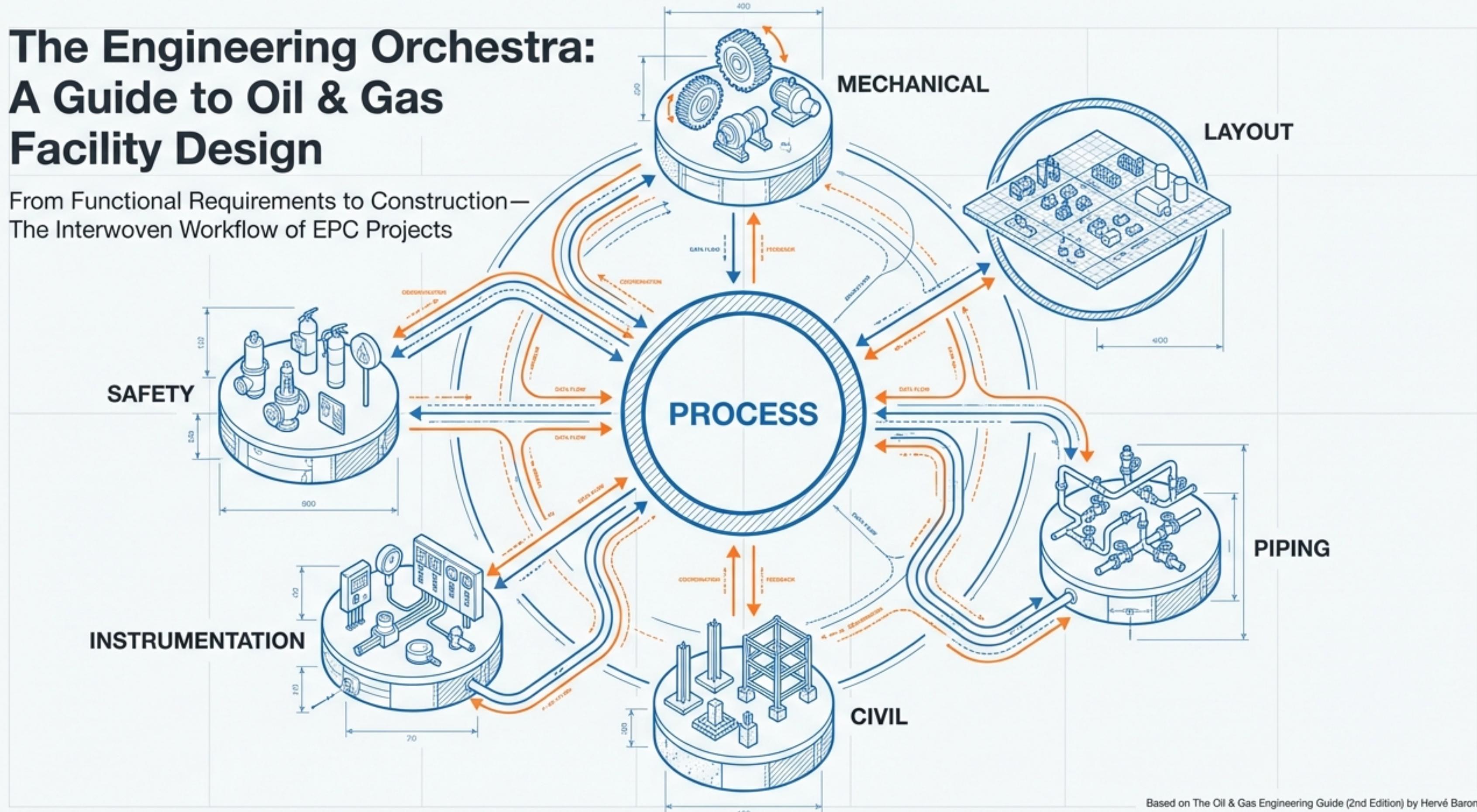


The Engineering Orchestra: A Guide to Oil & Gas Facility Design

From Functional Requirements to Construction—
The Interwoven Workflow of EPC Projects

