

Intelligent biomass analyzer (IBA)

Markku Tiitta, Puumit Ltd

Elmo Kick-off, Helsinki 11th December, 2019

Consortium partners are Puumit Ltd, Prometec Ltd, Luke, UEF, Torrec Ltd, Kuopion Energia Ltd and Kainuun Voima Ltd.

Electrical impedance spectroscopy of wood

Sovellus	Research (years)	N	Wood species	Proto	Laboratory	Industrial/Field-testing
Biomass moisture and classification	6	>2000	>10	X	+	+
Moisture gradient of wood boards	8	>10000	>20	X	+	+
Heartwood and sapwood classification	2	>10000	1	X	+	+
Pulpwood freshness	1	<100	3	X	+	-
Decay analysis of small samples	2	<100	1	X	+	-
Analysis of wood decay resistance	2	100-200	1	X	+	+
Analyses of decay and heartwood from living wood	2	100-200	5	X	+	+

Other studies include tree physiology, cold acclimation of trees, roots

Intelligent biomass analyzer (IBA)

- New intelligent biomass analyzer (IBA) will be tested and further tailored for Prometec Q-robot.
- Based on electrical impedance spectroscopy (EIS) and AI.
- To classify the biomass quality, type and to determine moisture content (MC)
- New sensors will be tested and evaluated including real-time monitoring
- Networking in ENF-region with RDI and business companies
- Potential end-users include energy, pulp, inorganic chemistry, and bio-plastics industries.
- Technical feasibility tests include in-site testing and investigations of the main industrial challenges with different type of end-users.

Work packages:

WP1: Laboratory testing and evaluation:

- Modifying current IBA sensors compatible with Q-robot
- Laboratory tests

WP2: Industrial testing and evaluation:

- Integration of new sensors with the Q-robot
- Industrial tests

WP3: Networking in ENF region

- To find out potential IBA end-users and business partners from the ENF region
- Future collaboration project plan

WP4: Roadmap

- A detailed roadmap, operations and business plan for full upscale is one of the main results of the project.

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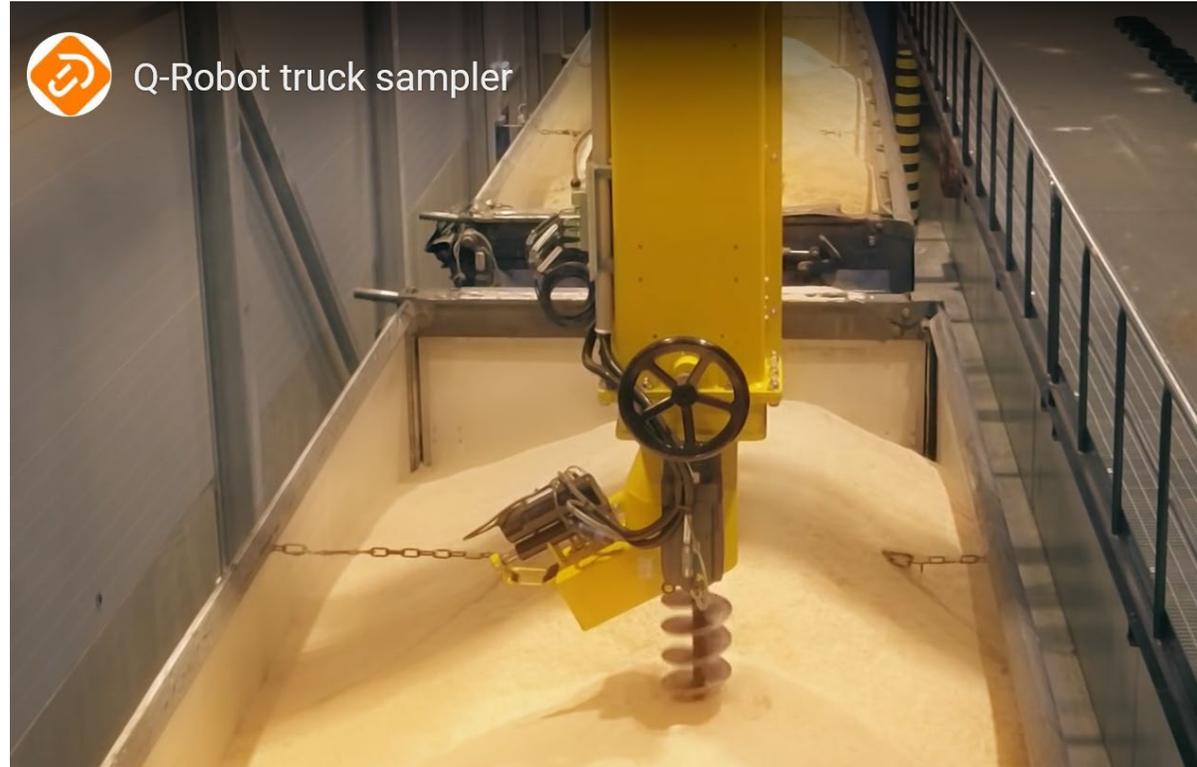


Impedance probe

*Impedance probe including AE sensor was installed
in the moving stream of wood chips*

EIS probe combined with acoustic emission sensor for wood chips and forest residuals. (Tiitta, presentation, Kajaani, Finland 14.3.2019, <https://puumies.fi/mittauspaivat-14-15-3-2019/>).

Intelligent biomass analyzer (IBA)



Prometec Q-Robot truck sampler (prometec.fi)

Benefits and outcome

- Save energy costs
- Automated sampling solution quickly drove Fuel Energy Balance Error down to almost zero
- By combining IBA, Prometec Q-robot and AI, the combined solution will be even more accurate and quicker.
- Time-consuming manual laboratory work is not needed
- Quality data may be provided to the whole supply chain in real time
- May be used to control logistics and storage
- Collaboration project plan
- The outcome of the project will be better valorisation of the circular bio-economy side-streams including wood chips, tree bark, and saw dust.
- A detailed roadmap, operations and business plan for full upscale is one of the main results of the project.