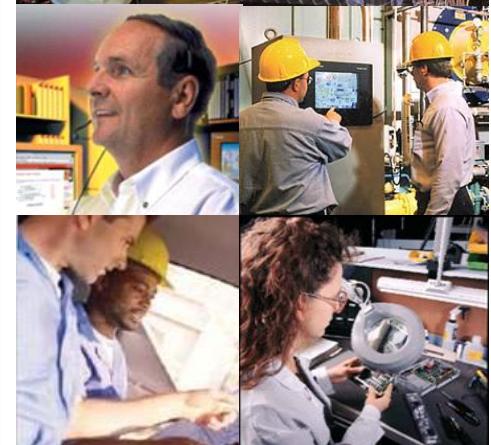
Componentes y Control Motores Inteligente



Arquitectura Integrada y Plataformas Información



Servicios y Soporte

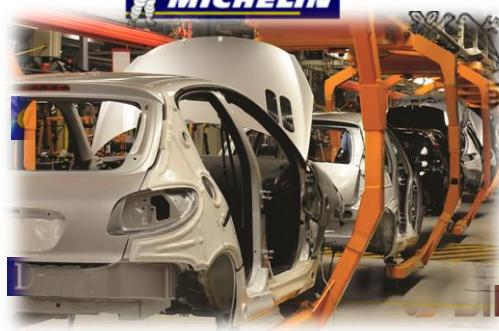


Industrias

BRIDGESTONE

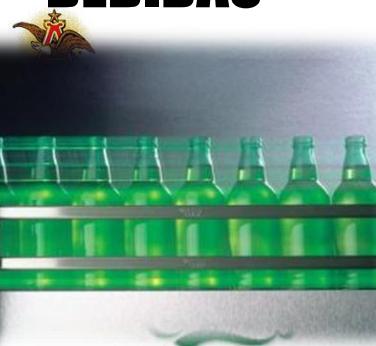
KRAFT

AUTOMÓVIL
MICHELIN



Heineken

BEBIDAS



Ford

GM

HYUNDAI

NISSAN

TOYOTA

ALIMENTACIÓN
General Mills



PEPSICO

**SAB
MILLER**

DIAGEO

Interbrew

**PRODUCTOS DE
CONSUMO**

Procter&Gamble

Kodak

Kimberly-Clark

**The
Gillette
Company**

GLOBOS



MERCK

Pfizer

Bristol-Myers Squibb

Wyeth

AMGEN

**INDUSTRIA
FARMACÉUTICA**



Y lo más importante

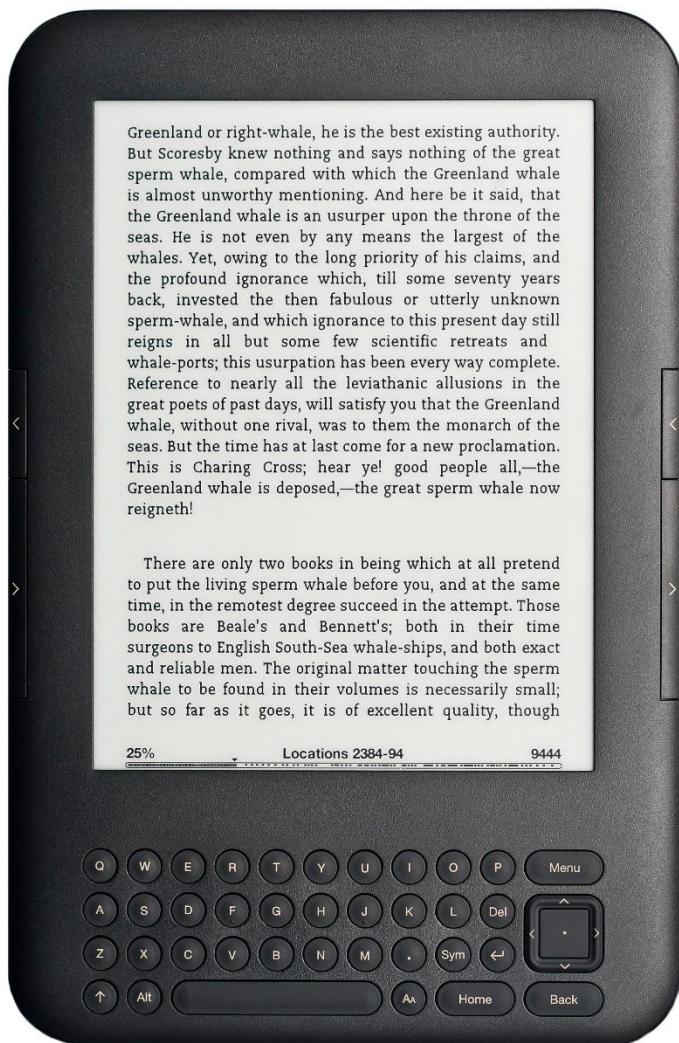


Un tipo con suerte





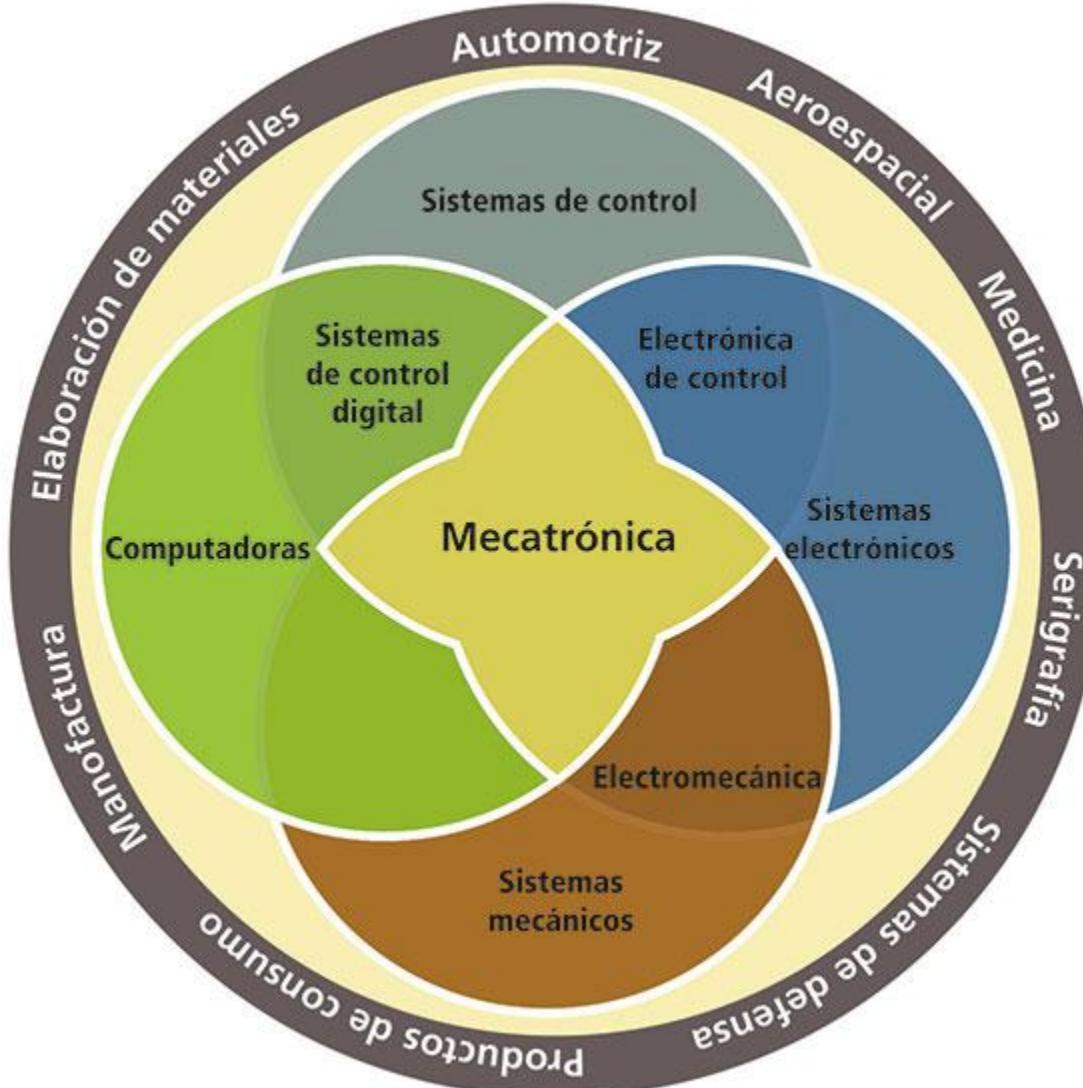
Un tipo con suerte



El principito



Mecatrónica

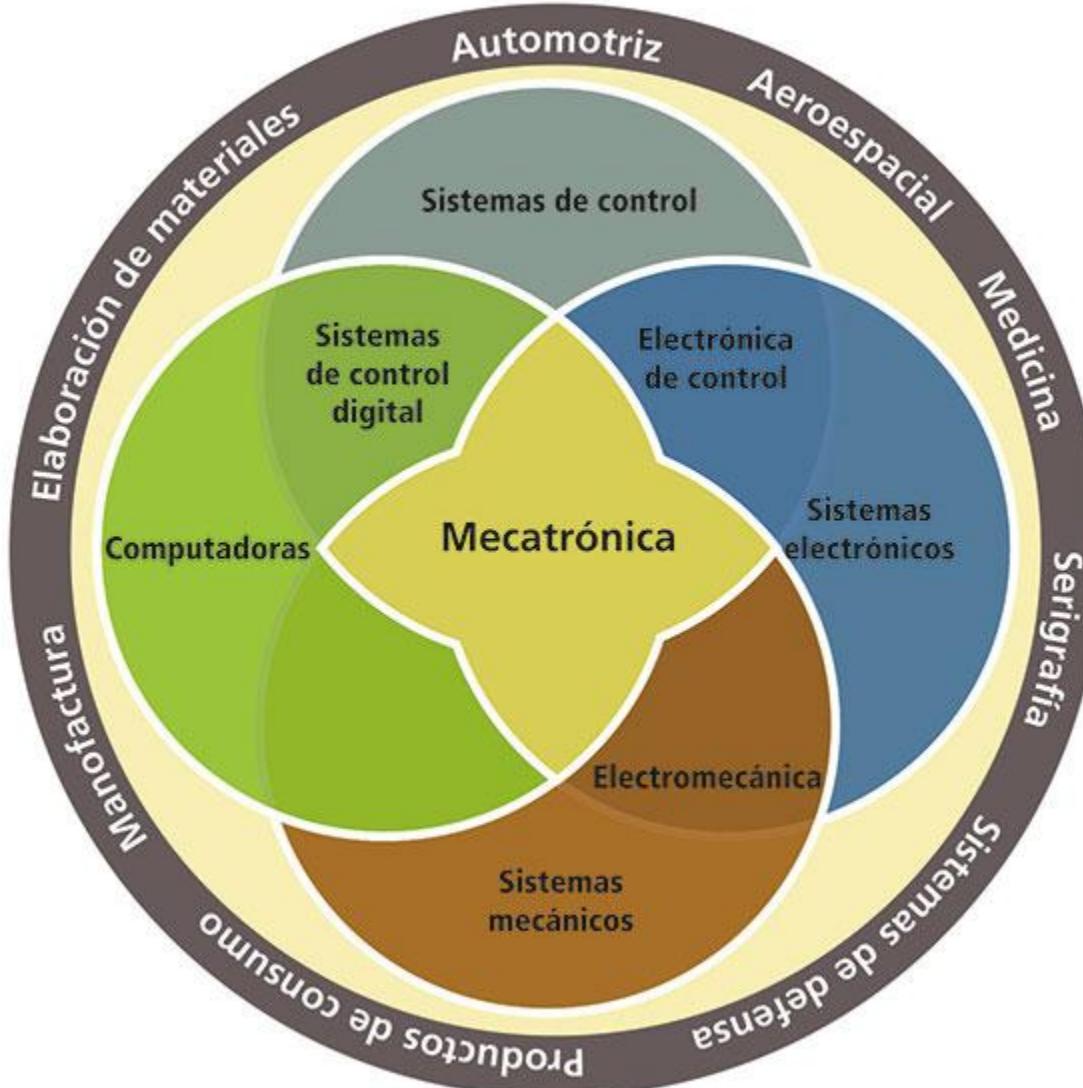








Mecatrónica



Mecatrónica

WIFI
La enc



“No creas todo
lo que leas en
Internet sólo
porque hay una
foto con una
cita al lado”

