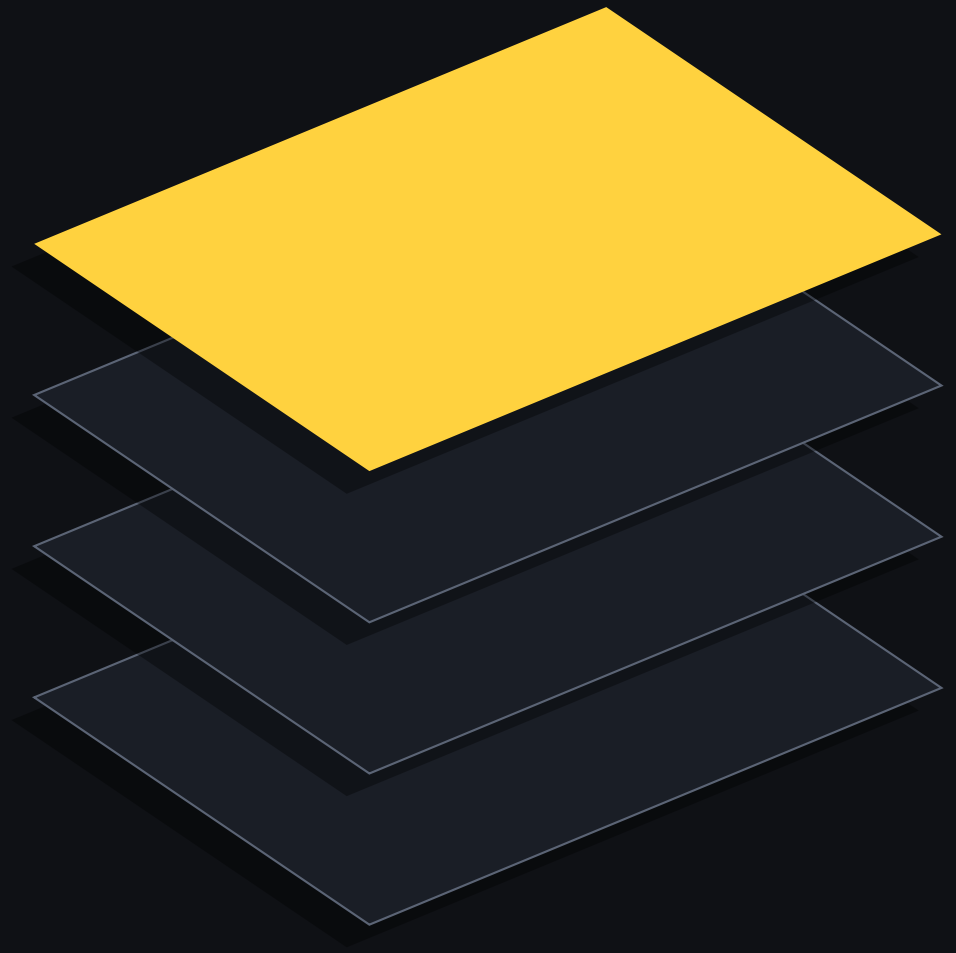


PALM OIL MILL & WATER TREATMENT AUTOMATION · BASED IN MEDAN

I work on every layer.

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Electrical engineer, hands-on in the field

I design and build automation, SCADA and telemetry for palm oil mills and water treatment plants. From the sensor in the pipe to the boardroom screen. Based in Medan, Indonesia, reaching from Aceh to Sulawesi.

Since 2018 I have been on site myself, through Xtend Integrasi Indonesia and my own practice, Firmansyah.co. S.T., M.T. and Professional Engineer Program (Ir.) in Electrical Engineering, ITS.

Ir. Adrian A. Firmansyah, S.T., M.T.
Technical Director, Xtend Integrasi Indonesia

