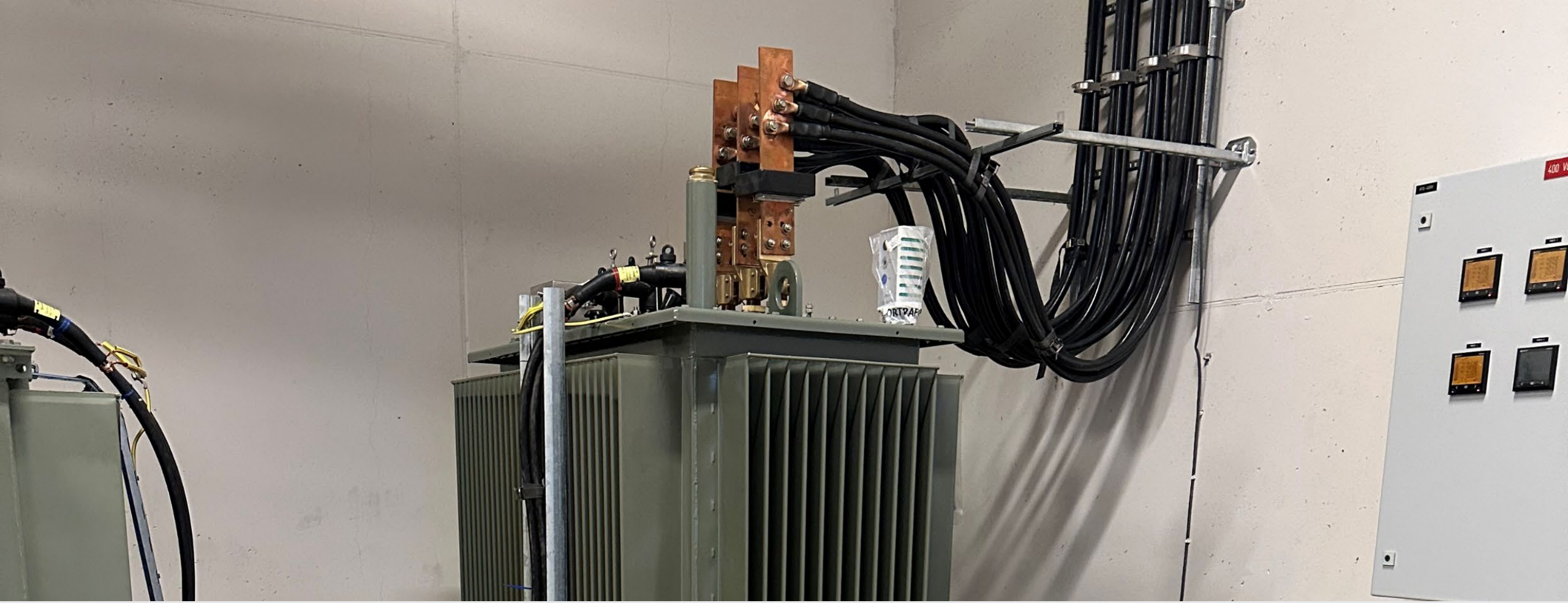


DTR

Dynamic Transformer Rating – Alexander Kristensen, Nortrafo Group

Norsk Transformator

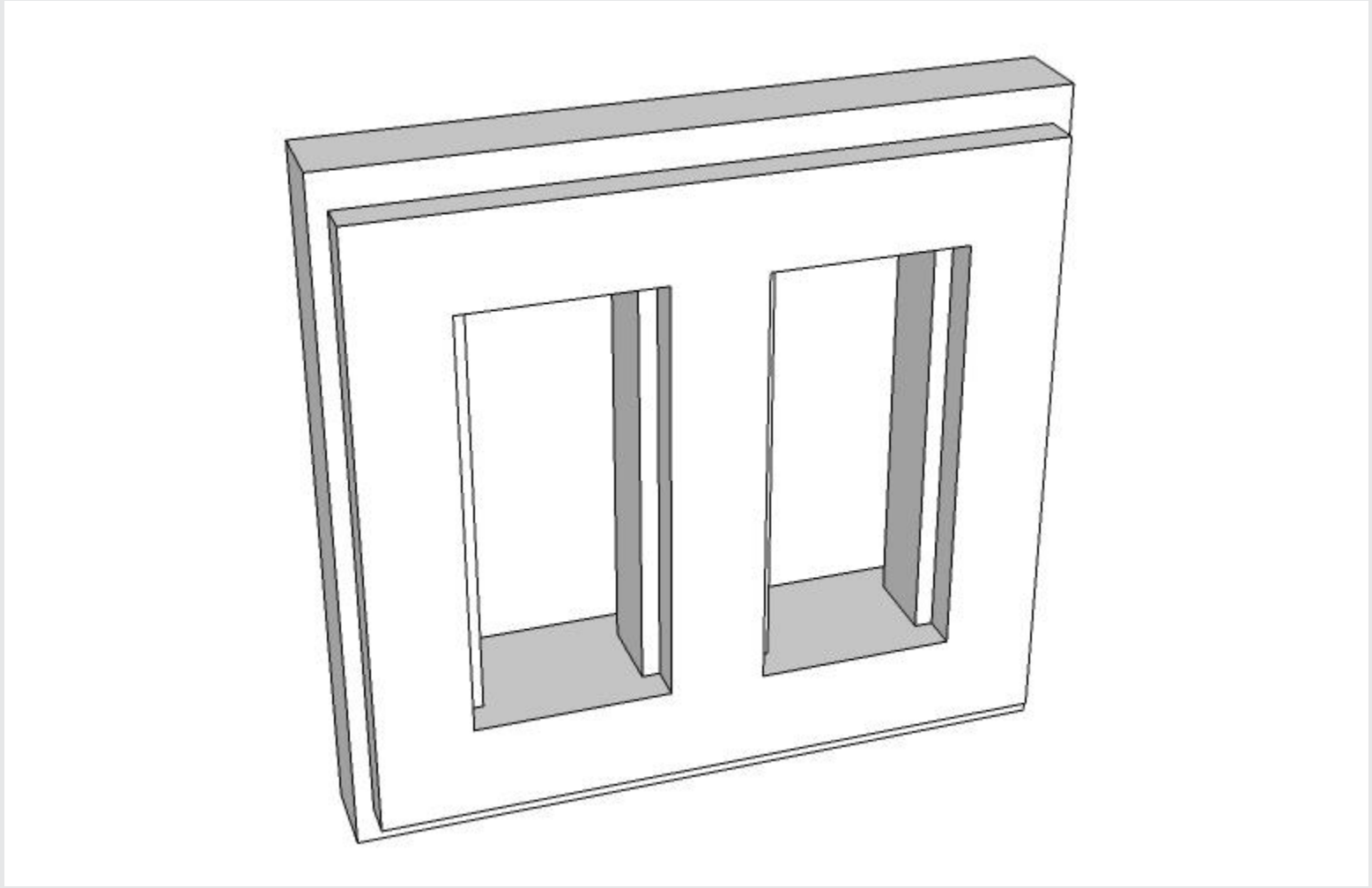
Magtech™

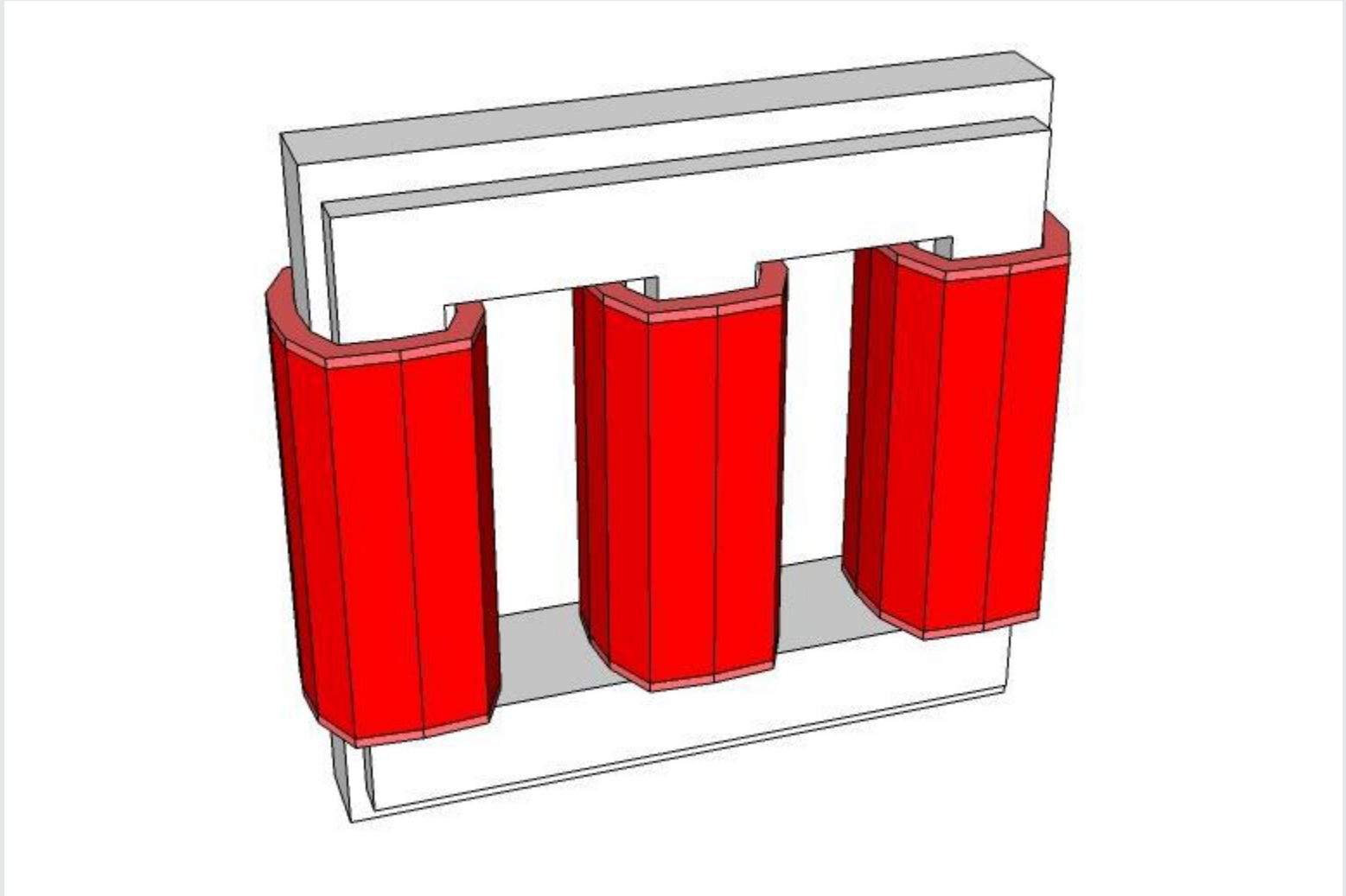
