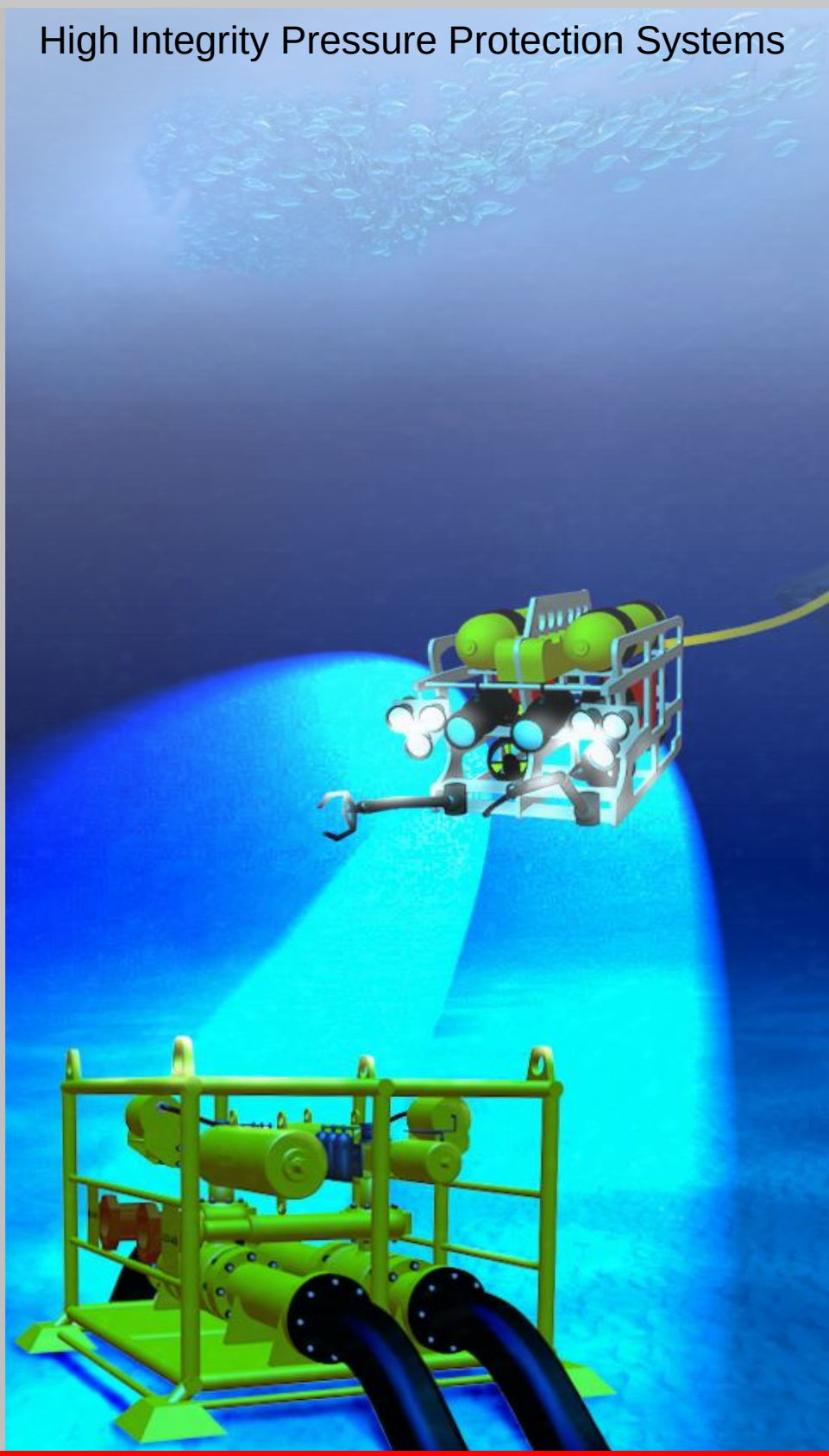
paladon

TOTAL VALVE CONTROL

# HIPPS

## High Integrity Pressure Protection Systems

# COMPANY

For over 30 years Paladon Systems has been supplying valve actuators and control systems on a global basis.

