HORIZON EUROPE PROGRAMME
TOPIC HORIZON-CL5-2021-D3-03
Demonstration pilot lines for alternative and innovative PV technologies
(Novel c-Si tandem, thin film tandem, bifacial, CPV, etc.)
GA No. 101084046

Digitalised pilot lines for silicon heterojunction tunnel interdigitated back contact solar cells and modules

PILATUS

PILATUS - Deliverable report 5.2

Report on the design and test of data-driven algorithms for optimising cell processing

Funded by the European Union

Publishable summary

This document details the design, implementation, and testing of data analytics solutions for the optimization of cell processes within the PILATUS European project.

Deliverable Context

The PILATUS project involves several stakeholders from the European PV industry, including wafer manufacturers, cells and modules producers, service providers, and applied research institutes. The project's objective is to set up pilot lines for heterojunction interdigitated back contact (IBC) cells and modules in Europe, integrating cutting-edge analysis and Industry 4.0 features.

Deliverable Achievements

The present deliverable highlights the outcomes of task 5.2 entitled “Data analytics for cell processing optimisation”, with contributions from MBR, MBG, ISRA and CSEM. ISRA has developed within task 5.2 a vision system (vision patterns and algorithms) to enhance data availability and reliability from cell line image sensors. CSEM and MBR collaborated to develop and deploy a correlation and causation analysis solutions in Meyer Burger research line. The solution has been tested and validated on data from the PECVD process from Meyer Burger research line. Finally, the document also describes current ongoing efforts between CSEM and MBG to integrate the developed algorithms into the visualization software Qlik used in the pilot line in Hohenstein.

Deliverable Structure

The introductory section emphasizes the need to better understand variations in cell quality outputs to improve production yields. It also recalls standard concepts related to Bayesian optimization and provides references for further readings. Section 2 outlines the chosen process steps for a case study on causality methods’ application within WP5 in the PILATUS project. It also elaborates on the design of the algorithms used and gives some insights and references for causal methods in statistics. Section 3 focuses on the deployment and testing stages, offering insights into the implementation of the graphical user interface (GUI) and the integration with Qlik. The present document can be used as a documentation of the delivered software solution.

8 Acknowledgement

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Project partners:

#	Partner short name	Partner Full Name
1	UNR	Uniresearch BV
2	MBG	Meyer Burger (Germany) GmbH
3	MBI	Meyer Burger (Industries) GmbH
4	FhG	Fraunhofer Gesellschaft zur Forderung der Angewandten Forschung EV
5	FZU	Fyzikalni Ustav AV CR V.V.I
6	EURAC	Accademia Europea di Bolzano
7	EXATEQ	Exateq GmbH
8	TNO	Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek TNO
9	NCR	Norwegian Crystals AS
10	ULIEGE	Universite de Liege
11	PADA	Finproject SpA
12	ISRA	ISRA VISION GmbH
13	CSEM	CSEM Centre Suisse d'Eletronique et de Microtechnique SA – Recherche et Developpement
14	MBCH	Meyer Burger AG
15	MBR	Meyer Burger Research AG
16	PASAN	PASAN SA
17	WCH	Wacker Chemie AG
18	EPFL	École Polytechnique Fédérale de Lausanne
19	CPT	Cambridge Photon Technology Limited

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