Mina Digital

Alemania-Chile-Perú

2023-07-05

INNOMOTICS

A Siemens Business

Claudio Gaete

Electrical Engineer

Product Portfolio Management Manager

Automation

Innomotics a Siemens Business

Chile-Peru

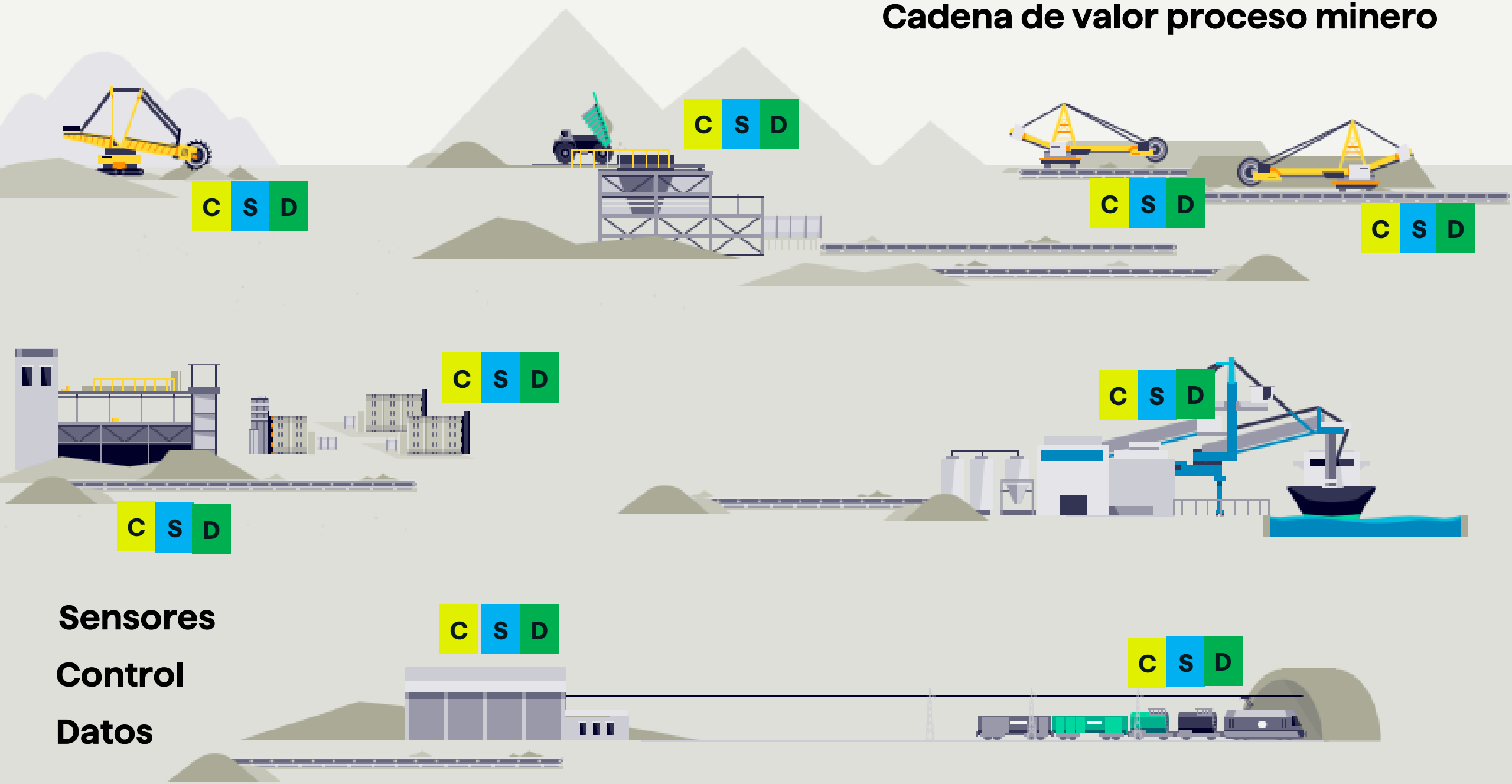
Mobile +56 9 500 12 675

E-Mail claudio.gaete@siemens.com

INNOMOTICS

A Siemens Business

Cadena de valor proceso minero

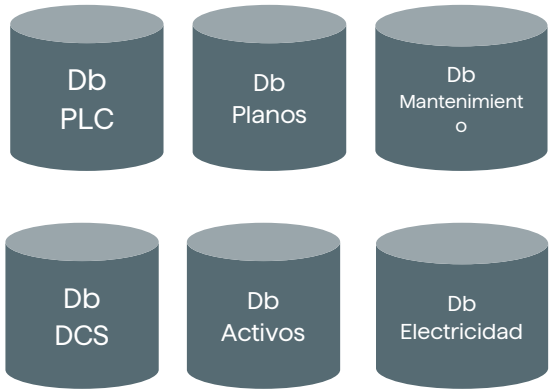


Sensores

Control

Datos

Base de la integración, la orientación a objetos

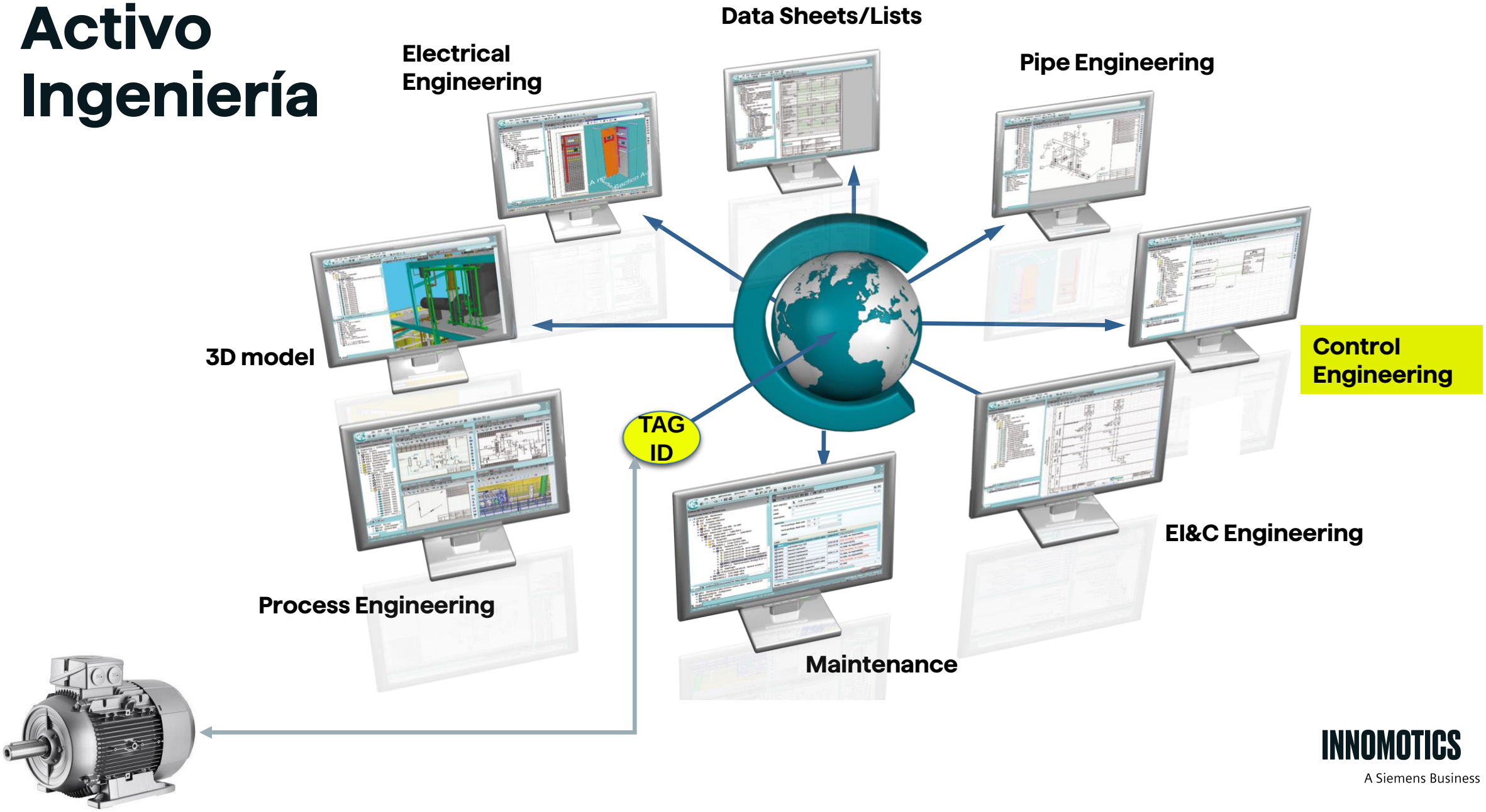


ISA88/ISA95 System Categorization

Level 5 Day/weeks/ months	**Enterprise Wide Control (ERP) / Optimization (LP Models)**			Enterprise Wide Control & Optimisation
Level 4 30min – 8hrs	**MES / MIS & Dynamic Simulation**			Optimisation & Scheduling
	Mine Wide Controlling	**Plant Wide Controller**	**Logistics Controller**	
	Real Time Optimization and Scheduling			
Level 3 30s – 30min	**E.g. Dynamic Dispatch Systems, Drill Positioning Systems**	**E.g. Crusher Circuit, Mill Circuit (Model Predictive Controllers)**	**E.g. Dispatch Scheduling**	Unit Optimisation & Stability
	Soft Sensors & Advanced Control (Fuzzy / MBC / MPC)			
Level 2 100ms	**E.g. Autonomous Equipment (Onboard Control)**	**E.g. Crusher Unit Control (PLC/SCADA)**	**E.g. Load out Control (PLC/SCADA)**	Process Safety & Stability
	Regulatory Control (PID / Sequences / ARC) - Process ILocks & Alarms – S88, ASM			
Level 1 1ms				Equipment Protection
	Instruments / Devices / Equipment - Interlocks & Alarms - ASM			
Level 0	Mining	Processing/Plant	Logistics	Physical Process