71
palm oil mills on one corporate SCADA

7
mills running our own lightning sensors

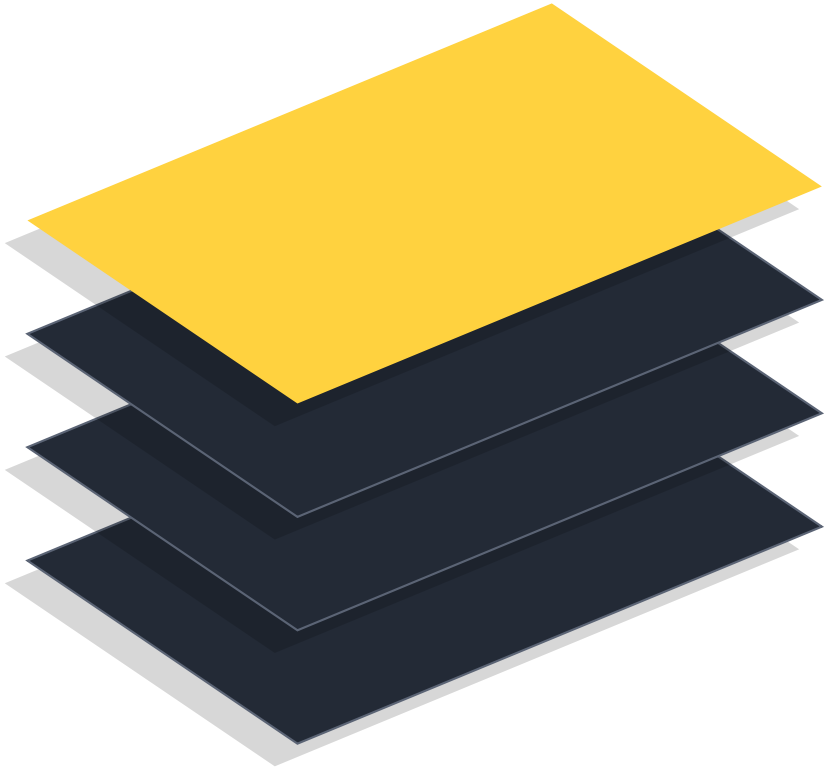
5
PDAM Tirtanadi water treatment plants

500 L/s
IPAM Sunggal uprating

35+
projects delivered since 2018

Four layers

Most vendors handle one or two layers. Get one wrong and the whole system is wrong. My team and I handle all four.



04	**Screen**	Dashboards and reports for management
03	**Telemetry**	Data links: VSAT, cellular, MQTT, Modbus, OPC-UA
02	**Logic**	Siemens, Schneider, Omron and CODESYS PLCs; interlocks; on-site SCADA
01	**Field**	Sensors, analyzers, instruments and in-house devices

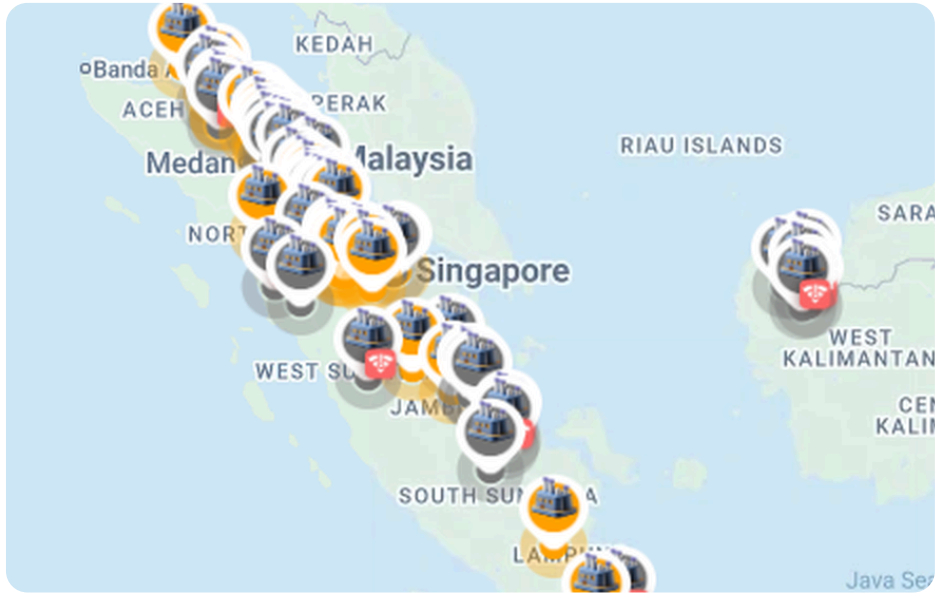
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PTPN IV · 2024-PRESENT 02 03 04

71 mills, one screen

PTPN IV head office used to read mill conditions from daily WhatsApp reports. Always yesterday's numbers. Now 71 palm oil mills across Indonesia show up on one screen, with data arriving every second.



Mill map in MIMS. Data masked.

The problem

Palm oil mills sit deep in the plantations. Head office is in Jakarta. Production reports went out by hand, once a day.