- Abraham Lincoln -



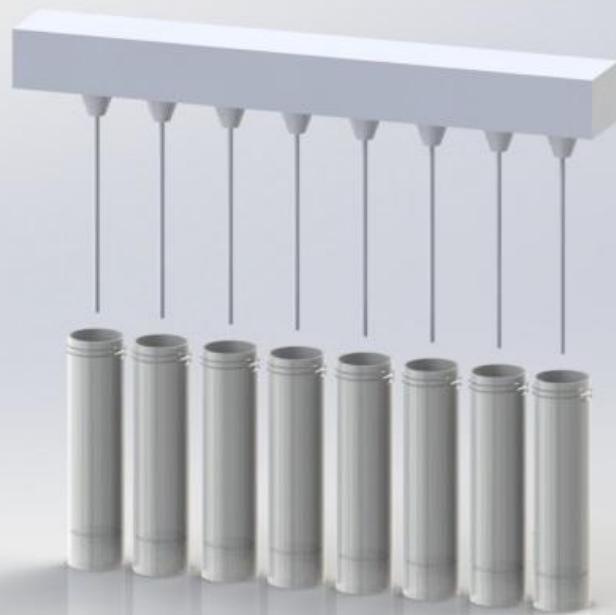


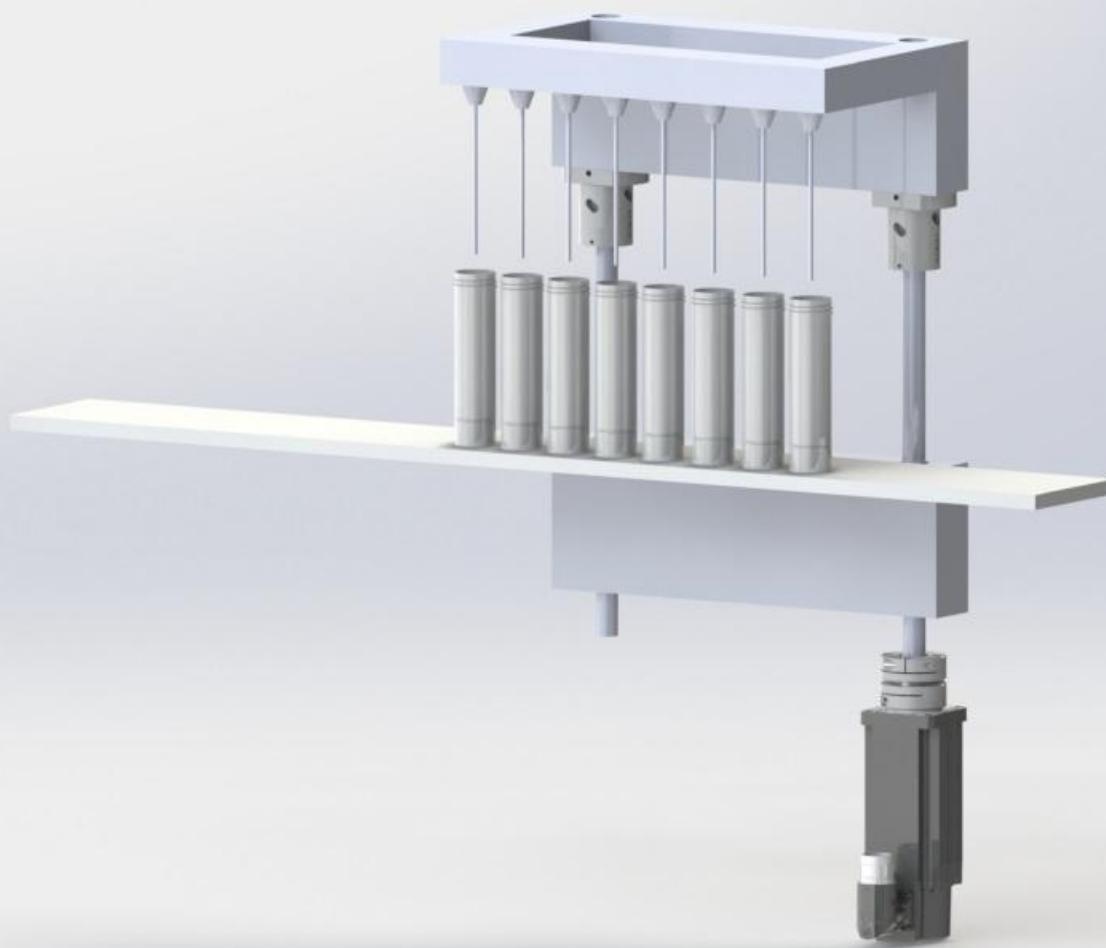


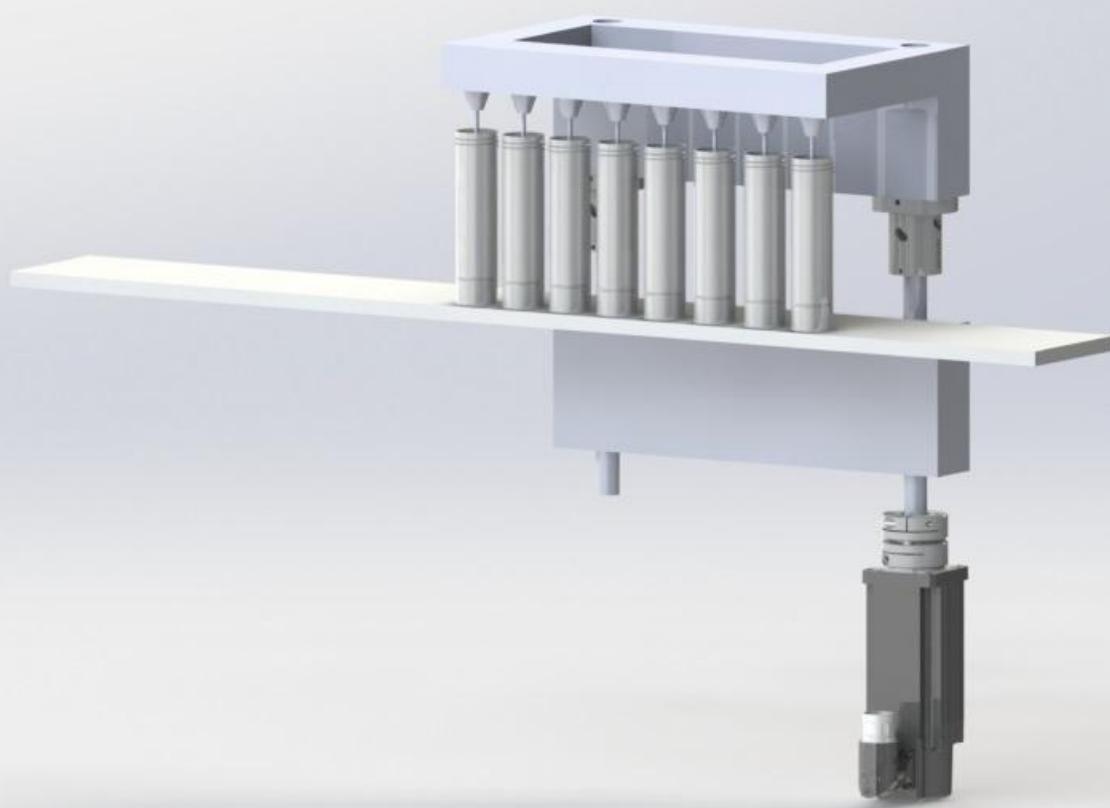
blah blah blah blah blah blah
ah blah

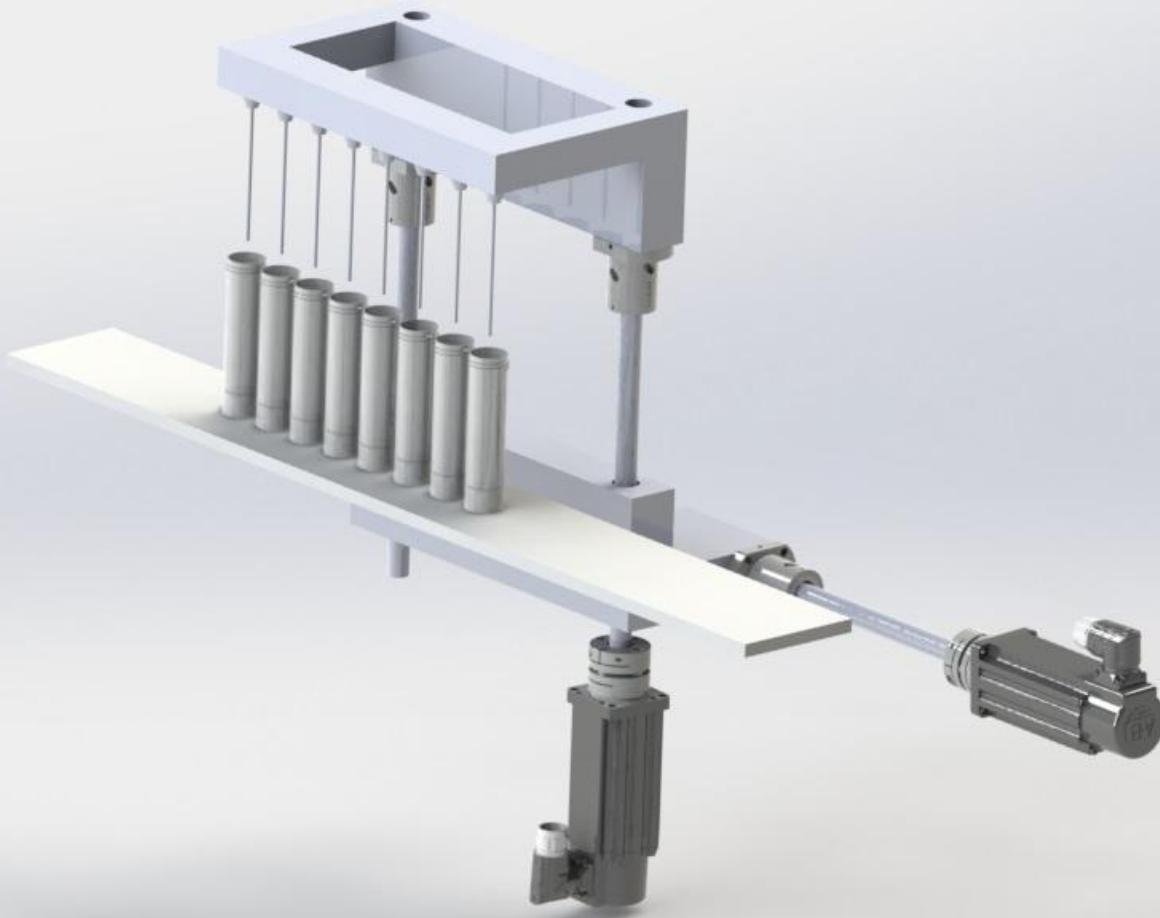


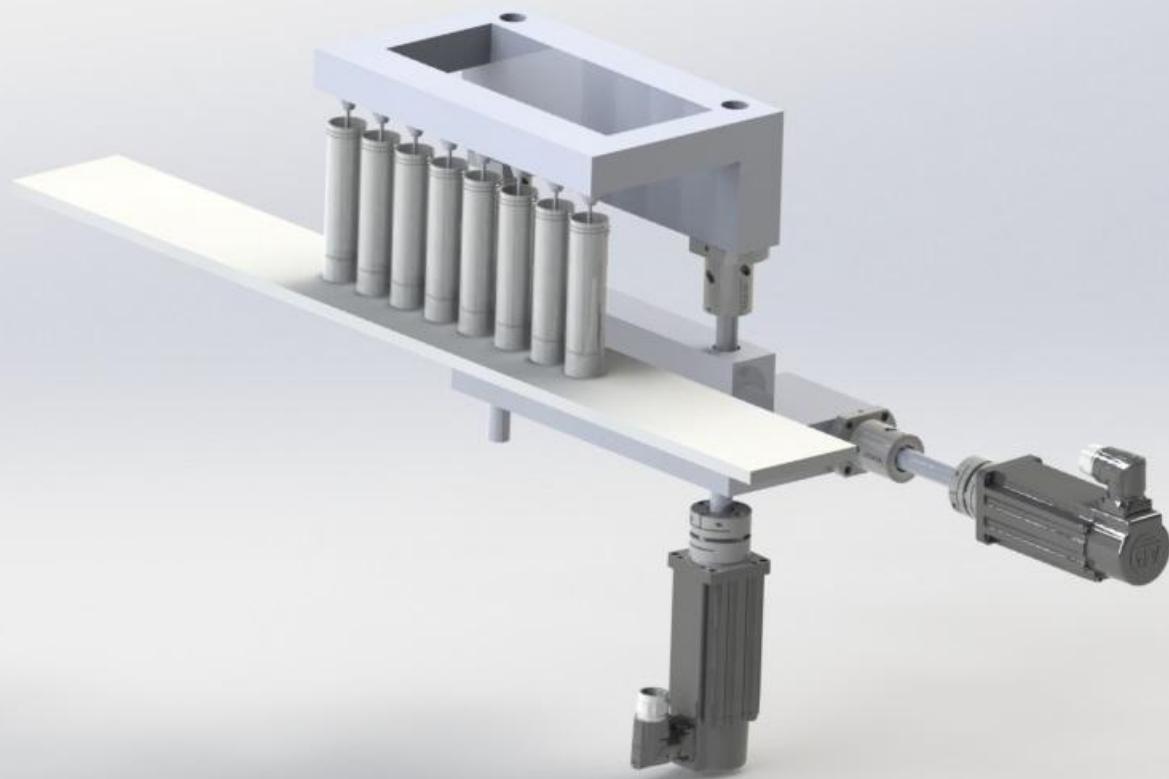






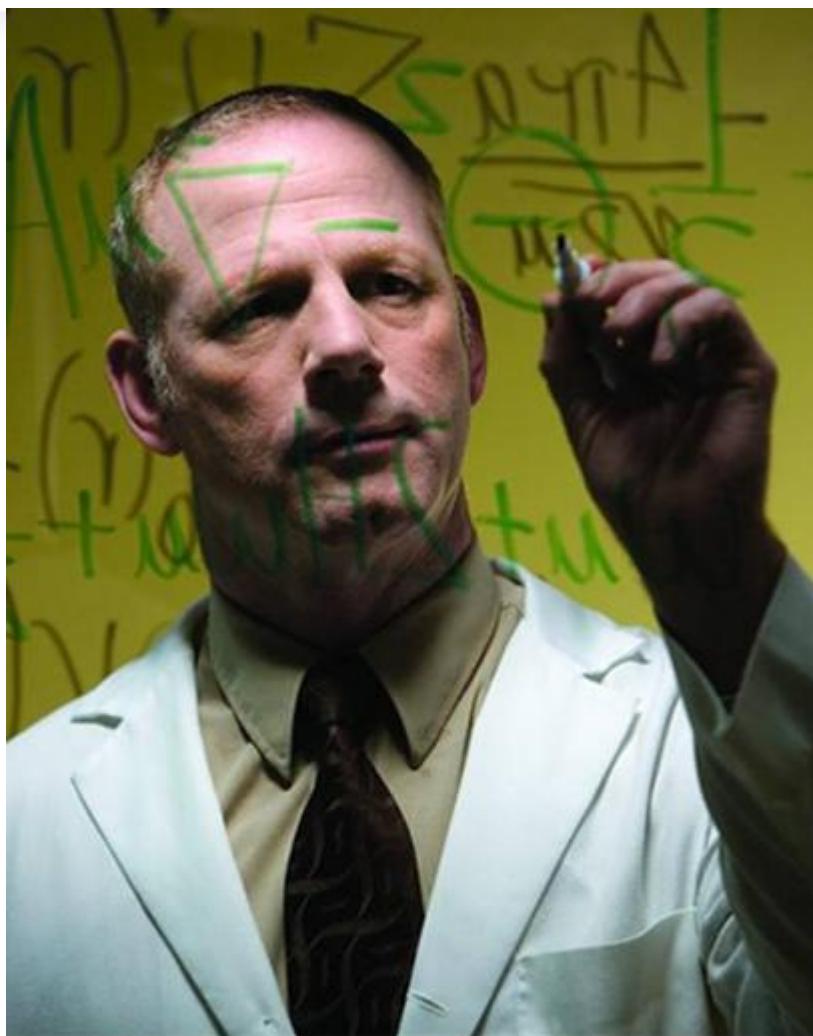








Podemos hacer cálculos...