INNOMOTICS
A Siemens Business

Activo Ingeniería



INNOMOTICS
A Siemens Business

File View Administrator Documents Extra Plugins Help

Query

COMOS_FEED Front end engineering & design

003 Project linked to Released area

- 003 Project » COMOS_FEED Front end engineering & design
  - PR001 Process
    - PFB.1 Block diagram DIN A4 x A1
    - PFB.3 Equipment list, total
    - PFB.4 Equipment lists
    - PFB.5 Mass balances
    - ABS Boundary streams
    - AKB Knowledge base
    - AMA Pure components
    - APU Process units
      - PU001 Demo Unit
        - MMB.1 Mass balances
        - PFB.1 Equipment lists
        - PFD.1 Process flow diagram PFD DIN A2
        - PFD.2 Process flow diagram PFD DIN A2
        - PFD.3 Process flow diagram PFD DIN A2
        - XML.1 XML connector document for process streams
        - AEQ Equipment
        - APS Process streams
        - AXX Miscellaneous
        - SIMD Simulation data process unit
          - C5_Phenol_extraction
      - PU002 Supply
      - PU003 Reaction
      - PU004 Separation
      - PU005 Process unit
      - PU006 Process unit
      - PU007 Storage
    - AQU Queries

Units | Documents | Base objects | Locations

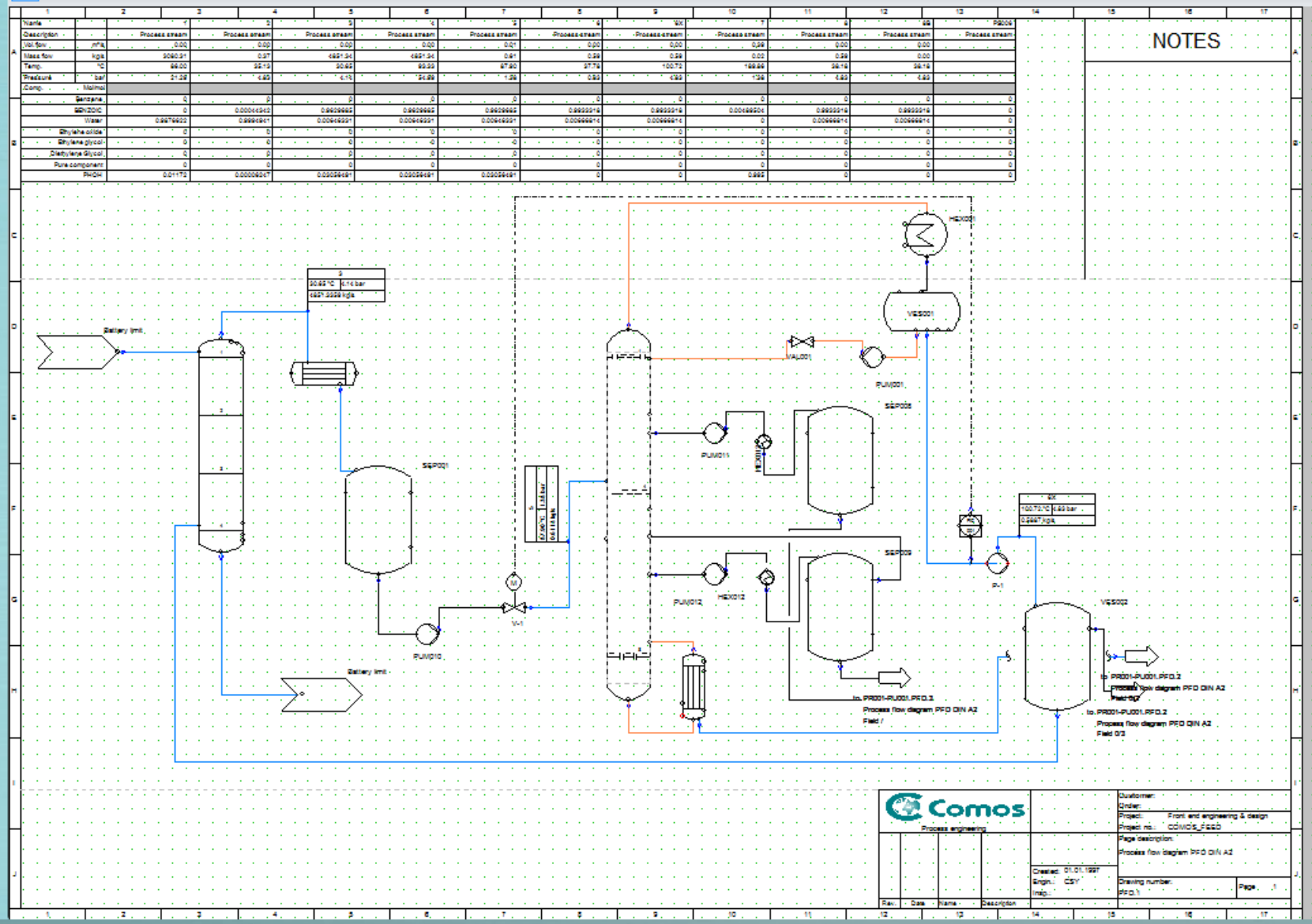
PFD.1 Process flow diagram PFD DIN A2

Details

PR001-PU001 PFD.1 Process flow diagram PFD DIN A2

Grid 1,25 Page 1/2 Zoom 45%

PFD



PR001-PU001.PFD.1 Process flow diagram PFD DIN A2 18.07.2013

x=165 y=20 Total objects: 38317 Save: 0 Check: 0

File Edit View Administrator Documents Extra Plugins Help

Query

COMOS_PID Workshop P&ID u.WF

Released area linked to Released area

- 3 Factory/Building/Production EN standard
  - PPB.10 Consumer list » .PPB.011
  - H1 Main unit
    - PFB.001 P&ID A0 EN 10628 » .PFB.020
    - PFD.1 PFD (C size)
    - T1 Subunit
    - T2 Subunit
    - T3 Subunit
    - T4 Subunit
    - T5 Subunit
    - T6 Subunit
  - PPB.6 Pipe list » .PPB.012

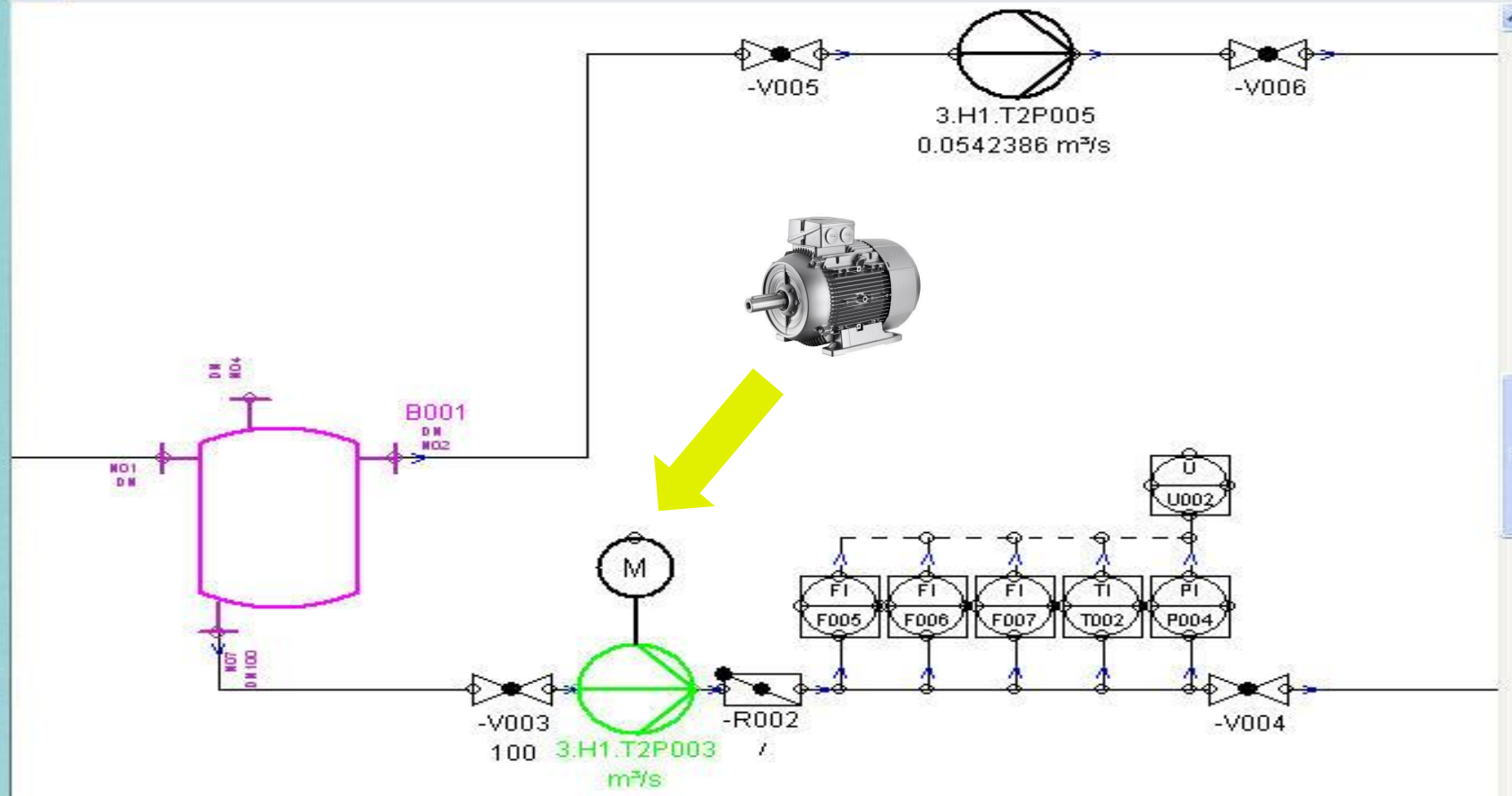
Units | Locations | Documents | Base objects

