3D Modeling

Simplified Pipe System Network 생성

-Functional Design Specification-

-Version 1.2-

2021-02-23

화공기술센터

Concept

- 과업 : Simplified Pipe System Network 생성 (가칭)
- 과업 내용 :
  1) ID2에서 인식한 결과를 Line list로 추출
  2) Line list의 Line ID는 Grouping이 필요
  3) Tee나 Component (Valve, Reducer) 구성을 위해서는
     - Pathitem Table 필요

  ~~- Line list 상에 존재 유/무 (O, X)로 표현~~

- 산출물 : ID2 → Excel(13 페이지 참조)
  PathItem 테이블(PathItem 테이블 Scheme 필요)
- 조건 : 삼성엔지니어링에서 테스트 모델 제공

Workflow

- Work flow

1. ID2에서 인식한 PID 도면 DATA에서 필요한 정보를 추출하여 Line list 생성
   - 대상 필요 정보 : From/To, Tee, Line ID (Size, PMC, F/C, I/C, SEQ No. 등), 일부 Component (Valve, Reducer 등)
   - Line list

* PMC : Piping Material Class
* F/C : Fluid Code
* I/C : Insulation Code

필요 정보 추출

UI를 통해 Mapping은 조정 가능

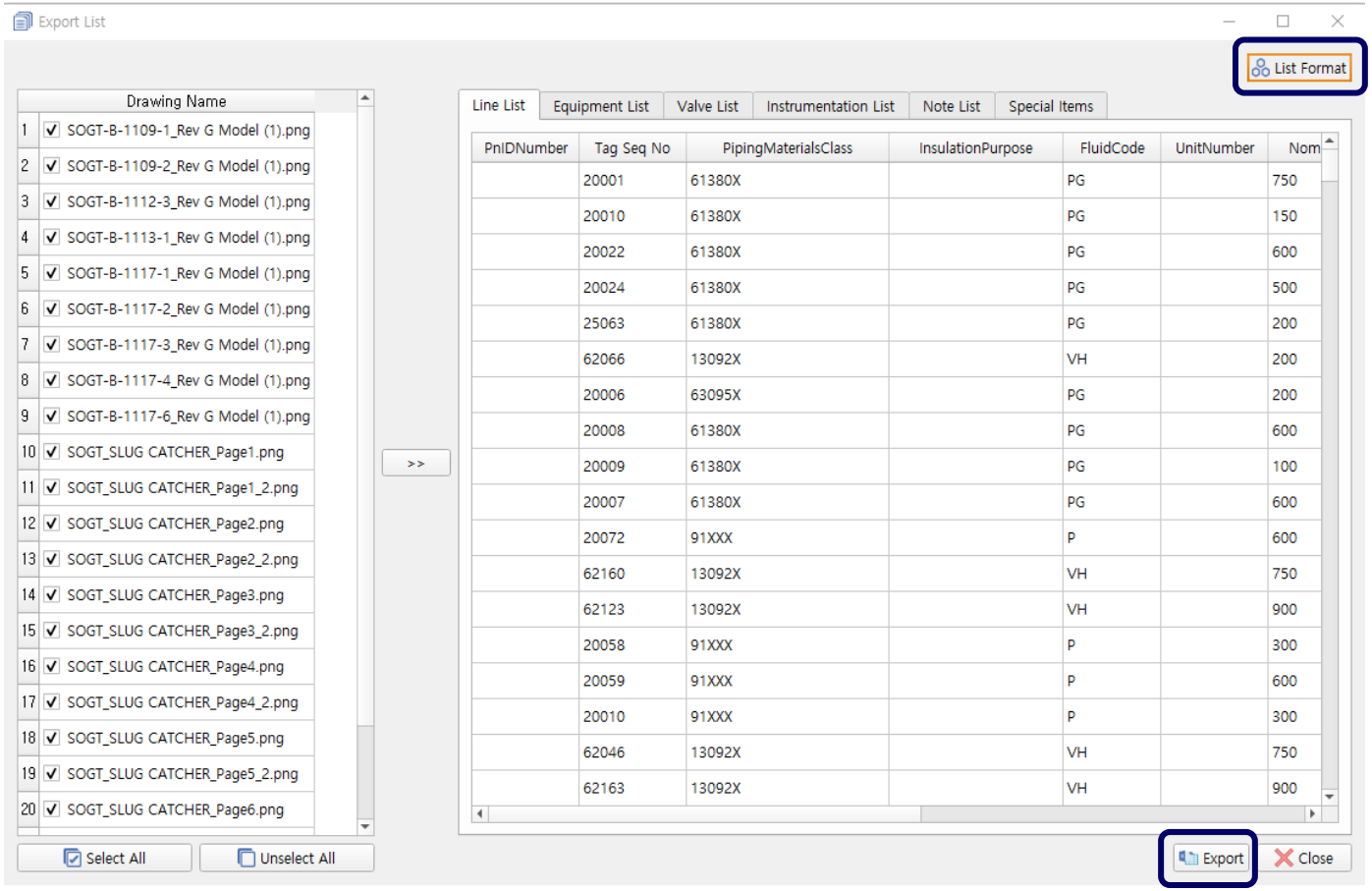
각 DB Table
Associations
Attributes
Components
Drawing
Equipment Data List
Line No Attributes
Line Types
OPC Relations
Pipe Run Items
Symbol
Symbol Attribute
Symbol Attribute Code Table

Line ID	Unit	Fluid	Line	Piping Material Class	Pipe Size	From	To	Insulation Purpose	P&ID Name
1"--26-046-A03A-N	26	DC	046	A03A	1"	2"--26-046-A03A-N, 2"--26-046-A03A-N	3/4"--26-046-A03A-N, 2"-DC-57-046-A03A-N	N	1905-90-DC-C-26107
10"-OC-22-043-A03A-N	22	OC	043	A03A	10"	12"-OC-22-043-A03A-N	12"-OC-22-043-A03A-N	N	1905-50-DC-C-22003
10"-OC-22-044-A03A-N	22	OC	044	A03A	10"	12"-OC-22-044-A03A-N	12"-OC-22-044-A03A-N	N	1905-50-DC-C-22003
12"-OC-22-044-A03A-N	22	OC	044	A03A	12"	10"-OC-22-044-A03A-N, 12"-OC-22-043-A03A-N	3/4"-OC-22-044-A03A-N, 12"-OC-22-043-A03A-N, 10"-OC-22-044-A03A-N, 3/4"-OC-22-044-A03A-N	N	1905-50-DC-C-22003
2"--26-046-A03A-N	26	DC	046	A03A	2"	90-VG-26-03A	1"--26-046-A03A-N, 90-VG-26-03A, 1"--26-046-A03A-N	N	1905-90-DC-C-26107
2"--32-2435-M01A-N	32	DC	2435	M01A	2"	20-CB-32-02, 3/4"--32-2435-M01A-N	20-CB-32-02, 3/4"--32-2435-M01A-N, 3/4"--32-2435-M01A-N, 3/4"--32-2435-M01A-N, 3/4"--32-2435-M01A-N, 3/4"--32-2435-M01A-N	N	1905-20-DC-C-32012