NextGrid Summit | 2025

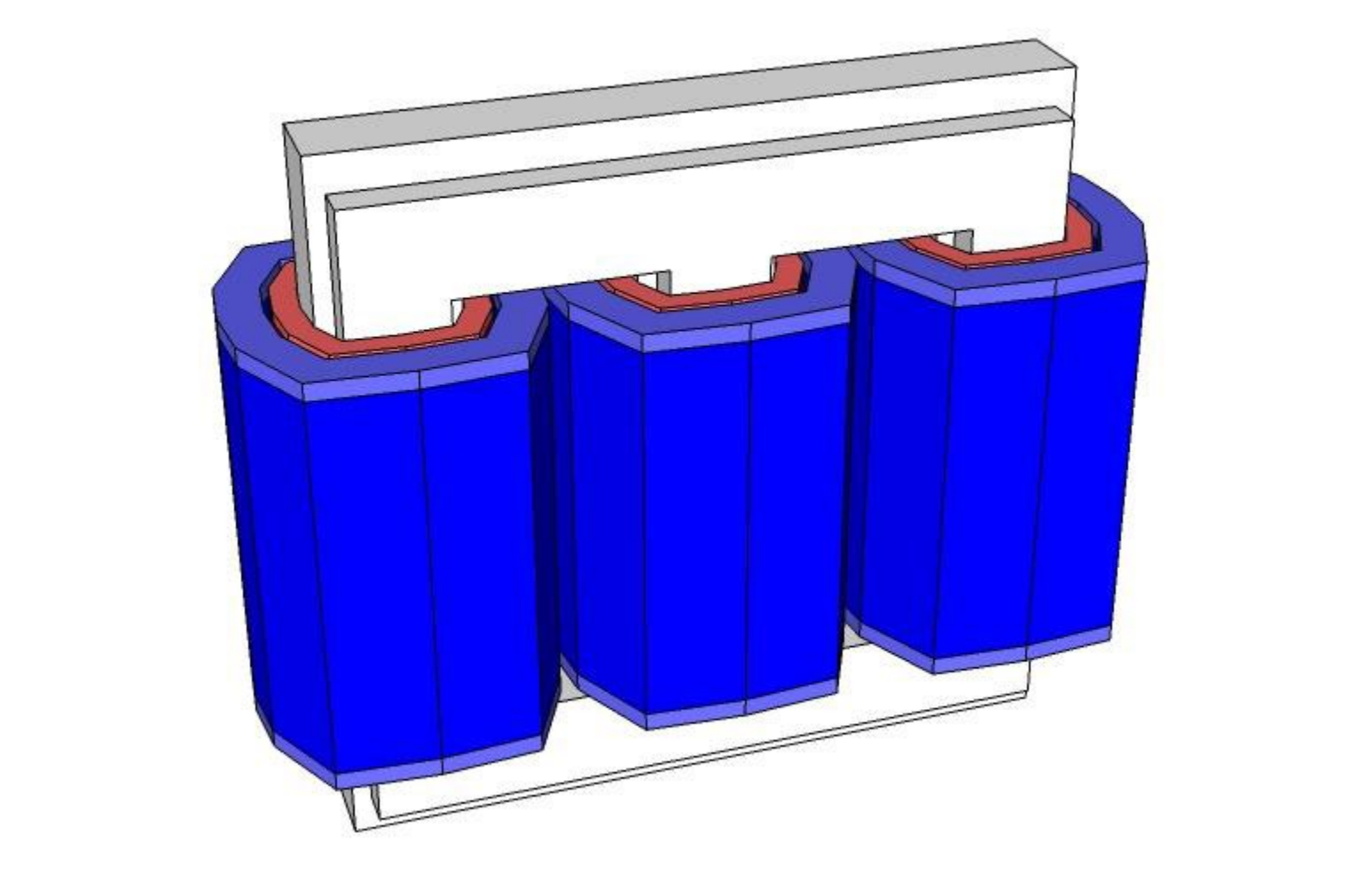
NextGrid

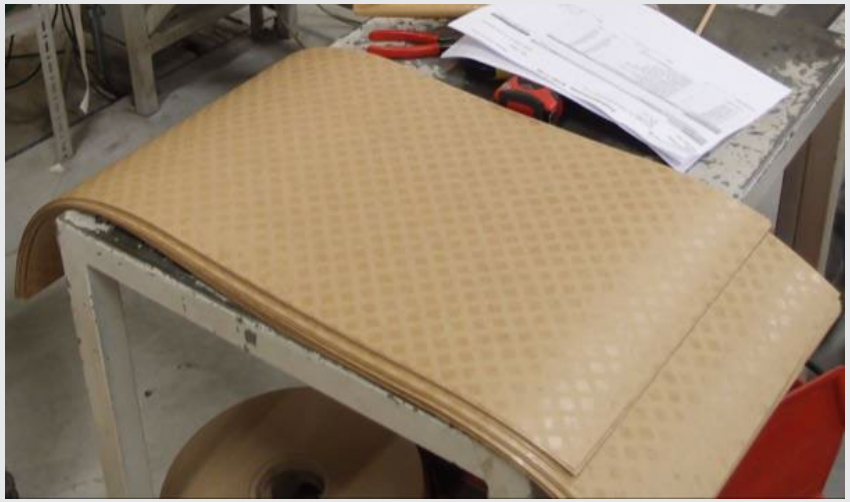
Development of a model for overload capacity and lifetime based on top-oil measurements using Sensor Docking.

