Data-driven pipe spool fabrication

Case: Helsinki Shipyard & PipeCloud

WHO YOU'LL HEAR FROM

Meet the speakers

Sakari Mäkinen

Head of Department · Helsinki Shipyard

Six years at Helsinki Shipyard, responsible for the pipe workshop and prefabrication operations. Day-to-day owner of how engineering data becomes physical steel on the shop floor - and the person who decided it was time to replace spreadsheets with a real production system.

Olli Yliaho

CTO, co-founder · PipeCloud

Software engineer by background. Has been building PipeCloud since 2016 - nearly a decade spent on one question: how to turn engineering data into controlled pipe production. Leads the technical direction of the product and the integrations with AVEVA.

HELSINKI
SHIPYARD

The Global Icebreaker Leader

- Design/engineering excellence
- Project management excellence

280m Covered Drydock	~50% Global icebreaker fleet
66 Icebreakers since ‘54	500+ Ships delivered
1+ Novel ship per year	Continuous Operations for >100 yrs

- *Aveva E3D, Aveva Hull Design, Aveva Engineering, Aveva ERM*

HELSINKI SHIPYARD

Where we began

Engineering & production

loosely connected — data handed off, not flowing

Planning by experience

spreadsheets, gut feel, tribal knowledge

Make vs buy

hard to decide without real workload visibility

Workload visibility

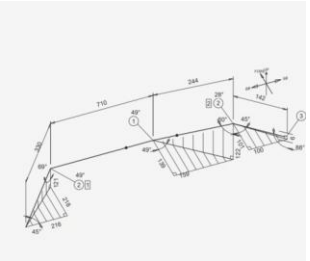
limited — bottlenecks surface too late to react

ABOUT

PipeCloud – Digital Workflow Management for Pipe Prefabrication

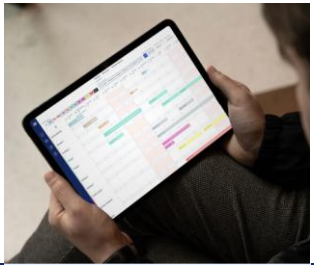
PipeCloud helps shipyards, prefab factories and piping subcontractors streamline the process from planning to shop-floor execution and real-time tracking.

- **Boost productivity by 30%** with real-time planning and execution insights
- **Plan 5× faster** and deliver projects on schedule
- **Reduce waste by 10%** through optimized workflows
- **Gain full visibility** and traceability — from welds to QA records
- **Work from anywhere** with a cloud-based, multi-shop platform



1 Import CAD data

2 Create production bundles



3 Plan and schedule production

4 Execute workflows on the shopfloor

5 Track progress in real time

PROBLEM

What’s Holding Pipe Workshops Back

Wasted labor time & skills scarcity

- **Welders spend 20 %** of each shift welding, the rest is hunting for drawings, parts or rework
- **A global shortage** of welders, fitters, and CNC programmers
- **Complex isometric drawings** intensify productivity losses tied to familiarization and retention

Lack of real-time shop-floor visibility

- **Manual planning slow**, no accurate view of capacity, resources or schedule
- **Estimates** based on inaccurate work effort
- **Supervisors use gut feel vs. data;** bottlenecks surface too late, causing constant firefighting