PFB.001 P&ID A0 EN 10628 » .PFB.020

Details

3.H1 PFB.001 P&ID A0 EN 10628

Grid 1,25 Zoom 90%

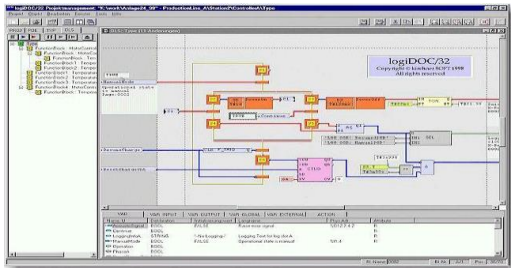


3.H1.PFB.001 P&ID A0 EN 10628 06.04.2009 x=488 y=348 Total objects: 51963 To save: 11 Unchecked: 0

Activo, Control

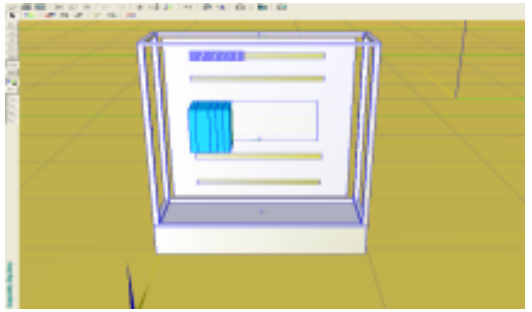
Diagramas Logicos

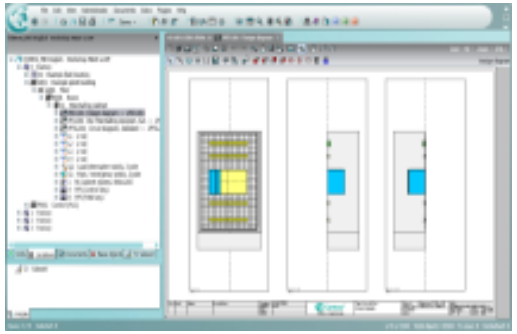
Circuitos electricos



Modelo
Matematico

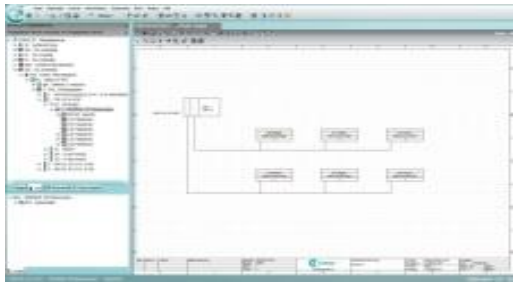
Diagramas de
Gabientes