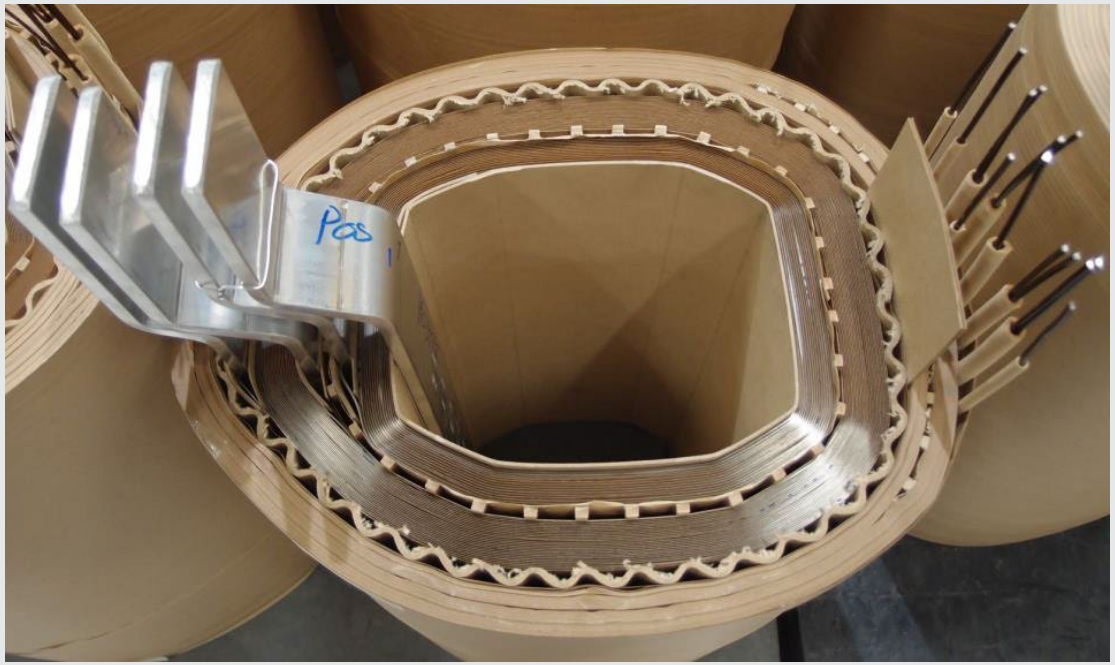
- Goal: Develop a model and a tool for Dynamic Transformer Rating (DTR) of distribution transformers based on EcoSmart Sensor Docking and its measurements of top-oil temperature.