$$V = U + a \cdot t$$

$$V^2 = U^2 + 2 \cdot a \cdot d$$

$$d = U \cdot t + \frac{1}{2} a t^2$$

$$F = M \cdot a$$

$$P = M_L \cdot w$$

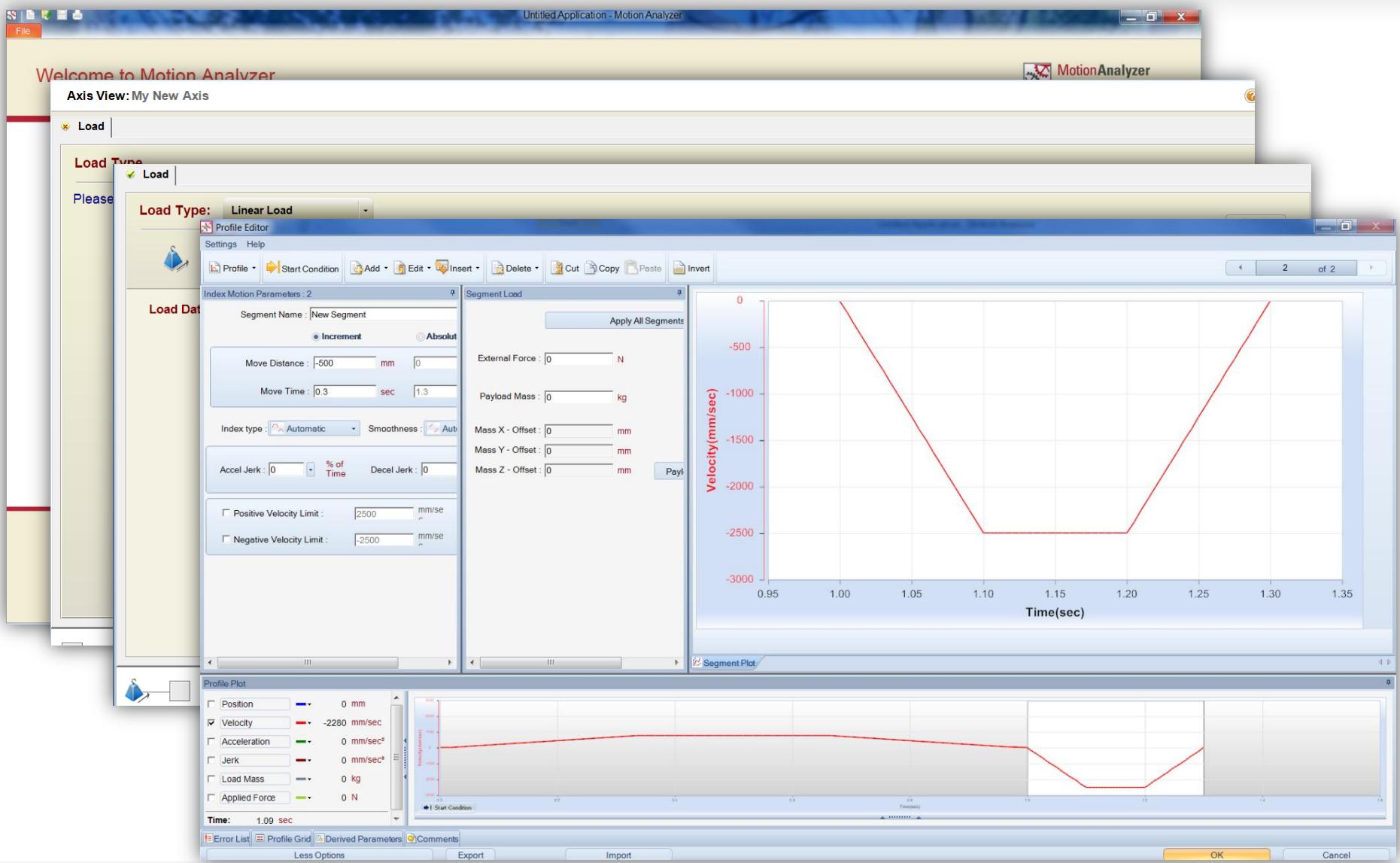
$$J = m \cdot r^2$$

$$J = m (v/w)^2$$

$$J = \frac{1}{Kt} (M_L + M_F + w \cdot D)$$

$$V = \frac{n}{2000} \cdot K_e + I \cdot R_T$$

Motion Analyzer



Motion Analyzer

Load | Profile | Mechanism | Transmissions | Super Review |

Mechanism Type: Lead Screw

Lead Screw / Ball Screw Mechanism data properties

Help

Axis View: My New Axis

Transmission Summary:

1. Select

Load | Profile | Mechanism | Transmissions | Motor | Super Review |

Motor Series Selection

No Selection Selected Drive Family: Currently Selected Motor Series: Select one or more motor series

Summary View Detailed View Application Compatibility Supports Marginal Not Recommended Product Compatibility Incompatible Compatible Details

2. Type:

3. Define Comp.

Application Requirements Reset All

- Maximum Speed (rpm) 7500
- Continuous Torque (N·m) 11.0683
- Peak Torque (N·m) 28.2889
- Ambient Temperature 40 °C
- Altitude 0 m
- Brake NO

Unselect All

<input type="checkbox"/> MPL - Low Inertia Motor	<input type="checkbox"/> VPL - Single Connector Low Inertia Motor	<input type="checkbox"/> VPF - Single Connector Food Grade Motor	<input type="checkbox"/> MDF - Integrated Drive Motor	<input type="checkbox"/> VPS - Stainless Steel Motor
<input type="checkbox"/> MPM - Medium Inertia Motor	<input type="checkbox"/> MPF - Food Grade Motor	<input type="checkbox"/> MPS - Stainless Steel Motor	<input type="checkbox"/> RDB - Direct Drive Servo Motor	<input type="checkbox"/> HPK - Asynchronous Servo Motor
<input type="checkbox"/> TL - Low Inertia Metric & NEMA Servo Motor	<input type="checkbox"/> TLY - Low Inertia Metric & NEMA Servo	<input type="checkbox"/> CM222 - AC Induction Motor	<input type="checkbox"/> Elwood SX - Explosion Proof Servo Motor	<input type="checkbox"/> TPM - High Torque, Low Speed Servo

Notes Next >

Motion Analyzer

Axis View: My New Axis

Load | Profile | Mechanism | Transmissions | Motor | Drive | Selection | Solution | Axis Stop | Configure Axis BOM | Super Review

Component Details

[Summary](#) | Motor | Drive |

Motor

<	VPL-B1002M	>
Motor Capacity (Temp)		12%
Peak Speed		43%
Peak Torque		26%
Brake Rating		
Inertia Ratio		19.43 : 1

Drive

<	2198-H008-ERS-460v-3ph-4	>
AC3ph. 400 -10%/+10%		62%
Drive Capacity (Temp)		50%
Average Current		45%
Peak Current		47%
Bus Utilization		

Gearbox

<	<<	Not Selected	>>	>
Peak Input Velocity				
RMS Torque				
Peak Torque				
Nominal Speed				

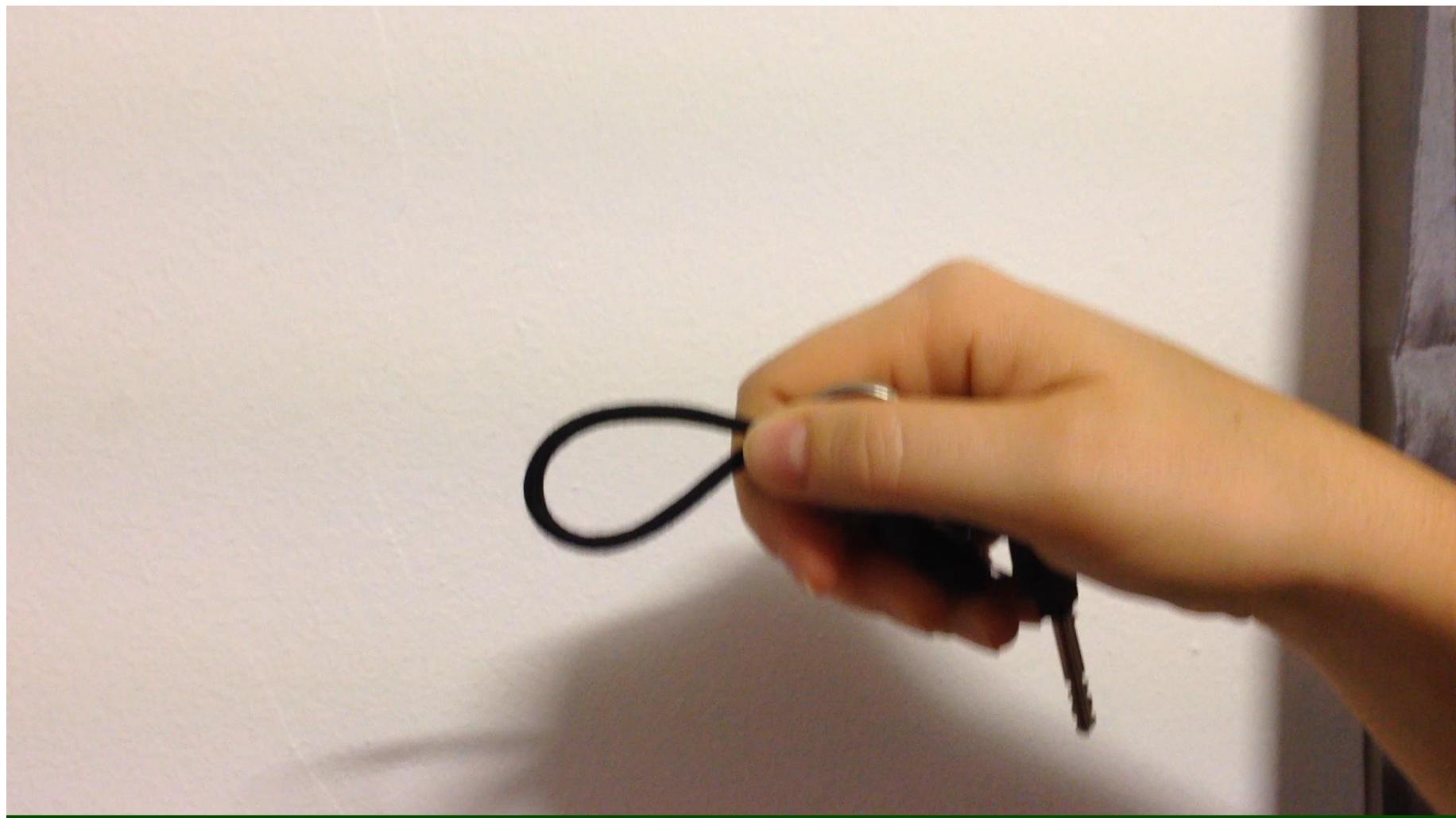
Axis System Performance

Torque - Speed | Power - Speed | Load | Thermal | RBM | Power-Supply

Motor - Drive

Quadrant | Torque

La importancia de la relación de inercias



La importancia de la relación de inercias



La importancia de la relación de inercias



Motion Analyzer

Axis View: My New Axis

Load | Profile | Mechanism | Transmissions | Motor | Drive | Selection | Solution | Axis Stop | Configure Axis BOM | Super Review

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Motor

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<	2198-H008-ERS-460v-3ph-4	>
AC3ph, 400 -10%/+10%		
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Gearbox

<	Not Selected	>>	>
Peak Input Velocity			
RMS Torque			
Peak Torque			
Nominal Speed			

Axis System Performance

Torque - Speed | Power - Speed | Load | Thermal | RBM | Power-Supply

Motor - Drive

Torque (N·m)

Speed (rpm)

Quadrant

Torque

Motion Analyzer

Axis View: My New Axis

Load

Load Type

Please choose from the available Load Type options.



Axis View: My New Axis

Load Profile Mechanism

Mechanism Type

Please choose from the available mechanism types below.