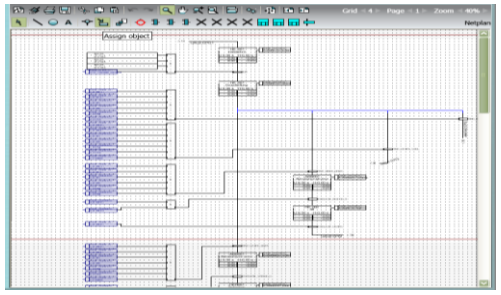




Design diagram

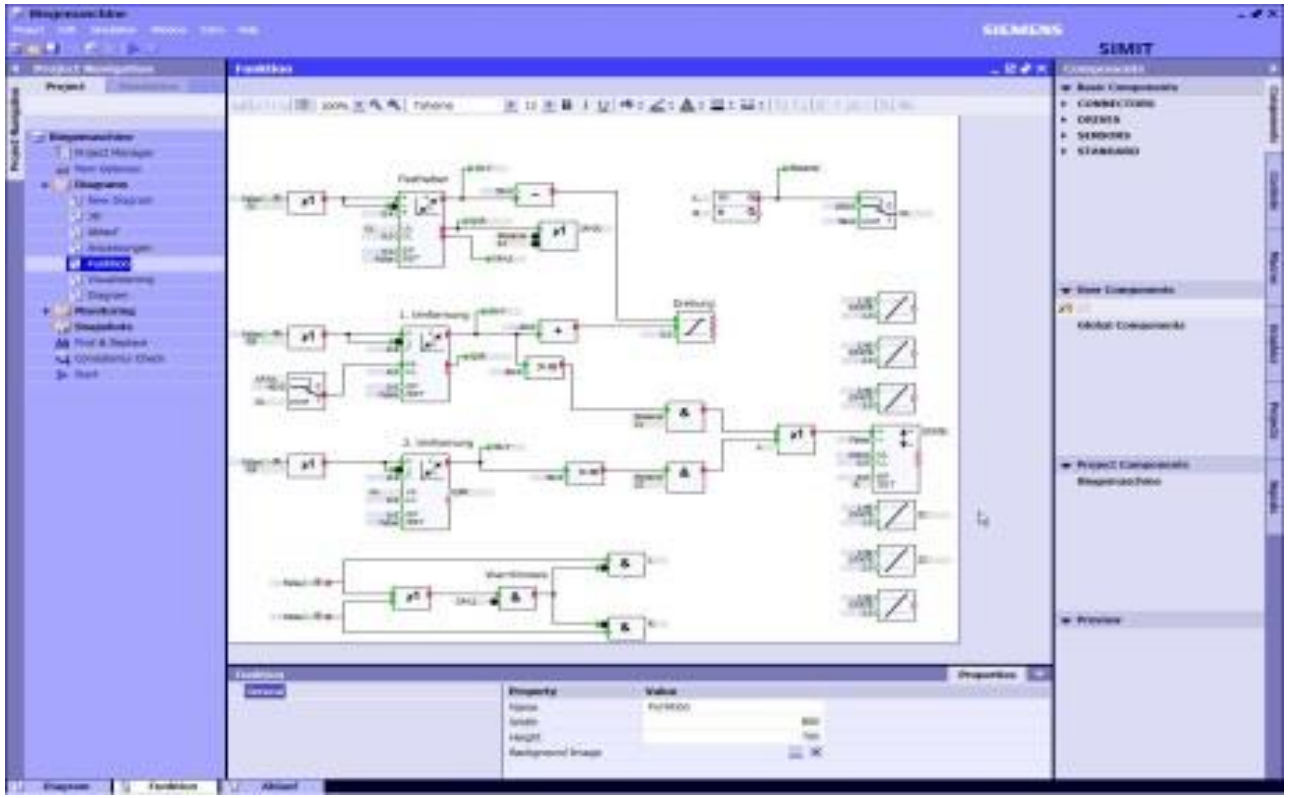
Diagrama
De conexionados

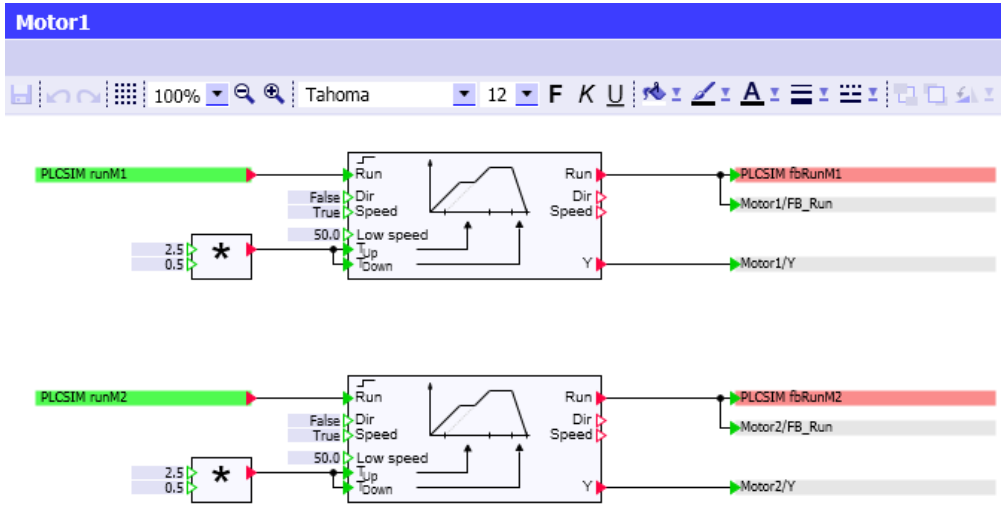




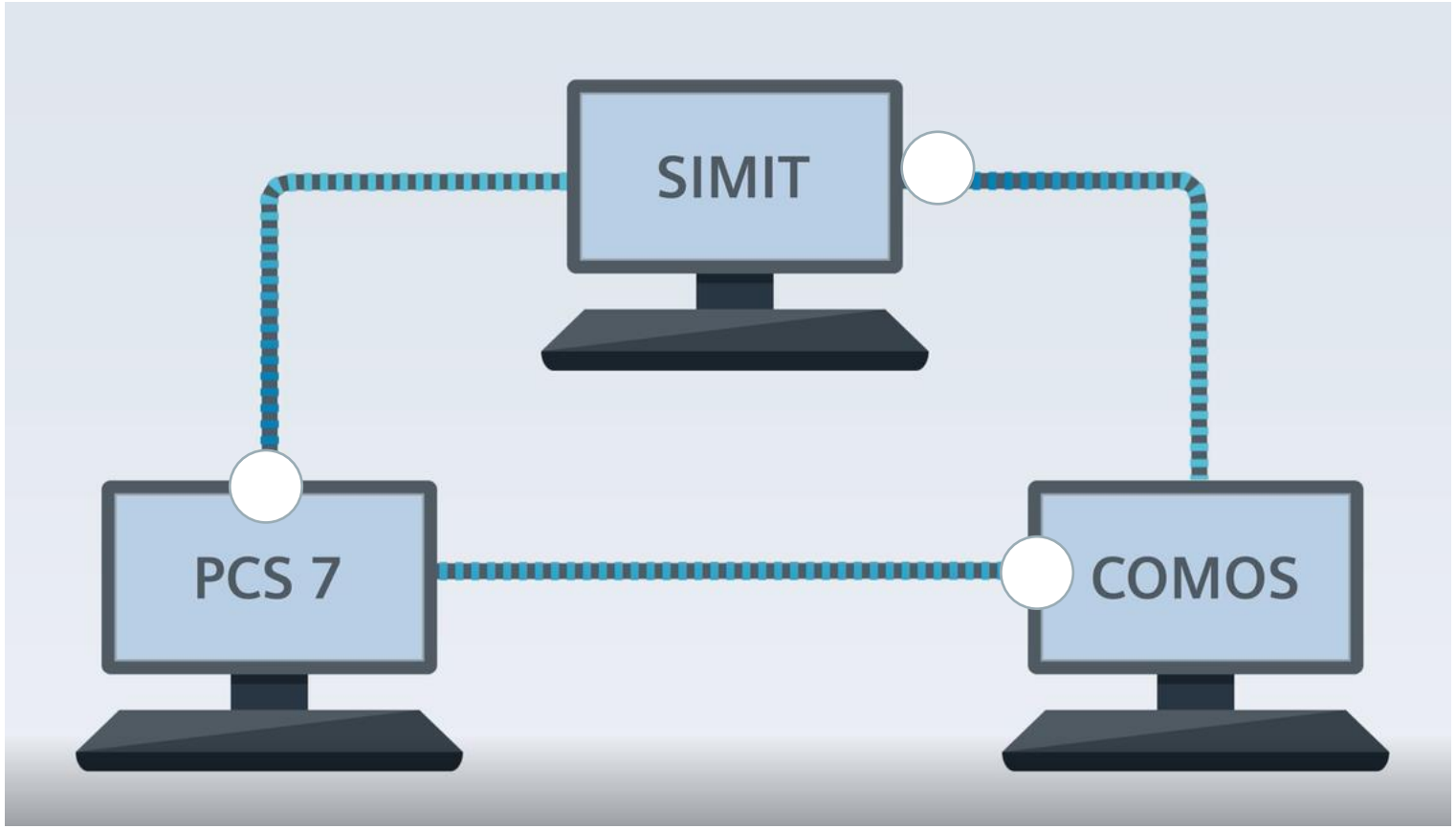
Logicas de control

Activo, Simulación

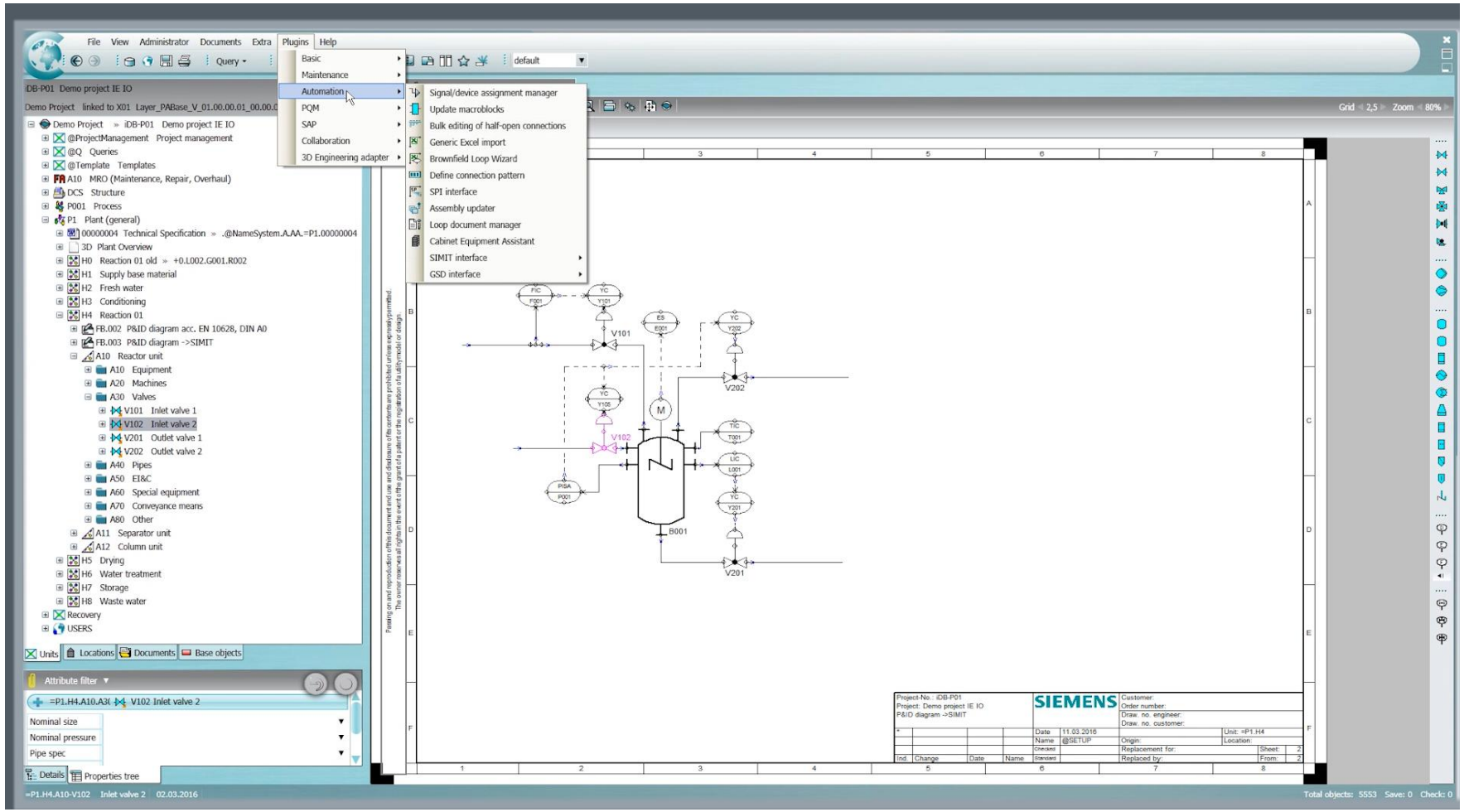




COMOS / PCS 7 / SIMIT
Real integración de plataformas de software



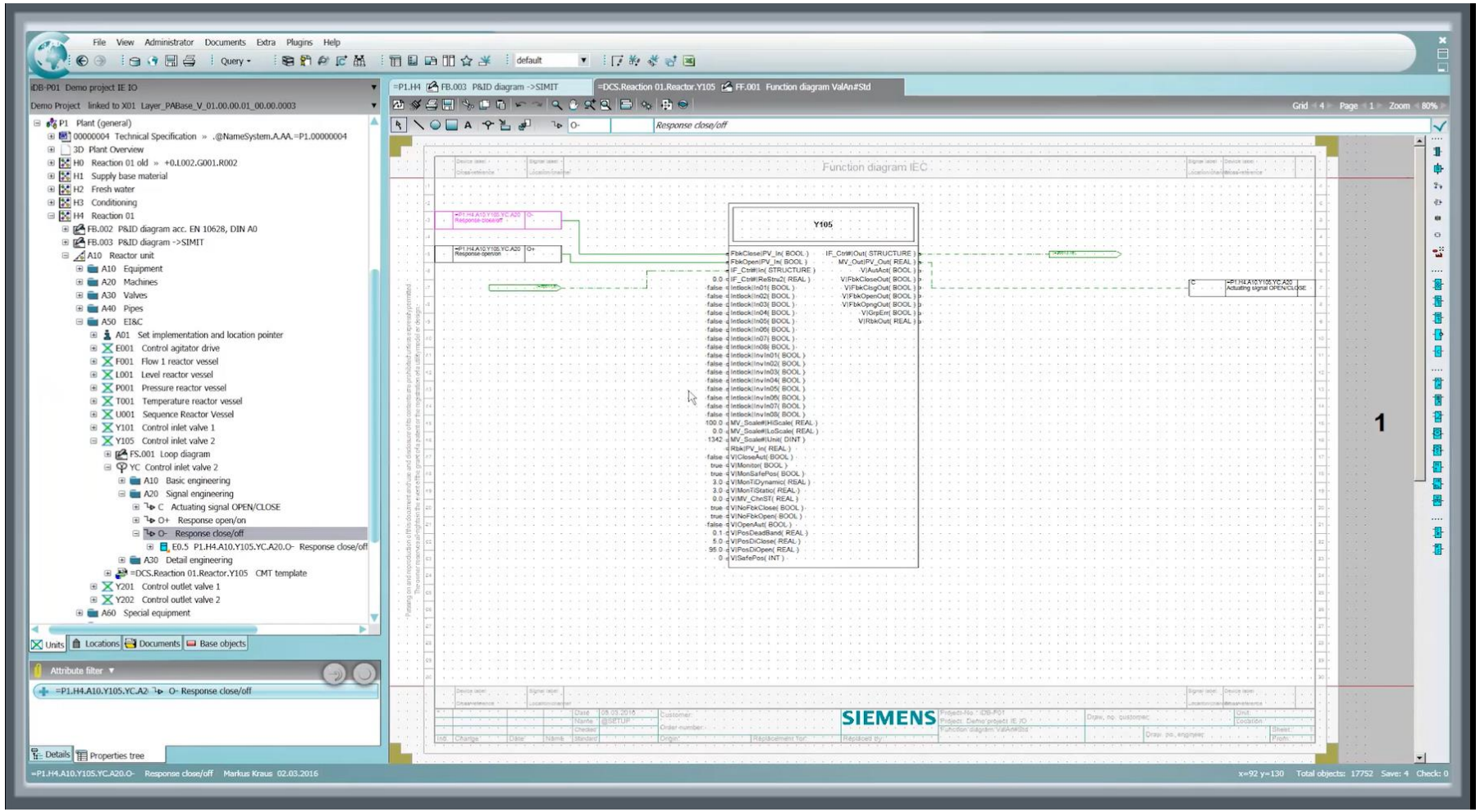
COMOS / PCS 7 / SIMIT
Real integración de plataformas de software