So management always read numbers 24 hours late. A boiler acting up this morning? Head office finds out tomorrow.

What we did

02 · LOGIC

Get the data at the mill

At the first 12 mills our team installed PLCs and remote I/O to pick up process data: boiler steam pressure, throughput, sterilizer cycles.

03 · TELEMETRY

Send it from the middle of nowhere

Data travels over MQTT and OPC-UA via VSAT, with 4G cellular as well. However remote the mill, it still reports in.

04 · SCREEN

Show it to the people who need it

One web portal for head office. A map of every mill, a dashboard per mill, SCADA mimics, and reports anyone can download.

LAYERS WORKED ON

- 04 SCREEN
- 03 TELEMETRY
- 02 LOGIC
- 01 FIELD

CLIENT

PTPN IV head office

PERIOD

2024 (12 mills), 2025–present (71 mills)

MY ROLE

Supervision in the 12-mill phase, design in the 71-mill phase

DELIVERED THROUGH

Xtend Integrasi Indonesia

THE RESULT

71 mills registered in one system. It started with 12 mills in 2024. · Data comes in automatically every second. It used to be once a day. · Reports download straight from the MIMS portal, any time.

Full story and more photos: firmansyah.co/en/case-studies/mims-71-pks.html

PDAM TIRTANADI · 2022-2025 01 02

Over 5 NTU, the pumps stop

Cloudy water must never reach people's taps. At five PDAM Tirtanadi plants, the distribution pumps now stop on their own once turbidity passes 5 NTU.



Raw water at IPA Sunggal. The river can get this muddy.

The problem

River water can turn muddy in no time, especially after heavy rain. The plant has to treat it until it is clear before pumping it to the city.

If the only safeguard is someone on watch, there will be gaps. That is not the operator's fault. Nobody can watch one number for 24 hours.

What we did

01 · FIELD

Measure all the time, not now and then

Online analyzers sit on the treated water line. Turbidity, pH, flow, pressure and reservoir level are read continuously.

02 · LOGIC

Let the PLC stand guard

The PLC reads turbidity and locks out the pumps. Treated water targets below 2 NTU. Above 5 NTU the distribution pumps stop automatically. Operators see it all on SCADA.

```
IF NTU > 5.0 THEN
    POMPA_DISTRIBUSI := STOP;
END_IF;
```

An illustration of the logic. The real code is longer, of course.

LAYERS WORKED ON

- 04 SCREEN
- 03 TELEMETRY
- **02 LOGIC**
- **01 FIELD**

CLIENT

PDAM Tirtanadi (Medan water utility)

SITES

Sunggal, Deli Tua, Martubung, Hamparan Perak, Limau Manis

PERIOD

2022–2025

MY ROLE

Lead engineer at four plants, supervision at Martubung

DELIVERED THROUGH

Xtend Integrasi Indonesia

THE RESULT

Treated water stays below 2 NTU. · Since the system went in, cloudy water has never again reached customers. · The same pattern runs at all five plants.

Full story and more photos: firmansyah.co/en/case-studies/interlock-5-ntu.html

PTPN IV · 2025-PRESENT 01 03 04

Lightning sensors, built in-house

Lightning protection at palm oil mills often fails quietly. The grounding dries out, or the cable gets stolen. So I designed a device that watches it every second.

7 mills

in operation, six more planned for 2027

The problem

Lightning protection has plenty of failure modes. Sometimes the grounding is poor because the soil is too dry. Sometimes the cable gets stolen.

Neither shows from the outside. You find out when lightning strikes and the equipment is already damaged.

What we did

01 · FIELD

Build the device in-house

I designed the sensor panel myself, hardware and firmware. The first version only counted strikes. The current one also measures strike current and logs grounding resistance every second.

03 · TELEMETRY

Ride the link that is already there

Data goes out over VSAT and cellular, on the same MIMS link that already connects the mills to head office.

04 · SCREEN

Show it in MIMS

Strike count, strike current and grounding resistance appear on the same screen as the mill data. Grounding getting worse or a cable gone missing? It shows.

LAYERS WORKED ON

- 04 SCREEN
- 03 TELEMETRY
- 02 LOGIC
- 01 FIELD

CLIENT

PTPN IV

SITES

PKS Tanjung Medan, Sei Buatan, Tandun, Terantam, Sei Tapung, Sei Rokan, Sei Intan

PERIOD

2025–present

MY ROLE

Designer of the hardware and the system

DELIVERED THROUGH

Xtend Integrasi Indonesia

THE RESULT

Running at 7 mills. Six more planned for 2027. · Lightning damage has dropped sharply compared with before. · Is anything still getting damaged? Yes. The cause is stolen grounding. The difference is that now we see it and can deal with it.