Pos

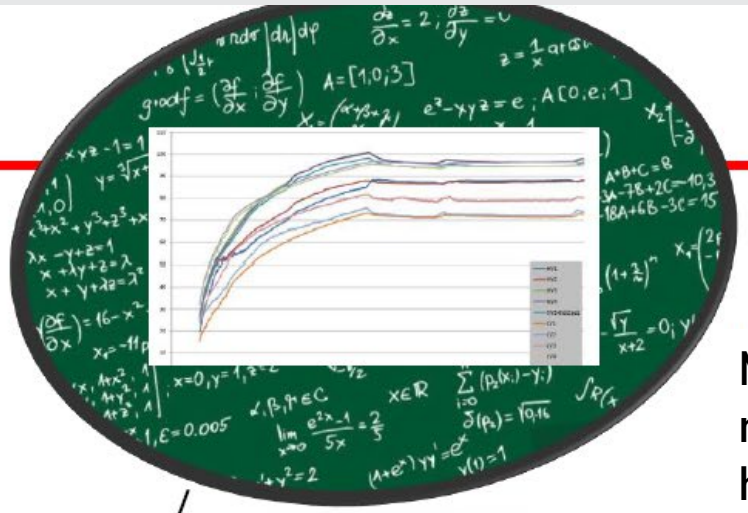
EcoSmart
Sensor Docking

Pressure

Oil level

Temperature

EcoSmart®
TRANSFORMER

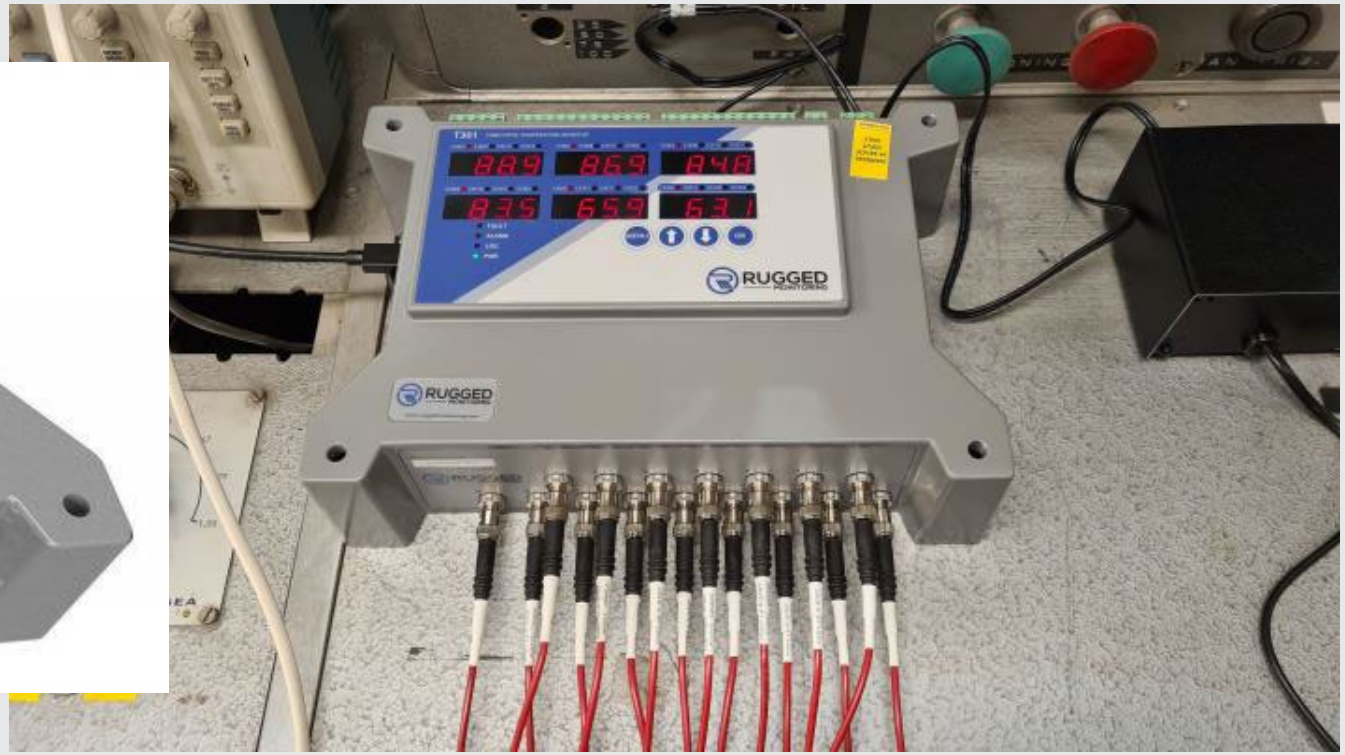


Mathematic model for hotspot temp

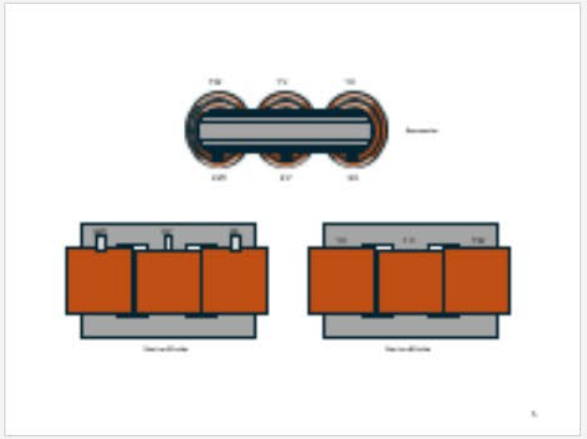
NextGrid is aiming to develop a mathematical model where the Sensor Docking is used to predict hotspot temperatures, and thereby, in real time, inform the DSO about possible dynamic overrating.

Sensor Docking


T301
RUGGED
MONITORING
MENU
FAULT
ALARM
LOG
PWR


RUGGED
MONITORING

1



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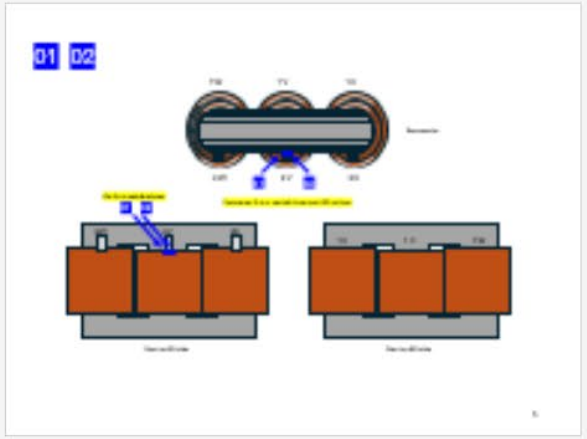

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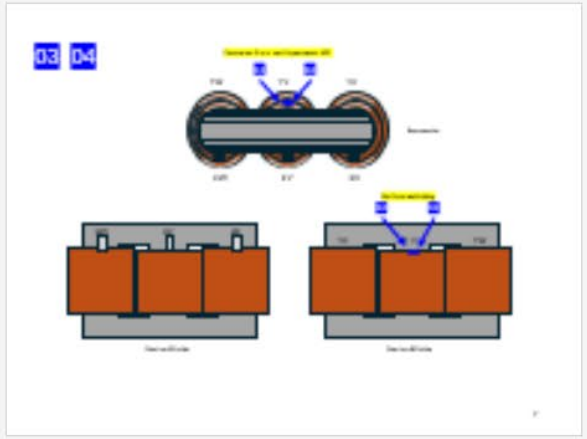

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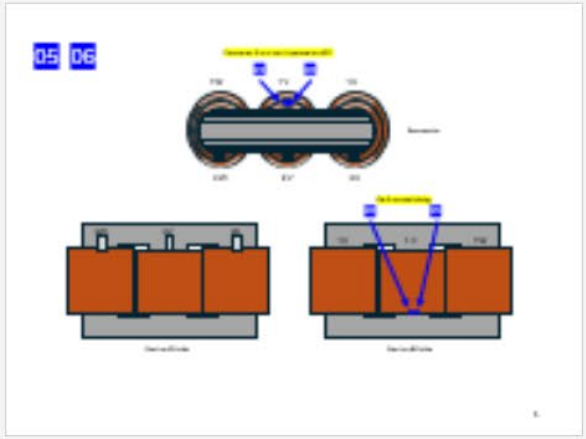

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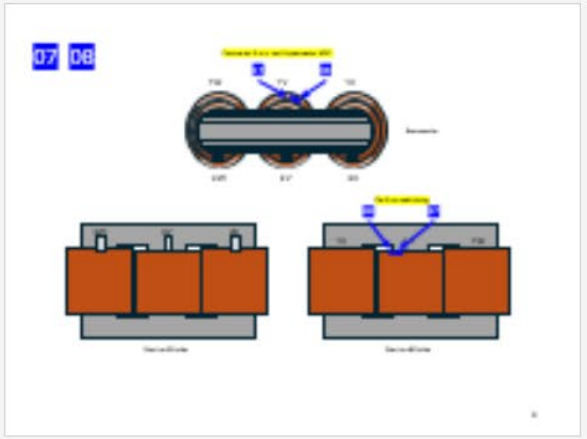