Since its inception in 1981, Paladon Systems has continuously developed its design, engineering, organisational, quality and management capabilities. Today Paladon Systems designs and manufactures many valve automation technologies that lead the industry in terms of cost efficiency, operational performance and environmental responsibility.

Paladon Systems' vast experience with supporting the Oil, Gas and Power industries with valve automation solutions for the most critical applications in extreme operating environments has resulted in product designs that offer unsurpassed quality and reliability across all industries and applications.

Holding ISO 9001 certification for over 20 years, today Paladon Systems hold accreditation and approvals from almost all major institutes, engineering companies and end users.

Now headquartered in Italy since the 2018 reorganization, is also based in the UK at the historical facility, founded in 1981, and in Houston, United States, thanks to great cooperation with a US partner. With a comprehensive suite of valve automation solutions backed by a dedicated team of field service engineers, Paladon Systems is **Total Valve Control**.

# INTRODUCTION

As oil and gas resources become harder to find, producers are forced to operate in environments of ever increasing severity and risk. Often operating in High Temperature High Pressure (HTHP) applications, the consequences of a catastrophic failure to personnel, the environment and infrastructure are immense.

To help manage the increasing and unprecedented risk, the concepts of Safety Instrumented Systems (SIS) and Safety Integrity Levels (SIL) were created and applied.

One such SIS type, is the High Integrity Pressure Protection System (HIPPS). A HIPPS is an independently instrumented protective device, and acts as the last line of defence for protecting downstream operations from over pressurization.

Typically certified to SIL3, a HIPPS gives operators the most dependable pressure protection device available in the market today.

# PROTECTING YOUR ASSETS

Traditionally, the risk of over-pressure events has been managed through the use of mechanical relief systems which open to relieve excess fluid to disposal systems such as flare or holding tanks. Although simple, relatively low cost and widely available, mechanical relief systems often require a large installation footprint, and are far from ideal when the process fluid is flammable or toxic.

Typically operators select a HIPPS when:

- High pressures or flow rates are required
- The environment needs to be protected from process fluid contamination
- The economic viability of an installation needs improvement
- The risk level of an installation needs to be reduced

# CAPEX & OPEX REDUCTION

In addition to optimum pressure protection, HIPPS offer operators significant CAPEX and OPEX savings.

**New Installations**

- Avoids the requirement for expensive flare systems and pressure relief valve manifolds
- Offer significant weight savings for offshore installations
- For wellhead installations, allows pressure ratings for downstream piping and instrumentation to be reduced