ID2 기존 기능

- DATA Export

1. ID2에서 인식한 PID 도면 DATA를 Format에 맞춰 추출하여 Line list 자동 생성



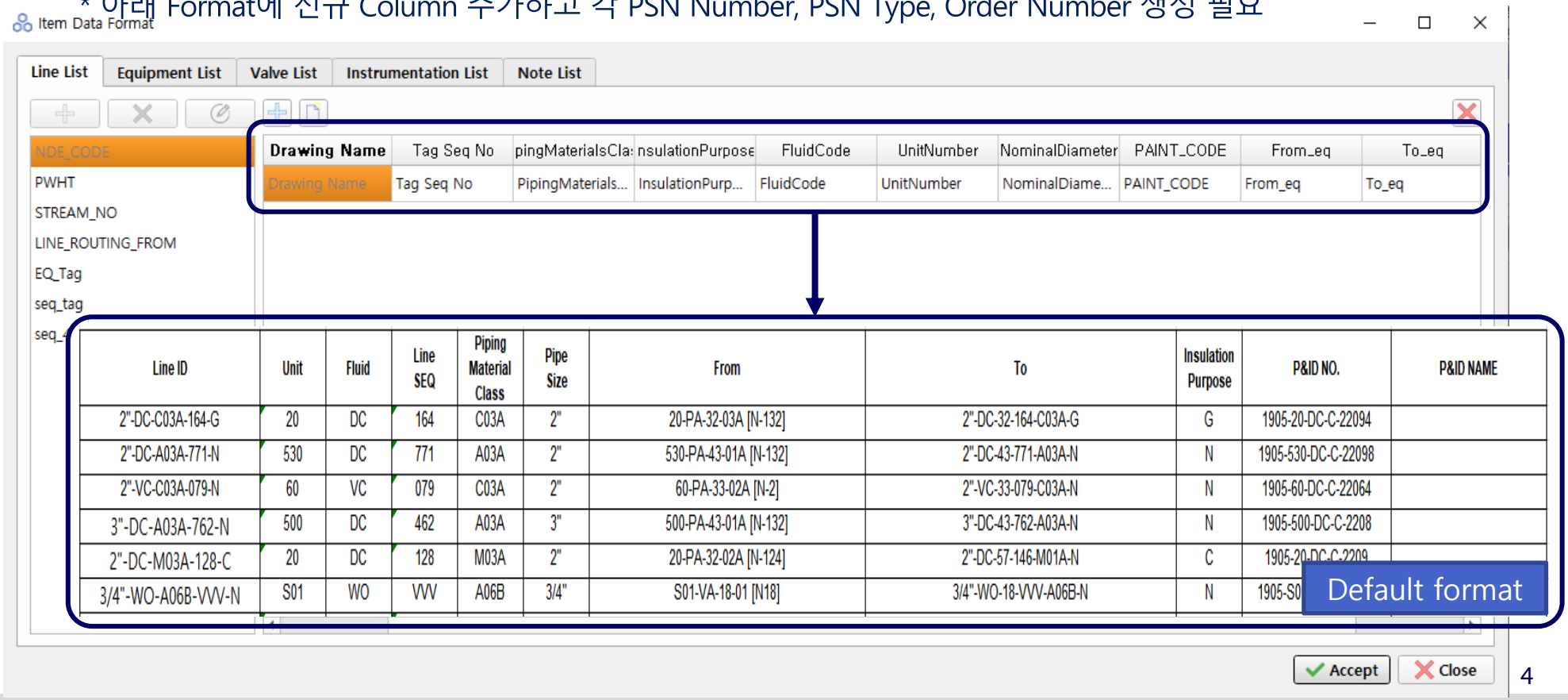
① Format을 필요정보 기준 편집 (뒷장 참고)

② Excel (*.xlsx) 형태로 추출

ID2 기존 기능 수정

- List format 편집

1. Column 추가/편집 기능 필요 : 기존 DATA를 조합해서 신규 Column을 만들 수 있는 기능 필요
   * ~~엑셀 수식 또는 정규식 지원 (엑셀 수식 선호)~~ → ID2 칼럼 조합 기능 사용
     예) 신규 Column 'LINE ID' 을 NPD – F/C – UNIT NO – SEQ NO – PMC – I/C) 조합해서 생성
   * 아래 Format에 신규 Column 추가하고 각 PSN Number, PSN Type, Order Number 생성 필요

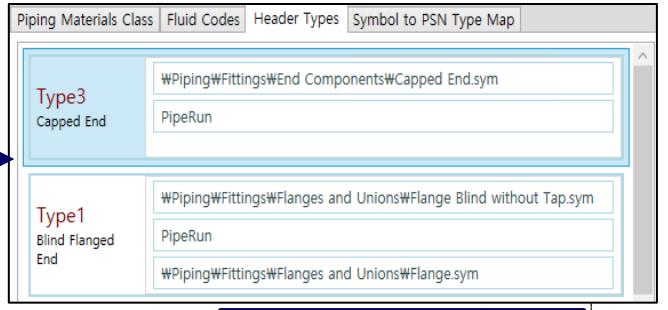


ID2 기존 기능 수정

- List format 편집-1

1. From/To는 Equipment Tag 외 Line ID, Header, Specialty item 등 포함 필요
   - Equipemt : From/To에 EQ Tag 표기
   - Branch 연결 : From/To에 Line ID 표기
   - Header : 특정 Rule로 (Sequence를 User가 정의) HEADER를 판단해서 'ENDOFHEADER'라는 키워드 입력
   - 기타 Keyword : 인식한 또는 특정 Symbol 넣고, 키워드 입력

(인식한 심볼 : GRADE_DRAIN, HOSECONNECTION, UDD, FLARE HEADER
특정 심볼 추가 : TIEINPOINT, ATM_VENT



Item Data Format

From / To 로 변경

Line List | Equipment List | Valve List | Instrumentation List | Note List

NDE_CODE
PWHT
STREAM_NO
LINE_ROUTING_FROM
EQ_Tag
seq_tag
seq_4

Drawing Name	Tag Seq No	pingMaterialsCla:	nsulationPurpose	FluidCode	UnitNumber	NominalDiameter	PAINT_CODE	From_eq	To_eq
Drawing Name	Tag Seq No	PipingMaterials...	InsulationPurp...	FluidCode	UnitNumber	NominalDiame...	PAINT_CODE	From_eq	To_eq

Line ID	Unit	Fluid	Line SEQ	Piping Material Class	Pipe Size	From	To	Insulation Purpose	P&ID NO.	P&ID NAME
2"-DC-C03A-164-G	20	DC	164	C03A	2"	20-PA-32-03A [N-132]	2"-DC-32-164-C03A-G	G	1905-20-DC-C-22094	
2"-DC-A03A-771-N	530	DC	771	A03A	2"	530-PA-43-01A [N-132]	2"-DC-43-771-A03A-N	N	1905-530-DC-C-22098	
2"-VC-C03A-079-N	60	VC	079	C03A	2"	60-PA-33-02A [N-2]	2"-VC-33-079-C03A-N	N	1905-60-DC-C-22064	
3"-DC-A03A-762-N	500	DC	462	A03A	3"	500-PA-43-01A [N-132]	3"-DC-43-762-A03A-N	N	1905-500-DC-C-2208	
2"-DC-M03A-128-C	20	DC	128	M03A	2"	20-PA-32-02A [N-124]	2"-DC-57-146-M01A-N	C		
3/4"-WO-A06B-VVV-N	S01	WO	VVV	A06B	3/4"	S01-VA-18-01 [N18]	3/4"-WO-18-VVV-A06B-N	N		

Default format

ID2 기존 기능 수정

- List format 편집-2 : 각 키워드 입력 기준

1. GRADE_DRAIN : Funnel 등 심벌에 본 키워드 적용
2. HOSECONNECTION : Flexible hose 또는 Hose Connector 심벌에 본 키워드 적용
3. UDD or FLARE HEADER : OPC에 목적지나 Page 번호 등이 없을 때 본 키워드 적용(OPC와 연결된 OPC를 찾을 수 없을 때)
4. TIEINPOINT : 특정 심벌을 만들어서 넣고 본 키워드 적용
5. ATM_VENT : Goose neck이 있다면 해당 심벌 활용,
   심벌이 없다면 특정 심벌을 만들어서 넣고 본 키워드 적용

ID2 신규 기능 개발

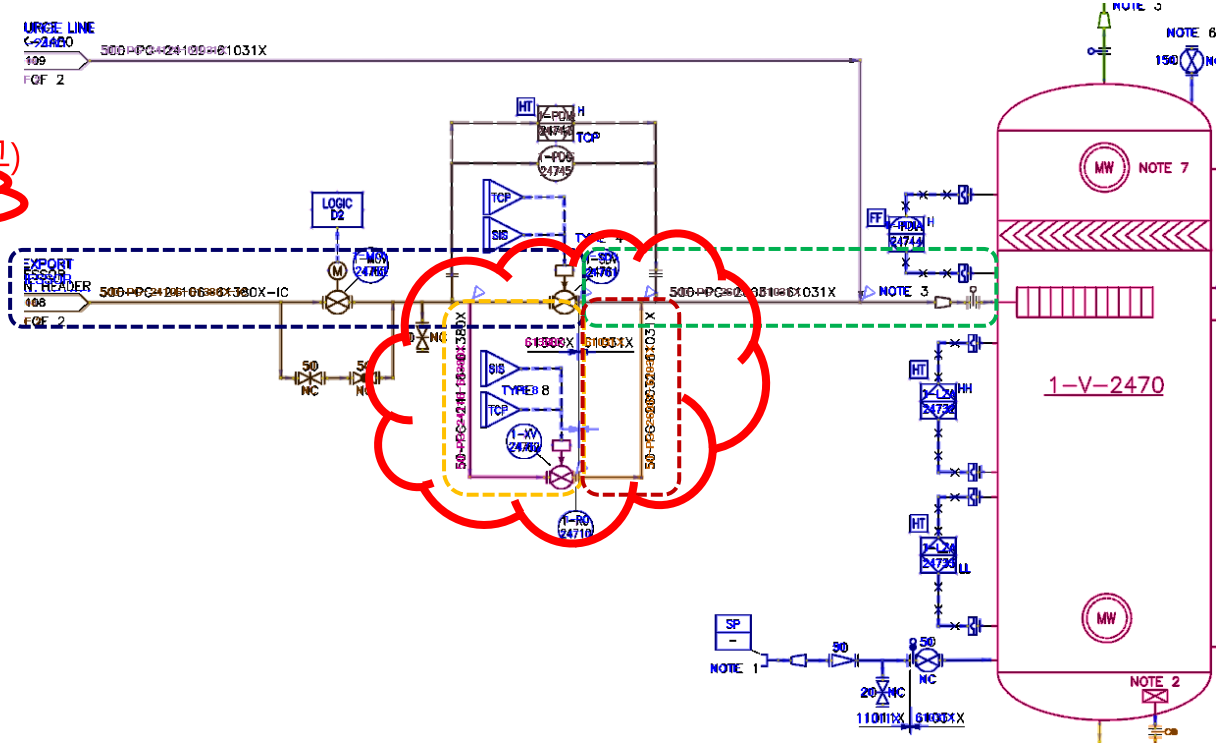
- Line Grouping : 다수의 Piperun을 1개의 Pipe System Network로 그룹핑