Full story and more photos: firmansyah.co/en/case-studies/sensor-petir.html

PTPN IV · PKS TANDUN · 2024-2025 01 02

Boiler water chemistry, kept by a machine

Boiler water with the wrong chemistry scales and corrodes the tubes. At PKS Tandun, four chemicals are now injected automatically based on sensor readings.

±0.1 pH

dosing range held

The problem

The boiler is the heart of a palm oil mill. If the water chemistry drifts, the tubes scale up, then corrode. In the end the steam turbine stops off schedule.

Keeping it right takes the correct dose, all the time. That is a job for a machine.

What we did

01 · FIELD

Sensors and pumps

Inline sensors read the boiler water's pH, conductivity and hardness. Four dosing pumps, each on its own VFD: pH booster, oxygen scavenger, anti-scalant and water softener.

02 · LOGIC

Dose follows the reading

A PLC and touchscreen HMI set each pump's dose from the sensor readings. The data also goes to PTPN IV's central monitoring system.

LAYERS WORKED ON

- 04 SCREEN
- 03 TELEMETRY
- **02 LOGIC**
- **01 FIELD**

CLIENT

PTPN IV, PKS Tandun

PERIOD

November 2024 – January 2025

MY ROLE

Supervision

DELIVERED THROUGH

Xtend Integrasi Indonesia

THE RESULT

Dosing held within ±0.1 pH. · The dose of all four chemicals follows the sensor readings, not guesswork.

Full story and more photos: firmansyah.co/en/case-studies/dosing-boiler-tandun.html

PERUMDA TIRTANADI · 2024-2025 01 02

IPAM Sunggal adds 500 L/s, on one control system

IPAM Sunggal added 500 litres per second of capacity for Medan. I handled the instrumentation and SCADA design for the new line.

500 L/s

added treated water capacity

The context

IPAM Sunggal's capacity grew through one new treatment line, IPA 7.

A new line means new pumps, new filters and new instruments. All of it has to connect to one control system, and that was our part.

What we did

01 · FIELD

Instruments for the new line

DN 600 electromagnetic flowmeter on raw water. Level and pressure transmitters. pH and turbidity analyzers.

02 · LOGIC

Control and operator screens

Schneider Modicon M221 PLCs and HMIs for IPA 7. Raw water and distribution pump control. Automatic filter backwash sequence.

02 · LOGIC

The drawings too

Electrical schematics, loop drawings and MC-0 documents. Work nobody sees, but without it nothing can be maintained.

LAYERS WORKED ON

- 04 SCREEN
- 03 TELEMETRY
- **02 LOGIC**
- **01 FIELD**

OWNER

Perumda Tirtanadi (North Sumatra water utility)

MAIN CONTRACTOR

PT Karya Sepakat Kita

PERIOD

June 2024 – June 2025

MY ROLE

Instrumentation and SCADA design

DELIVERED THROUGH

Xtend Integrasi Indonesia, as subcontractor

THE RESULT

Automation work for the added 500 L/s was completed in June 2025. · IPA 7 runs on one control system for raw water pumps, distribution pumps and filter backwash.

Full story and more photos: firmansyah.co/en/case-studies/uprating-ipam-sunggal.html

Other projects

Delivered projects whose clients may be named. Roles as they were.

PALM OIL

YEAR	CLIENT AND SCOPE	ROLE	THROUGH
2025–	PTPN IV · MIMS, corporate SCADA for 71 mills	Design	Xtend
2024	PTPN IV · MIMS first phase, 12 mills	Supervision	Xtend
2025–	PTPN IV · In-house lightning and grounding sensors, 7 mills	Design	Xtend
2024–25	PTPN IV PKS Tandun · Boiler water analysis and automatic chemical dosing	Supervision	Xtend
2025	Sinarmas Ivo Mas Lubukgaung · Low-pressure boiler control retrofit	Lead engineer	Xtend, sub. to Mechmar
2025–	PT Prima Tetap Jaya · New decanter control panel with automatic CIP	Design	Firmansyah.co, sub. to PT Prima Tetap Jaya
2023	GEA Westfalia · PMO4150 to Siemens S7-1200; Palmmaster 5000 SSR to ABB	Design	Firmansyah.co, sub. to GEA Westfalia
2026	PTPN IV PKS Sei Silau · PLC and program modernization	Engineer	Firmansyah.co, sub. to Mechmar
2026	PTPN IV · Peatland groundwater level monitoring, Jambi	Design	Xtend