Diseño de Ingeniería

COMOS
Define las características de los componentes de sistema de control

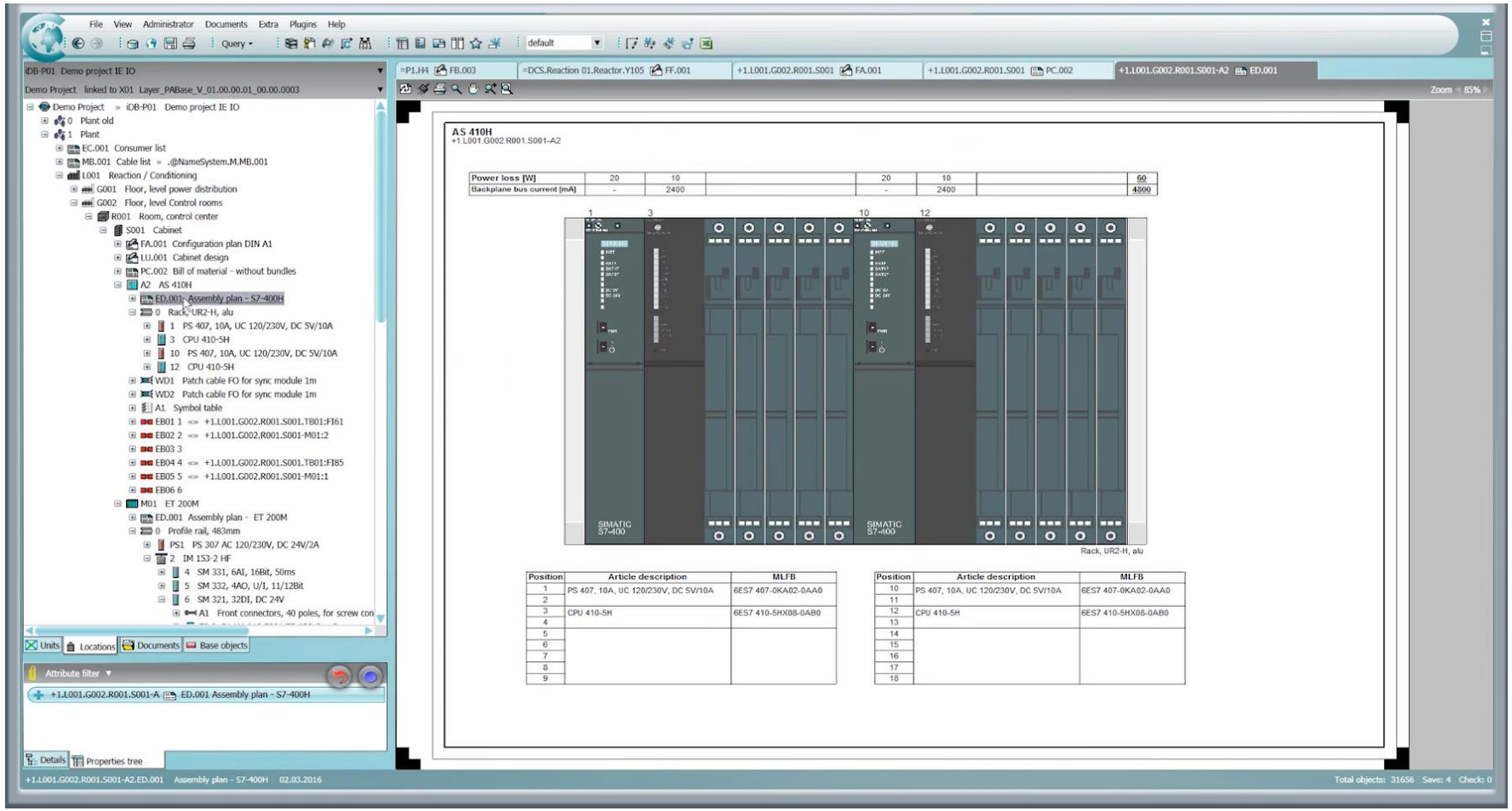
COMOS / PCS 7 / SIMIT
Real integración de plataformas de software



Diseño de Ingeniería

COMOS
Define los diagramas de conexión de bloques del DCS y las terminales marshalling panels.

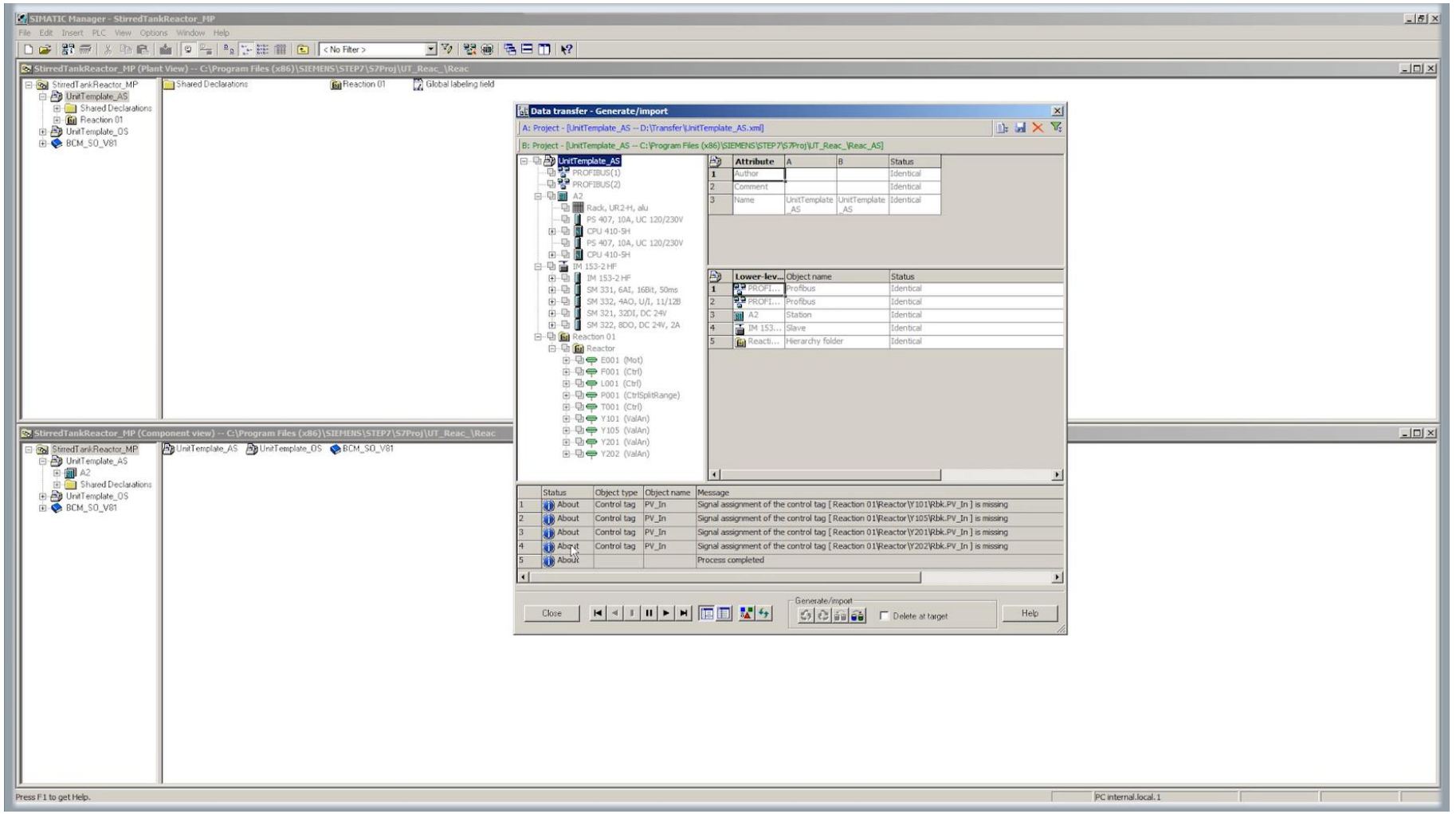
COMOS / PCS 7 / SIMIT
Real integración de plataformas de software



Diseño de Ingeniería

COMOS
Define el hardware del sistema de control, asi como sus conexiones logicas y electricas.