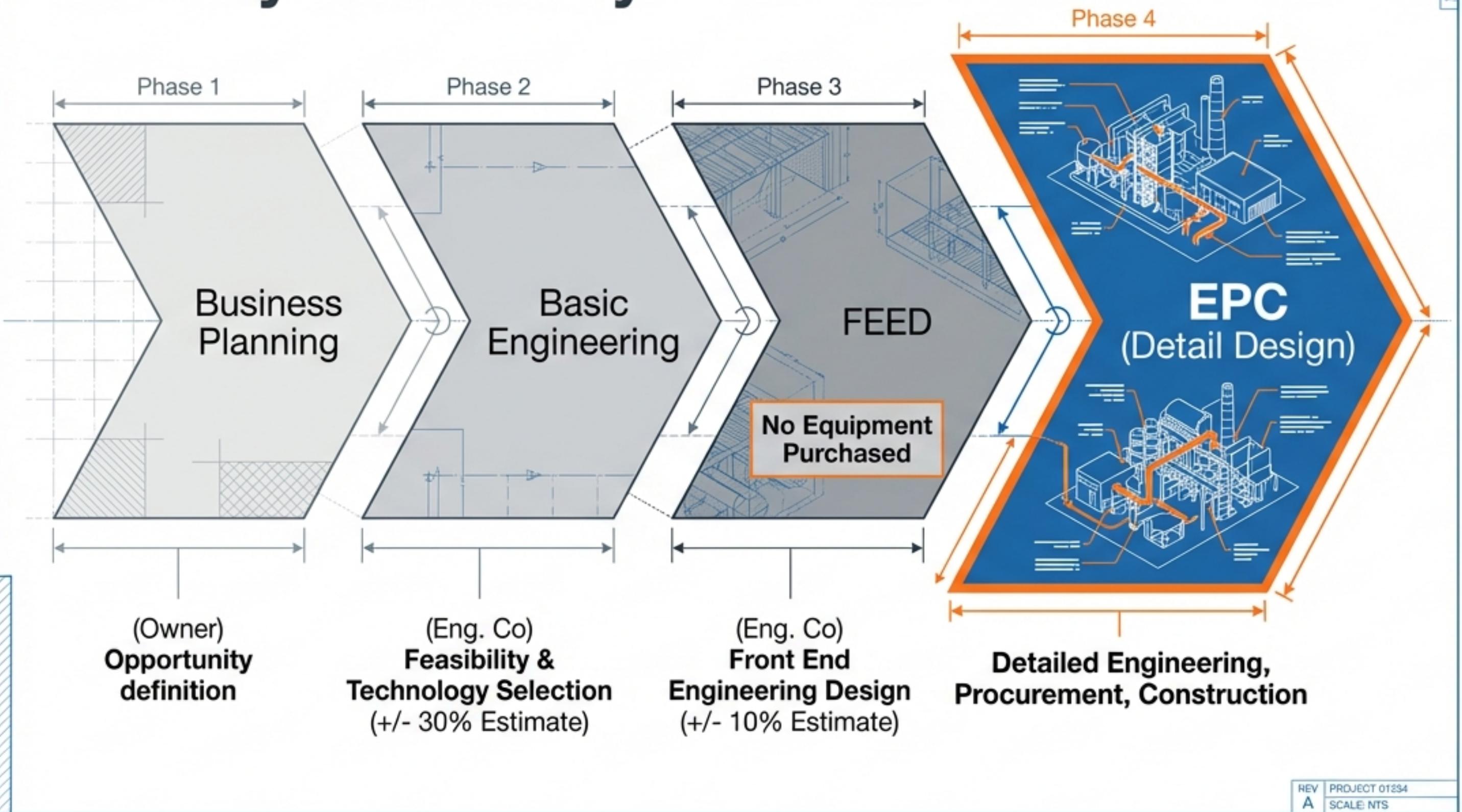


Based on The Oil & Gas Engineering Guide (2nd Edition) by Hervé Baron

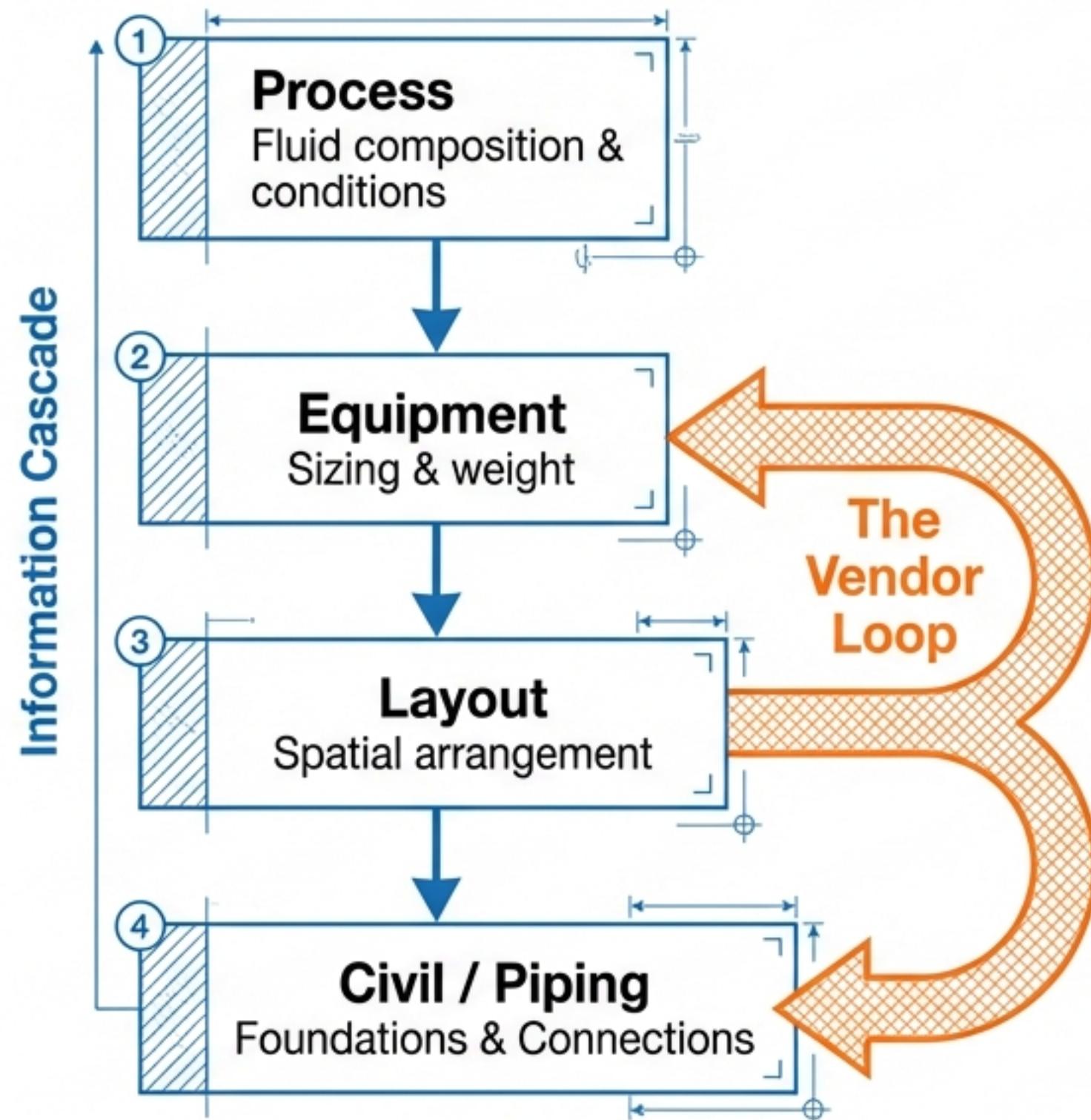
Translating Functional Requirements into Physical Reality

REV
APROJECT 01234
SCALE: NTS

CORE DEFINITION:
Engineering is the act of translating functional requirements into a full set of thousands of drawings. It writes the music that will be played by Procurement and Construction.

REV
APROJECT 01234
SCALE: NTS

The Engineering Workflow is Iterative, Not Linear



**"We do not build
in a straight line;
we refine in
loops."**

Example: Civil cannot design foundations until Vendor confirms equipment weight, which requires Process pressure data.

Process Engineering: Defining the Transformation

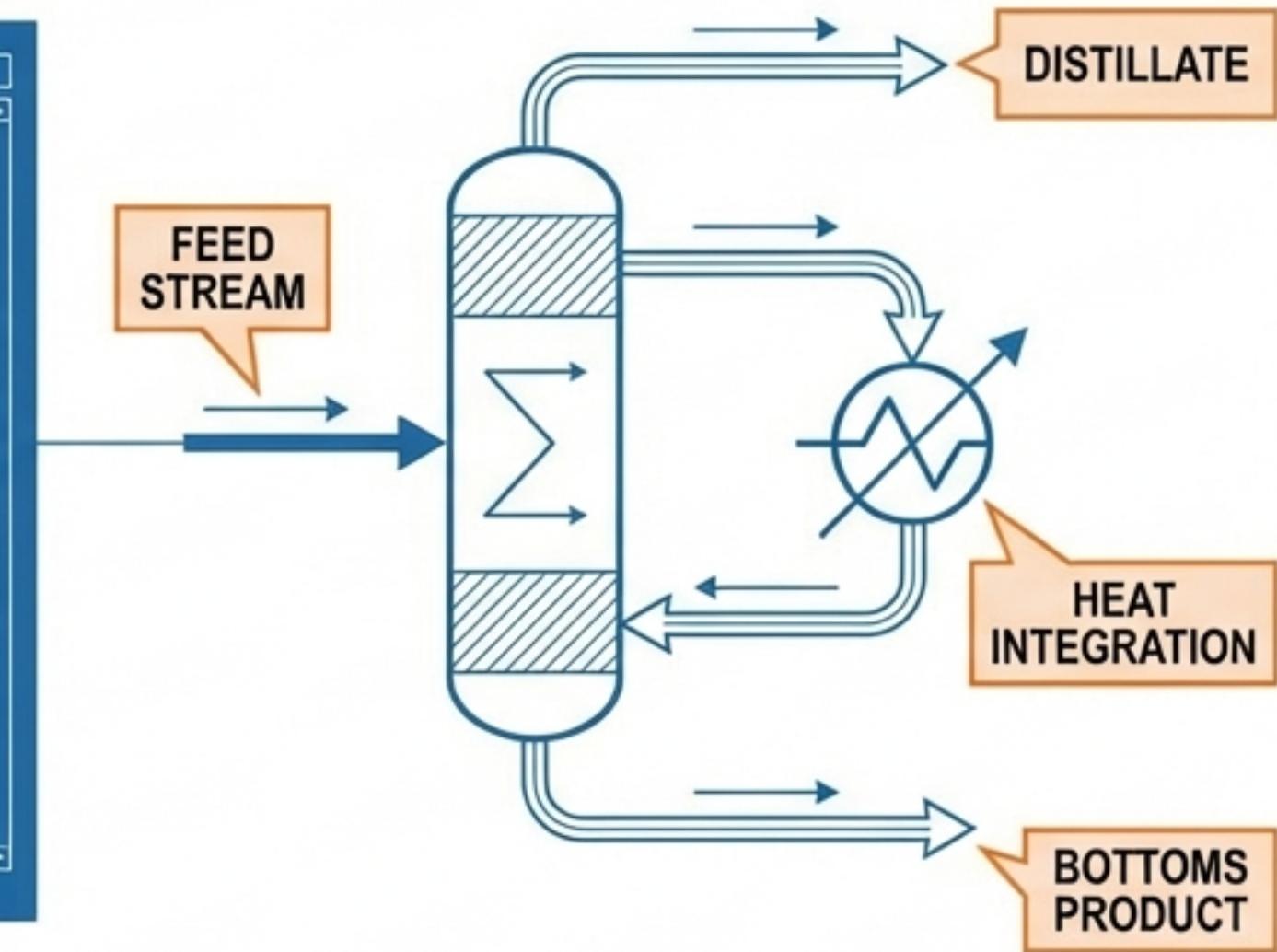
WORKFLOW

The Simulation

A	B	C	D	E	F
1	Enthalpy (kJ/kg)	Entropy (kJ/kg K)	Phase Fraction (Vapor)	Temperature (C)	Pressure (Bar)
1245.3	2.45	0.85	120.0	8.0	P _{stage1} (Bar)
1245.3	2.45	0.85	120.0	8.0	P _{stage2} (Bar)
1207.7	2.45	0.76	120.0	8.0	18:11:8
385.8	2.45	0.85	90.0	8.0	Temp (C)
918.8	2.45	0.85	120.0	8.0	P _{stage3} (Bar)
1245.3	2.45	0.85	120.0	8.0	P _{stage4} (Bar)
1245.3	2.45	0.85	120.0	8.0	P _{stage5} (Bar)
788.1	2.45	0.36	120.0	8.0	100
1246.8	2.45	0.85	120.0	8.0	100
1246.8	2.45	0.75	120.0	8.0	P _{stage6} (Bar)
1245.8	2.45	0.85	120.0	8.0	202