DRINKING AND INDUSTRIAL WATER

YEAR	CLIENT AND SCOPE	ROLE	THROUGH
2024–25	Perumda Tirtanadi IPAM Sunggal · 500 L/s instrumentation and SCADA uprating	Design	Xtend, sub. to PT Karya Sepakat Kita
2022	PDAM Tirtanadi IPA Sunggal · SCADA, offtake area	Lead engineer	Xtend
2022	PDAM Tirtanadi IPA Deli Tua · Intake and offtake SCADA, raw water analyzers, pump control	Lead engineer	Xtend
2023	PDAM Tirtanadi IPAM Hamparan Perak · SCADA, treated water analyzers, pump control	Lead engineer	Xtend
2023	PDAM Tirtanadi IPAM Limau Manis · SCADA, treated water analyzers, pump control	Lead engineer	Xtend
2023–25	PDAM Tirtanadi IPAM Martubung · SCADA, analyzers, pump control, flocculation-sedimentation-filter automation	Supervision	Xtend
2024	PDAM Tirta Mon Pase IPAM Lhoksukon (Aceh) · SCADA and treated water analyzers	Supervision	Xtend
2025	KINRA Sei Mangkei · Electromagnetic flowmeter monitoring	Design	Xtend

OTHER INDUSTRY

YEAR	CLIENT AND SCOPE	ROLE	THROUGH
2026	PT Intibumi Alumindotama · Post-flood plant recovery, full production back in 14 weeks	Supervision	Xtend
2026	PLN ULP Pangkalan Susu · Pyrite box revitalization and damper control	Design	Xtend
2025	SGN PG Rendeng · Retrofit of 3 high-grade sugar centrifugals	Supervision	Xtend
2025	SGN PG Pradjekan · Instrumentation and sensor retrofit	Design	Xtend
2025	Standard Chartered Bank Medan · Building management system, designed to a 99.99% uptime requirement	Design	Xtend
2025	PT Jet Plastic · IIoT and power monitoring	Design	Firmansyah.co
2022	PT Central Sahabat Baru · Printing press DC drive synchronization (digital lock)	Engineer	Firmansyah.co, sub. to PT Apikon
2020–21	PT Intibumi Alumindotama · Annealing oven and continuous caster monitoring, punch automation, cut-up line	Engineer	Firmansyah.co
2020	PT Mechmar Jaya Industries · Bending machine HMI and PLC replacement	Engineer	Firmansyah.co
2020	sk8sum Medan · Speed slalom timing device, 1 ms precision	Engineer	Firmansyah.co
2018	PT Panverta Cakrakencana · Continuous winder drive migration	Team member	Firmansyah.co, sub. to PT Apikon

How I work

01 **Roles as they were.**

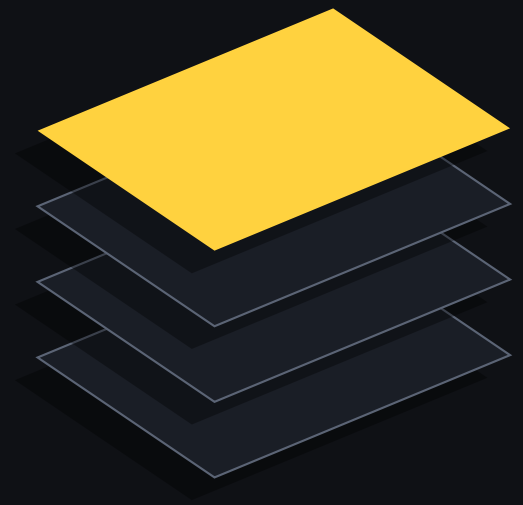
Each project says whether I designed, led or supervised it. When Xtend or Firmansyah.co was a subcontractor, that is stated too.

02 **Every layer in one pair of hands.**

Instruments, PLCs, data links and screens are done by the same team. No passing the problem between vendors.

03 **No device for it? I build one.**

If nothing on the market fits, I design one, like the lightning sensors at 7 mills.



Plant still running blind? Let's talk.

Tell me how things stand. I will tell you straight which layer to fix first.

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