1. ID2는 현재 Line ID 기준 묶음, M3는 PSN 기준 묶음
   => ID2 기준 상 거의 대부분 B2E/B2B
   ID2 DATA를 Post Processing으로 PSN 형태로 묶어주는 Grouping Logic 필요

2. Piperun 간의 Grouping Logic
   - Piperun → Topology → PSN
   ~~그룹핑되는 기준 반영 (APPENDIX I 참고)~~
   ~~PSN 생성 Priority 순서 기준도 반영 要~~

3. Line Type 정의 : Piperun의 From/To에 따라 각 타입 할당
   예) E2E, E2B, B2E, B2B, HDE, HDB, HD2

Equipment Branch Header	TO 2	Equipment Branch Header



ID2 신규 기능 개발

- Branch (Tee) 연결점 생성 : Piperun items에 연결되는 Branch line의 OID 생성

1. ID2 DATA 기준
   - Parent Piperun의 Pathitem (=Piperun Items)에는 연결 정보 없음
   - Childrun Piperun의 Pathitem (=Piperun Items)에 처음 또는 마지막 Data가 Parent Component UID 중 1개

2. PSN DATA 기준 : Parent Piperun의 Pathitem 상에 Branch 연결 정보 존재

PathItem ID	Branch Topology II	PSN OID	Item Name	Item Tag	PipeLine ID	NPD	PipeRun ID	De	Class	Sub-Class	Type
PG-A06A-074-B5_0	PG-A06A-074-M1	R0011-PSN-01154	Branch	3"-PG-24-074-A06A-G	PG-A06A-074-G	3"	3"-PG-A06A-074-G		Branch	Tee	
PG-A06A-097-M0_0		R0011-PSN-01997	Branch	3"-PG-24-074-A06A-G	PG-A06A-097-G	3"	3"-PG-A06A-097-G		Branch	Tee	
PG-A06A-097-M0_1		R0011-PSN-01997	PipeRun	3"-PG-24-097-A06A-G	PG-A06A-097-G	3"	3"-PG-A06A-097-G		Piping		Piping, secondary
PG-A06A-097-M0_2		R0011-PSN-01997	PipingComp		PG-A06A-097-G	3"	3"-PG-A06A-097-G	FB	Valve	In-line compc	Ball valve
PG-A06A-097-M0_3		R0011-PSN-01997	PipeRun	3"-PG-24-097-A06A-G	PG-A06A-097-G	3"	3"-PG-A06A-097-G		Piping		Piping, secondary
PG-A06A-097-M0_4		R0011-PSN-01997	Branch	3"-PG-24-097-A06A-G	PG-A06A-097-G	3"	3"-PG-A06A-097-G		Branch	Tee	
PG-A06A-097-M0_5		R0011-PSN-01997	PipeRun	3"-PG-24-097-A06A-G	PG-A06A-097-G	3"	3"-PG-A06A-097-G		Piping		Piping, secondary
PG-A06A-097-M0_6		R0011-PSN-01997	PipingComp		PG-A06A-097-G	3"	3"-PG-A06A-097-G		In-Line Fitting	In-line compc	Concentric diameter change
PG-A06A-097-M0_7		R0011-PSN-01997	PipeRun	2"-PG-24-097-A06A-G	PG-A06A-097-G	2"	2"-PG-A06A-097-G		Piping		Piping, secondary
PG-A06A-097-M0_8		R0011-PSN-01997	Instrument	24-PSV-028B	PG-A06A-097-G			FIF	Relief devices		Angle press relief valve
VH-C01A-624-M0_0		R0011-PSN-01997	Instrument	24-PSV-028B	VH-C01A-624-N			FIF	Relief devices		Angle press relief valve
VH-C01A-624-M0_1		R0011-PSN-01997	PipeRun	3"-VH-43-624-C01A-N	VH-C01A-624-N	3"	3"-VH-C01A-624-N		Piping		Piping, secondary
VH-C01A-624-M0_2		R0011-PSN-01997	PipingComp		VH-C01A-624-N	3"	3"-VH-C01A-624-N		In-Line Fitting	In-line compc	Concentric diameter change
VH-C01A-624-M0_3		R0011-PSN-01997	PipeRun	6"-VH-43-624-C01A-N	VH-C01A-624-N	6"	6"-VH-C01A-624-N		Piping		Piping, secondary
VH-C01A-624-M0_4	VH-C01A-624-B1		Branch	6"-VH-43-624-C01A-N	VH-C01A-624-N	6"	6"-VH-C01A-624-N		Branch	Tee	
VH-C01A-624-M0_5		R0011-PSN-01997	PipeRun	6"-VH-43-624-C01A-N	VH-C01A-624-N	6"	6"-VH-C01A-624-N		Piping		Piping, secondary
VH-C01A-624-M0_6		R0011-PSN-01997	PipingComp		VH-C01A-624-N	6"	6"-VH-C01A-624-N	FB	Valve	In-line compc	Gate valve
VH-C01A-624-M0_7		R0011-PSN-01997	PipeRun	6"-VH-43-624-C01A-N	VH-C01A-624-N	6"	6"-VH-C01A-624-N		Piping		Piping, secondary
VH-C01A-624-M0_8		R0011-PSN-01997	Branch	6"-VH-43-615-C01A-N	VH-C01A-624-N	6"	6"-VH-C01A-624-N		Branch	Tee	
VH-C01A-615-B3_0	VH-C01A-615-M0	R0011-PSN-01154	Branch	6"-VH-43-615-C01A-N	VH-C01A-615-N	6"	6"-VH-C01A-615-N		Branch	Tee	

본 페이지는 Concept 설명을 위한 예시이며,
실제 ID2의 Data 구조에 따라 내용 수정 要

- Branch (Tee) 연결점 생성 : Piperun items에 연결되는 Branch line의 OID 생성

3. Logic Concept : Post Processing을 통해 PiperunItems에 Branch 정보 (Piperun OID) 삽입 및 Index 갱신
   - Piperun Component UID 중 처음 또는 마지막 Index에 Piperun UID가 있다면,
     Components_UID = Parent line, Piperuns_UID = Child line

4. Branch 내용 추가 방법은 아래 ②번 방법대로 자료 검색 및 특정화 후,
   a) Index 상 위치는 데이터 상 찾아야 함
   b) Component_UID에 '-TEE'를 붙여서 표기하는 방안
   c) Index도 기존 넘버에 '-1' 을 붙이는 방안

① 다른 Piperun_UID라면,
- Components_UID는 Parent Line
- Piperuns_UID는 Child Line임

테이블(T): PipeRunItems

	UID	PipeRuns_UID	Index	Components_UID
	필터	필터	필터	필터
1	da32b5b0-0ed7-4211-a670-d5d23588ce97	Child Line	1	6f0572e2-be06-46f0-947a-e6824f6cc53f
2	8dff8260-1e6c-4b45-aacc-91cd29657605		2	Parent Lines
3	cc166623-417c-47d1-a4bf-22126ea52fe1	7f1ef878-cfe0-4aaf-8911-b8ce9d45f9bb	3	
4	176f85ca-27c7-4a18-ba44-2c286bc1dc12	7f1ef878-cfe0-4aaf-8911-b8ce9d45f9bb	4	5dfbfc7d-666d-43a2-a736-da219a542185
5	e68cd09a-7748-427c-80e5-fb96ae1ab37e	6c49b8db-0ca3-4c17-985e-bddc1129b9e0	1	8edaca8c-ca43-45cf-bac7-26efe42d7d0d
6	946fd152-2d4b-4cac-bf3e-dbca4f6c6212	6c49b8db-0ca3-4c17-985e-bddc1129b9e0		92b3d43c8c72
7	f18663cc-02fd-4d13-adcd-7095a670e885	6c49b8db-0ca3-4c17-985e-bddc1129b9e0	3	77f2ae8c-f7a0-4c1f-8f31-9f9b3190632b
		Parent Line	1	38b95c7a-ed97-4863-951e-2603041a1305
			2	5afb1bee-5fbe-41b4-ac92-82ab07a9c2e0
		5dfbfc7d-666d-43a2-a736-da219a542185	3	8f931080-9d93-446b-8a6b-9b788d4e4a22