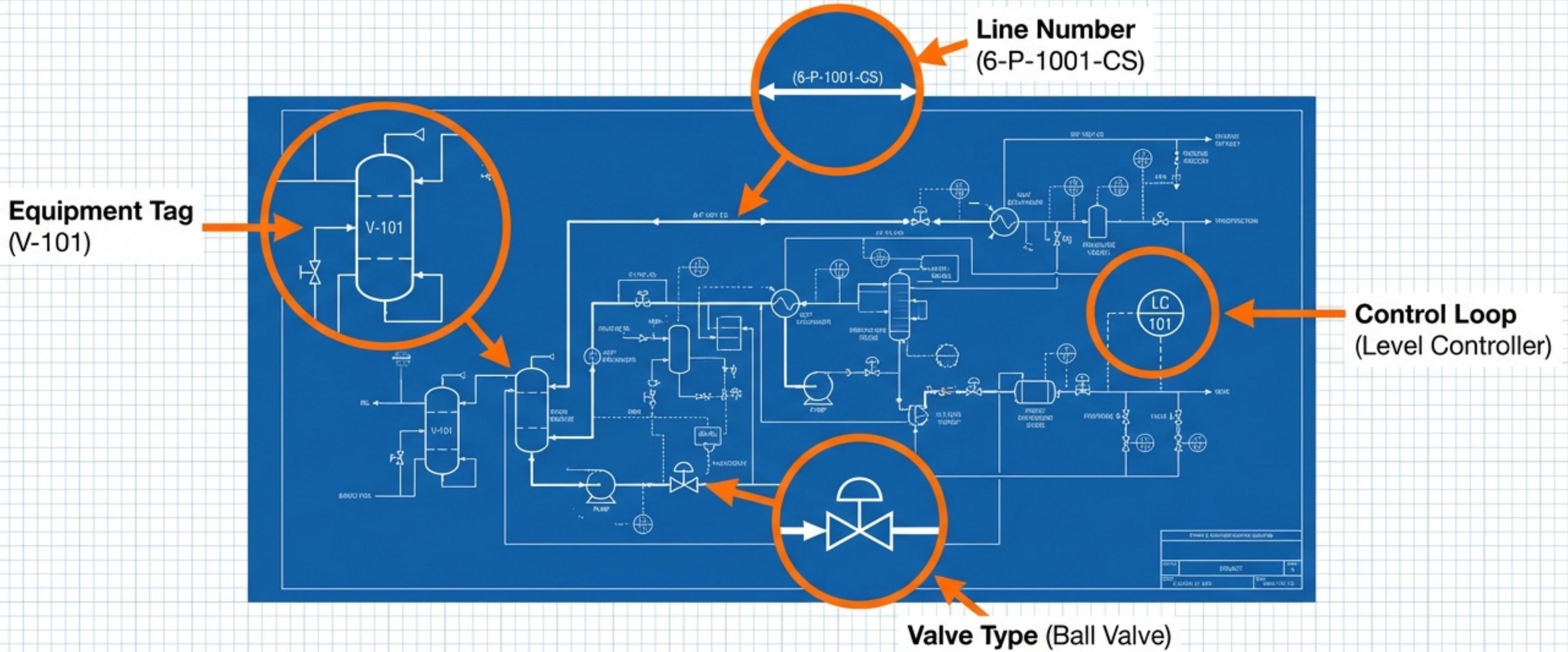
- **INPUT:** Feedstock composition, Product specifications.
- **OUTPUT:** Process Flow Diagrams (PFD), Heat & Mass Balance.

Stream #1	Temp (C)	Press (Bar)	Phase (Vapor)
1	120	5.0	0.85
2	45	1.2	0.02
3	110	4.8	0.10

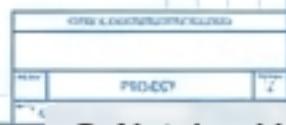


Heat & Mass Balance

The P&ID: The Primary Map of the Facility

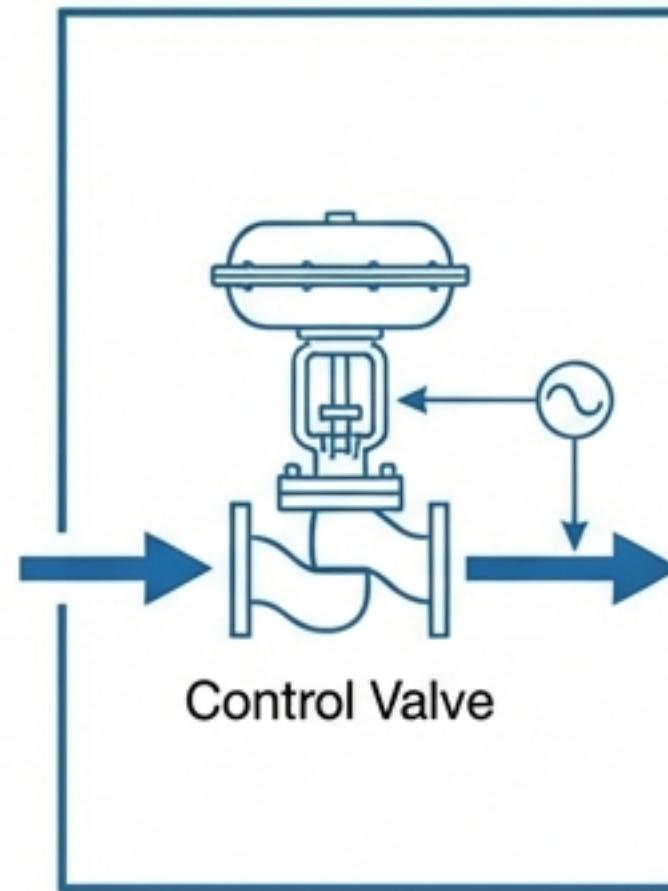


The P&ID incorporates requirements for Operation, Safety, and Maintenance. It is the living document used by Process, Piping, Instrumentation, and Safety to align their work.