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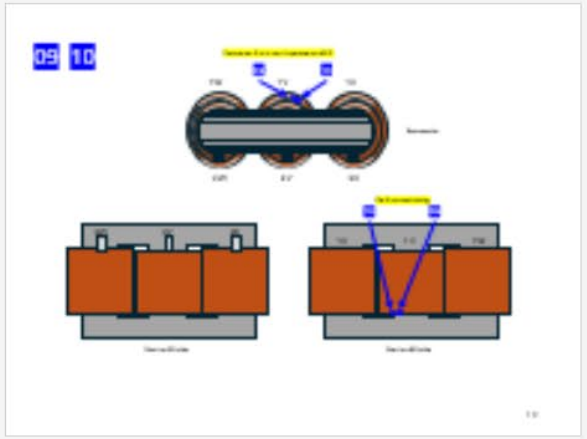

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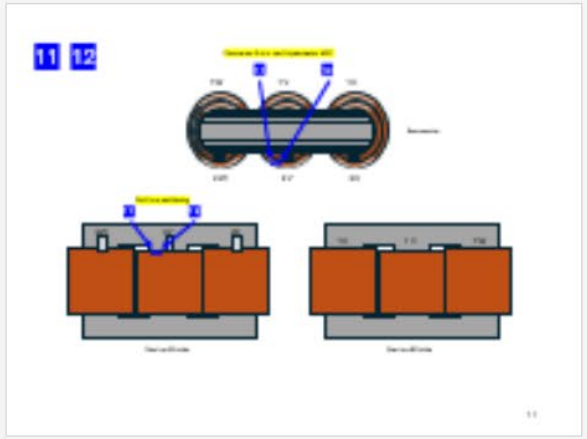

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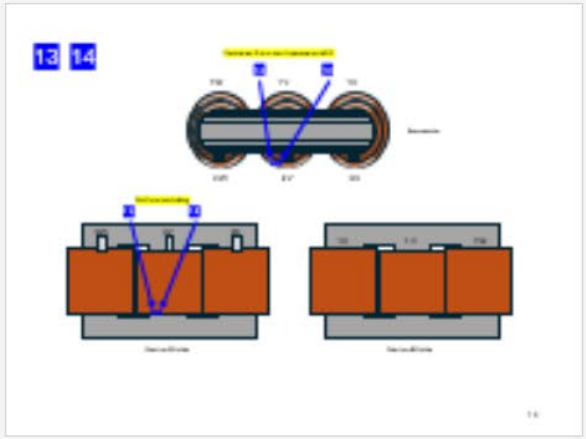
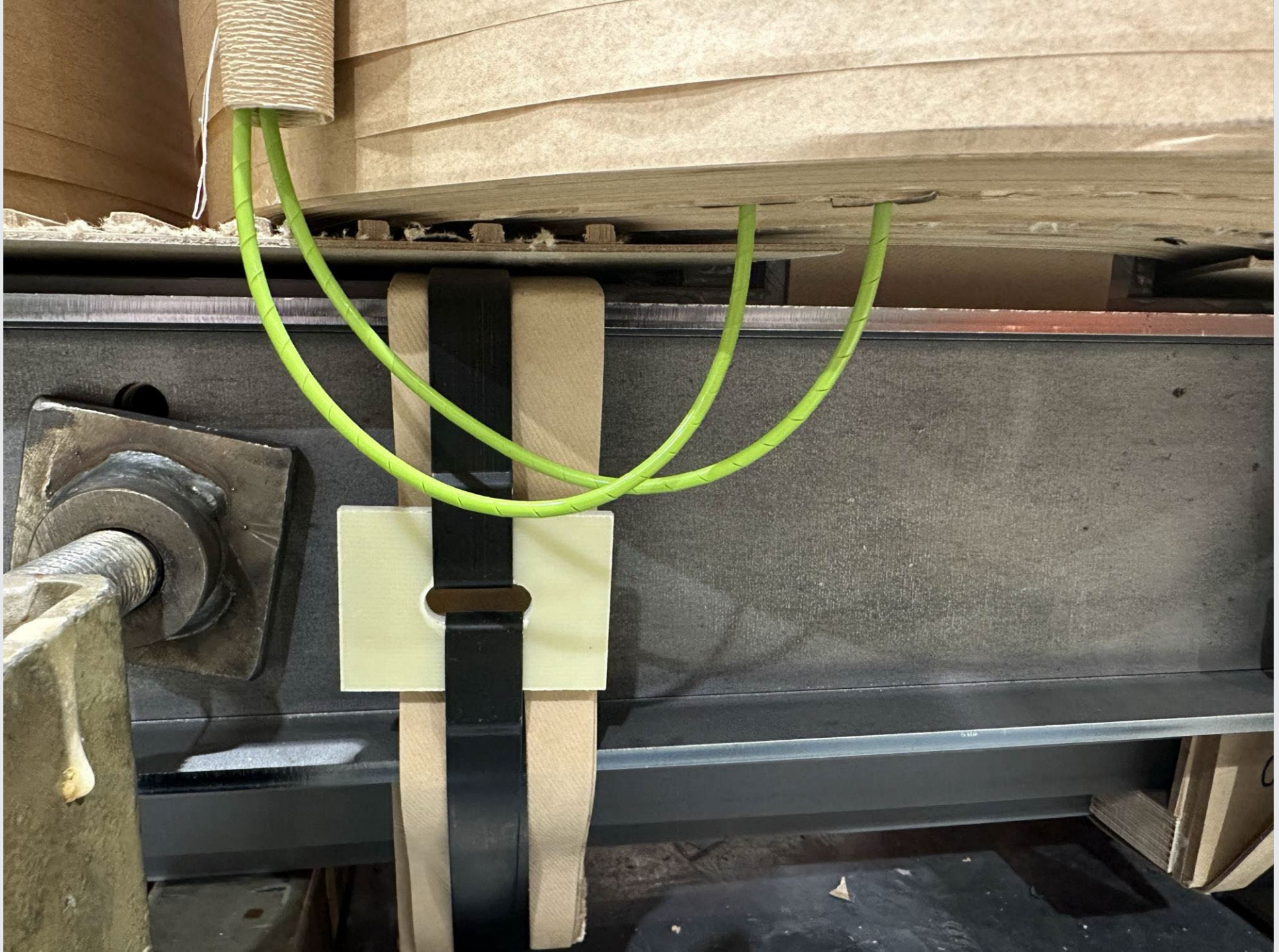
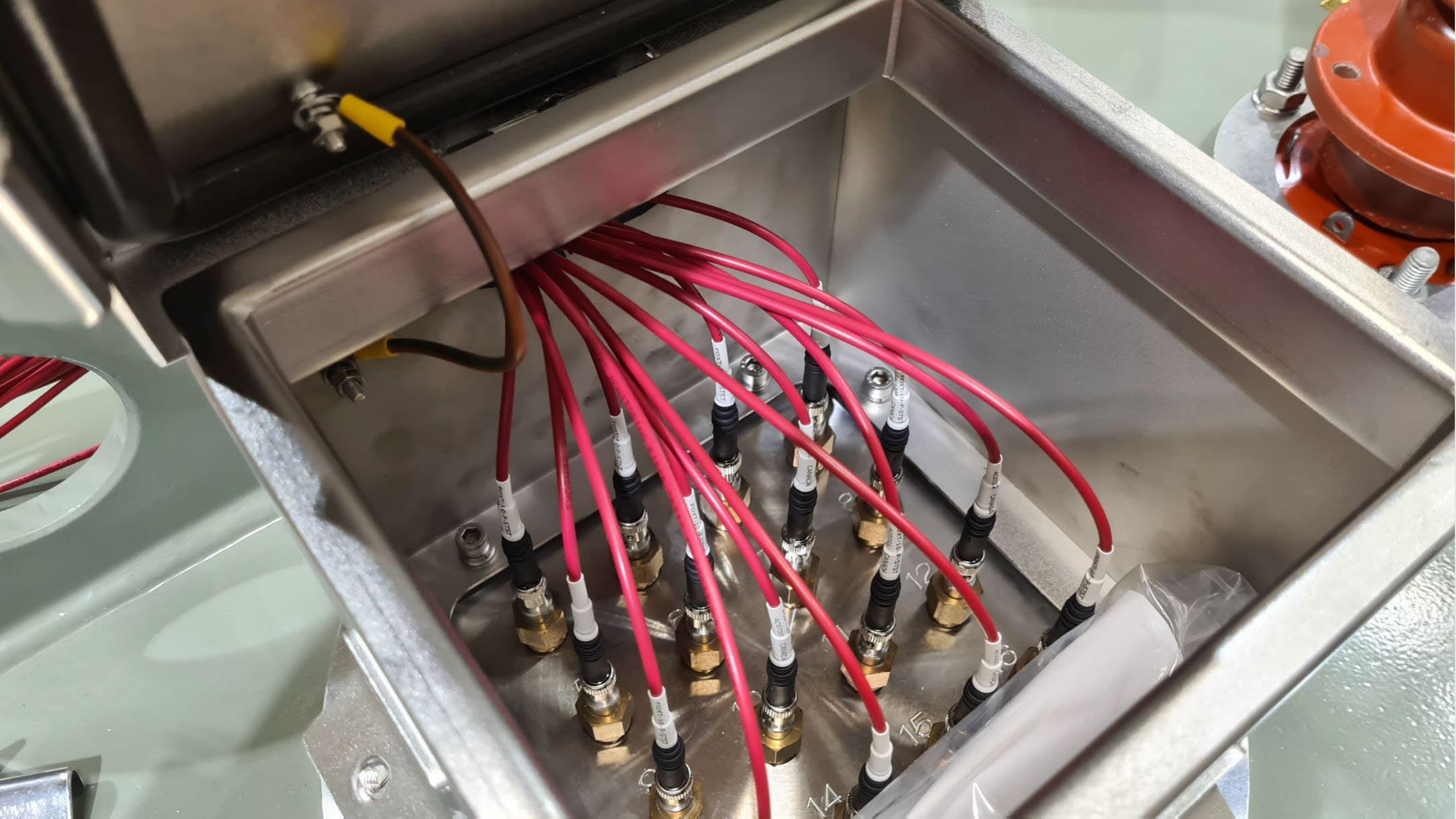