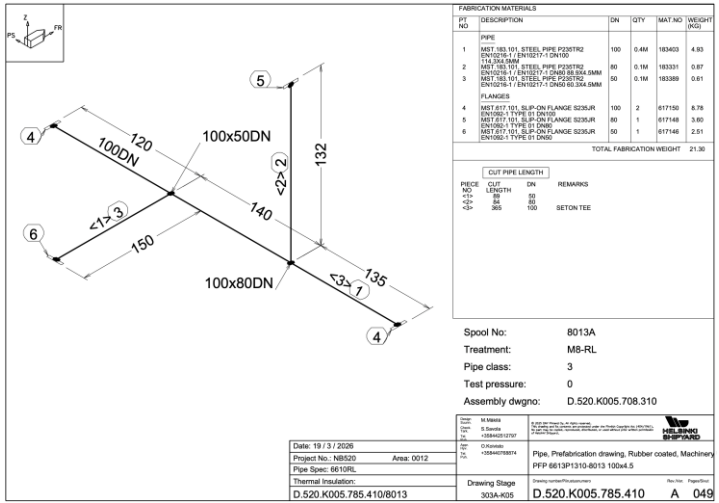
Traceability & compliance burden

- **Full welding & material traceability paper** logs take hours and are inconvenient
- **Auditing through piles of paper** risks missing defects and triggering costly rework
- **As built** documentation is laborious to collect and does not match with the reality

ROOT CAUSE

The real issue: no production data model

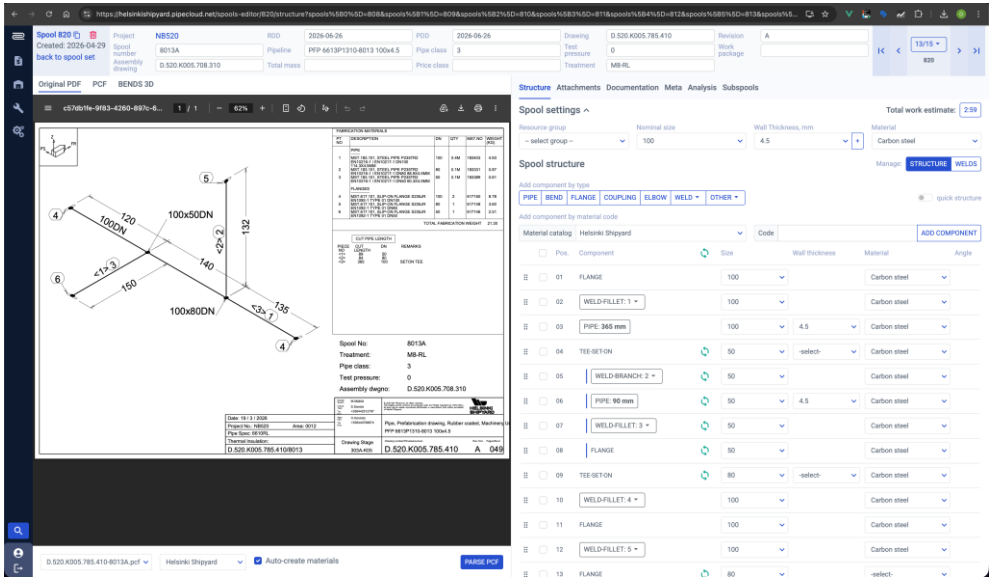
- **CAD → Excel → paper → machines → ERP** — data exists everywhere, connected nowhere
- **No consistent representation of work** — a spool means something different in every system
- **No consistent representation of materials** — BOMs are rebuilt, not derived
- **No consistent representation of progress** — status is a conversation, not a state



Production must be defined as data

- **Spools** — units of work
- **Phases** — steps of execution
- **Tasks** — assigned work
- **Events** — actual execution, recorded as it happens