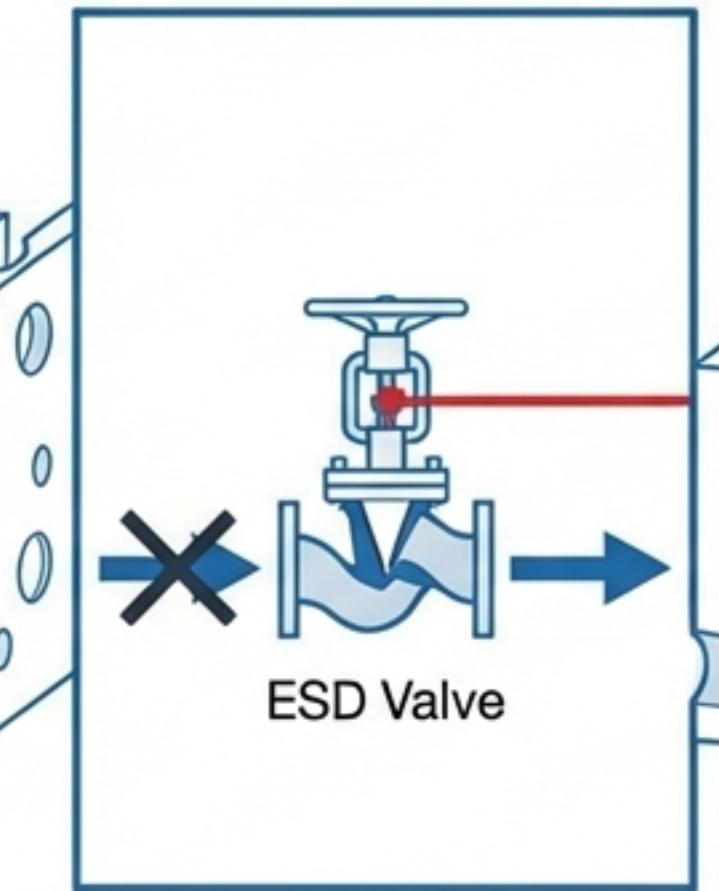
Safeguarding the Process: Control vs. Shutdown

PCS
(Process Control System)



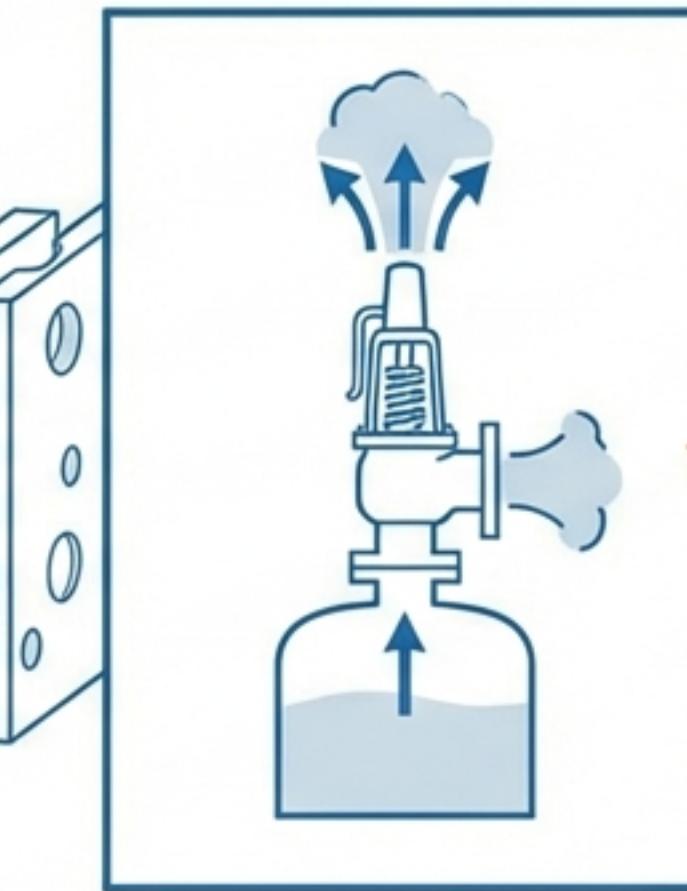
Active Regulation.

PSS
(Process Shutdown System)



Automatic Trip.

Relief System



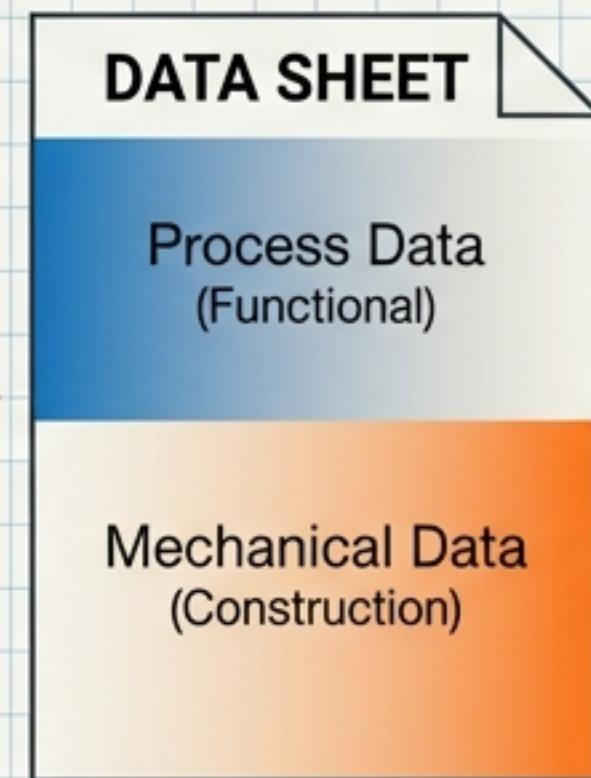
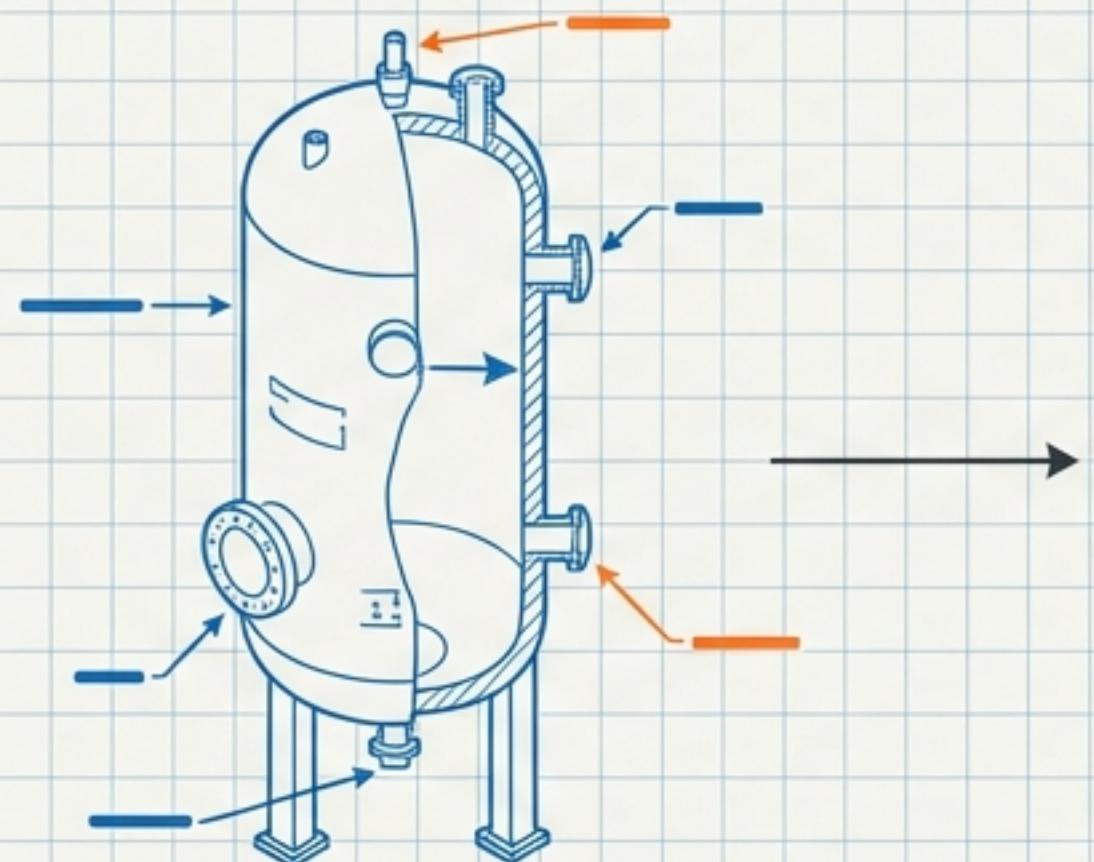
HAZOP (Hazard and Operability Study): The systematic 'What if' analysis that validates these layers.