Allen Bradley Integrated Linear Actuators

Electric Cylinder



Linear Thruster



Linear Motor



Linear Stage

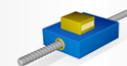


User-Defined Mechanisms

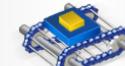
Belt Drive



Lead Screw



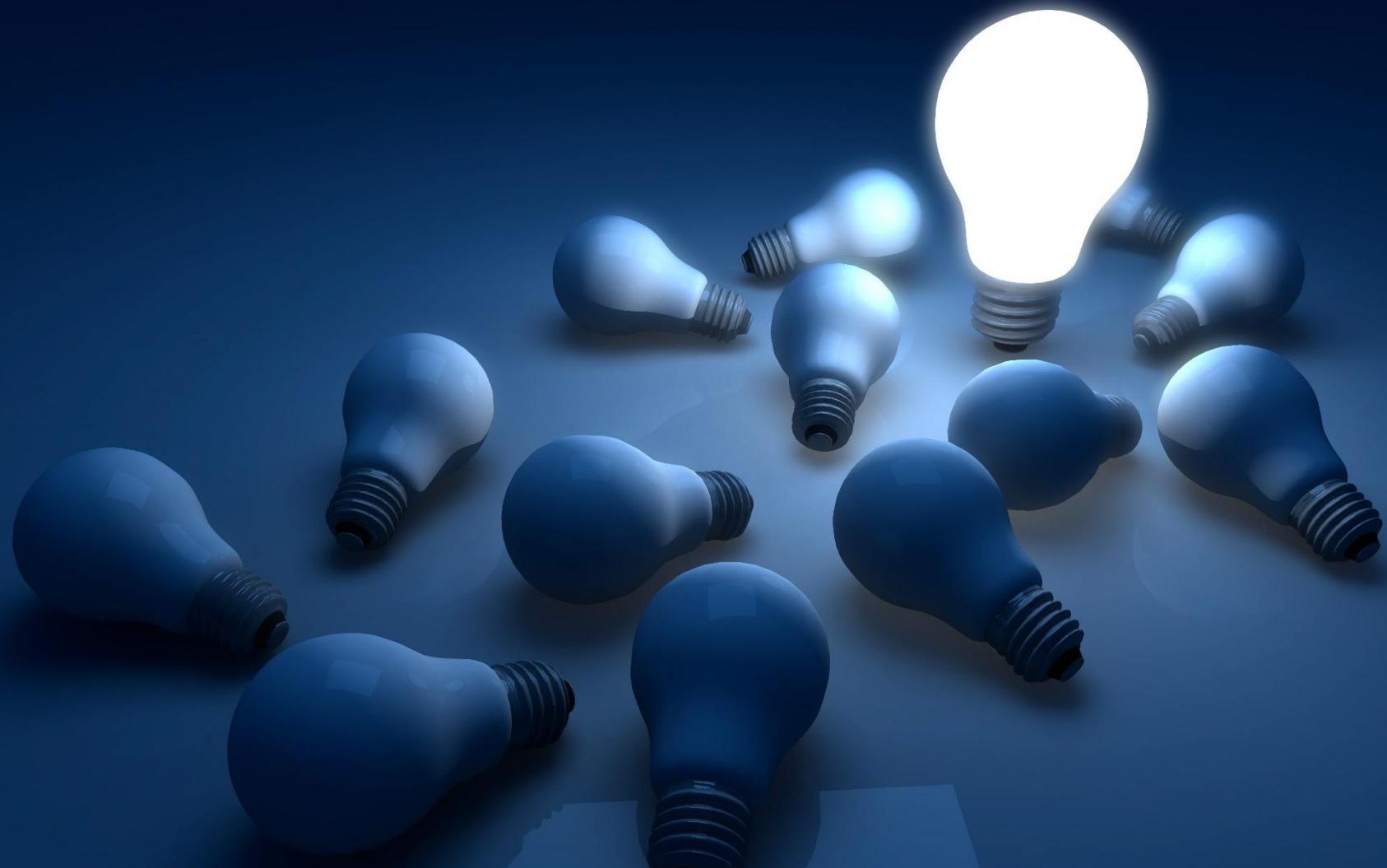
Chain and Sprocket

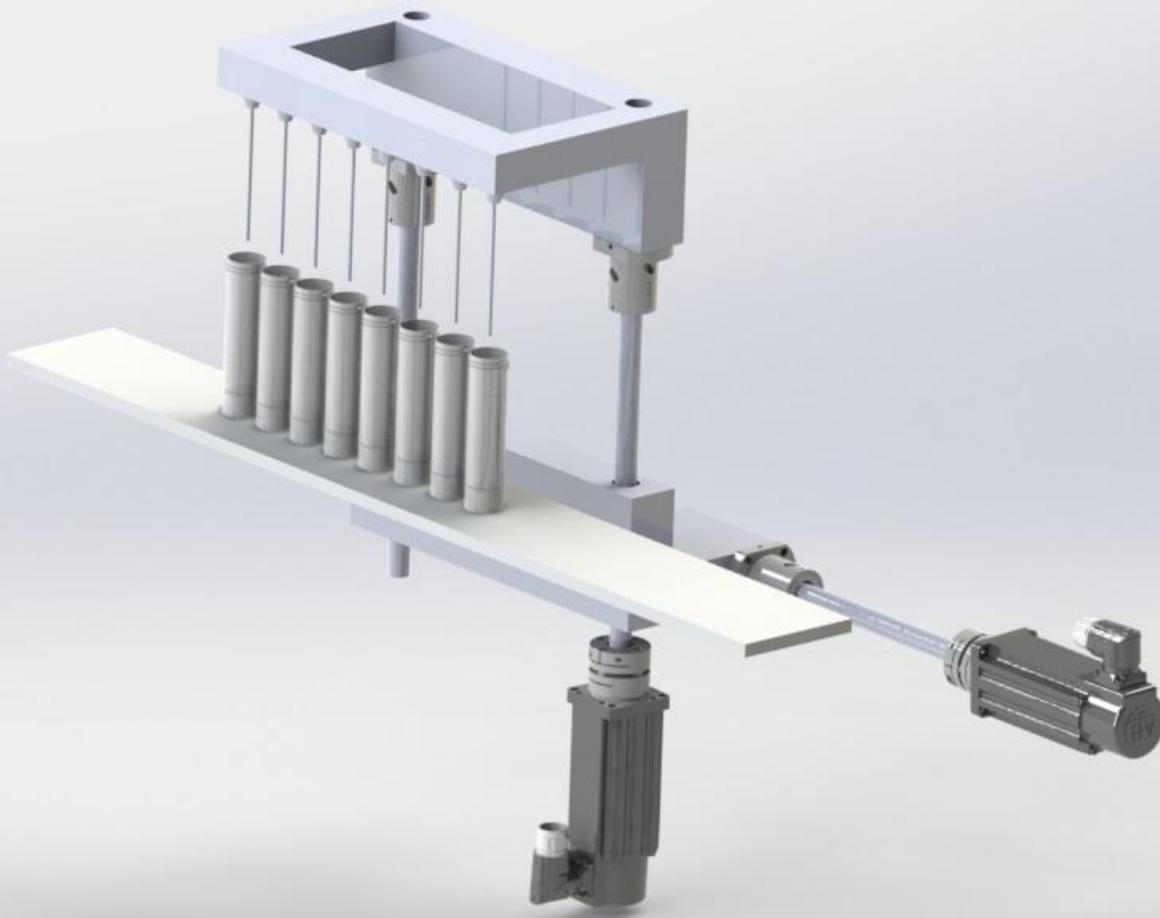


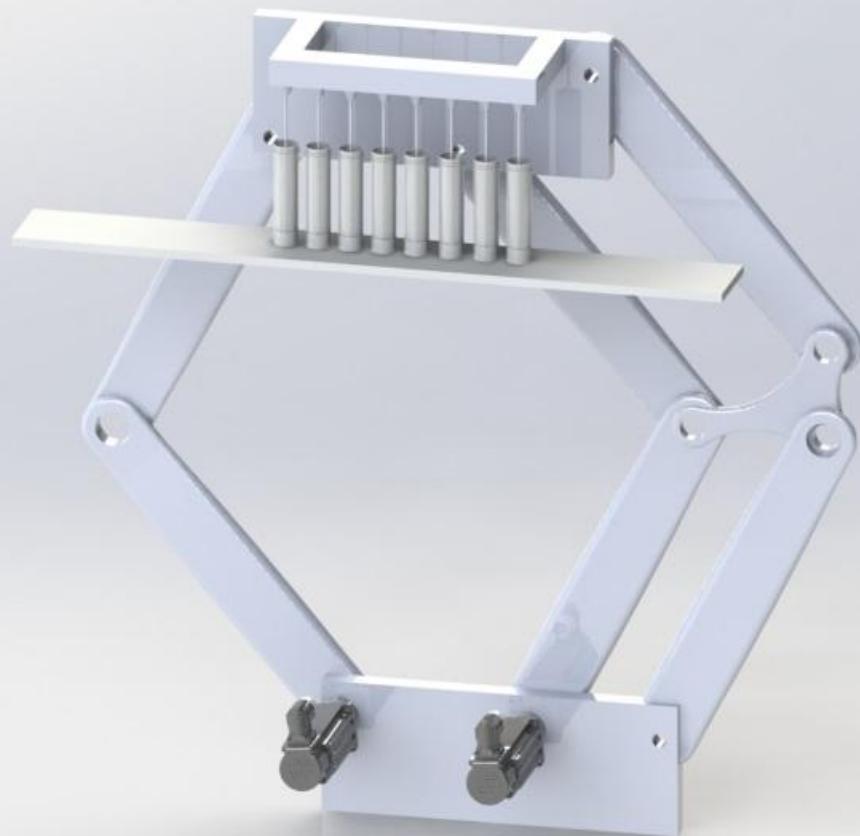
Rack and Pinion

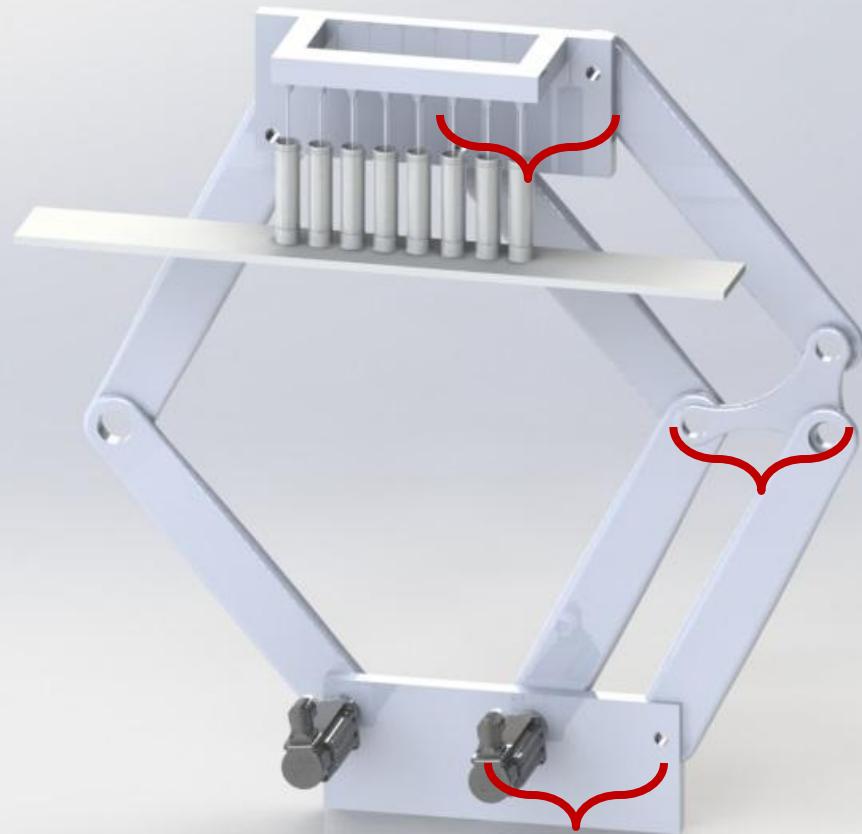


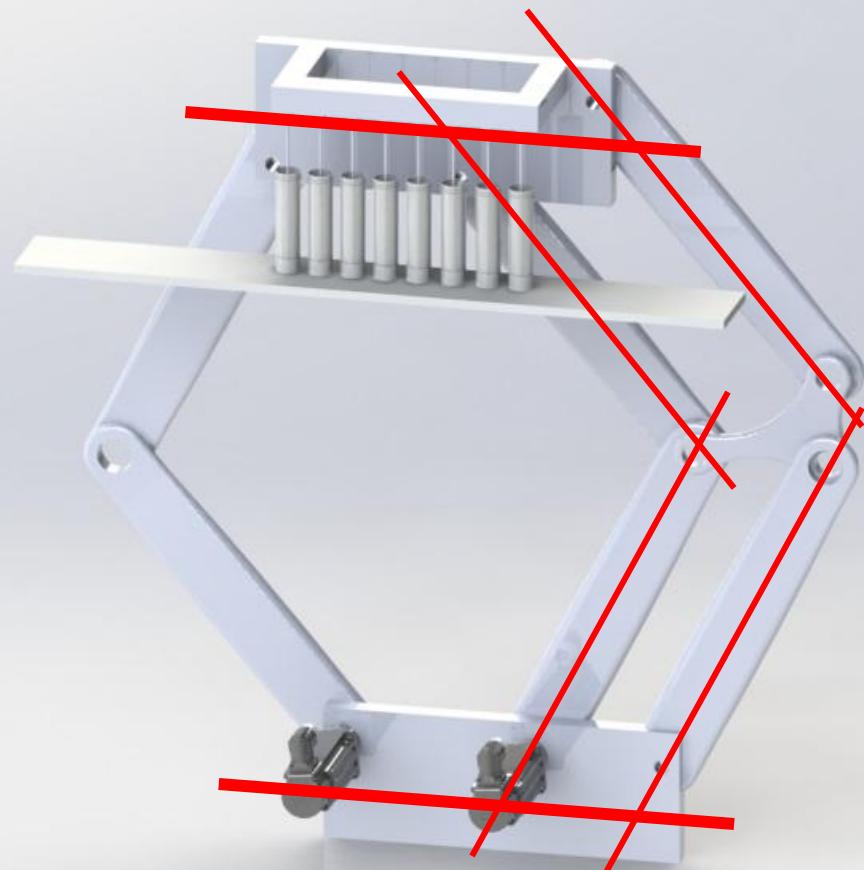
Mecatrónica

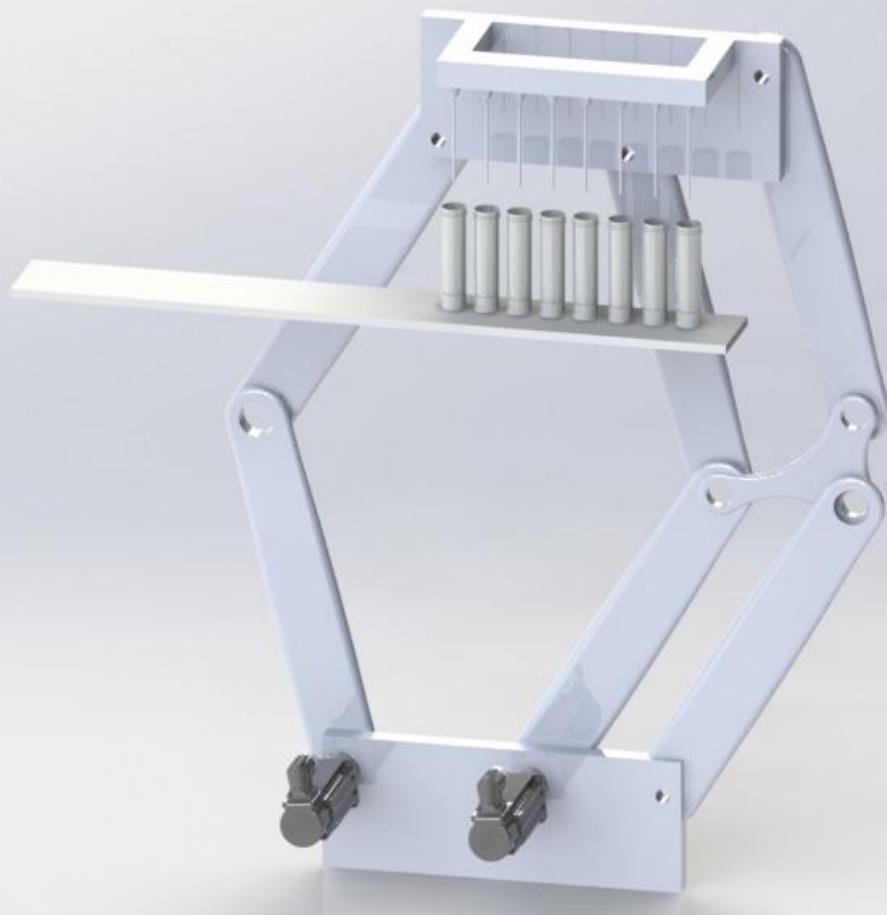




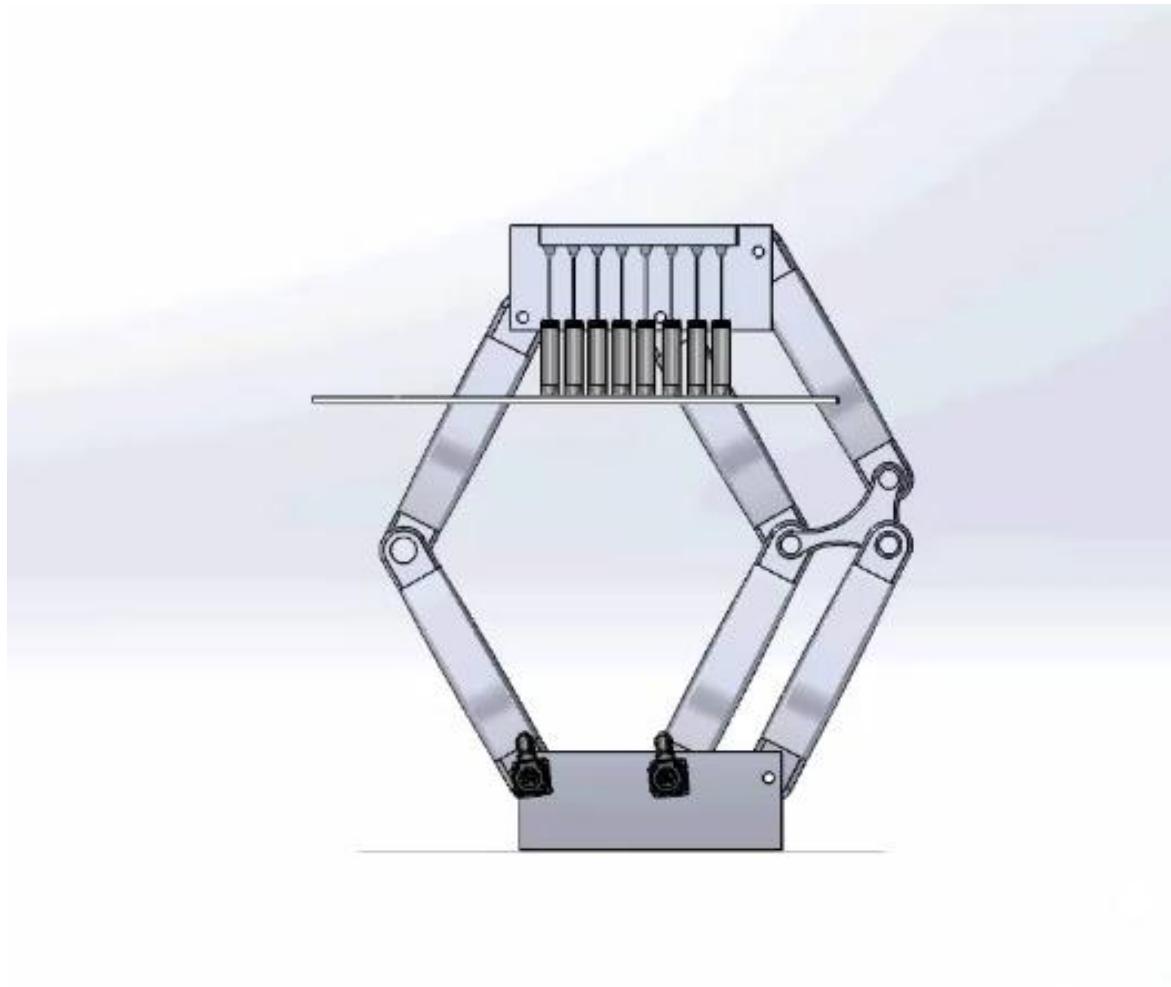


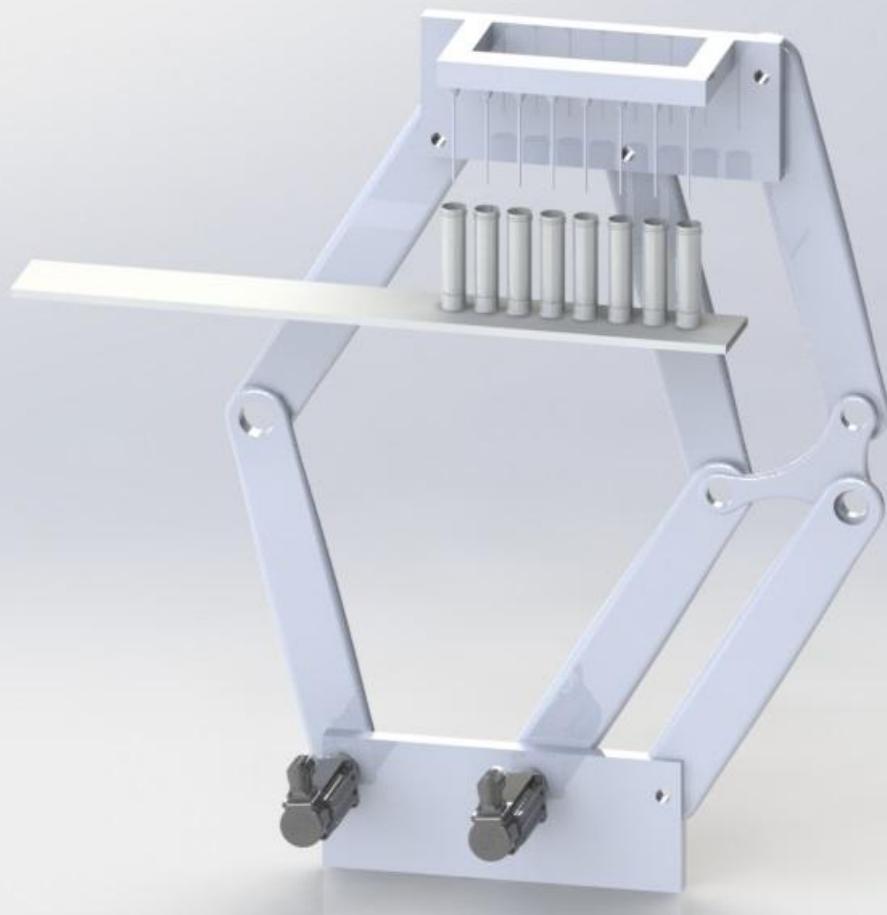






Animación





Integración con Motion Analyzer

Axis View: My New Axis

Load | Help

Load Type

Please choose from the available Load Type options.

Load | Help

SolidWorks

Use this SolidWorks Load Configuration process to analyze one axis at a time. You will export the motion profile for this axis to SolidWorks and SolidWorks will calculate the force or torque required by the motor to move the load through your profile. If you wish to analyze multiple interacting axes, return to the System View and launch the Multi-Axis SolidWorks Wizard.

Change Load Type ▾

SolidWorks Load Configuration :

Select the Motor

Axis View: My New Axis

Load | Profile | Help

Profile Editor

Settings Help

Simple Index Motion Parameters : 1

Parameter	Value	Unit
Move Distance	30	deg
Move Time	1	sec
Dwell Time	1	sec
Index type	Automatic	
Smoothness	Automatic	

Segment Plot

More Options Export Import OK Cancel

Time: 0 sec

Edit Motion Profile

Integración con Motion Analyzer

The screenshot displays the SolidWorks Motion Designer interface with the Motion Analyzer add-in integrated. The main window shows three overlapping dialog boxes:

- Axis View: My New Axis (1)**: Shows the assembly path: C:\Users\Sergi\Desktop\op\Mechatronica\dos... and the Motion Study: Motion Study 1.