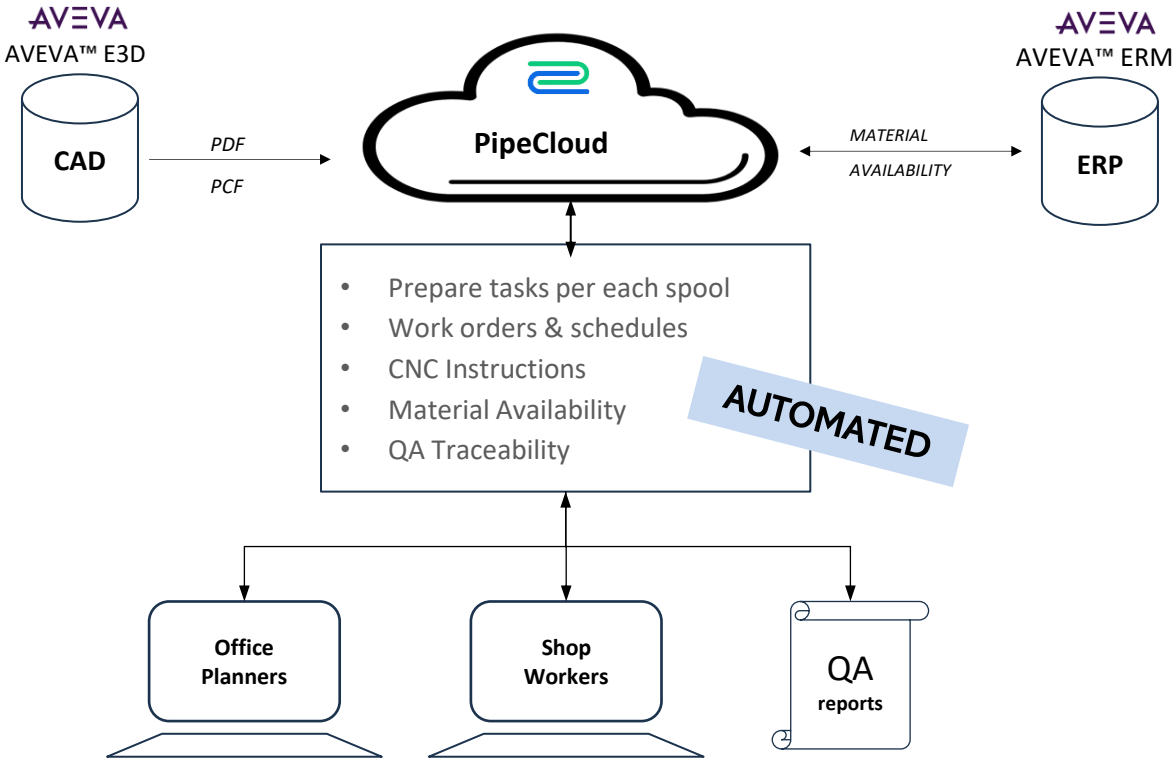
This spool's work estimate: 2:59



Once production is data, it becomes measurable. Once measurable — controllable.

THE FLOW

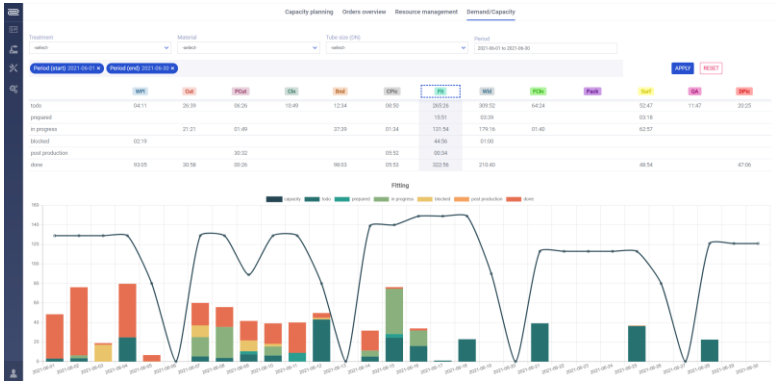
From engineering data to controlled production