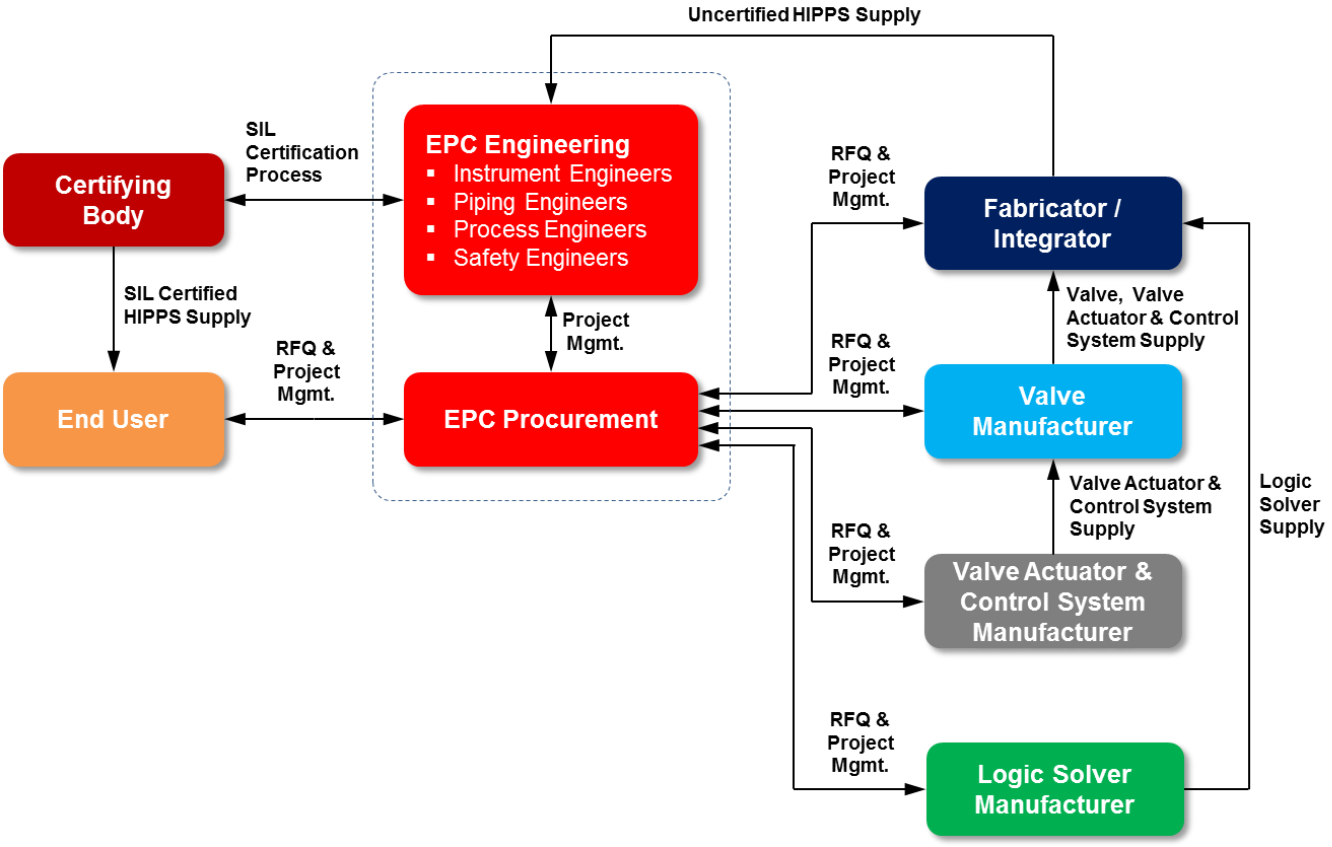
**Existing Installations**

- Avoids the requirement to upgrade flare systems and pressure relief valve manifolds

# EXPEDITED & SIMPLIFIED PROCUREMENT

Traditionally, end users and EPCs have had to source HIPPS components from multiple suppliers and internally conduct the safety analysis on the complete system assembly to ensure compliance up to SIL 3 certification.

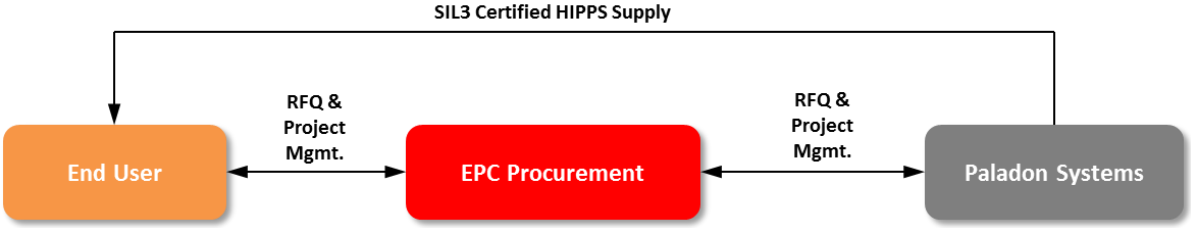
### Traditional Workflow for HIPPS Procurement




The project management of numerous vendors is a complex and time consuming process for procurement departments and the SIL3 calculations and certification activities require end user or EPC resources from multiple engineering disciplines.

Clients that choose to partner with Paladon Systems have a single point of contact for all project management matters and no specialist engineering resources are required as Paladon Systems conducts all SIL calculations and certification activities up to SIL3.