Cause & Effect Matrix Logic

	Cause	Effect
1	If Level Low (Sensor LSL-101)	Then Close Valve (ESDV-101)

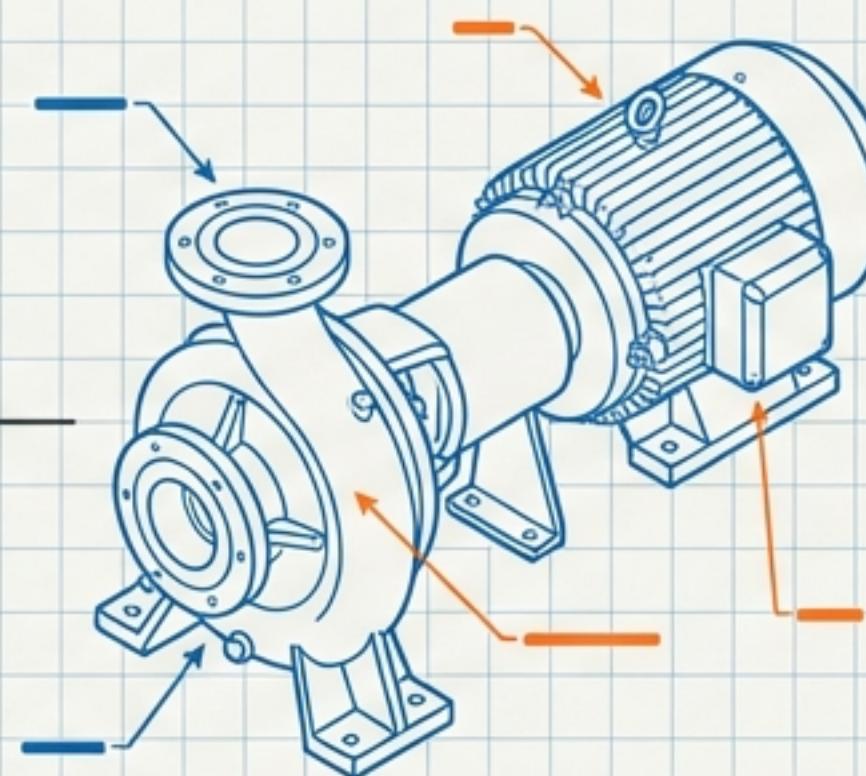
Mechanical Equipment: Specifying the Hardware

STATIC EQUIPMENT



Designed by Engineering. We calculate wall thickness, nozzle locations, and materials (ASME codes). Output = Guide Drawing.

ROTATING EQUIPMENT



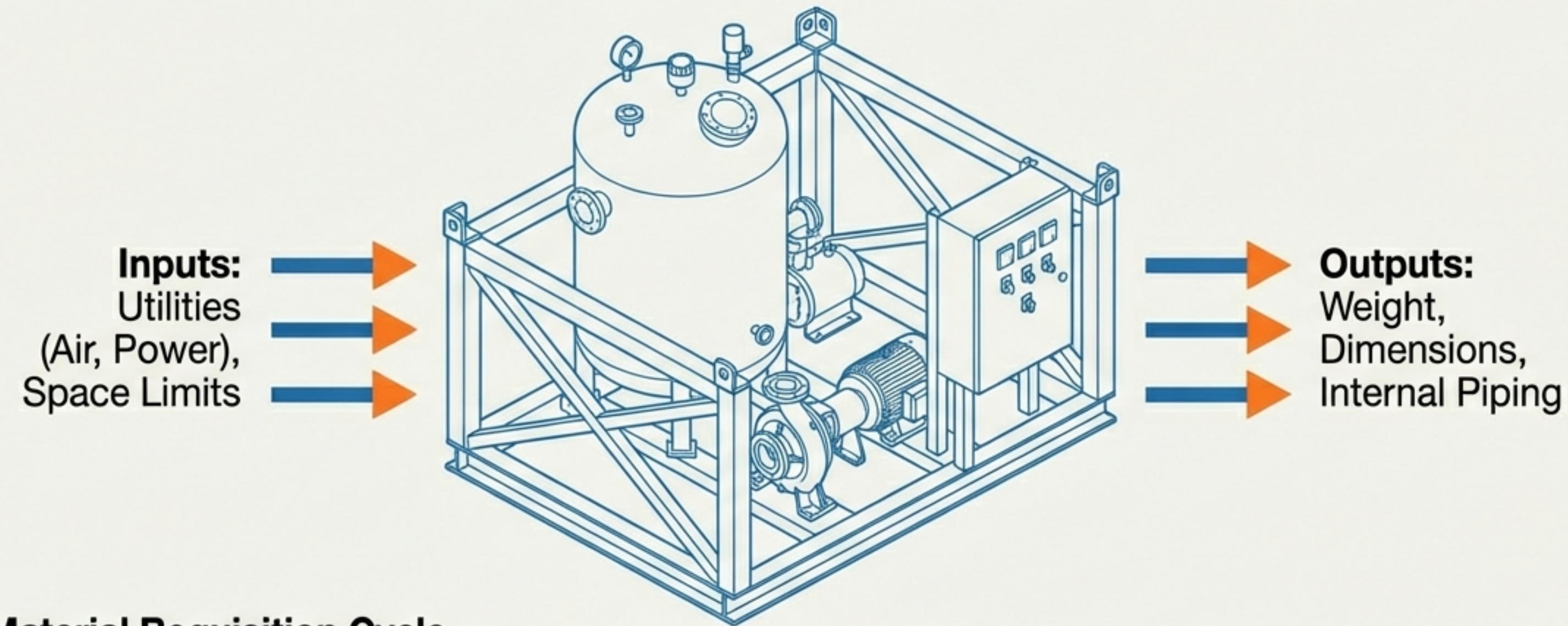
Specified by Engineering, Designed by Vendor.
We provide the Duty (flow/head); Vendor provides the mechanics.

PROJECT
01234

A

Mechanical Equipment:
Specifying the Hardware

The Vendor Loop: Integration & Packages



The Material Requisition Cycle



We don't just buy loose parts; we buy functional units. The Vendor's data is a critical input for Civil and Layout.