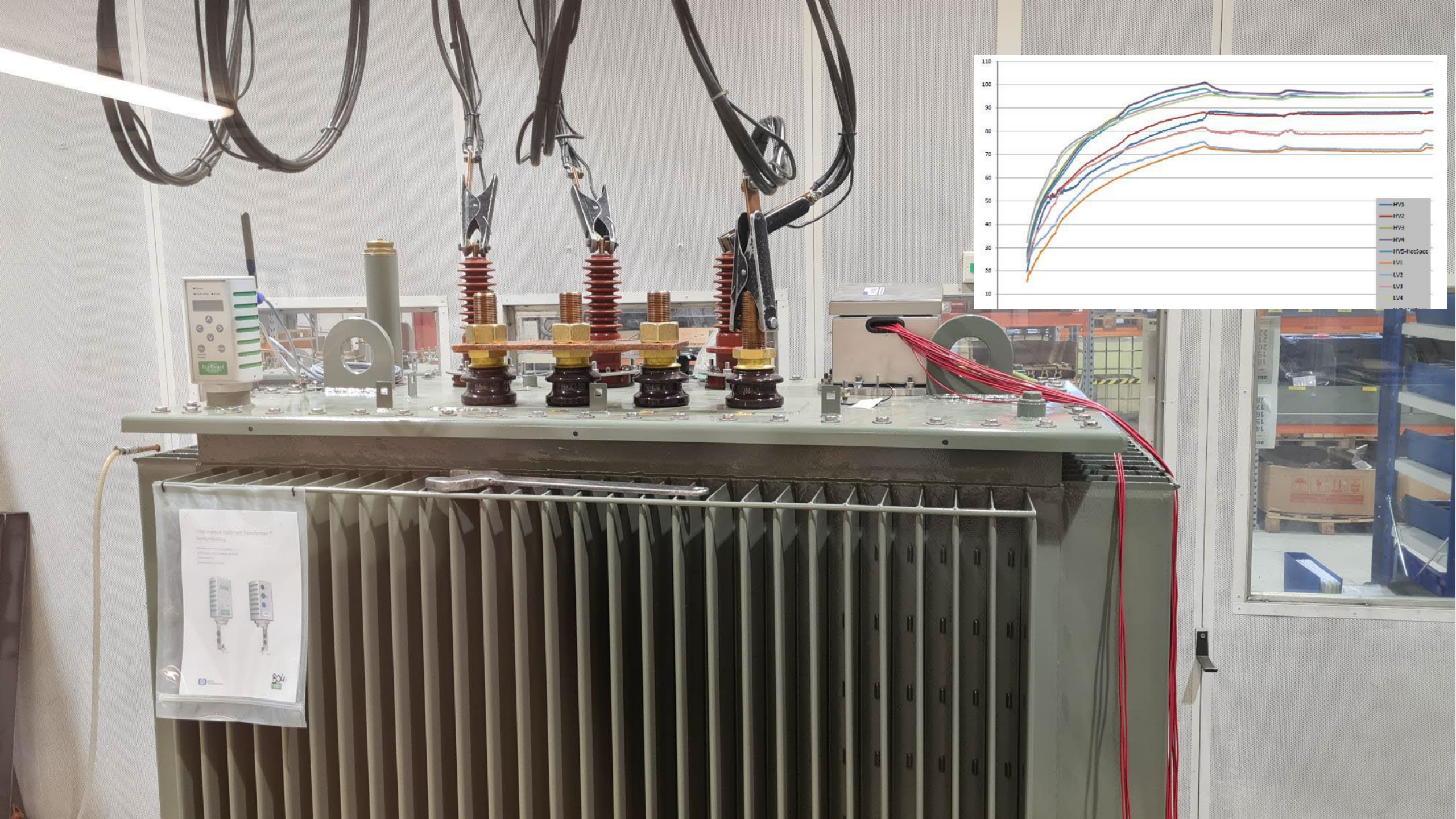



88H

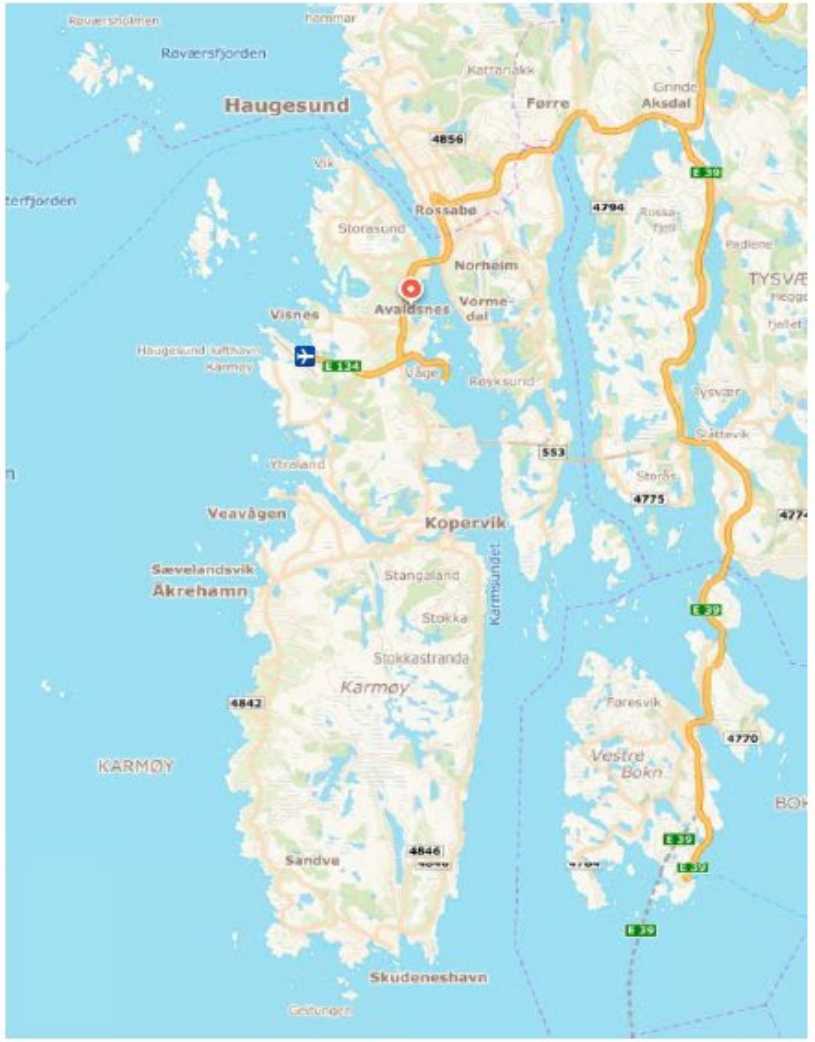

NORTRAFO
PRODUCTION
NextGrid


415 V
2W
2V
2U
2N



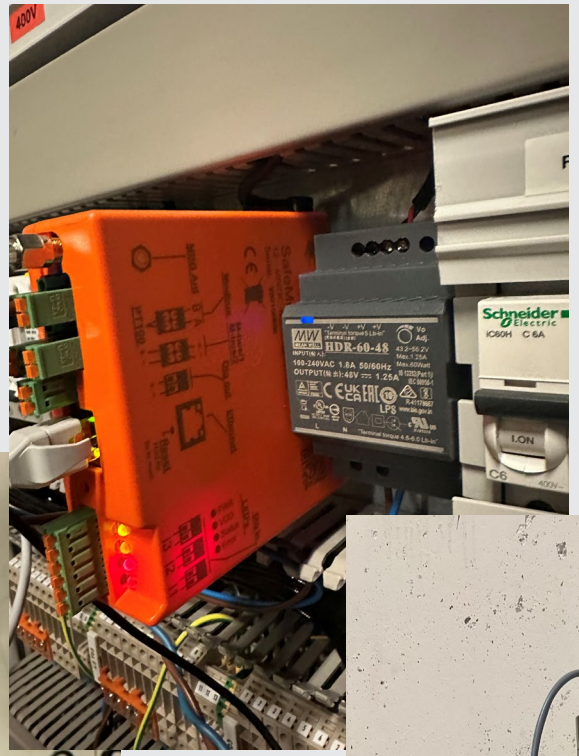

110
100
90
80
70
60
50
40
30
20
10
HV1
HV2
HV3
HV4
HVS-HotSpot
LV1
LV2
LV3
LV4