- Application1 - Motion Analyzer / SolidWorks Integration**: Shows the Selected SolidWorks Assembly and the Motion Study: Motion Study 3.
- Axis View: My New Axis**: Shows the Transmission Summary, which helps provide a speed-torque conversion from a higher speed motor to a slower more forceful output.

The **Motor Series Selection** panel is open, showing the following settings:

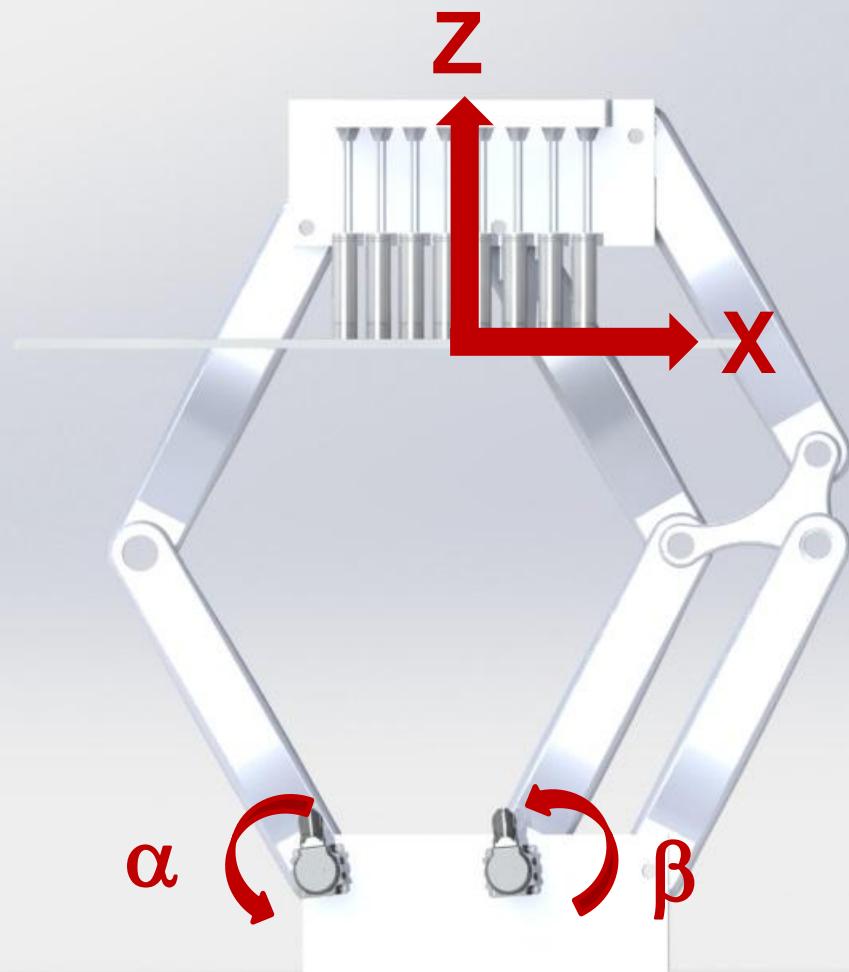
- Selected Drive Family:** No Selection
- Currently Selected Motor Series:** No Selection
- Application Compatibility:**
 - Supports: Checked
 - Marginal: Unchecked
 - Not Recommended: Unchecked
- Product Compatibility:**
 - Incompatible: Unchecked
 - Compatible: Checked

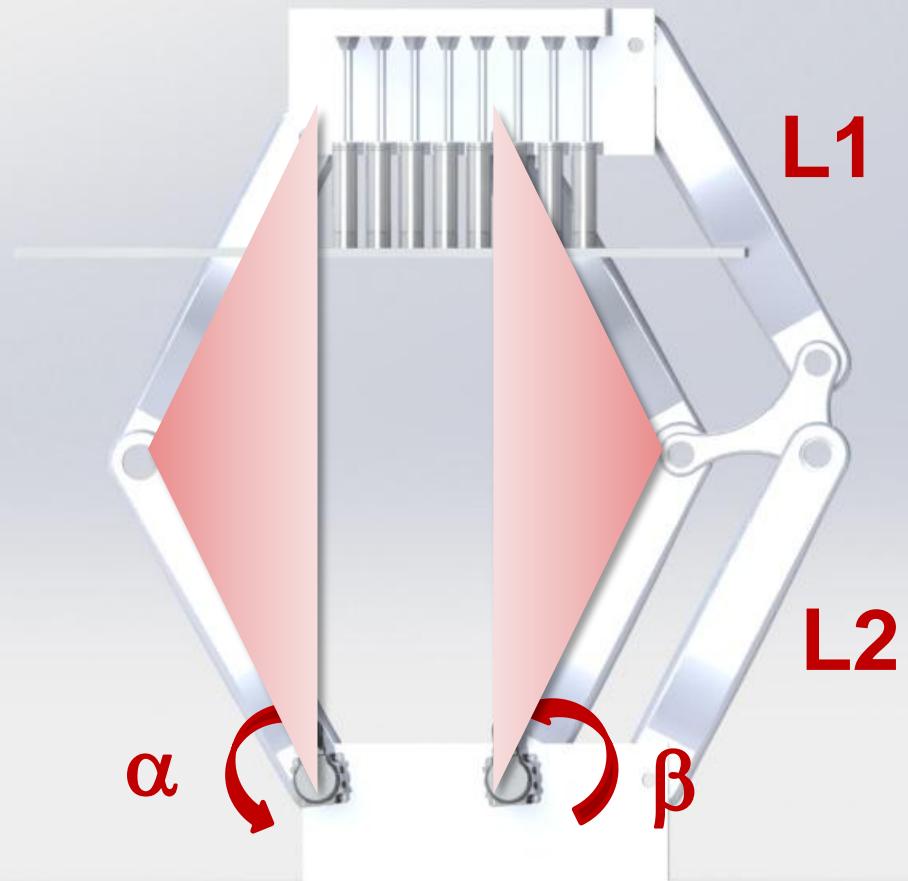
The **Motor Series Selection** panel lists various motor series:

- 1. Select**: Application Requirements (Maximum Speed: 7500 rpm, Continuous Torque: 11.0683 N-m, Peak Torque: 28.2889 N-m, Ambient Temperature: 40 °C, Altitude: 0 m, Brake: NO).
- 2. Type**: Unselected.
- 3. Define**: Unselected.

Below the application requirements, there are 16 motor models displayed in a grid:

Model	Description	Status
MPL - Low Inertia Motor	Low Inertia Motor	?
VPL - Single Connector Low Inertia Motor	Single Connector Low Inertia Motor	?
VPF - Single Connector Food Grade Motor	Single Connector Food Grade Motor	?
MDF - Integrated Drive Motor	Integrated Drive Motor	?
VPS - Stainless Steel Motor	Stainless Steel Motor	?
MPM - Medium Inertia Motor	Medium Inertia Motor	?
MPF - Food Grade Motor	Food Grade Motor	?
MPS - Stainless Steel Motor	Stainless Steel Motor	?
RDB - Direct Drive Servo Motor	Direct Drive Servo Motor	?
HPK - Asynchronous Servo Motor	Asynchronous Servo Motor	?
TL - Low Inertia Metric & NFMA Servo Motor	Low Inertia Metric & NFMA Servo Motor	?
TLY - Low Inertia Metric & NFMA Servo	Low Inertia Metric & NFMA Servo	?
CM222 - AC Induction Motor	AC Induction Motor	?
Elwood SX - Explosion Proof Servo Motor	Explosion Proof Servo Motor	?
TPM - High Torque, Low Speed Servo	High Torque, Low Speed Servo	?