Plant Layout: The Spatial Puzzle



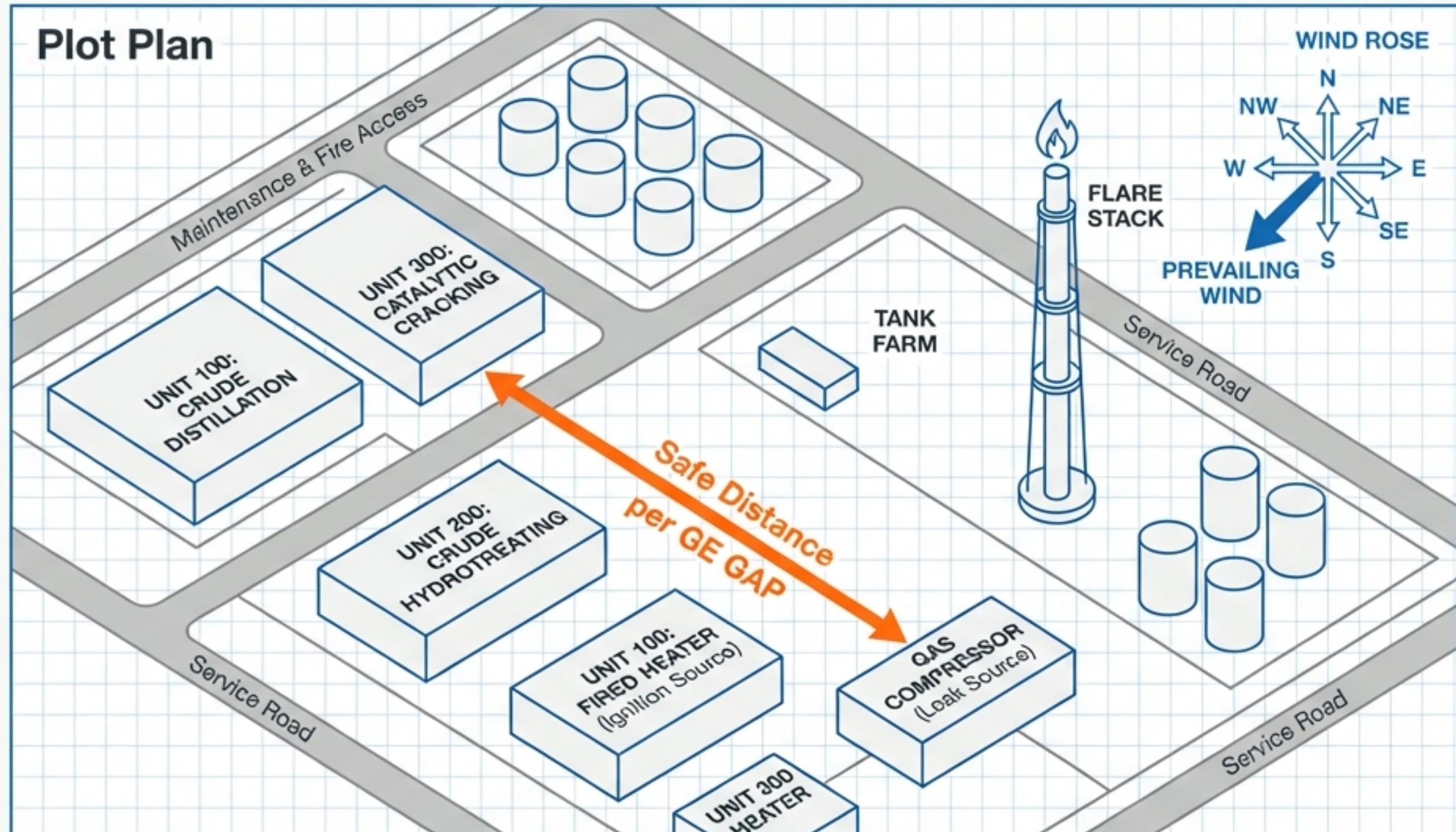
INPUT

Equipment dimensions
(Vendor), P&IDs



OUTPUT

General Plot
Plan, Unit Plot
Plans



PROJECT
01234

A

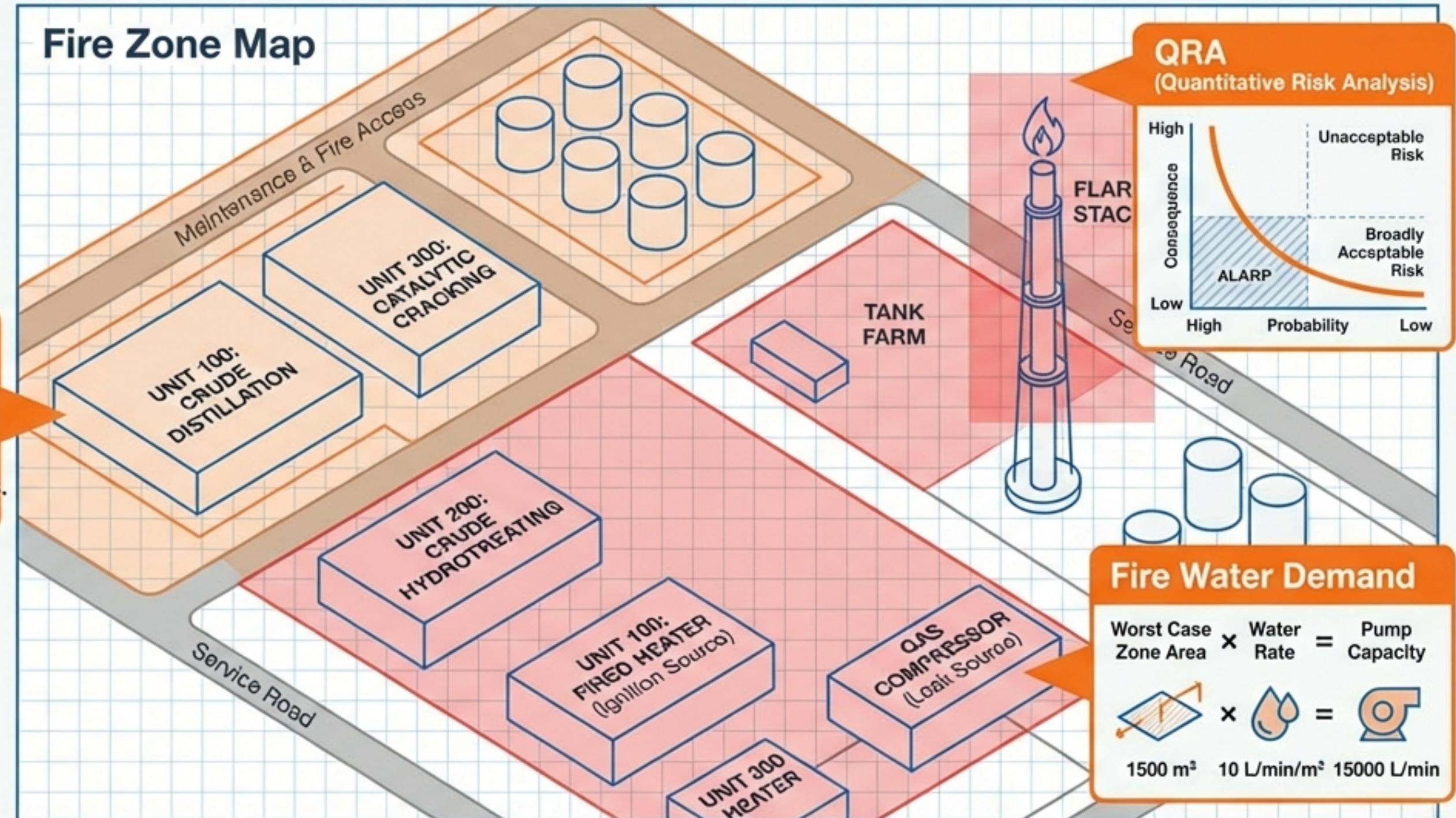
Plant Layout:
The Spatial Puzzle.

HSE: The Shield Against Loss



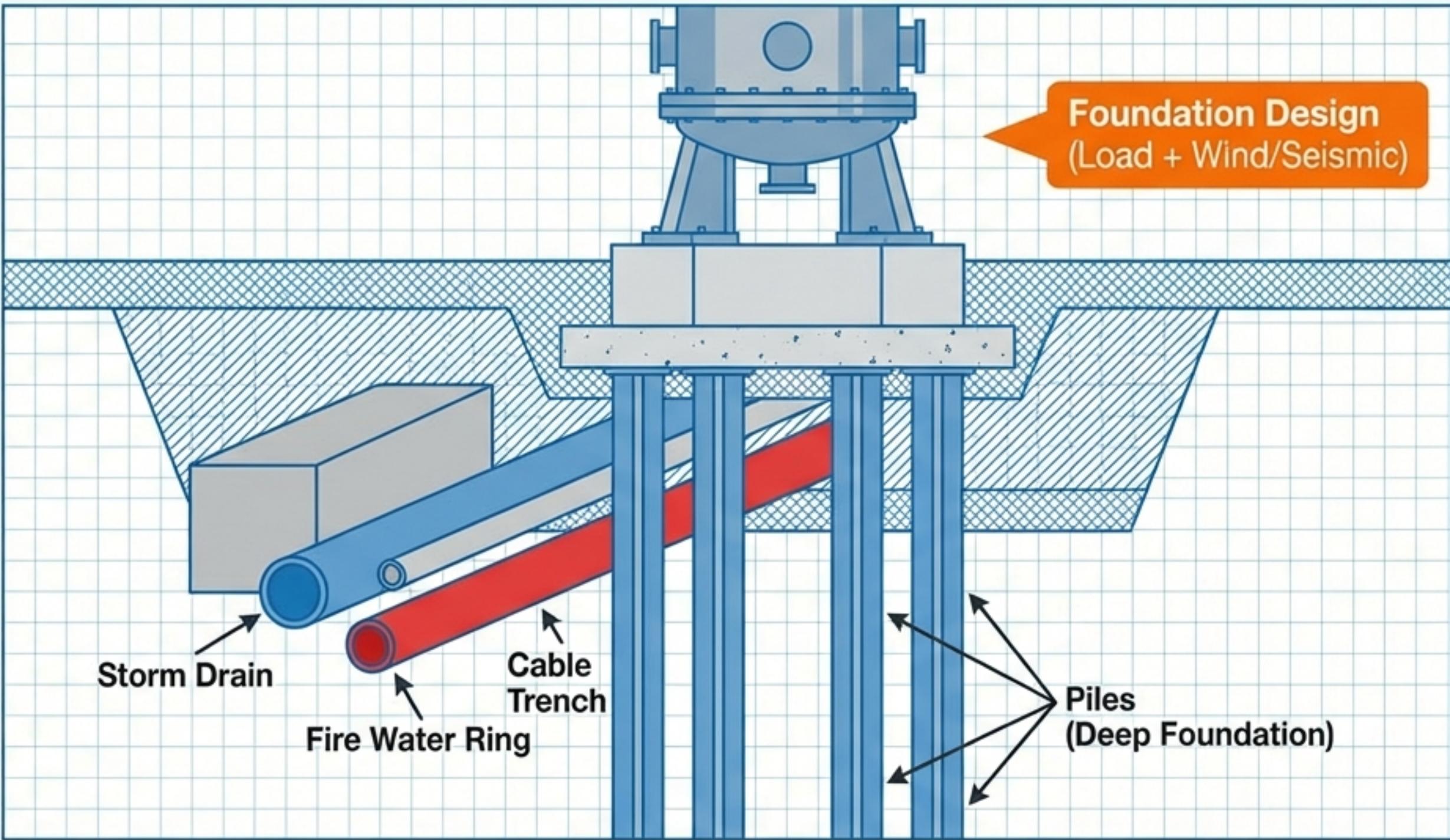
INPUT
Equipment dimensions
(Vendor), P&IDs