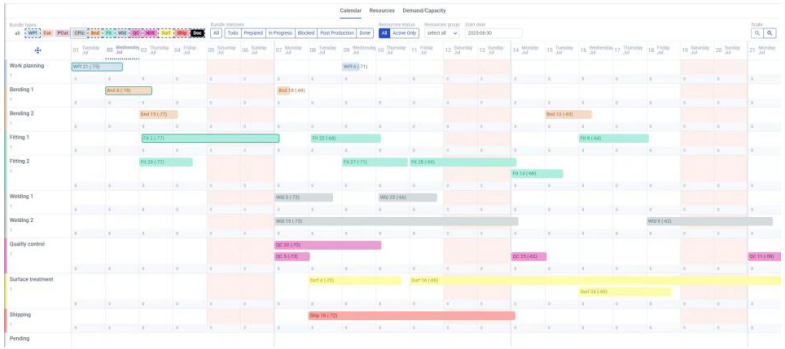


PLANNING

Planning based on actual workload

- **Automatic work effort calculation** — per spool and per phase, derived from design
- **Capacity planning on real workload** — not gut feel, not last quarter's spreadsheet
- **Visual planning calendar** — drag, drop, rebalance — see conflicts immediately
- **Early bottleneck detection** — before production starts, not after it's stuck

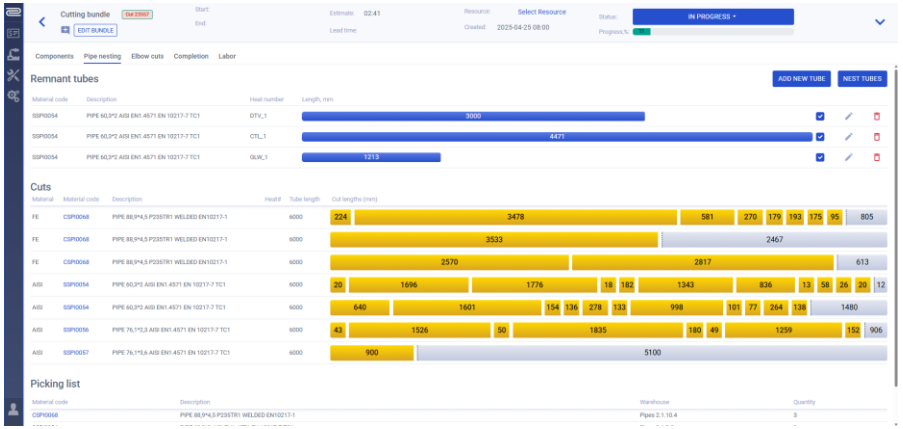




MATERIALS

Material planning and optimization

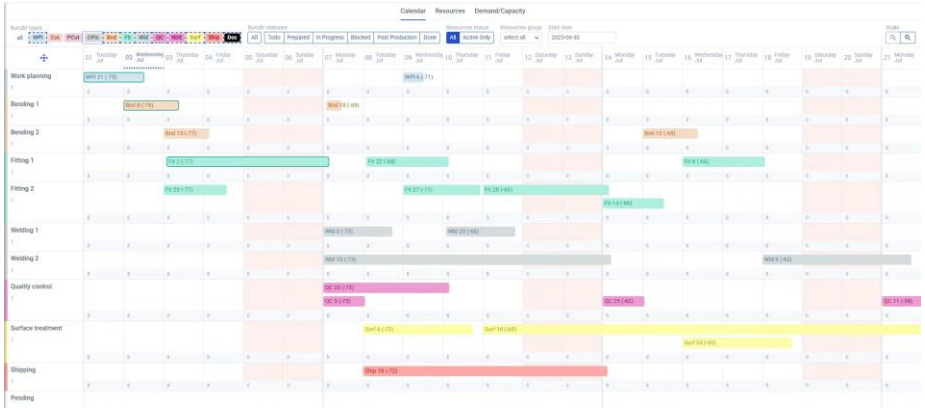
- **Automatic BOM generation** — directly from spool structure, always in sync
- **Purchasing support** — aligned with real production needs and timing
- **Cut nesting** — reduced waste during cutting
- **Design–production alignment** — one source of truth, no reconciliation



EXECUTION PRIMITIVE

Bundles = actual work orders

- **A group of spools** — per phase and per resource
- **Defines what, where, when** — the atomic unit of shop-floor work
- **If work is not bundled — it does not exist** — no bundle, no capacity, no tracking, no traceability