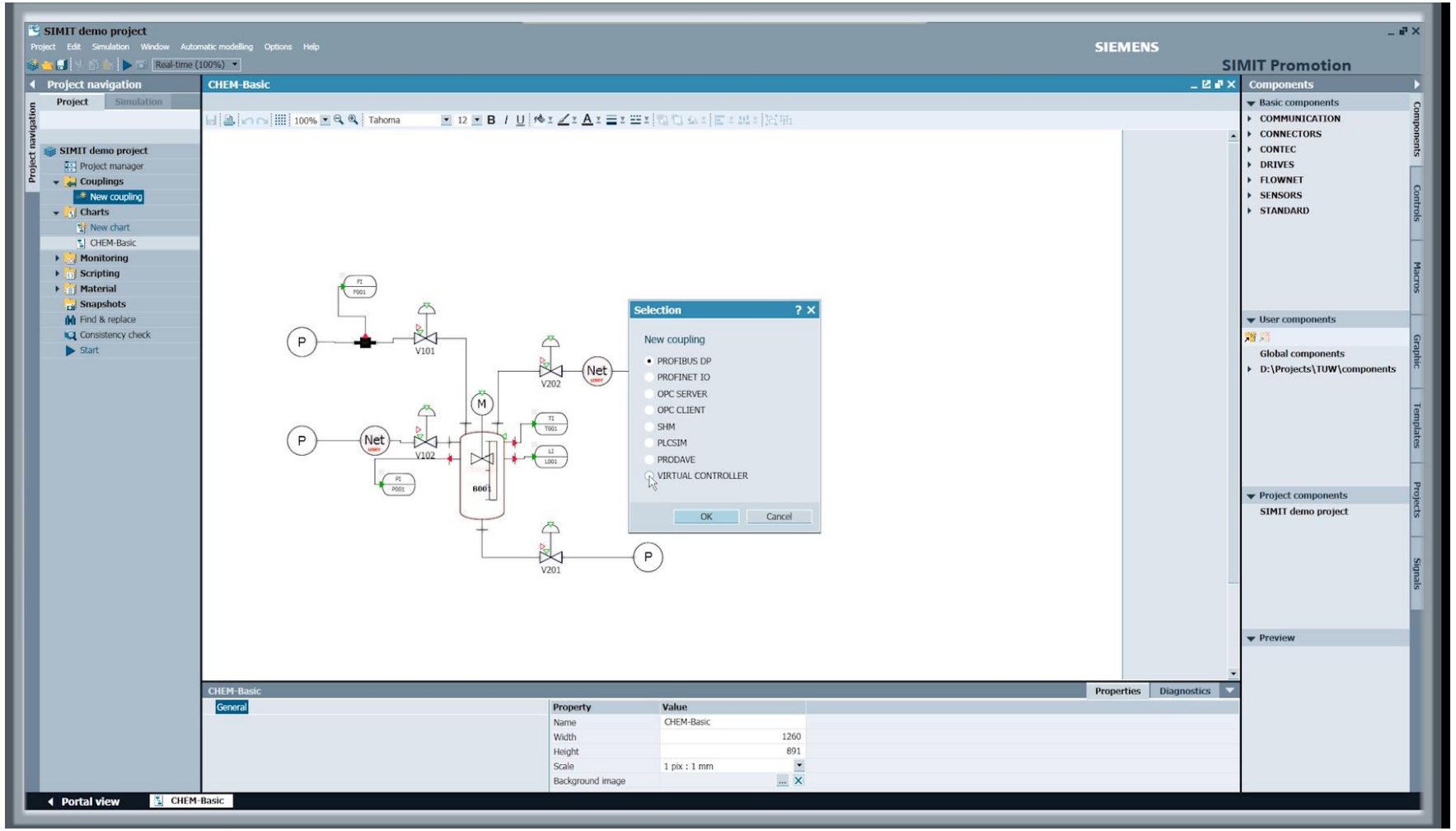
COMOS / PCS 7 / SIMIT
Real integración de plataformas de software



Configuración DCS

COMOS / DCS
En base a la ingeniería definida en COMOS, se importa la definición de HW hacia el DCS

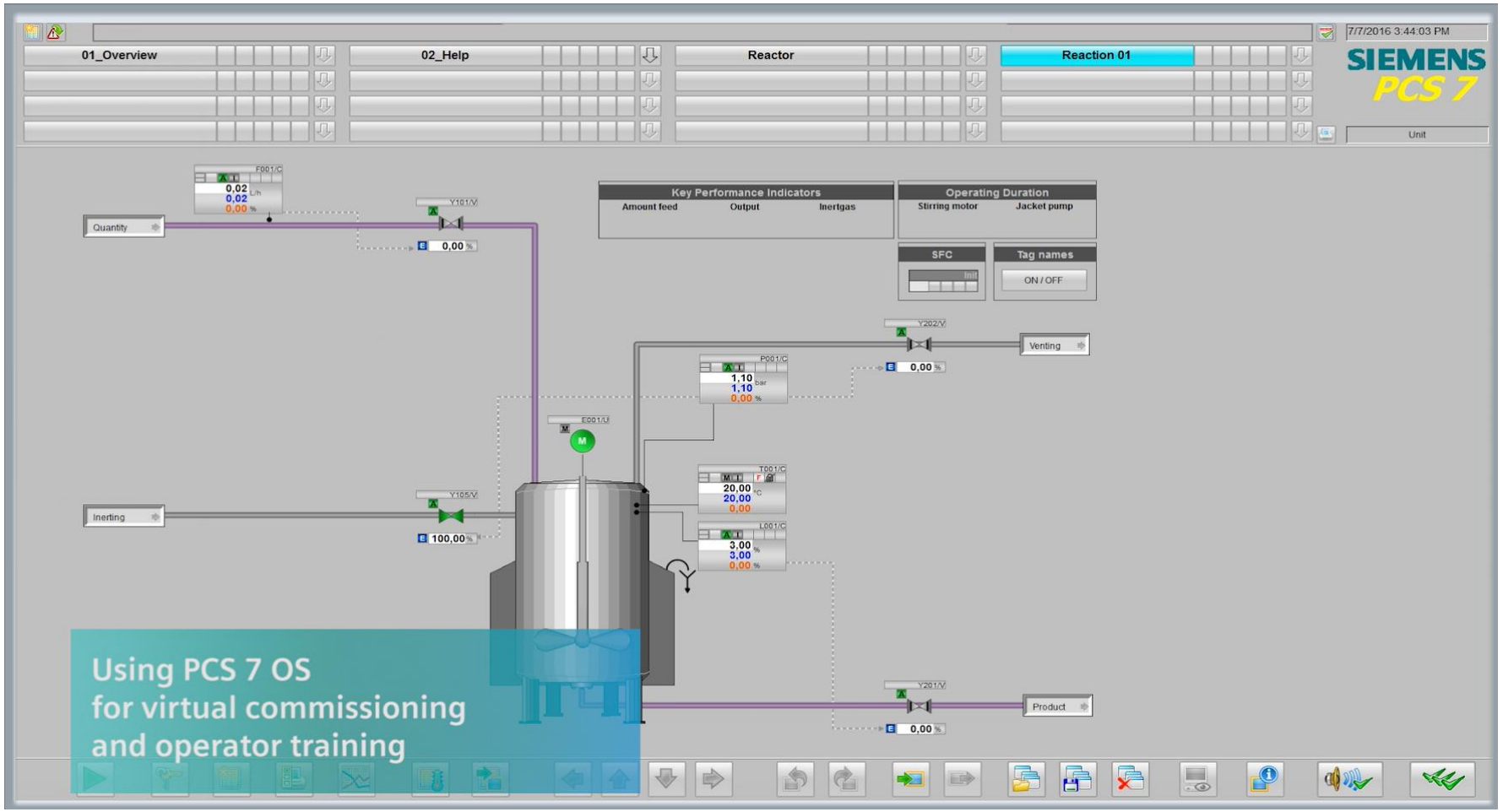
COMOS / PCS 7 / SIMIT
Real integración de plataformas de software



Modelamiento de Simulación

COMOS / DCS / SIMIT
Tanto la lógica, la configuración del HW y las conexión de proceso se importan en SIMIT para desarrollo de simulación