OUTPUT
General Plot Plan, Unit Plot Plans



Civil Engineering: Interfacing with the Earth

The Invisible City:
The Underground Network (UG)
dictates the sequence of
construction.

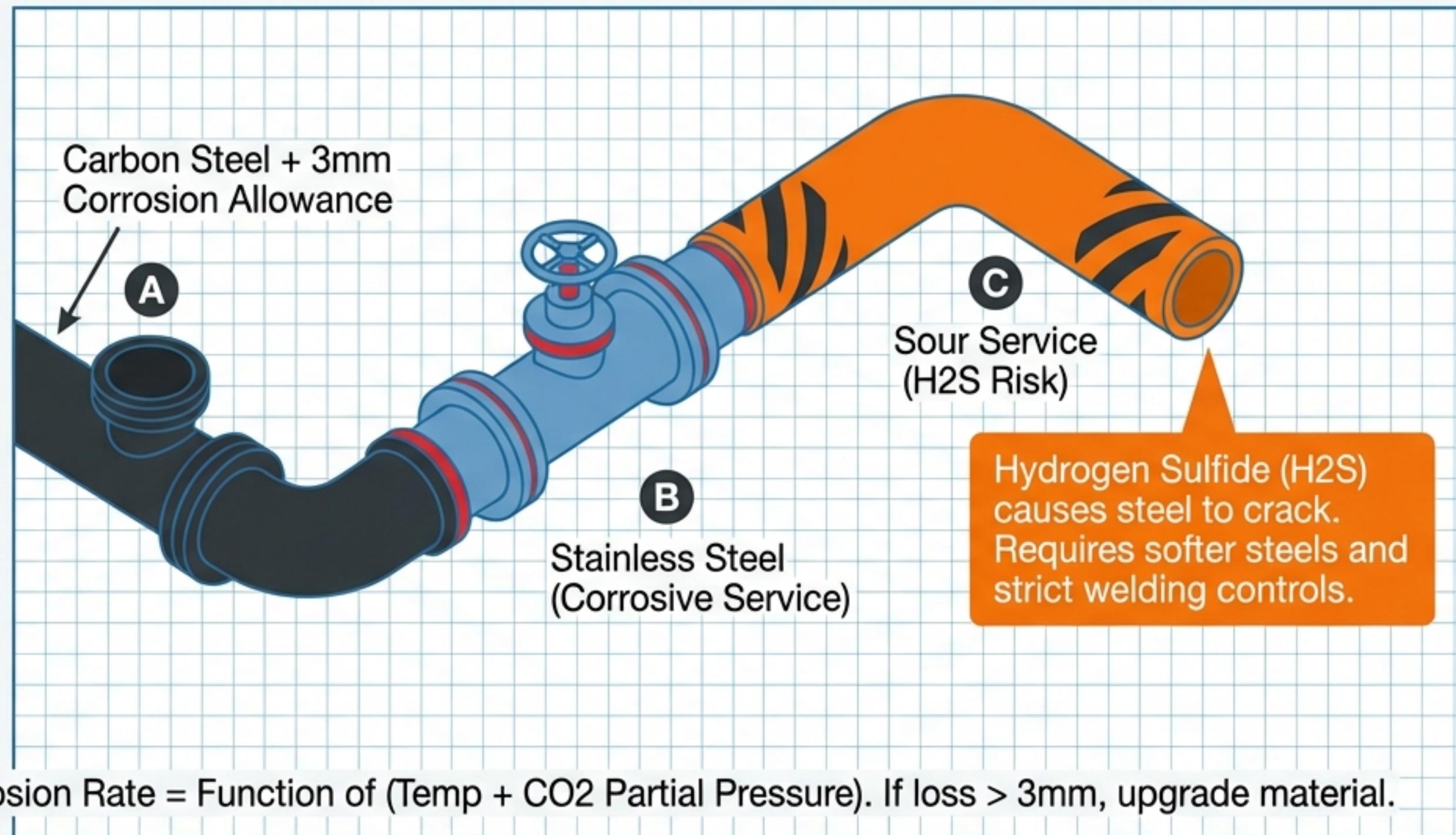


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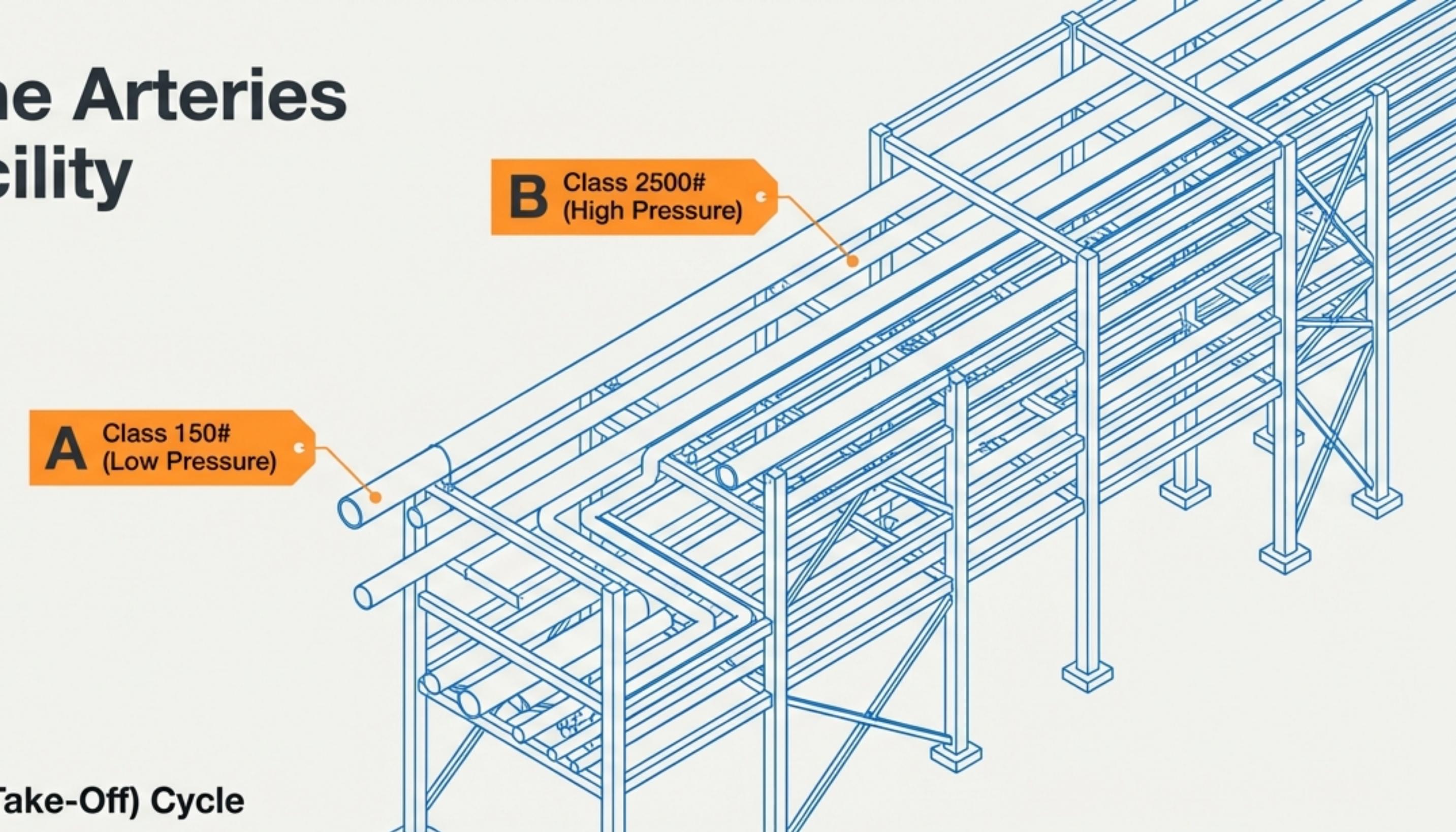
A