STRATEGIC DECISION

Make or buy — at spool level

- **All spools visible and structured** — no spool hides in a drawing or an email
- **Full workload context at decision time** — real capacity, real demand, real cost
- **Buy → purchase order** — handed off to procurement with structured data
- **Make → production bundles** — released directly to the shop floor
- **Decision stays linked to execution** — fully traceable, fully auditable

WHAT WE BUILT

Implementation scope

- **CAD import** — structured spool data from AVEVA (PDF & PCF)
- **Make-vs-buy** — integrated into the decision flow
- **Automatic task & phase generation** — no manual setup per spool
- **Bundling** — of all production work
- **Shop-floor interface** — for execution and reporting
- **External integrations** — ERP, procurement, machines

Production fully defined in the system

- **All spools structured and validated** — everything has a definition
- **Make-or-buy decisions defined** — no pending choices that block execution
- **Production work fully bundled** — every hour of work has an owner
- **Shop-floor tasks generated** — ready to be picked up
- **Data flows connected across systems** — no re-entry, no drift

This is not a temporary pre-go-live state. This is the operating model.

DIGITAL WORK INSTRUCTIONS ON THE SHOP FLOOR

From Paper & Pen to Digital Execution

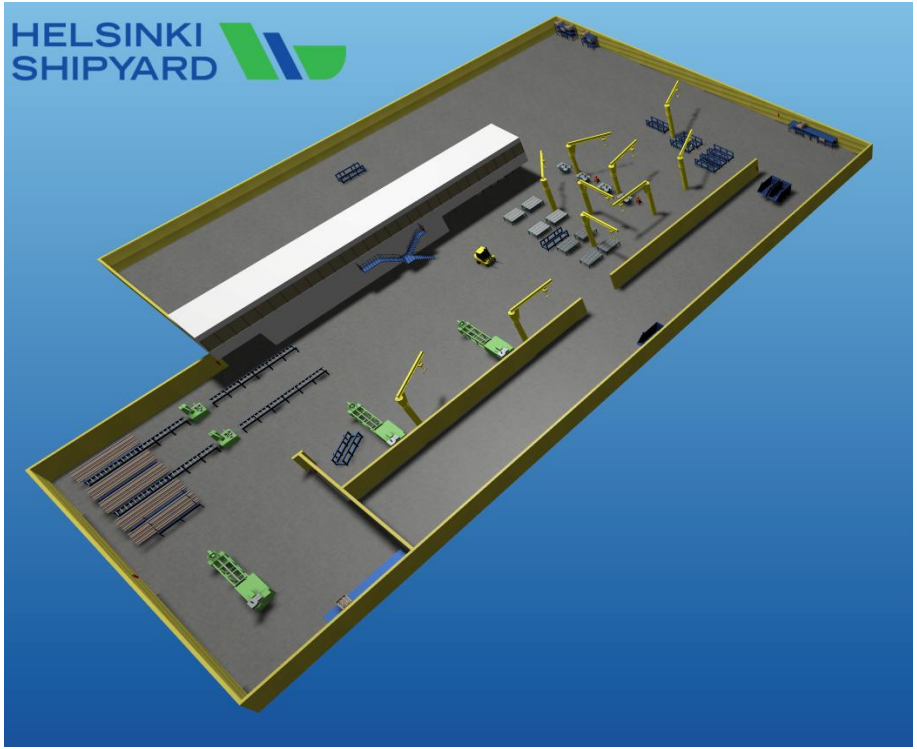
At the shop-floor workstation, the PipeCloud screen shows:

- Individual daily tasks and schedule
- Material availability
- Digital work instructions and drawings
- Time and progress reporting
- Direct communication with the office team