② Parent Line을 Piperuns_UID에서 찾아서, Child Line의 UID를 삽입

ID2 신규 기능 개발

- Pathitem 처리

1. ID2의 PipeRunItems Table을 활용하여 들어가는 Component 정보 연동
   - 필요한 Component 정보 (Components_UID 기준)만 남기고 나머지 삭제, 순서 (Index) 정보 유지
   예) Valve, Reducer, Branch만 추출 – Valve Components_UID = AAA, Reducer UID = BBB, Branch UID = CCC
   -> AAA, BBB랑 일치하는 UID만 남기고 나머지는 모두 제거하고 신규 Index 부여

Piperun_UID	INDEX	Components_UID
XXX	1	DDD
XXX	2	CCC
XXX	3	BBB
XXX	4	AAA
XXX	5	BBB
XXX	6	EEE

→ **User defined filter**
기본은 전체 Component UID 모두 생성
본 예시는 Valve, Reducer, Branch만 선택했을 때 결과 →

Piperun_UID	INDEX	Components_UID
XXX	1	CCC
XXX	2	BBB
XXX	3	AAA
XXX	4	BBB

테이블(T): PipeRunItems

	UID	PipeRuns_UID	Index	Components_UID
	필터	필터	필터	필터
1	da32b5b0-0ed7-4211-a670-d5d23588ce97	7f1ef878-cfe0-4aaf-8911-b8ce9d45f9bb	1	6f0572e2-be06-46f0-947a-e6824f6cc53f
2	8dff8260-1e6c-4b45-aacc-91cd29657605	7f1ef878-cfe0-4aaf-8911-b8ce9d45f9bb	2	cb60de75-ef73-429a-9def-472dd8c58226
3	cc166623-417c-47d1-a4bf-22126ea52fe1	7f1ef878-cfe0-4aaf-8911-b8ce9d45f9bb	3	6e363cea-23e1-4a87-b582-94670a3e6d30
4	176f85ca-27c7-4a18-ba44-2c286bc1dc12	7f1ef878-cfe0-4aaf-8911-b8ce9d45f9bb	4	bf2bf21e-777a-4059-9e84-c1db7ecdf8eb
5	e68cd09a-7748-427c-80e5-fb96ae1ab37e	6c49b8db-0ca3-4c17-985e-bddc1129b9e0	1	8edaca8c-ca43-45cf-bac7-26efe42d7d0d
6	946fd152-2d4b-4cac-bf3e-dbca4f6c6212	6c49b8db-0ca3-4c17-985e-bddc1129b9e0	2	23fd174d-00f4-40be-84f7-92b3d43c8c72
7	f18663cc-02fd-4d13-adcd-7095a670e885	6c49b8db-0ca3-4c17-985e-bddc1129b9e0	3	77f2ae8c-f7a0-4c1f-8f31-9f9b3190632b
8	e7a79f60-af3c-4ed9-b4a5-bdd9b46cbf98	5dfbfc7d-666d-43a2-a736-da219a542185	1	38b95c7a-ed97-4863-951e-2603041a1305
9	0f506080-6ce6-4558-9d26-eea98941a040	5dfbfc7d-666d-43a2-a736-da219a542185	2	5afb1bee-5fbe-41b4-ac92-82ab07a9c2e0
10	4f4bc2c7-ebb5-4178-aa47-27d71af98012	5dfbfc7d-666d-43a2-a736-da219a542185	3	8f931080-9d93-446b-8a6b-9b788d4e4a22

옆 테이블을 기본 구조로 Piperun UID도 추가할 수 있도록 Table join 필요

ID2 신규 기능 개발

- Viewer 기능 추가 : PSN과 Drawing 표시하여 Data 검토 및 추적 지원

Topologys (861) | Pipe System Networks | Revision History | Edit History | Drawing

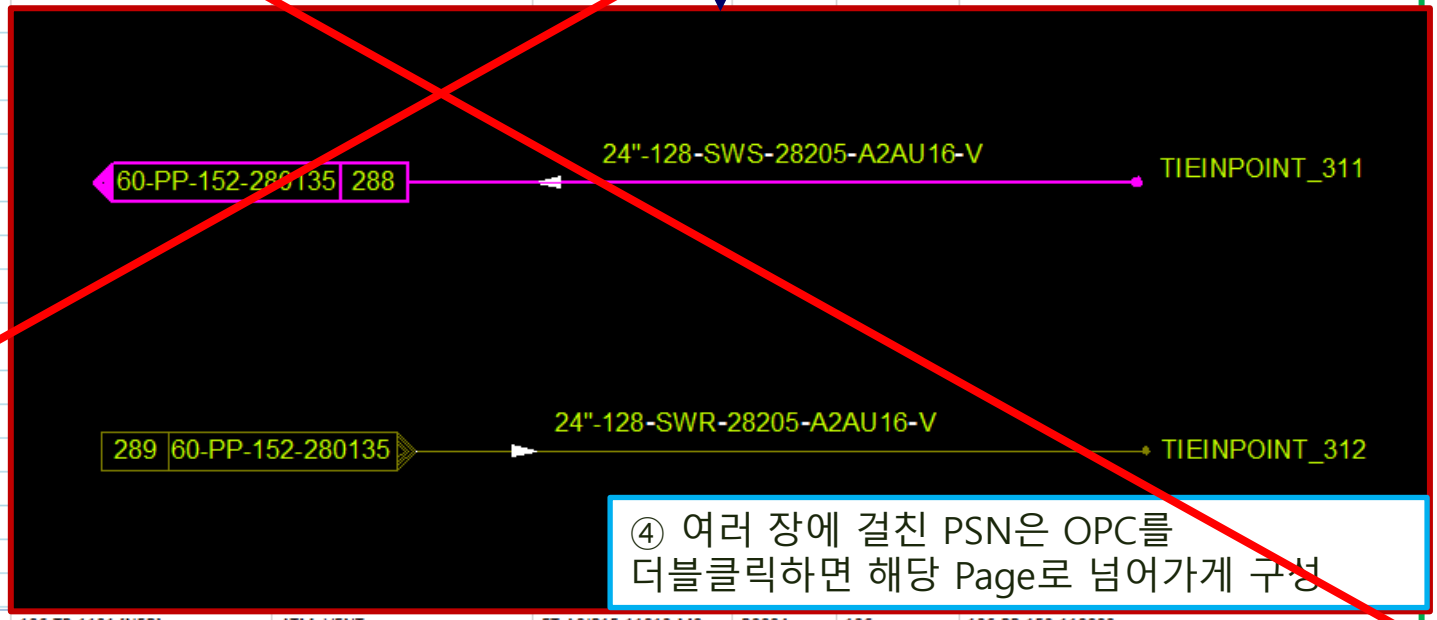
③ 도면으로 넘어갈 수 있는 별도 TAP도 제공

Full Text Search

PSN ID	Type	Order #	PipeLine ID	From	To	SeqData ID	Revision	PBS	PID Drawings
R0004-PSN-00001	E2E	0	IA-A1AU01-28003-V	63-NF-2821 [N-1]	63-XK-2821 [N-3]	IA-A1AU01-28003-M0	R0004	63	63-PP-152-280101
R0004-PSN-00002	E2E	0	IA-A1AU01-28007-V	63-NF-2823A [N-1]	63-XK-2823A [N-2]	IA-A1AU01-28007-M0	R0004	63	63-PP-152-280102
R0004-PSN-00003	E2E	0	IA-A1AU01-28008-V	63-NF-2823B [N-1]	63-XK-2823B [N-2]	IA-A1AU01-28008-M0	R0004	63	63-PP-152-280103
R0004-PSN-00004	E2E	0	MW-A0KU16-28019-V	56-TK-2821 [N4]	56-PC-2821A [N-2]	MW-A0KU16-28019-M0	R0004		
					LOADFUNNEL	MW-A0KU16-28018-M0	R0004		
					TIEINPOINT_113	PG-A0JP15-19008-M0	R0004	126,128	126-PP-152-190002, 128-PP-152-290025
					126-XA-1121A/B [N-1]	ET-A0JP15-11033-M0	R0004	126	126-PP-152-110002, 126-PP-152-110004
					ATM_VENT	PO-A2AP01-16050-M0	R0004	126	126-PP-152-160001
R0004-PSN-00009	E2E	0	LC-A2AU05-28019-I						
R0004-PSN-00010	E2E	0	PO-A2AP01-16049-V						
R0004-PSN-00011	E2E	0	SWS-A2AU16-28205-V						
R0004-PSN-00012	E2B	0	SWR-A2AU16-28218-V						
R0004-PSN-00013	E2E	0	MW-A0KU16-28005-V						
R0004-PSN-00014	E2E	0	P-A2AP01-20025-V						
R0004-PSN-00015	E2E	0	MW-A0KU16-28003-I						
R0004-PSN-00016	E2E	0	SWR-A2AU16-28205-V						
R0004-PSN-00017	E2E	0	P-A2AP01-20029-V						
R0004-PSN-00018	E2E	0	MW-A0KU16-28001-I						
R0004-PSN-00019	E2E	0	LC-A2AU05-28009-I						
R0004-PSN-00020	E2B	0	P-A2AP30-14127-F						
R0004-PSN-00021	E2E	0	PL-A0JP15-19001-F						
R0004-PSN-00022	E2B	0	P-A2AP30-14075-F						
R0004-PSN-00023	E2B	0	P-A2AP30-14046-F						
R0004-PSN-00024	E2B	0	SWR-A2AU16-28001-V						
R0004-PSN-00025	E2B	0	DA-A0KU01-28004-I						
R0004-PSN-00026	E2E	0	P-A2AP01-14009-V						