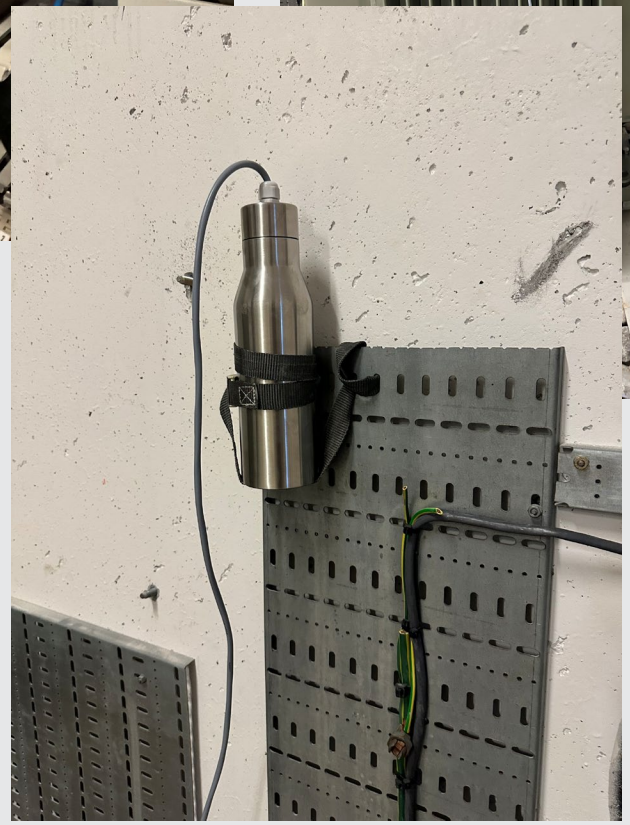
- Pilot customer: Fagne AS
- 1250 kVA, 22 +2-4x2,5% / 0,415 kV, Dyn11
- Sensors from Heimdall Power and SafeBase supplying load data in the area
- Industry area: high peaks, low average load
- Sintef will develop the mathematical models