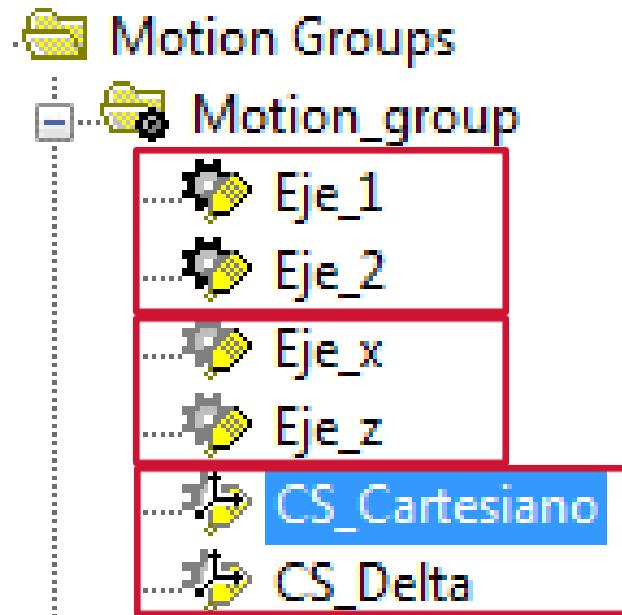




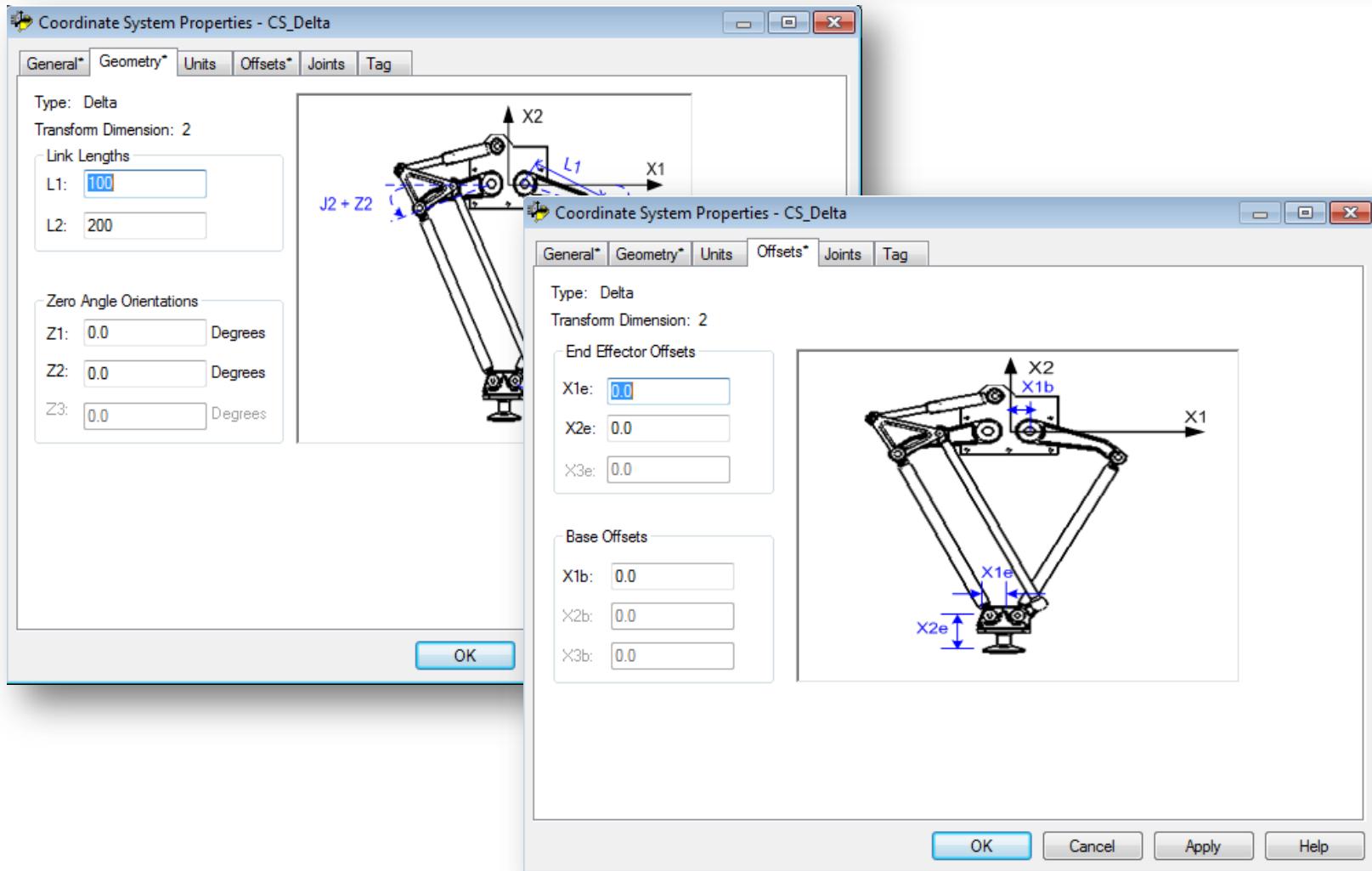
Controladores



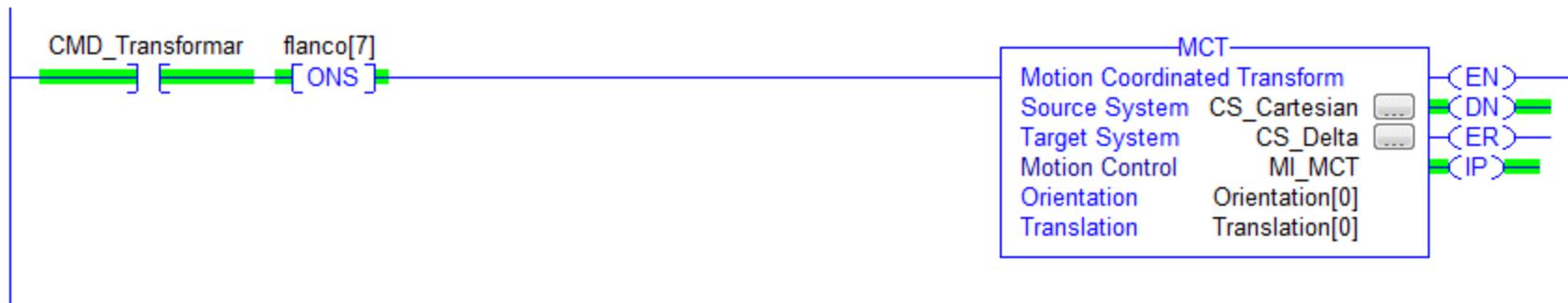
Logix hace mucho por nosotros

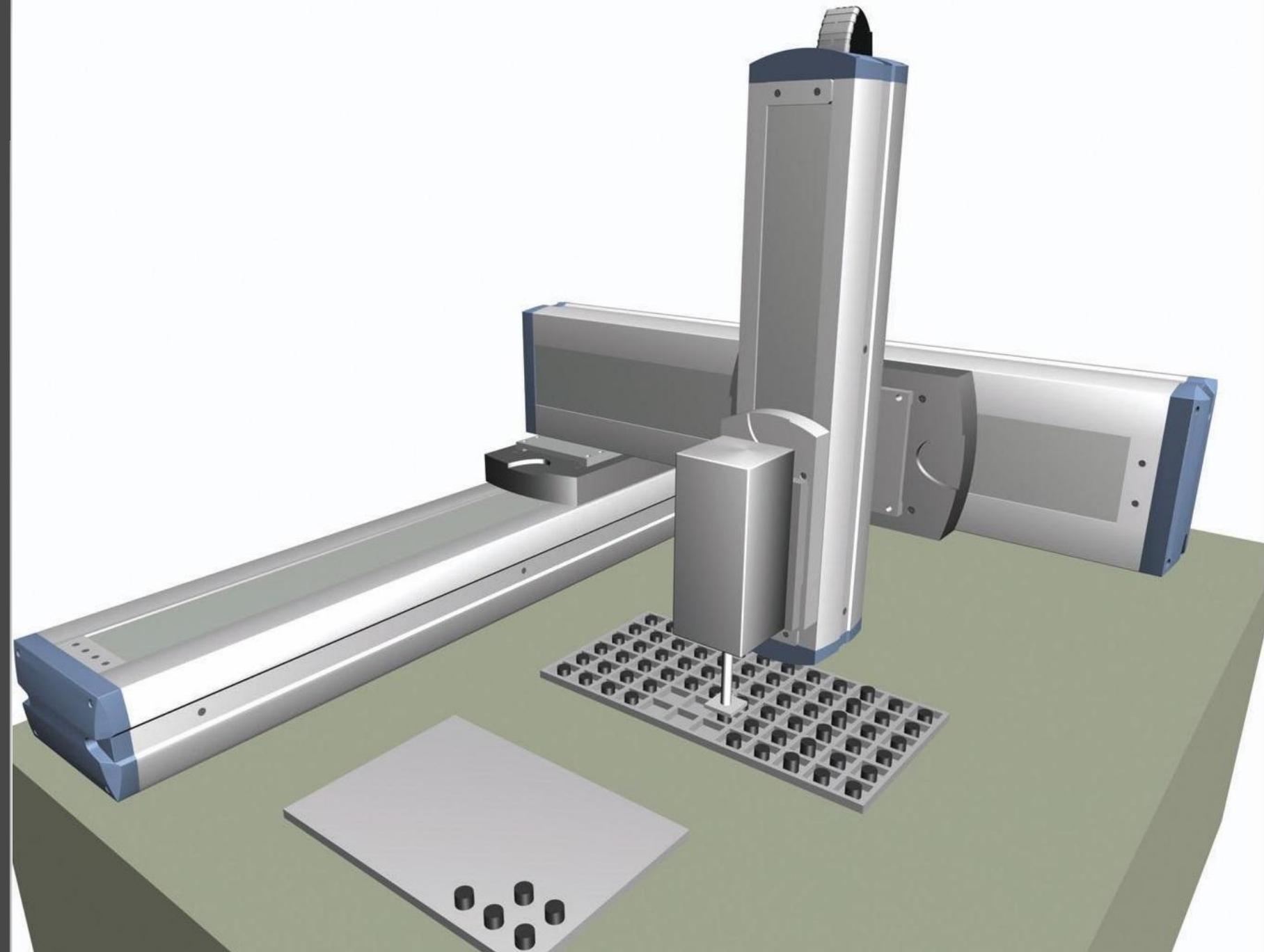


Logix hace mucho por nosotros



Instrucción para la transformada





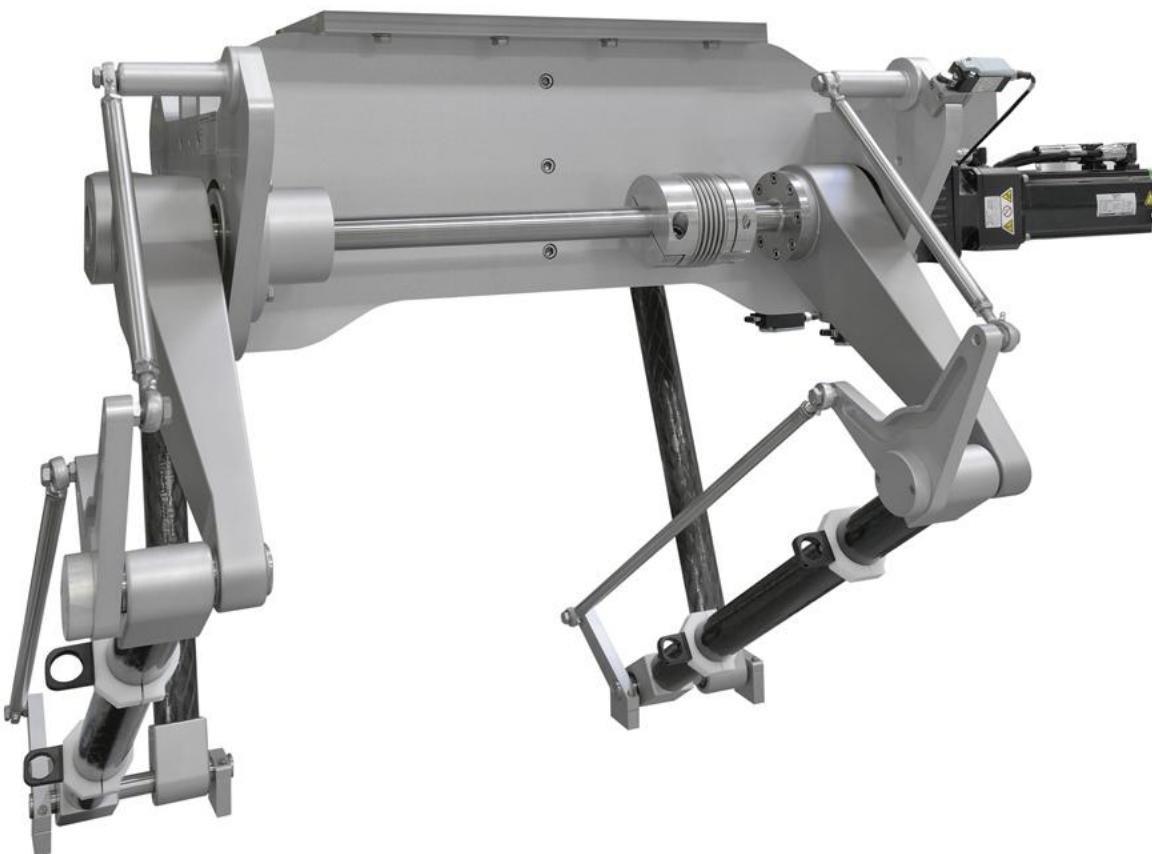
Aplicaciones posibles



Aplicaciones posibles



Aplicaciones posibles



Aplicaciones posibles





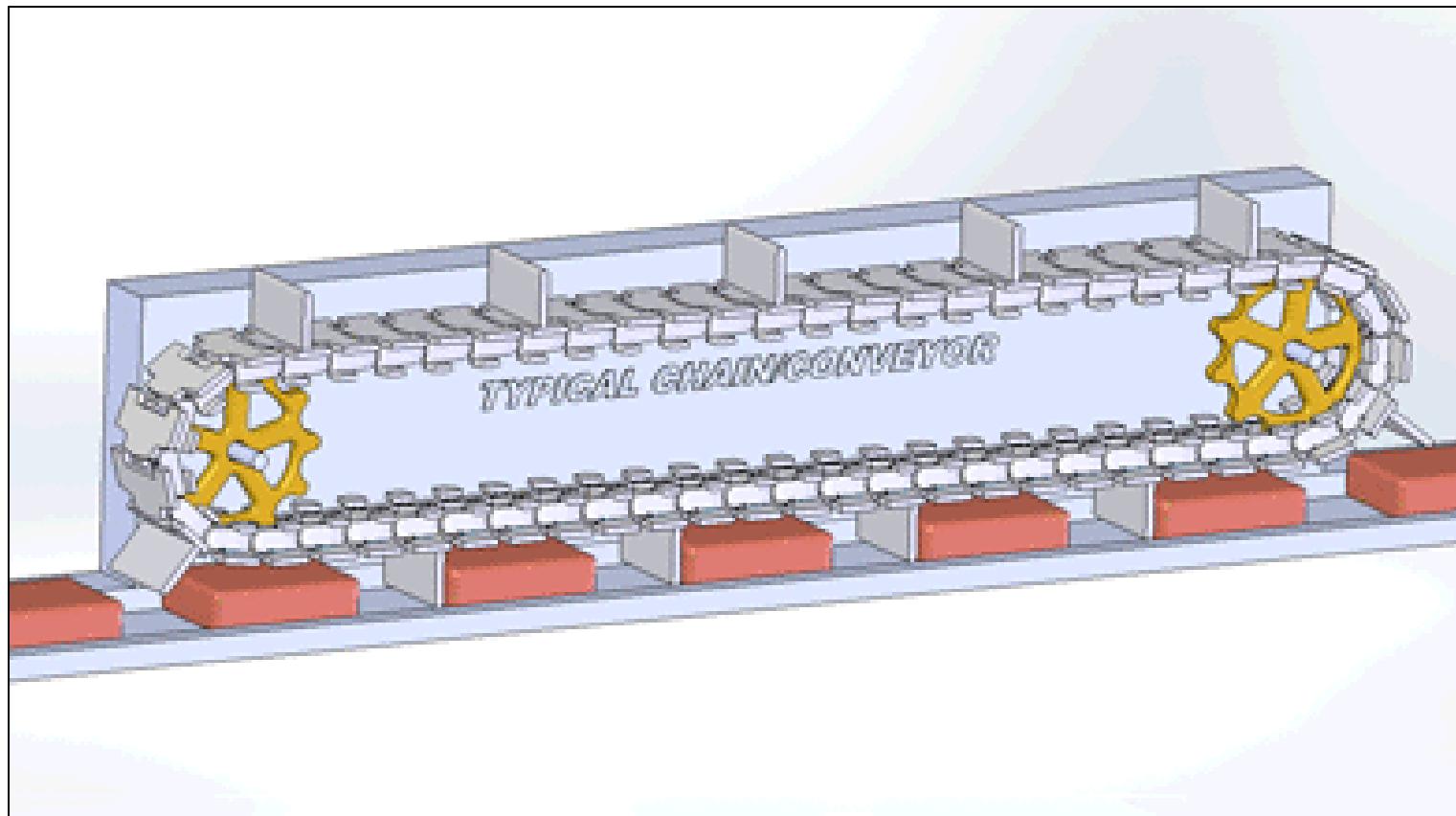


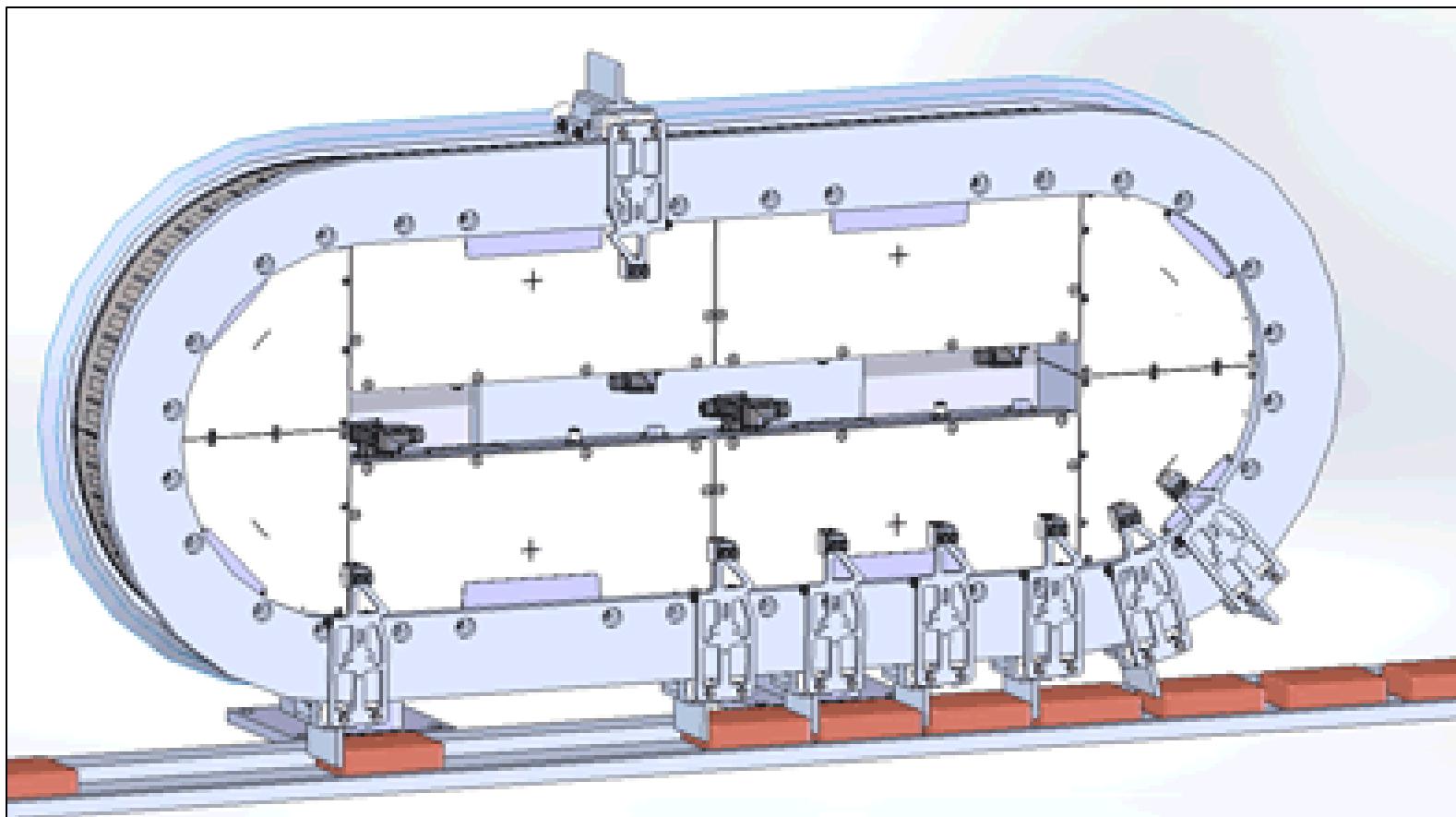


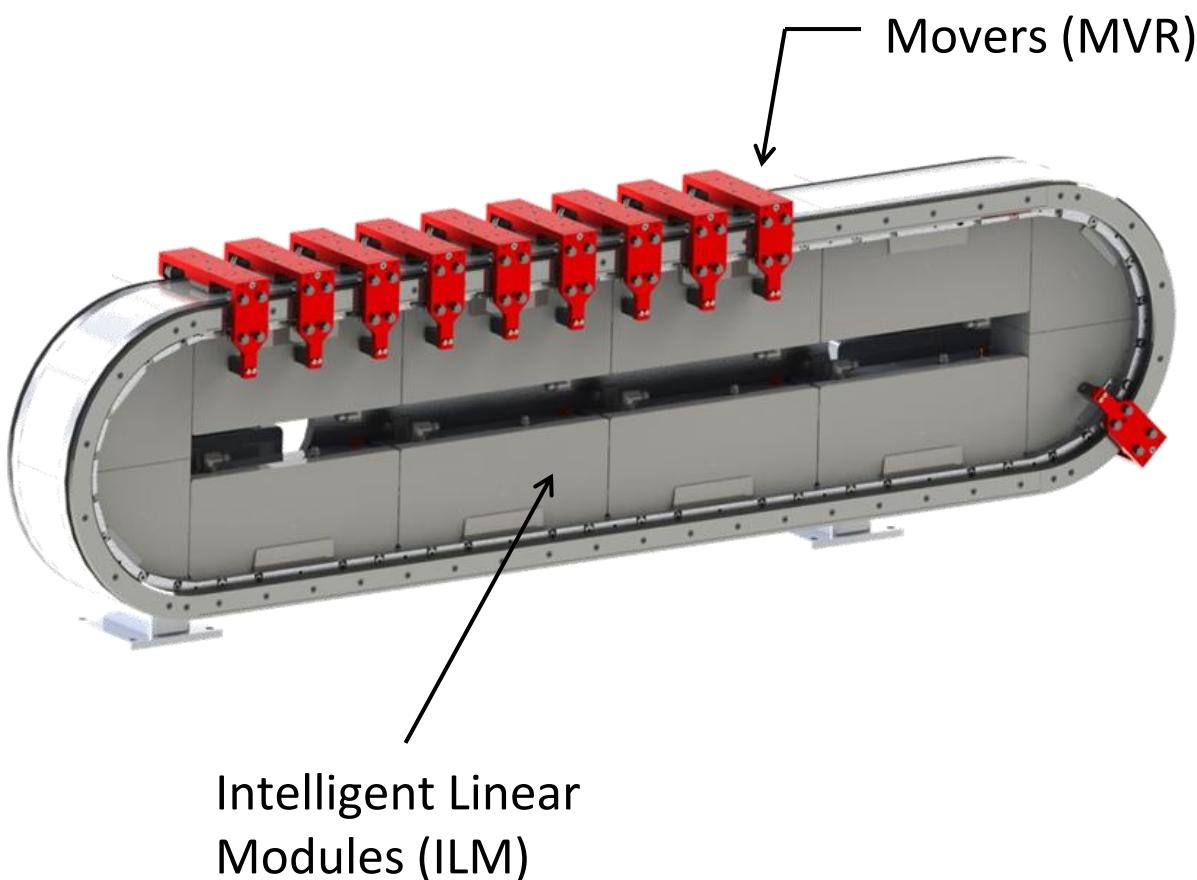
Solución de control de movimiento

Rockwell
Automation