CONTROL

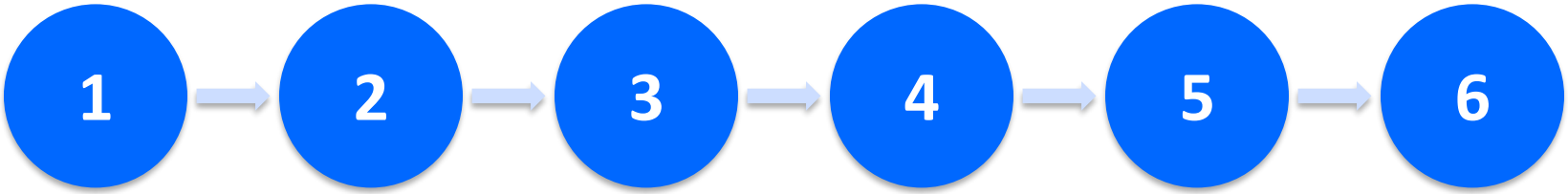
Real-time production visibility

- **Live factory view** — current state of the shop, updated as events happen
- **Status of all spools and phases** — one place, one truth
- **Immediate visibility to delays** — problems surface early enough to act on
- **Shared view for production and management** — same data, no conflicting reports



END-TO-END

Example: a spool's lifecycle



Every spool follows the same lifecycle — which is what makes comparison and improvement possible.

OUTCOMES

What becomes possible

- **Controlled make-vs-buy decisions** — based on real workload, not relationships
- **Capacity planning on real workload** — supervisors plan, not firefight
- **Material flow aligned with production** — less waste, less cash tied up in stock
- **Real-time shop-floor visibility** — problems surface early enough to fix
- **Full traceability — no manual effort** — audit-ready by default