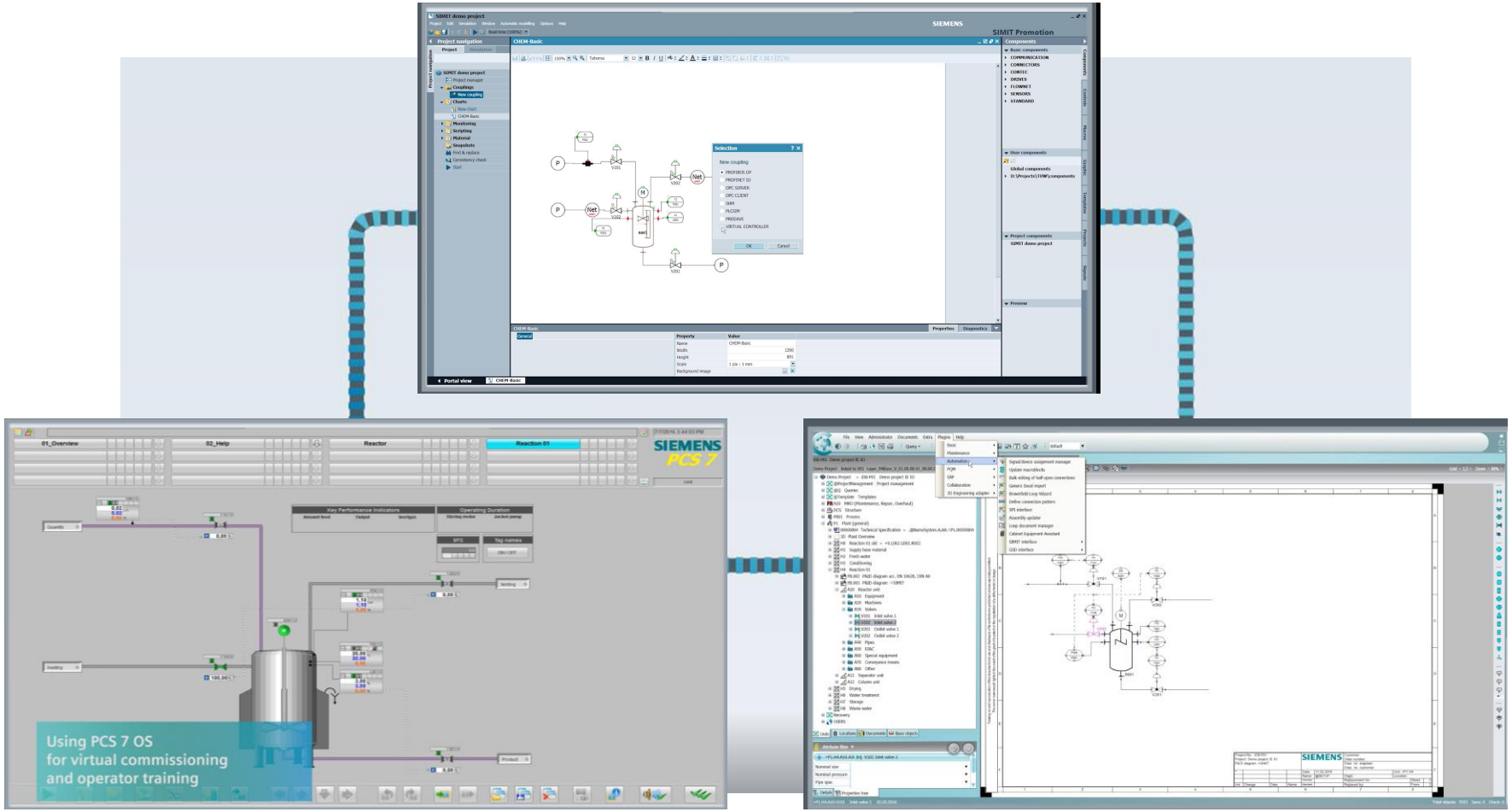
COMOS / PCS 7 / SIMIT
Real integración de plataformas de software



Integración Vertical de disciplinas y Proyectos de Automatización

COMOS / DCS / SIMIT
La operación del DCS y la simulación del proceso desarrollados a través de una herramienta central de ingeniería

COMOS / PCS 7 / SIMIT
Real integración de plataformas de software



Quellaveco Project

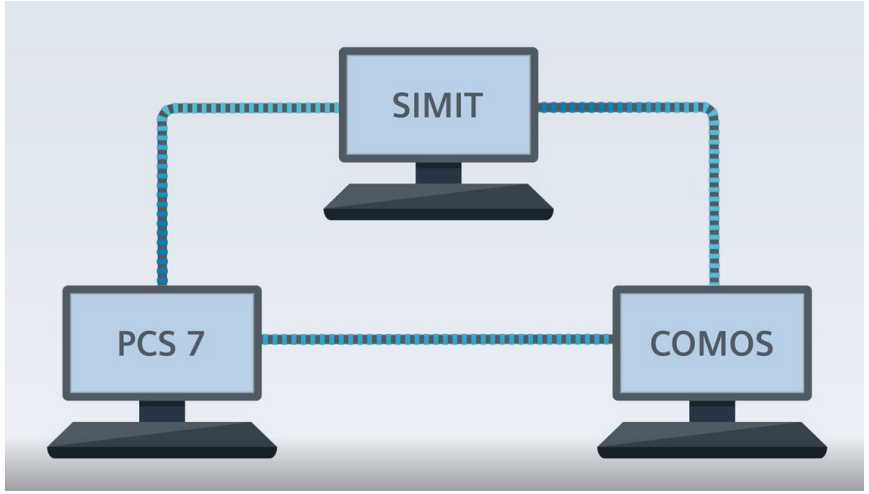
- Primera planta **concentradora** 100% digital del Perú
- 4500 msnm
- Es la mayor inversión minera del Perú
- 5500 M USD
- 36 años de operación
- 2500 puestos de trabajo
- 300mil Tons de **cobre** (10 primeros años)

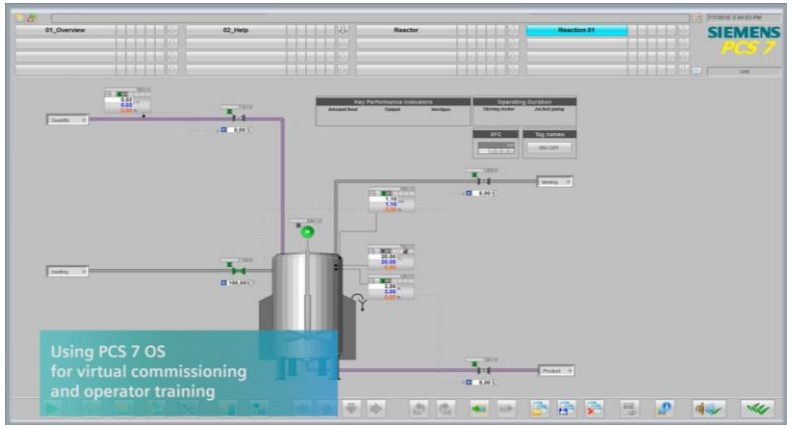
INNOMOTICS

A Siemens Business

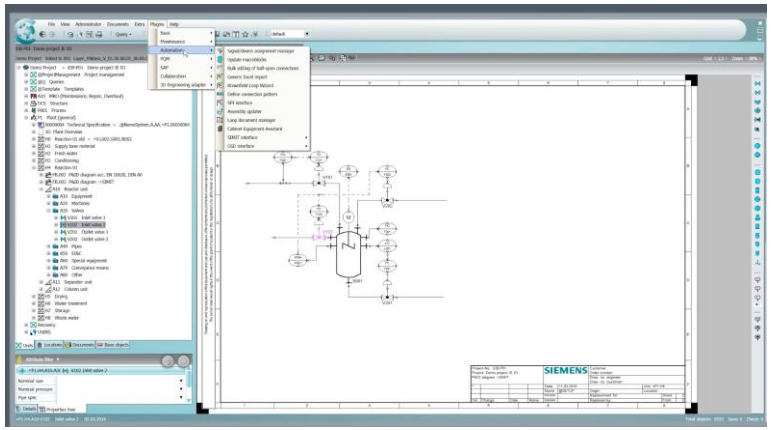
Digitalización, simulación y control automático

- Control Automático integrado con ingeniería, simulación y analítica de datos.