① 산출된 PSN List에서 더블클릭 시,
해당 라인 인식도면 표시 및 색깔로 구별

② 인식한 P&ID 도면 넘버도 제공



④ 여러 장에 걸친 PSN은 OPC를
더블클릭하면 해당 Page로 넘어가게 구성

ID2 신규 기능 개발

- 연결 정보 기준 강화 : 도면 인식 후 인식 안 되거나, 끊어져 있는 것을 수정해주는 기능 강화 필요

1. 현재 기준 :

   a) 인식 못한 부분 수정 :
   - 입력한 특정 거리 기준 연결
   - 근접한 심벌끼리 접합 (Valve – Flange, Valve – Spectacle, Spectacle – Flange 등)
   - 근접한 심벌 사이 짧은 라인은 인식이 안 되었으면 자동 추가
   - Drain/Vent 에서 미인식 라인 생성

   b) 誤인식된 부분 수정 :
   - Diagonal Piperun Line 인식 금지 기능 (EQ Body와 오류)
   - 라인끼리 또는 심벌과 연결점이 없는 라인은 인식 되어도 삭제

2. ~~추가할 기능 : CASE별 인식 안 된 부분을 보정하기 위한 Logic 수립 필요~~

ARS Module 3 추가 개발

- Simplified PSN 형태 정보로 출력(엑셀)~~모델링 구현 기능~~

1. Simplified PSN에 포함되는 정보는 아래 참고

Line ID	Unit	Fluid	Line SEQ	Piping Material Class	Pipe Size	From	To	Insulation Purpose	P&ID NO.	P&ID NAME
2"-DC-C03A-164-G	20	DC	164	C03A	2"	20-PA-32-03A [N-132]	2"-DC-32-164-C03A-G	G	1905-20-DC-C-22094	
2"-DC-A03A-771-N	530	DC	771	A03A	2"	530-PA-43-01A [N-132]	2"-DC-43-771-A03A-N	N	1905-530-DC-C-22098	
2"-VC-C03A-079-N	60	VC	079	C03A	2"	60-PA-33-02A [N-2]	2"-VC-33-079-C03A-N	N	1905-60-DC-C-22064	
3"-DC-A03A-762-N	500	DC	462	A03A	3"	500-PA-43-01A [N-132]	3"-DC-43-762-A03A-N	N	1905-500-DC-C-2208	
2"-DC-M03A-128-C	20	DC	128	M03A	2"	20-PA-32-02A [N-124]	2"-DC-57-146-M01A-N	C	1905-20-DC-C-2209	
3/4"-WO-A06B-VVV-N	S01	WO	VVV	A06B	3/4"	S01-VA-18-01 [N18]	3/4"-WO-18-VVV-A06B-N	N	1905-S01-DC-C-22020	

출력 엑셀 형식 필요

~~위 간소화된 DATA 기준으로도 Modeling이 가능하도록 기능 개선/개발 (ARS Module 3)~~

General Terminology:

Terminology	Description
Pipe System	Classification based on Fluid Code and Materials Class (FC-PMC)
Pipe Line/Run	Classification based on "Pipe System" + Sequence Number (FC-PMC-SN)
Topology	Layout detail of a Pipe Line, describing its Structure i.e. Branches, From-To data, components, etc.
PSN *"Pipe System Network"*	A collection of continuously connected Topologies
PSN Types	E2E, E2B/B2E, B2B, HDE, HDB, HD2 * *Details in slides*
Path Item	Item/component placed along the Pipe Line or at its ends.
From / To, Head / Tail	Item Tag of component connected to the Start or End of a Pipe Line, Topology or a PSN.

Pipe System:

Classification based on Fluid Code and Materials Class (FC-PMC)

Pipe Systems (75)

System ID	System Name	Fluid	Materials Class	PipeLines
AI-1D1A2	Instrument air	AI	1D1A2	34 nos
AI-	Instrument air	AI		
AS-1D1A2	SERVICE AIR	AS	1D1A2	20 nos
CM-1A1A1	CHEMICAL INJ (METHANOL)	CM	1A1A1	11 nos
CM-9A1A1	CHEMICAL INJ (METHANOL)	CM	9A1A1	8 nos
CM-9J0A1	CHEMICAL INJ (METHANOL)	CM	9J0A1	1 nos
DC-	CLOSED DRAIN	DC		0 nos
DC-1A1A1	CL	DC	1A1A1	5 nos
DC-1A3A1	CLOS DRAIN	DC	1A3A1	74 nos
DC-6A3A3	CLOSED DRAIN	DC	6A3A3	1 nos
DC-	CLOSED DRAIN	DC		
DO-1A1A1	OPEN DRAIN (NON-HAZARDOUS)	DO	1A1A1	7 nos
FD-1A1A1	DIESEL FUEL	FD	1A1A1	19 nos
FG-1A1A1	FUEL GAS	FG	1A1A1	15 nos
FG-1B1A3	FUEL GAS	FG	1B1A3	1 nos

FC Fluid Code

PMC Piping Materials Class

Pipe Line/Run:

Classification based on “Pipe System” + Sequence Number (‘PS’-SN)