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Spool num	Production number	Drawing	Order number	Revision	Pipeline	Dimension	Weld	Weld type	Part 1 type	Part 1 heat	Part 2 type	Part 2 heat	Welding date	WPS	Welder	Filler	Fitter	Fitting date
2	8627	62173/175187	D.395.074Y.535.0	6202	A	5713P704	88.9x4.5	#01	WELD-FILL FLANGE	26313	PIPE	26314	2025-05-08 08:31		WPS-FL-01	Test Worker	PVW1910628	Test Fitter	2025-05-02 14:34
3	8627	62173/175187	D.395.074Y.535.0	6202	A	5713P704	88.9x4.5	#02	WELD-BUT	PIPE	26314	ELBOW	26315	2025-05-08 08:31	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-02 14:34
4	8627	62173/175187	D.395.074Y.535.0	6202	A	5713P704	88.9x4.5	#03	WELD-BUT	ELBOW	26315	PIPE	26314	2025-05-08 08:31	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-02 14:34
5	8627	62173/175187	D.395.074Y.535.0	6202	A	5713P704	88.9x4.5	#04	WELD-BUT	PIPE	26314	ELBOW	26315	2025-05-08 08:31	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-02 14:34
6	8627	62173/175187	D.395.074Y.535.0	6202	A	5713P704	88.9x4.5	#05	WELD-BUT	ELBOW	26315	PIPE	26314	2025-05-08 08:31	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-02 14:34
7	8628	62173/175188	D.395.074Y.535.0	6202	A	5713P704	88.9x4.5	#01	WELD-FILL FLANGE	26313	PIPE	26314	2025-05-08 08:31		WPS-FL-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 11:15
8	8629	62173/175189	D.395.074Y.535.0	6202	A	5713P704	60.3x4.5	#01	WELD-BUT	PIPE	26313	ELBOW	26316	2025-05-08 08:32	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 11:15
9	8629	62173/175189	D.395.074Y.535.0	6202	A	5713P704	60.3x4.5	#02	WELD-BUT	ELBOW	26316	PIPE	26317	2025-05-08 08:32	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 11:15
10	8629	62173/175189	D.395.074Y.535.0	6202	A	5713P704	60.3x4.5	#03	WELD-FILL	PIPE	26317	SUPPORT		2025-05-08 08:32	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 11:15
11	8631	62173/175190	D.395.074Y.535.0	6202	A	5713P704	88.9x4.5	#01	WELD-FILL	PIPE	26314	FLANGE	26313	2025-05-08 08:32	WPS-FL-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 11:15
12	8632	62173/175191	D.395.074Y.535.0	6202	A	5612P651	168.3x4	#01	WELD-BUT	PIPE	26318	ELBOW	26319	2025-05-08 08:33	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 11:15
13	8632	62173/175191	D.395.074Y.535.0	6202	A	5612P651	168.3x4	#02	WELD-BUT	ELBOW	26319	PIPE	26318	2025-05-08 08:33	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 11:15
14	8660	62173/175195	D.395.074Y.535.0	6202	A	5213P762	76.1x2.3	#01	WELD-FILL	COUPLING	26320	PIPE	26321	2025-05-08 08:36	WPS-FL-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 12:21
15	8660	62173/175195	D.395.074Y.535.0	6202	A	5213P762	76.1x2.3	#02	WELD-BUT	PIPE	26321	ELBOW	26322	2025-05-08 08:36	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 12:21
16	8660	62173/175195	D.395.074Y.535.0	6202	A	5213P762	76.1x2.3	#03	WELD-BUT	ELBOW	26322	PIPE	26321	2025-05-08 08:36	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 12:21
17	8660	62173/175195	D.395.074Y.535.0	6202	A	5213P762	76.1x2.3	#04	WELD-BUT	PIPE	26321	ELBOW	26322	2025-05-08 08:36	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 12:21
18	8660	62173/175195	D.395.074Y.535.0	6202	A	5213P762	76.1x2.3	#05	WELD-BUT	ELBOW	26322	PIPE	26321	2025-05-08 08:36	WPS-BT-01	Test Worker	PVW1910628	Test Fitter	2025-05-06 12:21
19	8660	62173/175195	D.395.074Y.535.0	6202	A	5213P762	76.1x2.3	#06	WELD-FILL	PIPE	26321	COUPLING	26320	2025-05-08 08:36	WPS-FL-01	Test Worker	PVV41057534	Test Fitter	2025-05-06 12:21
20	8660	62173/175195	D.395.074Y.535.0	6202	A	5213P762	76.1x2.3	#07	WELD-BRA	COUPLING	26320	PIPE	26321	2025-05-08 08:36	WPS-BR-0	Test Worker	PVV41057534	Test Fitter	2025-05-06 12:21
21	8660	62173/175195	D.395.074Y.535.0	6202	A	5213P762	76.1x2.3	#08	WELD-FILL	PIPE	26321	COUPLING	26320	2025-05-08 08:36	WPS-FL-01	Test Worker	PVV41057534	Test Fitter	2025-05-06 12:21

WHAT WE CAN NOW MEASURE

Post go-live measurement

- **Planned vs actual per phase** — where does the plan consistently miss?
- **Capacity utilization** — what is the real shop output?
- **Internal vs outsourced balance** — is make-vs-buy working as intended?
- **Material efficiency and waste** — where do we lose steel?
- **Traceability completeness** — how much of execution is truly traceable?

PRINCIPLE

You cannot improve what you cannot define.

01

Structure

before decisions

02

Decisions

before execution

03

Measurement

before improvement

MARINE | FINLAND

Helsinki Shipyard turns engineering data into controlled pipe production

Challenge

- Engineering and production loosely connected
- Planning based on experience and spreadsheets
- Make-vs-buy decisions without workload visibility
- Manual, incomplete traceability

Solution

- PipeCloud integrates with AVEVA™ E3D, importing PCF data to structure every spool as production data. A unified model drives make-or-buy, planning, shop-floor execution, and real-time traceability.

Results

- Connected engineering and production on a single data model
- Bundling and digital work instructions on the shop floor
- Enabled real-time visibility into spool status, delays, and bottlenecks
- Built complete welding and material traceability without manual logs
- Makes production measurable and analyzable for continuous improvement