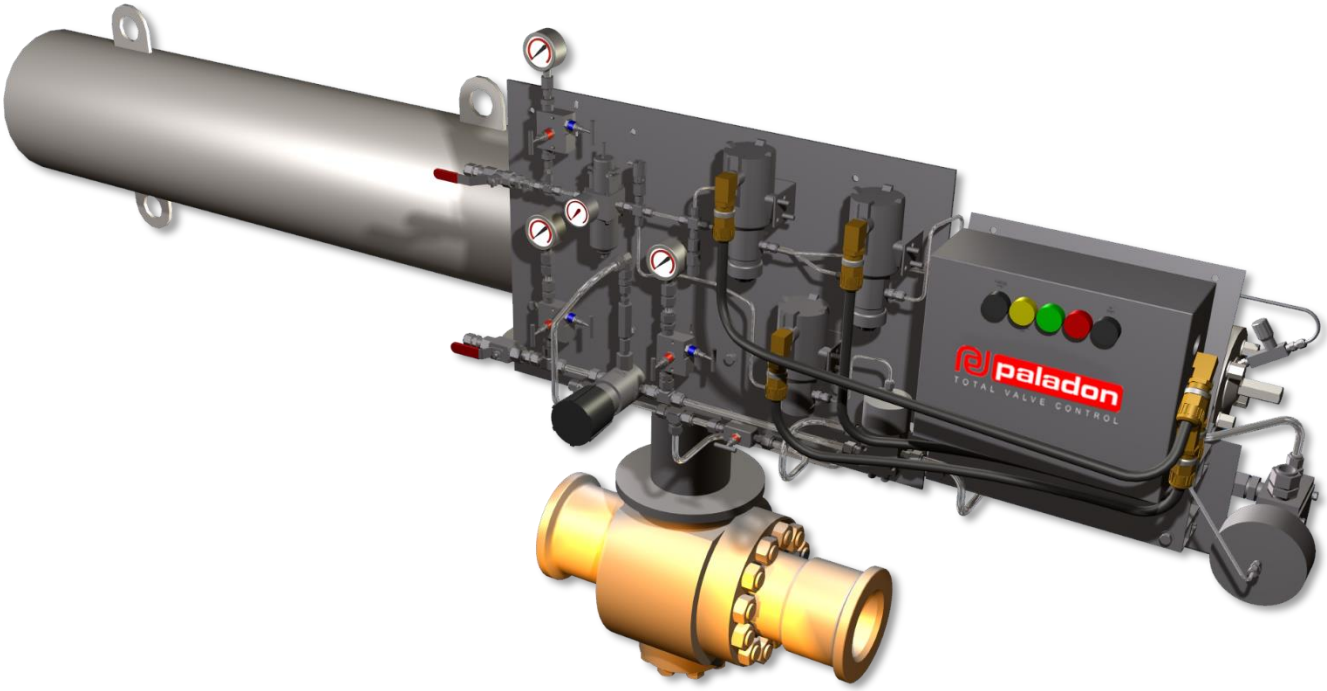
### Paladon Systems Workflow for HIPPS Procurement



# KEY FEATURES & BENEFITS

Paladon Systems provides fully certified HIPPS with the following key features and benefits:

- Full engineering design support for any HIPPS application
- Full compliance with IEC 61508 Edition 2 up to SIL3; including system and sub-system calculations and documentation set:
  - SIL calculations
  - Safe failure fractions
  - HFT requirements
  - Partial Stroke Testing (PST) frequency determination
  - 3rd party certification
- Fast closure times down to 2 seconds
- API and ASME valves up to 60”
- Skid design and fabrication
- Installation, commissioning and servicing support to maintain SIL certification levels
- Valve actuator designs and manufacturing based on over 30 years’ experience in the Oil & Gas industry
- World class and proven logic solver
- Full diagnostics capability
- Compact manifold design control systems
- Hydraulic power units
- All instrumentation