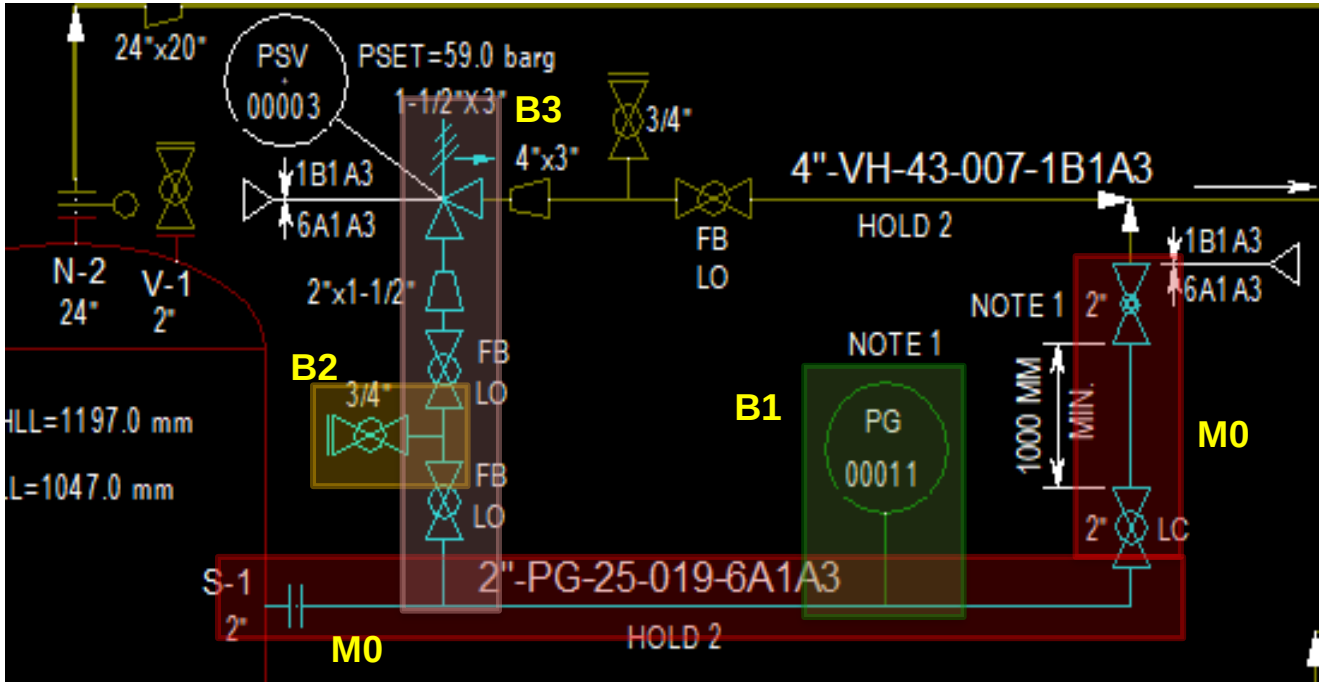
Pipe Lines (863) PipeRuns

System ID	PipeLine ID	Fluid	PMC	Seq Nbr	Insl
DC-1A3A1	DC-1A3A1-013	DC	1A3A1	013	
HM-1A1A1	HM-1A1A1-009	HM	1A1A1	009	
PG-3B3A3	PG-3B3A3-012	PG	3B3A3	012	
PL-3A3A3	PL-3A3A3-628	PL	3A3A3	628	
VH-1B1A3	VH-1B1A3-034	VH	1B1A3	034	
VH-1B1A3	VH-1B1A3-035	VH	1B1A3	035	
VH-1B1A3	VH-1B1A3-036	VH	1B1A3	036	
VH-1B1A3	VH-1B1A3-037	VH	1B1A3	037	
VH-1B1A3	VH-1B1A3-038	VH	1B1A3	038	
VH-1B1A3	VH-1B1A3-039	VH	1B1A3	039	
VH-1B1A3	VH-1B1A3-040	VH	1B1A3	040	
VH-1B1A3	VH-1B1A3-041	VH	1B1A3	041	
VH-1B1A3	VH-1B1A3-042	VH	1B1A3	042	

FC	Fluid Code
PMC	Piping Materials Class
SN	Tag Sequence Number
NPD	Nominal Diameter
IN	Insulation Purpose / Req.

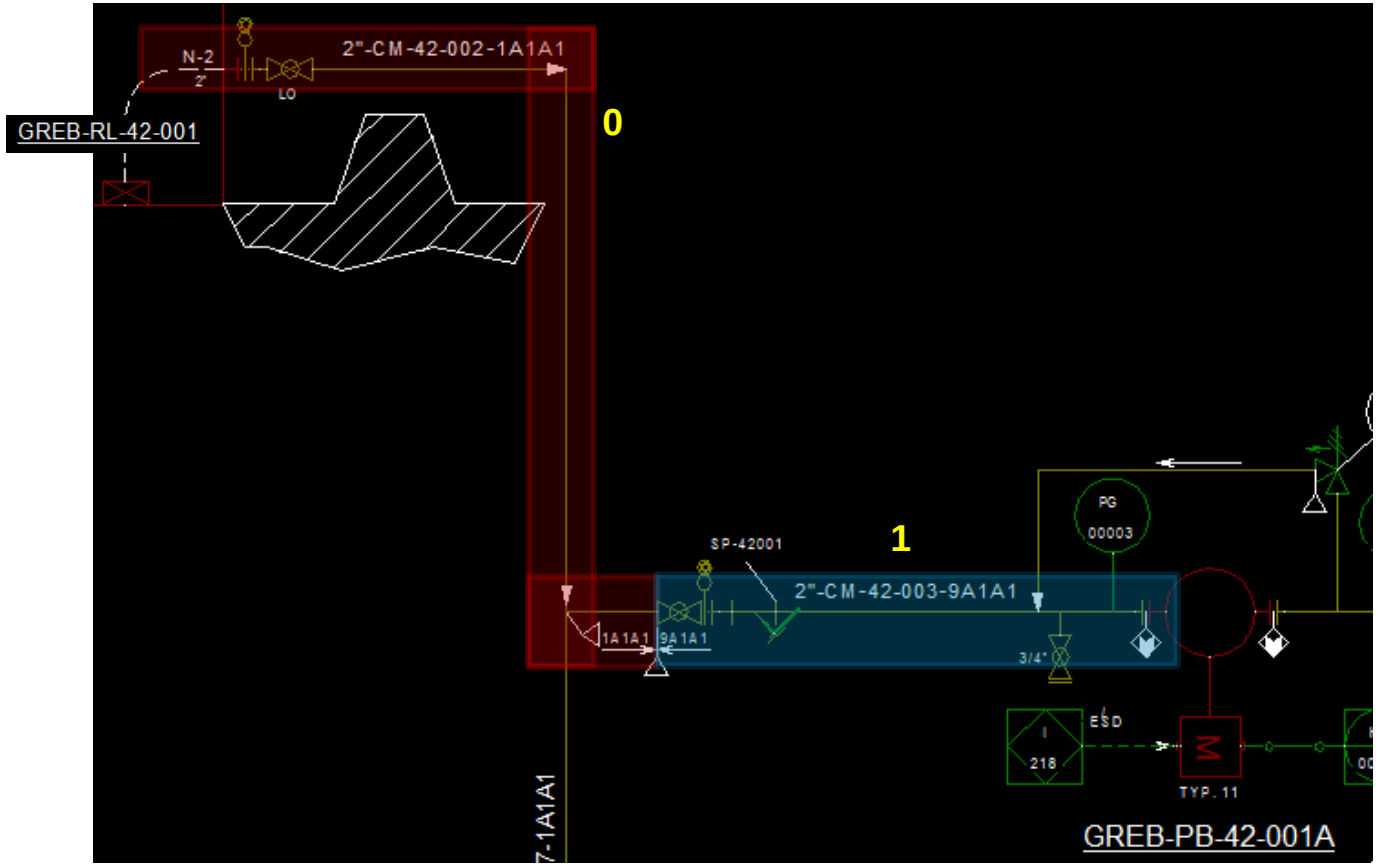
Topology: Layout detail of a Pipe Line, describing its Structure i.e. Branches, From-To data, components, etc.

Topology ID	Type	Sub-Type	Head Side ItemTag	Tail Side ItemTag
PG-6A1A3-019-M0	Main	Normal	GREB-VL-25-001C	4"-VH-43-007-1B1A3
PG-6A1A3-019-B1	Branch	Instrument	2"-PG-25-019-6A1A3	GREB-25-PG-00011
PG-6A1A3-019-B2	Branch	Vent_Drain	2"-PG-25-019-6A1A3	n/a
PG-6A1A3-019-B3	Branch	Normal	2"-PG-25-019-6A1A3	3"-VH-43-007-1B1A3



Pipe System Network (PSN): A collection of continuously connected Topologies

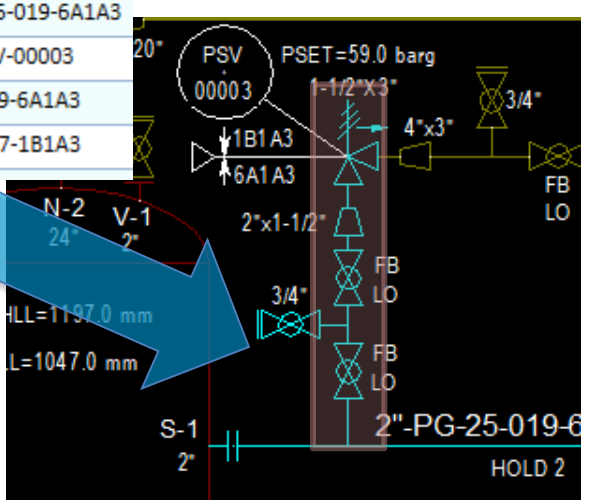
PSN ID	Type	Order #	PipeLine ID	From	To	SeqData ID
R0003-PSN-00215	E2E	0	CM-1A1A1-002	GREB-RL-42-001 [N-2]	GREB-PB-42-001A [N-1]	CM-1A1A1-002-M0
R0003-PSN-00215	E2E	1	CM-9A1A1-003	GREB-RL-42-001 [N-2]	GREB-PB-42-001A [N-1]	CM-9A1A1-003-M0



Path Item(s): Item/component placed along the Pipe Line or at its ends.