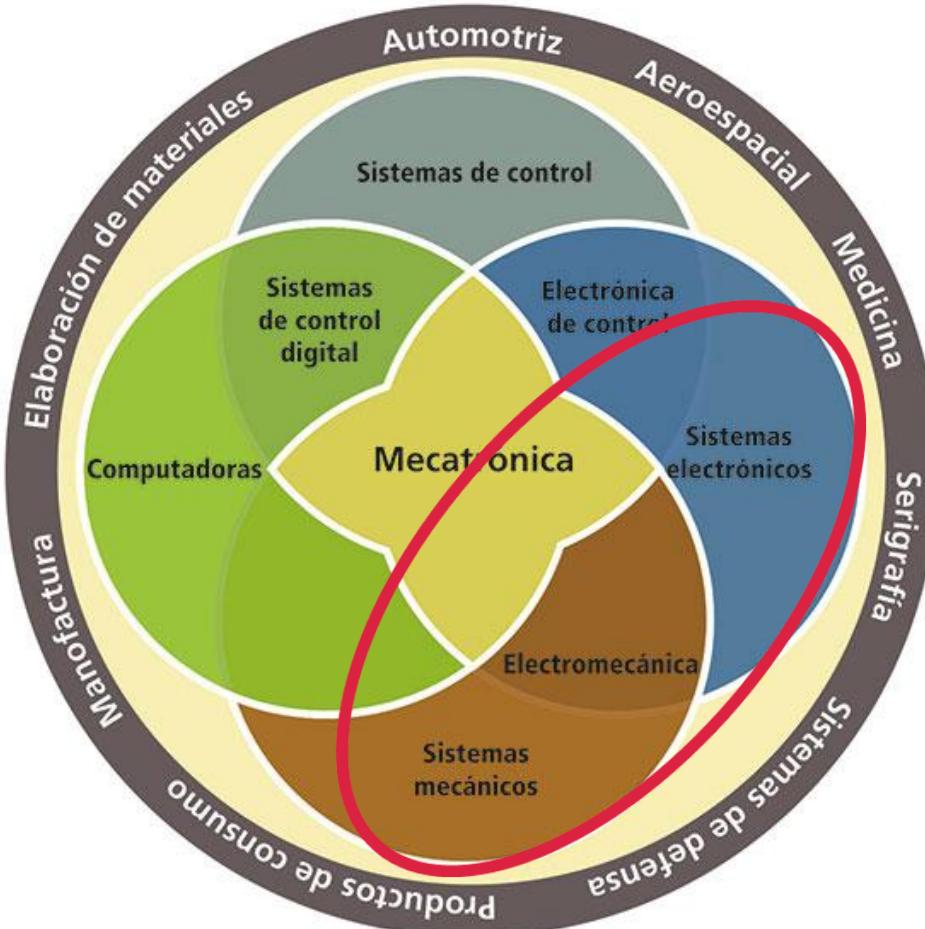








Mecatrónica





Eficiencia



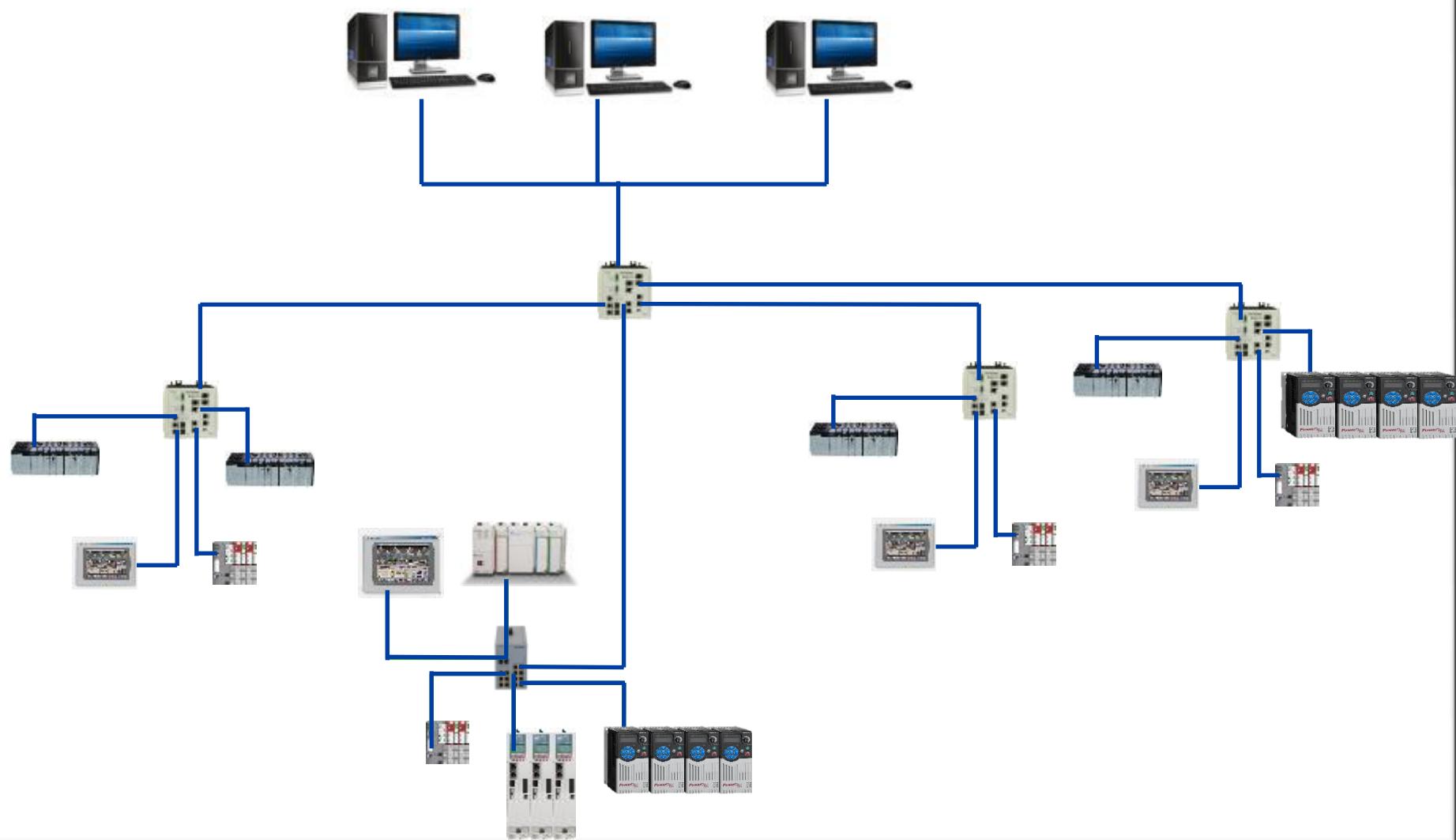
Diagnóstico



Un correcto diagnóstico



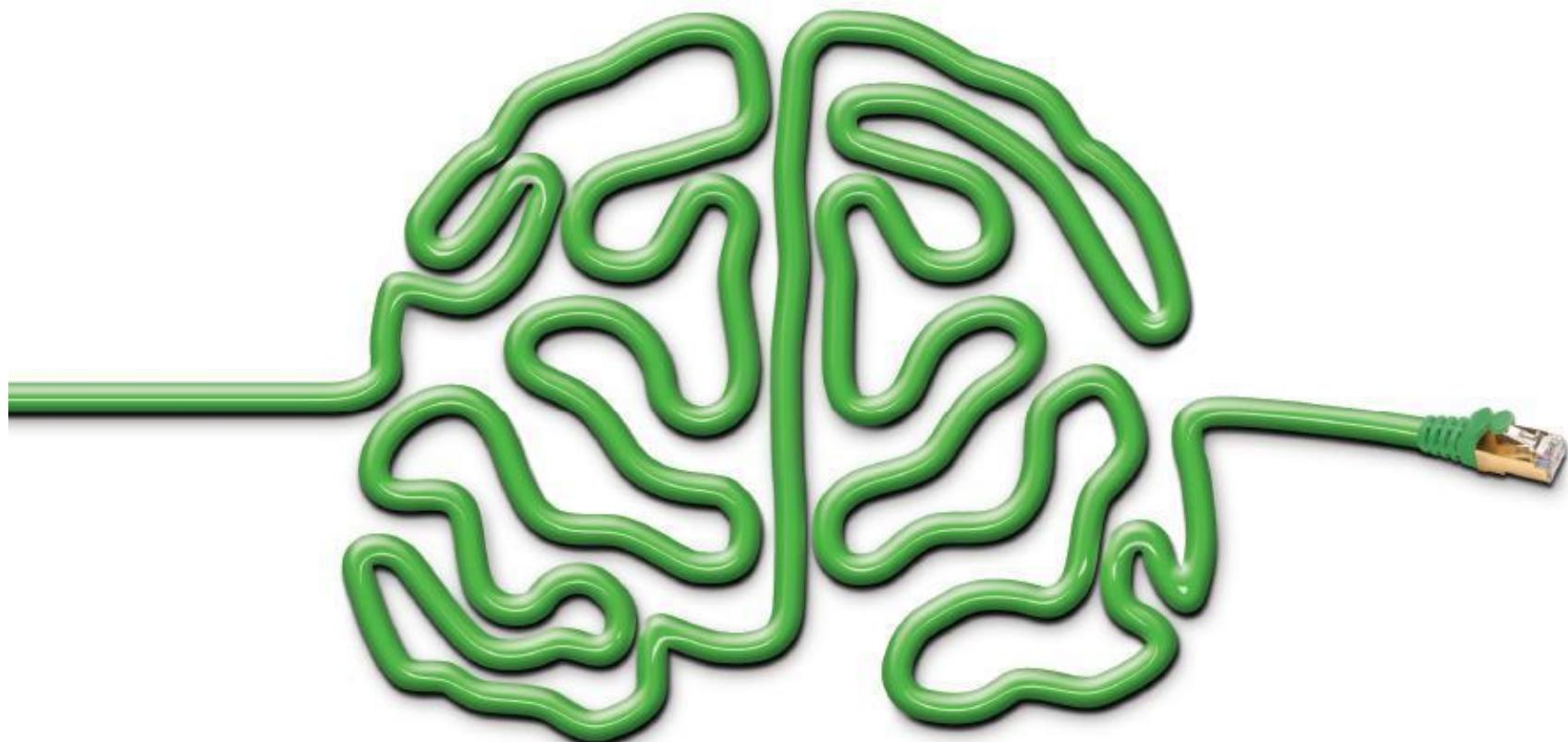
Integración de una máquina



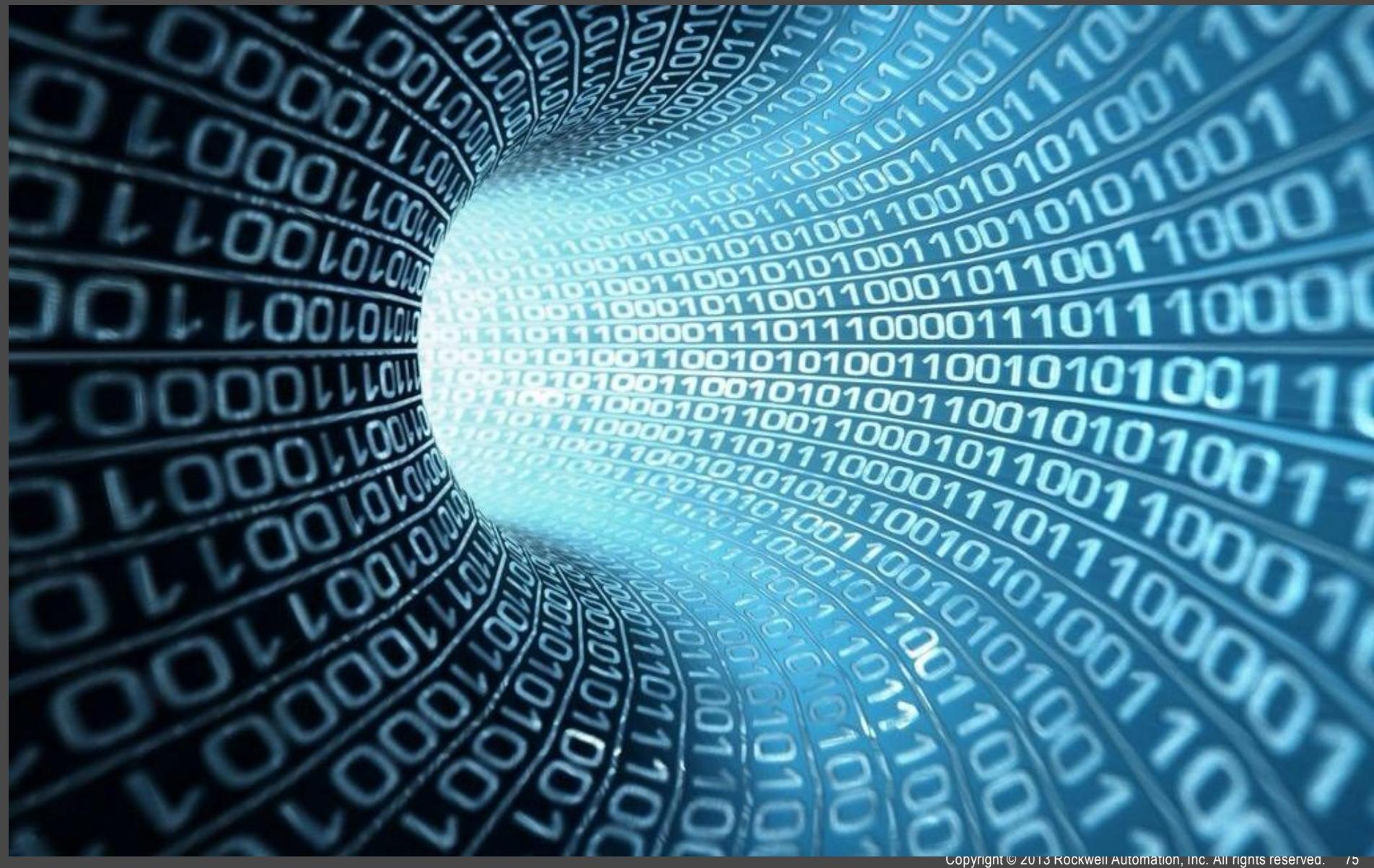
El colapso puede ser en los dos sentidos



Redes de comunicaciones



Gestión de la información



Las seguridades

... no siempre han estado a la altura



Analogía: La seguridad en los cascos



- past**
- Seguro!
 - Incómodo
 - Pesado
 - No ventilado

present

- ¡Seguro!
- Comodo(pads)
- ligero (foam or composite)
- Ventilado



performance

- Seguro
- Cómodo
- Ligero