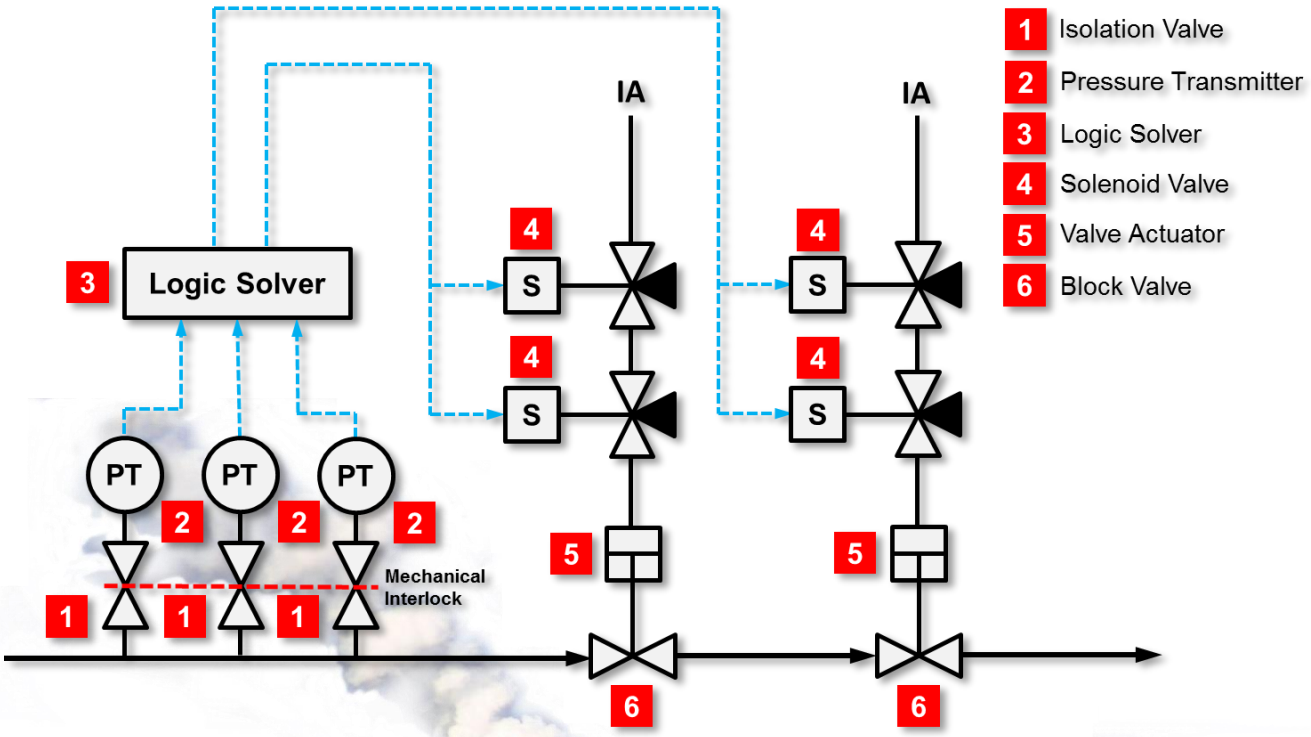


# SYSTEM ARCHITECTURE

The exact configuration of a HIPPS System will be dependent on the specific application; however, as a minimum all HIPPS Systems include the following components:

- A mainline valve
- A valve actuator
- A valve actuator control system
- A logic solver

One defining characteristic of all HIPPS is the duplication of system components to provide failure redundancy; ultimately resulting in higher system integrity. Below is a common HIPPS architecture showing redundant pressure transmitters, valve actuators, solenoid valves and block valves.




# SYSTEM COMPONENTS

- **Mainline Valve**
  Typically will be trunnion mounted, double block bleed ball type due to proven tight shut-off, high reliability and low operating torque requirements. Ultimately the final valve selection will be based on application specifications and end user preference.

- **Valve Actuator**
  Spring-return scotch-yoke or linear piston designs reflecting Paladon Systems' over thirty years experience with providing valve automation solutions for the most demanding applications in the Oil & Gas industry.

- **Valve Actuator Control System**
  Bespoke systems available for any HIPPS applications. Manifold designs to maximize robustness and reliability.

- **Logic Solver**
  Working with our Sira/CASS certified technology partner, we provide TUV/AK6 certified logic solvers. Our logic solvers use standard, proven and function block software which allows for numerous options such as partial stroke testing, and valve function logging to support preventative maintenance programs. Communications to all major DCS systems and customized third party communications interfaces are also available.

  The SIS controller can be provided up to a range of IEC 61508 SIL3 platforms to include scalable 2oo3 pressure transmitters and 1oo2 solenoid valve packages. The final SIS choice is dictated by functionality and availability requirements, system costs and client preferences.

  All systems are independently third party certified to ensure compliance with all current legislation and industry standards.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