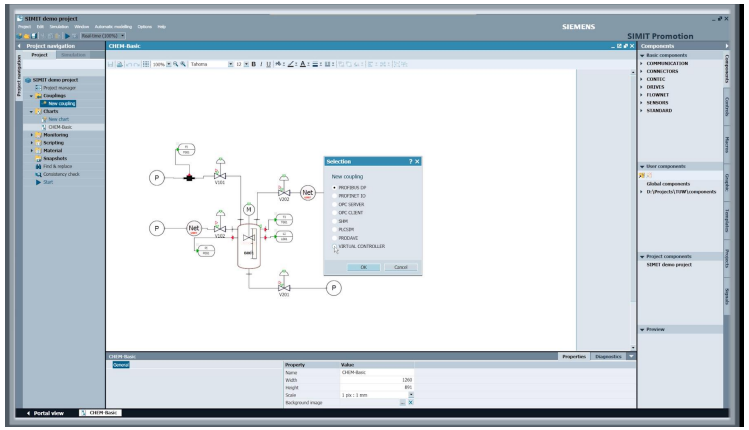




Control Automático
DCS: **Simatic PCS7**



Ingeniería Integrada: **COMOS**



Simulación: **SIMIT**

INNOMOTICS
A Siemens Business

Innomotics

Amplio portafolio de control, instrumentación y eléctrico

Enterprise Level
ERP level

Management Level
MES/Plant Engineering

Operator Level
DCS Operator Station

Control Level
DCS Controller

Field Level
Drives, Field Bus, Sensors

Integration with ERP Level

XHQ / MINDSPHERE

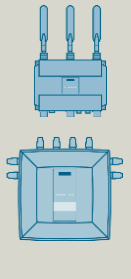
COMOS
Plant Engineering

SIMATIC IT
Intelligence Suite

SIMATIC IT
R&D Suite

SIMATIC IT
Production Suite

SIMATIC PH
Production Arch



PROFINET

PROFIBUS

Industrial Communication
SCALANCE/
RUGGEDCOM

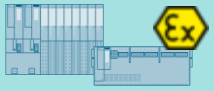
SIMATIC PCS 7 Engineering

SIMIT Simulation

SIMATIC PCS 7 Operating System

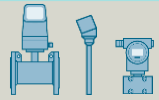
SIMATIC
HMI

SIMATIC PCS 7 Controller

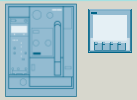


SIMATIC Distributed I/O

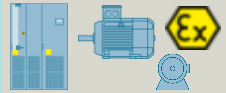
SIMATIC Field Bus



SITRANS/SIPART
Instrumentation



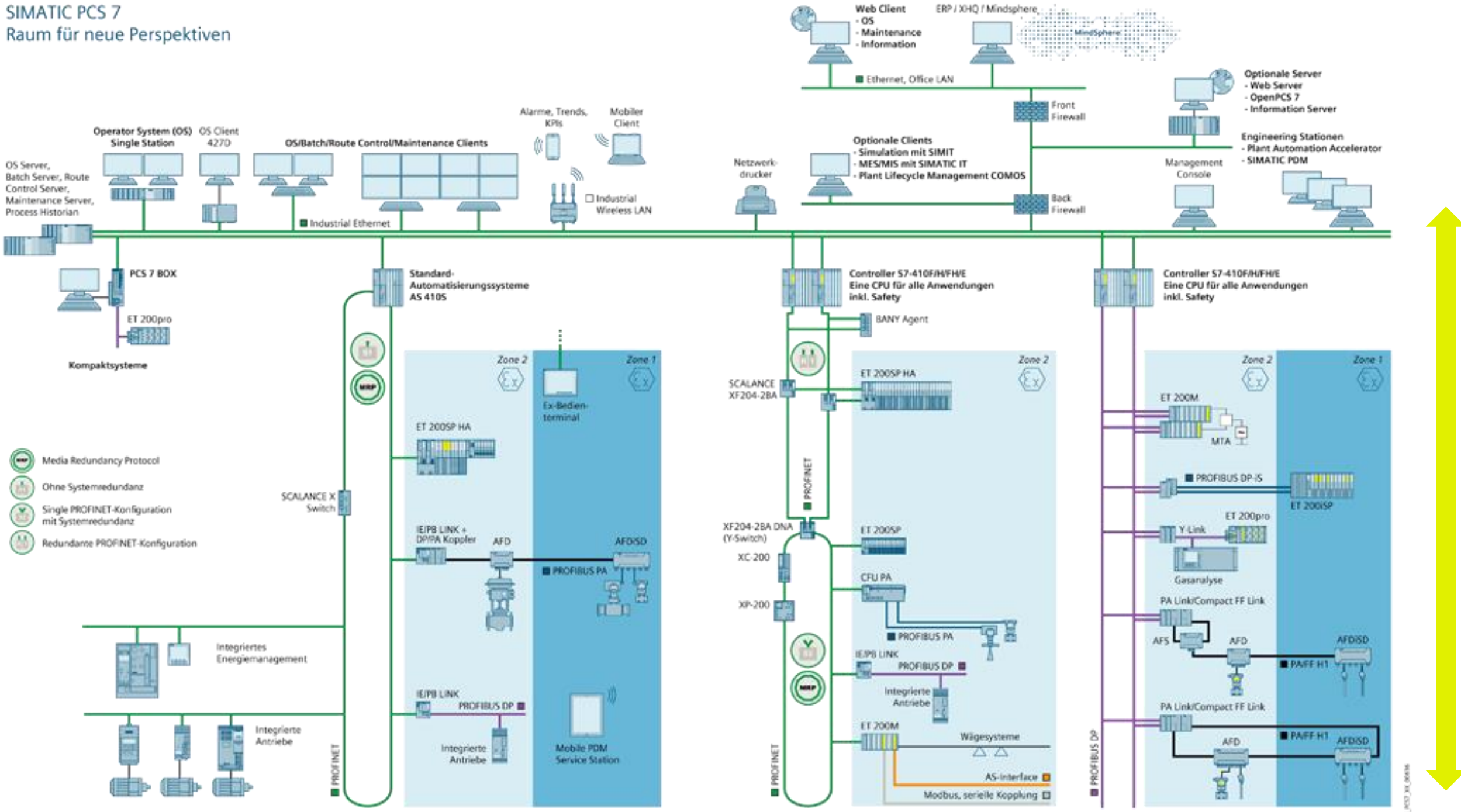
SENTRON Power Control



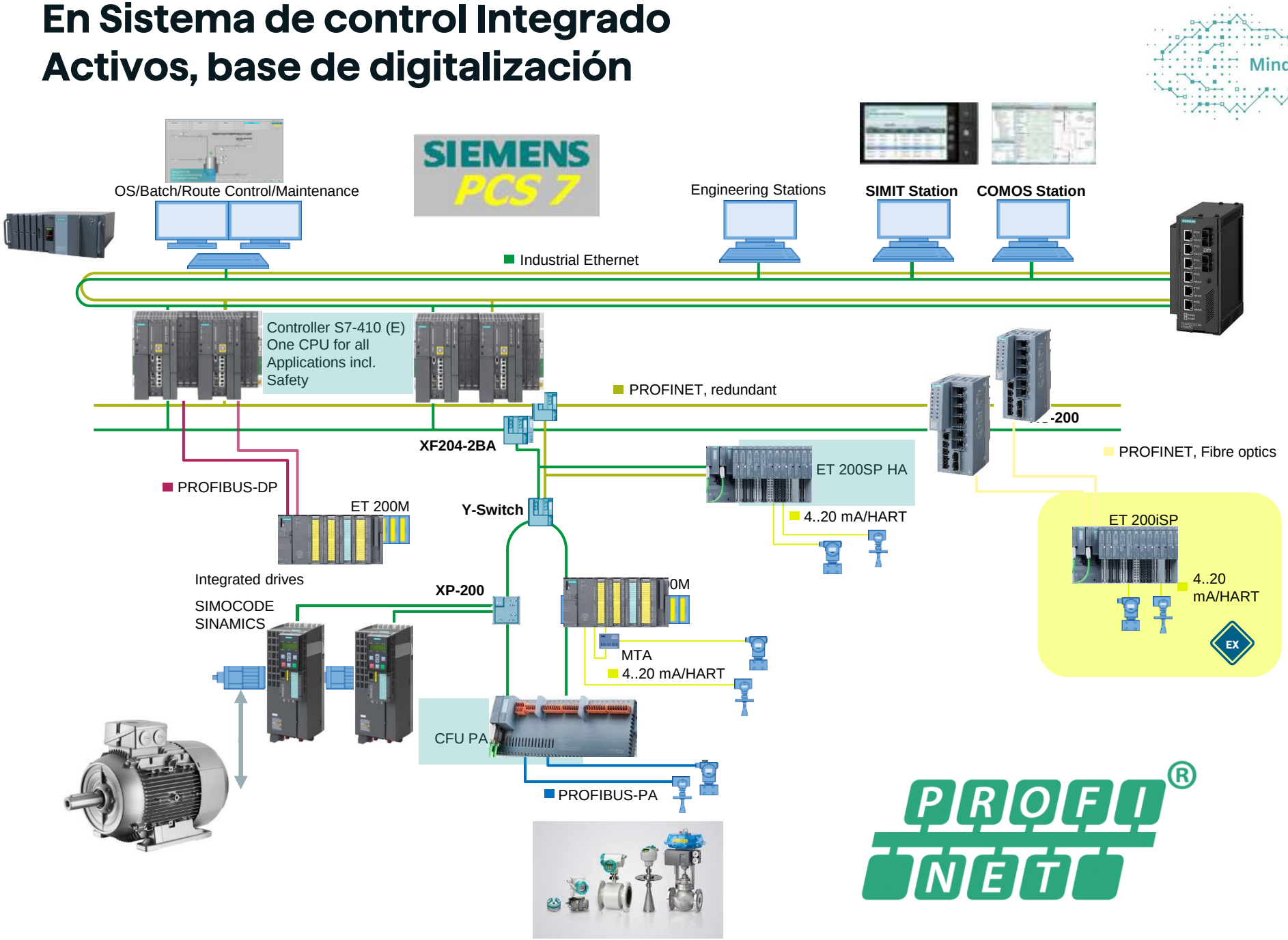
SINAMICS Drive Systems

INNOMOTICS
A Siemens Business

SIMATIC PCS 7
Raum für neue Perspektiven



En Sistema de control Integrado
Activos, base de digitalización



Digitalización en el campo

Redundancia total

Arquitectura Flexible

Fácil Instalación

Protección de inversión

“Sustentabilidad y digitalización”

Mina digital

- Cerrar brechas en toda la cadena de valor de la minería
- Reducción de CAPEX y OPEX
- Aumento de eficiencia
- Profundizar el conocimiento del equipamiento operativo
- Analítica de datos
- Simulación integrada
- Aplicaciones específicas para minería
- Estandarización de PKI
- Soporte interconectado en el mundo
- Sustentabilidad, siendo lideres del mercado, respetando en medio ambiente
- Carbono neutral

INNOMOTICS
A Siemens Business

Thank You

Claudio Gaete
Electrical Engineer
Product Portfolio Management Manager
Automation
Innomotics a Siemens Business

Chile-Peru

Mobile +56 9 500 12 675
E-Mail claudio.gaete@siemens.com

INNOMOTICS
A Siemens Business