Path Items | Sequence Data Items | Topologies | Nozzle Data | Equipment Data | Drawing

SP ID	PathItem ID	Branch Topology ID	PSN OID	Item Name	Item Tag
69B9068	PG-6A1A3-019-B3_0	PG-6A1A3-019-M0	R0003-PSN-00159	Branch	2"-PG-25-019-6A1A3
69B9068	PG-6A1A3-019-B3_1	PG-6A1A3-019-M0	R0003-PSN-00561	PipeRun	2"-PG-25-019-6A1A3
F44D61F	PG-6A1A3-019-B3_2		R0003-PSN-00561	PipingComp	
69B9068	PG-6A1A3-019-B3_3	PG-6A1A3-019-M0	R0003-PSN-00561	PipeRun	2"-PG-25-019-6A1A3
69B9068	PG-6A1A3-019-B3_4	PG-6A1A3-019-B2		Branch	2"-PG-25-019-6A1A3
69B9068	PG-6A1A3-019-B3_5	PG-6A1A3-019-M0	R0003-PSN-00561	PipeRun	2"-PG-25-019-6A1A3
9FC6B21	PG-6A1A3-019-B3_6		R0003-PSN-00561	PipingComp	
69B9068	PG-6A1A3-019-B3_7	PG-6A1A3-019-M0	R0003-PSN-00561	PipeRun	2"-PG-25-019-6A1A3
291FA2F	PG-6A1A3-019-B3_8		R0003-PSN-00561	PipingComp	
D317E5B	PG-6A1A3-019-B3_9		R0003-PSN-00561	PipeRun	1-1/2"-PG-25-019-6A1A3
84FB3DC	PG-6A1A3-019-B3_10		R0003-PSN-00561	Instrument	GREB-25-PSV-00003
1989307	PG-6A1A3-019-B3_11		R0003-PSN-00561	PipeRun	3"-PG-25-019-6A1A3
1989307	PG-6A1A3-019-B3_12		R0003-PSN-00561	Branch	3"-VH-43-007-1B1A3

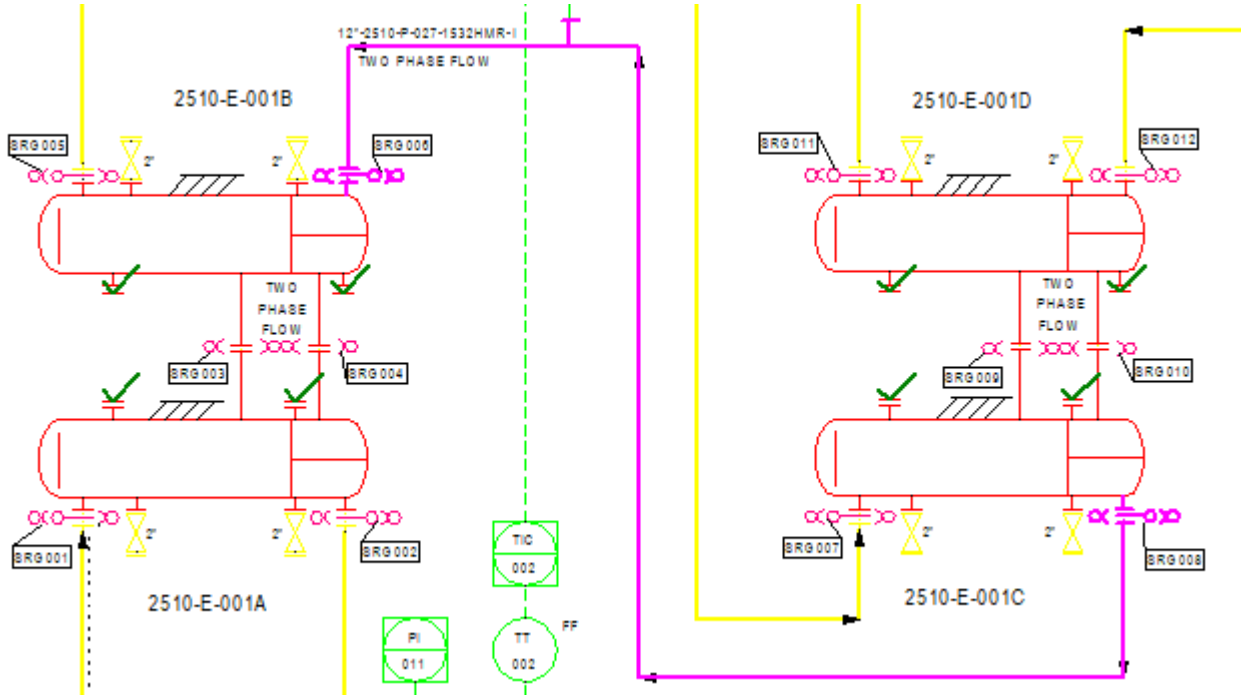


PSN Types: E2E, E2B/B2E, B2B, HDE, HDB, HD2

E2E:

Equipment - to – Equipment.

Pipelines (Single or multiple) connected end-to-end by Equipment / Nozzle

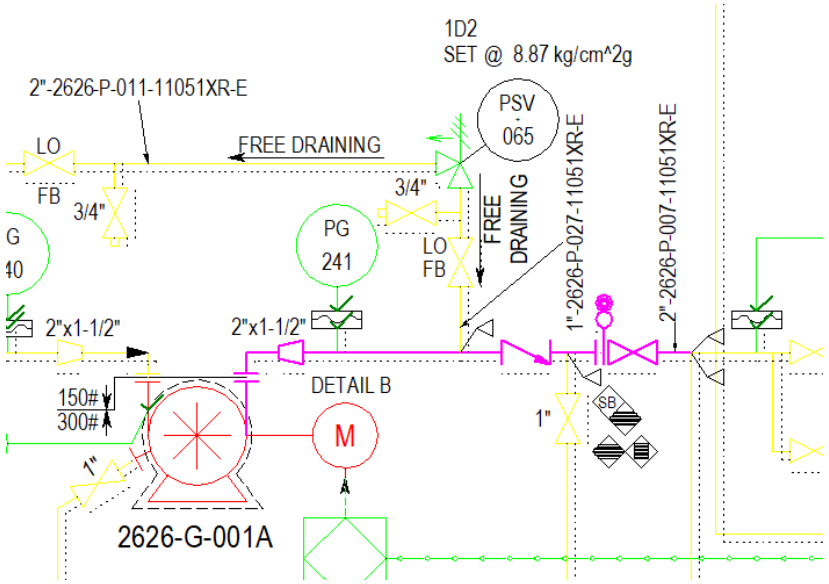


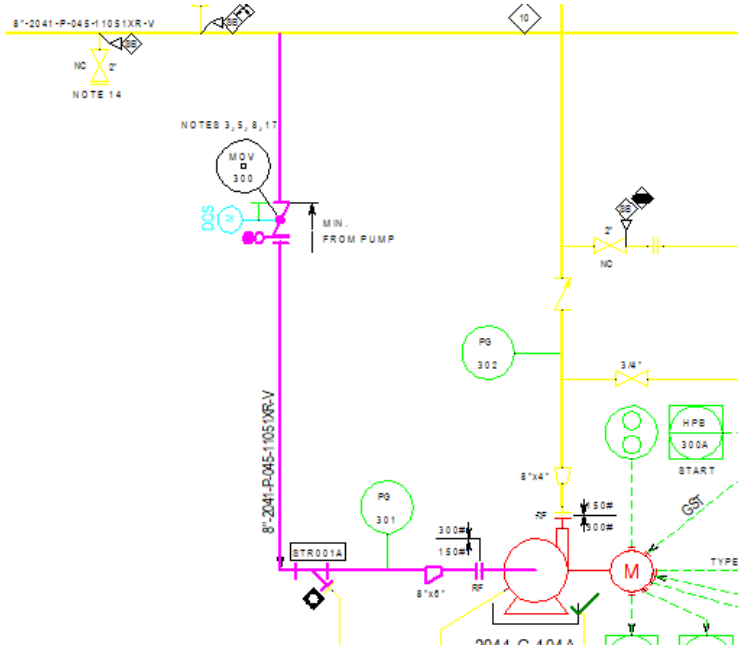
AutoRouting SPPID System

PSN Types: E2E, E2B/B2E, B2B, HDE, HDB, HD2

E2B / B2E: Equipment-to–Branch // Branch-to-Equipment

Pipelines connected one end to another Pipeline/System, and opposite Side to Equipment / Nozzle.