- Ventilado



*Mejorando
prestaciones!*

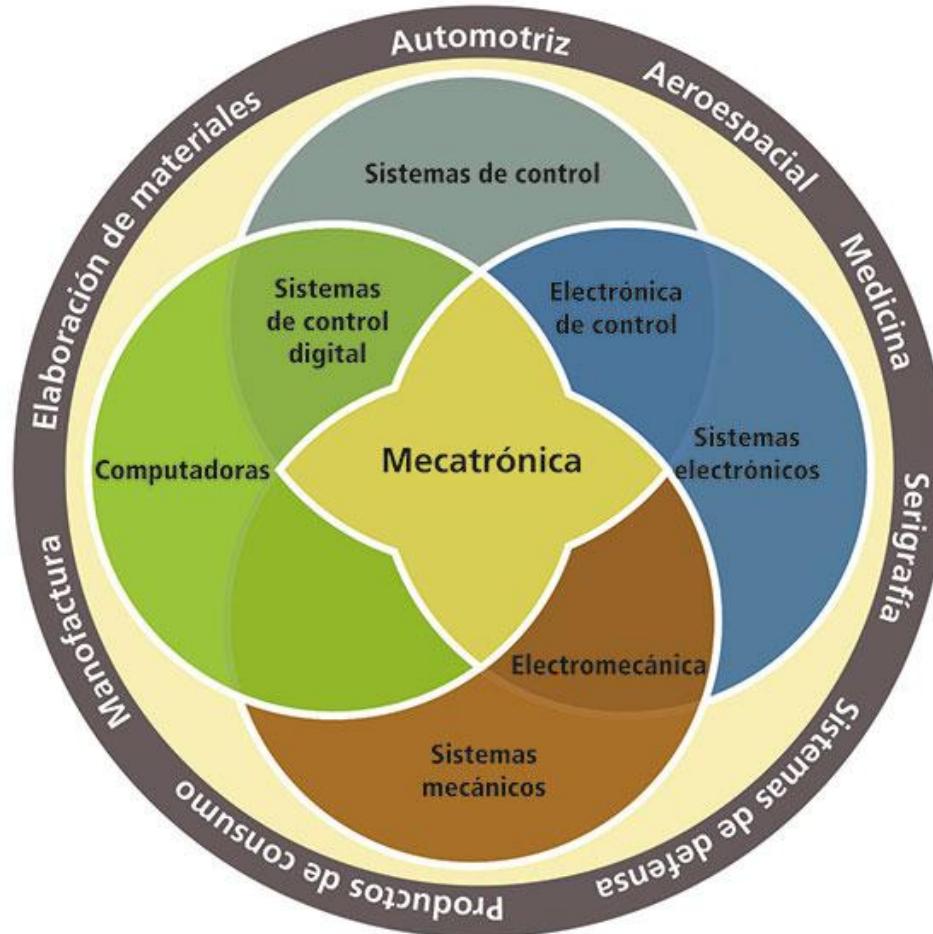
Y todo esto no es un capricho

	Empresa clásica
Costes de ingeniería	€
Costes en “hierro”	€€
Costes en “potencia”	€€
Beneficios	€€
Precio de venta	€€€€€€€€

Segunda máquina

	Empresa clásica
Costes de ingeniería	€
Costes en “hierro”	€€
Costes en “potencia”	€€
Beneficios	€€
Precio de venta	€€€€€€€

Podemos hacer una aproximación mecatrónica





LISTEN.
THINK.
SOLVE.

Muchas gracias

Rockwell Automation
Coruña, 24 - 4º - Oficina E
36208 - VIGO
Tel. 986 21 09 01
www.rockwellautomation.es



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