Bøvågen, Karmøy


Power
Fault relay
Error
Serial number:
19001976
Enter


400V
Schneider Electric
HDR-60-48



Norsk Transformator

Dashboard | Live View | Devices

[redacted]

Online Status | Operational Status | Alarm Status | Active Alerts | Recent Events



[redacted]

Organizational Items

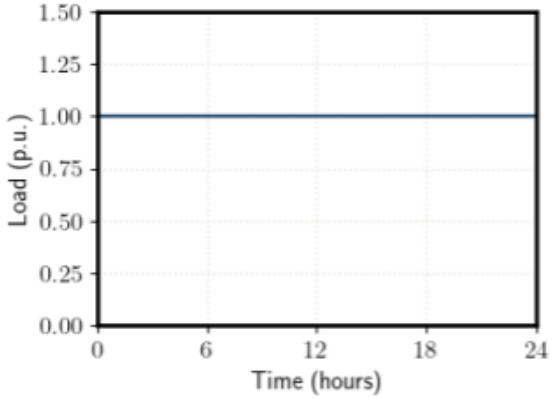
- [redacted]
  - [redacted]
    - [redacted]
  - Nortrafo
    - Test
      - Fagne-enhet, kommunikasjonstest

Installations | Alerts | Events

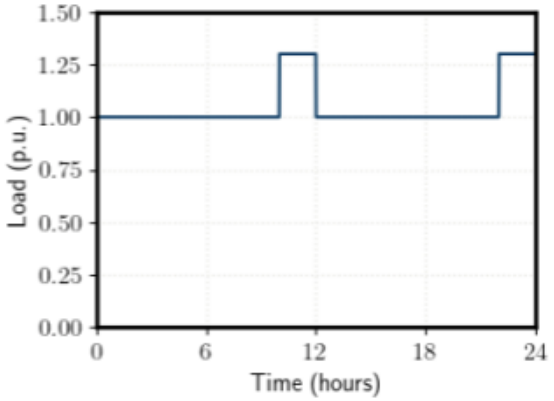
Exclude unoccupied

Status	Organization	Site	Installation	Uptime	Product	Industry	Region	Fw Ver	Oil Lvl
	Nortrafo	Test	Fagne-enhet, kommunikasjonstest	8d	AA116			NTES 2.0.02	
	[redacted]			10d	AA116		[redacted]	NTES 2.0.02	Normal

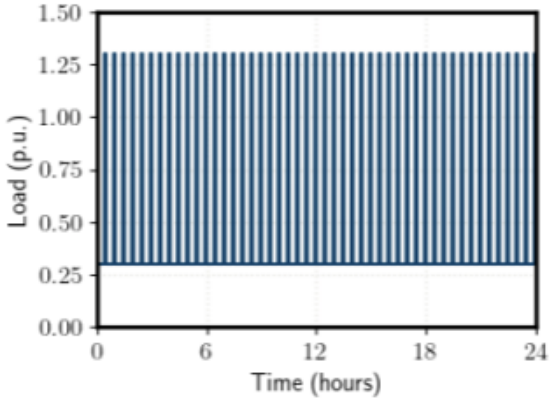
Rows per page: 10 | 1-2 of 2



(a) Constant load at rated load.

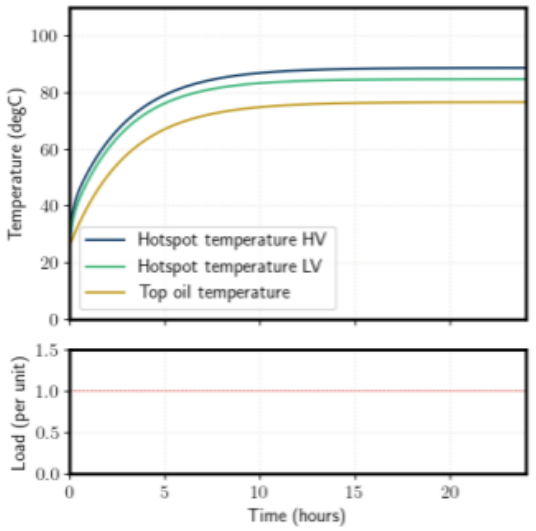


(b) Pattern A: Relatively slow variations with 2 hours at 1.3 p.u. load per 12 hours.

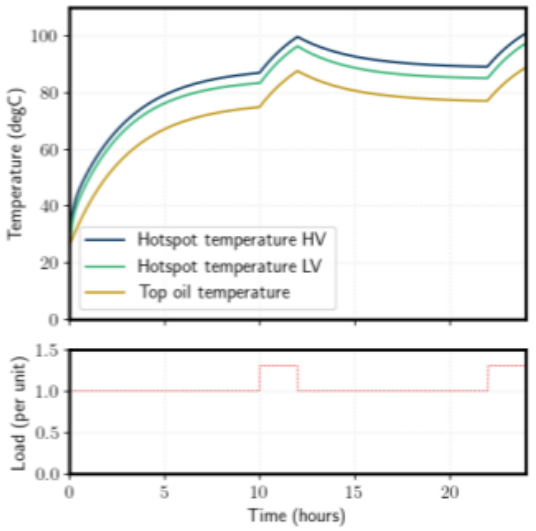


(c) Pattern B: Fast variations, similar to e.g. charging patterns, with 5 minutes at 1.3 p.u. load and 25 minutes at 0.3 p.u. load.

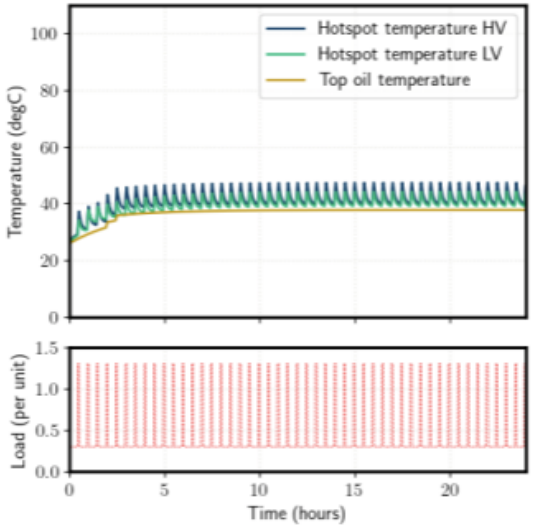
Figure 1: Plots of the first 24 hours of the load scenarios that have been investigated.



(a) Constant load



(b) Pattern A, rapid variations



(c) Pattern B, rapid variations

It is clear that having a high average load, i.e. the constant load and Pattern A, gives [.] much more significant ageing than having a low average load with very frequent overloading, i.e. Pattern B.

Scenario	Dry	Dry +5%	Dry -5%	Wet (1 wt%)
Constant load	637	534	732	382
Pattern A	529	422	637	292
Pattern B	997	996	998	991

Table 5: DP-value after one year of ageing for the different conditions.

Work still to be done…

“Can we use today’s DTR (Dynamic Transformer Rating) model for power transformers also for distribution transformers based on top-oil temperature, or does a new model need to be developed?”