Plant Layout:
The Spatial Puzzle.

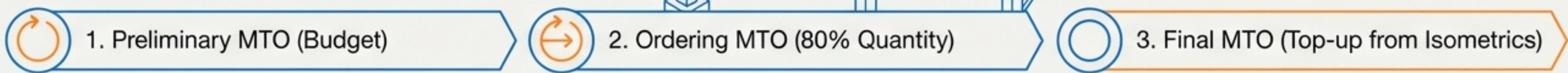
Materials & Corrosion: Selecting the Skin



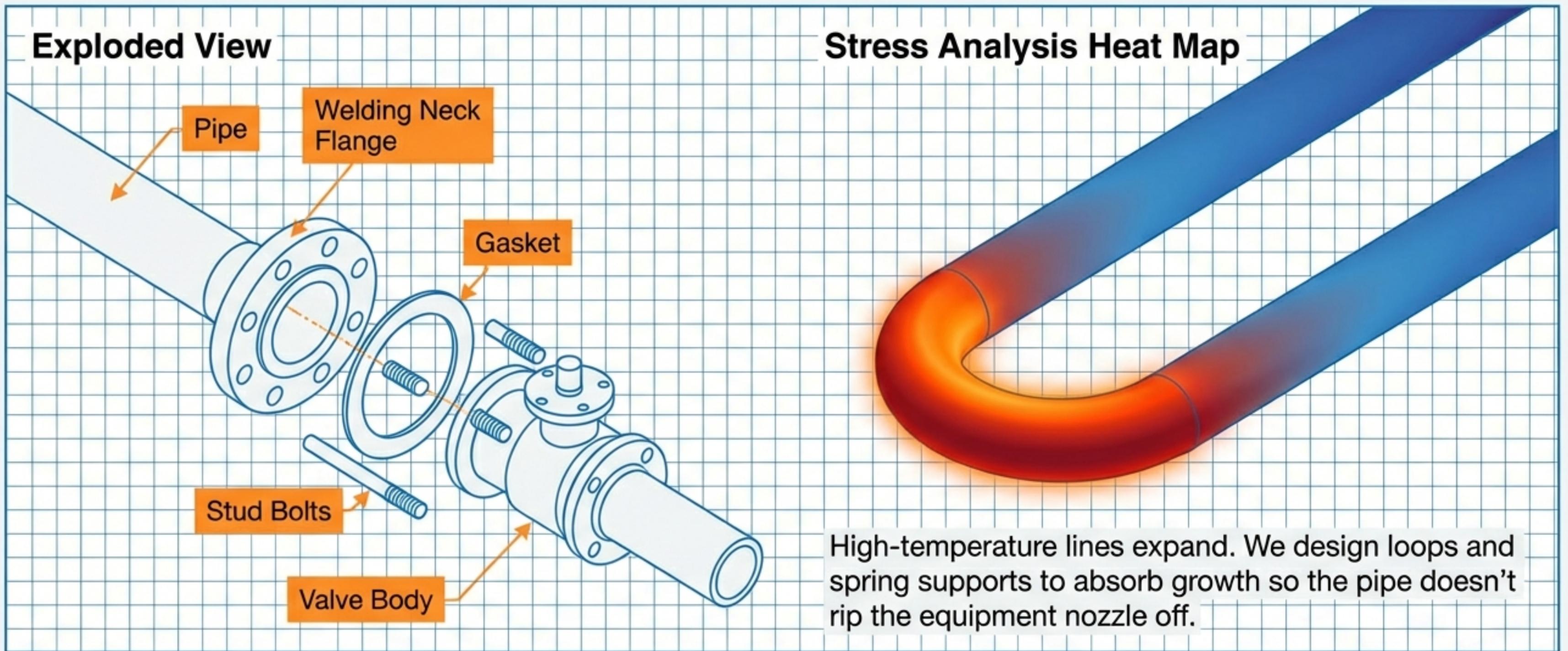
Piping: The Arteries of the Facility



The MTO (Material Take-Off) Cycle



Piping Components & Stress Analysis

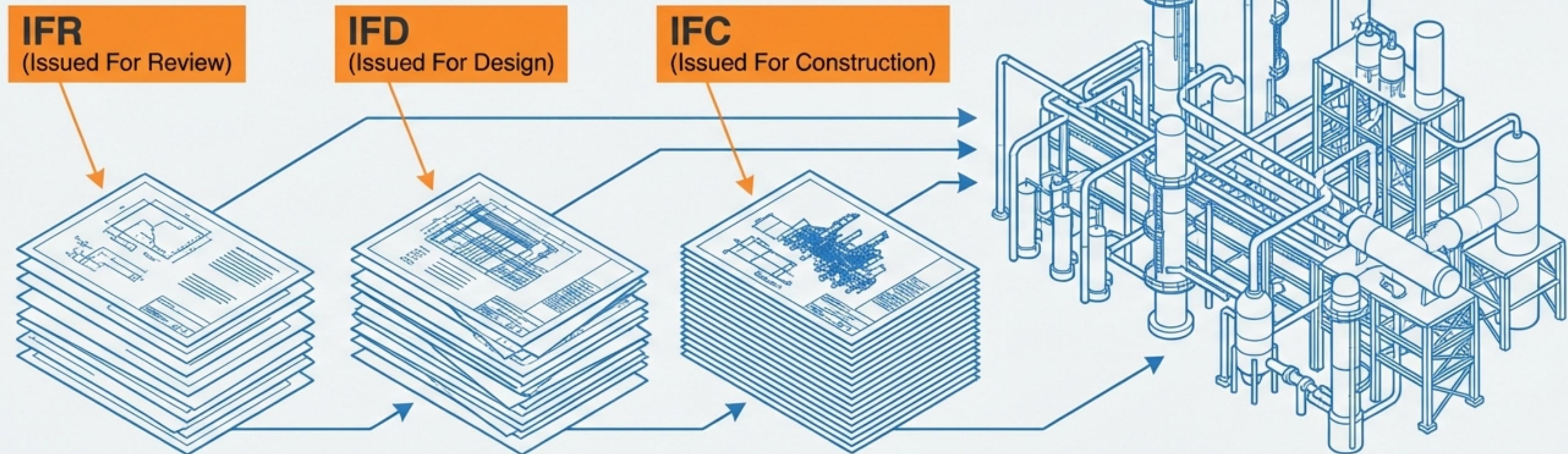


PROJECT
01234

A

Plant Layout:
The Spatial Puzzle.

The Master Document Register: Ready for Construction



Engineering is a collaborative, iterative discipline. Thousands of documents, calculations, and drawings converge to create a safe, constructible facility. The 'Music' has been written; now Construction can play.