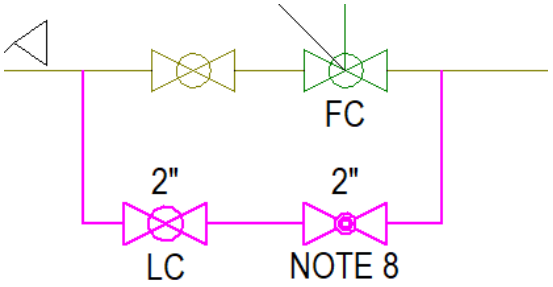


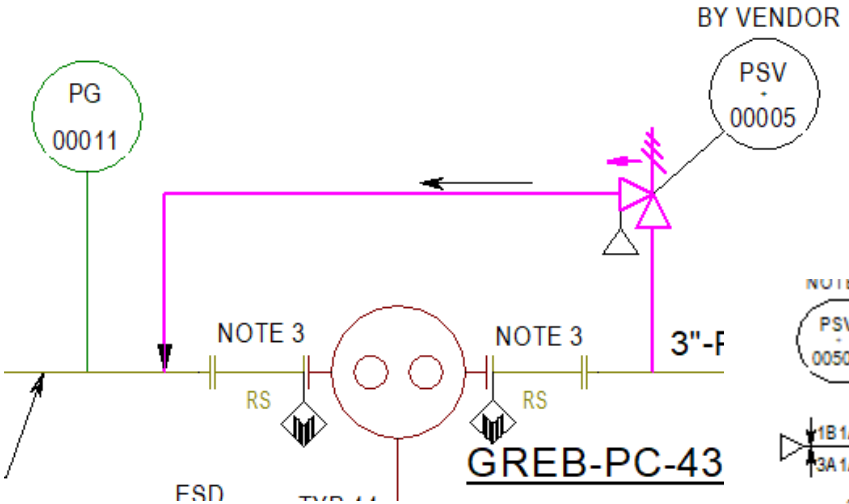
PSN Types: E2E, E2B/B2E, B2B, HDE, HDB, HD2

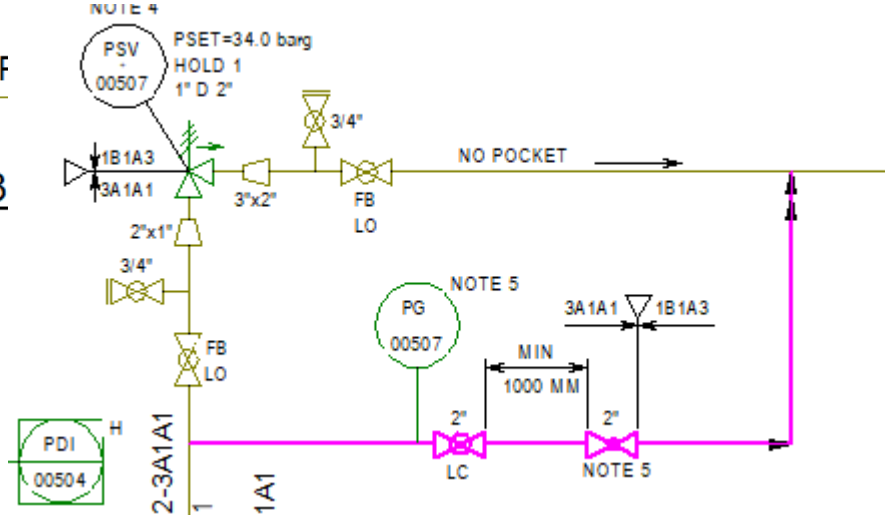
B2B:

Branch-to–Branch

Pipelines connected on both ends to another Pipeline.



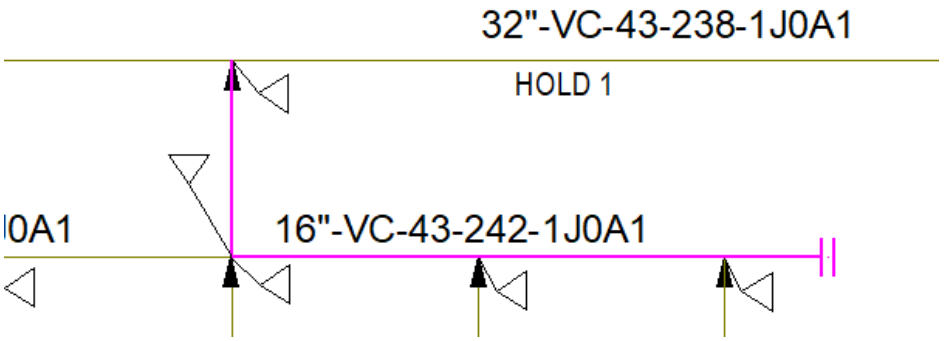


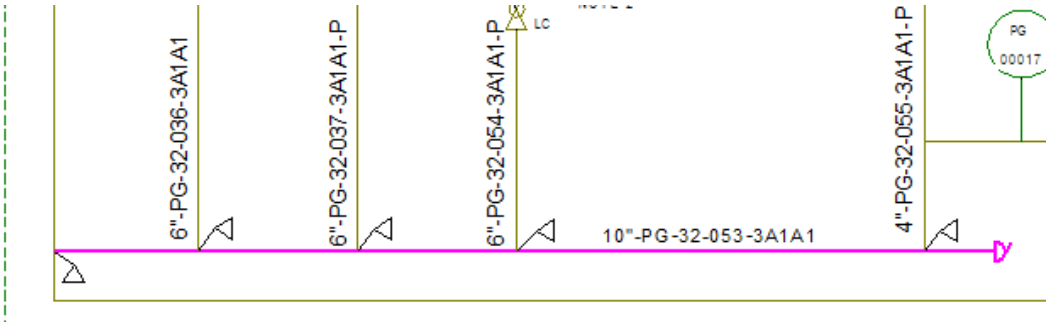


PSN Types: E2E, E2B/B2E, B2B, HDE, HDB, HD2

HDB: Header-to–Branch

Pipelines having Header Types at one end and other end is connected to another Pipeline.

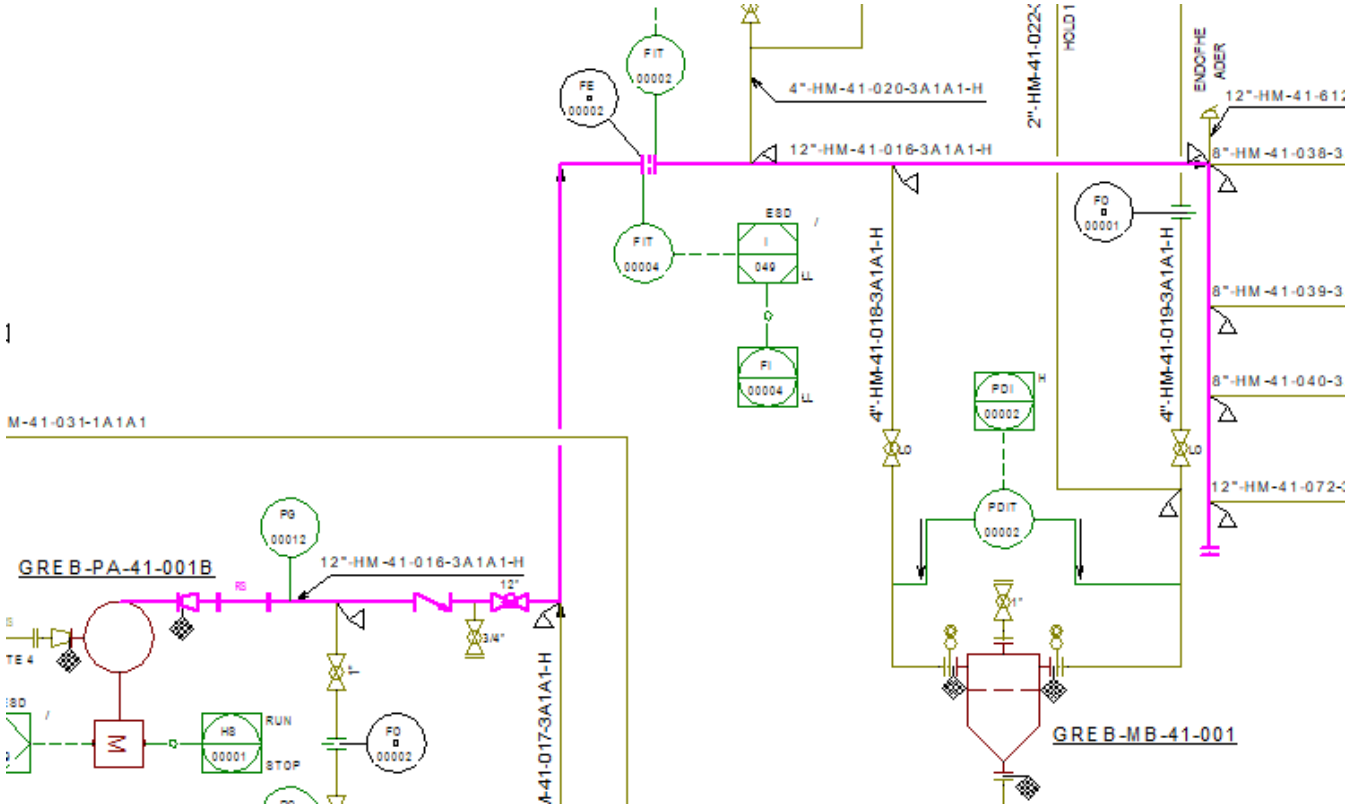




PSN Types: E2E, E2B/B2E, B2B, HDE, HDB, HD2

HDE: Header-to–Equipment / Equipment-to-Header

Pipelines having Header Types at one end and other end is connected to Equipment / Nozzle.



PSN Types: E2E, E2B/B2E, B2B, HDE, HDB, HD2

HD2: Header-to–Header

Pipelines having Header Types at both ends.