

Smart Solar PV Cloud

Usage Instructions

14/07/2020



INDEX

INDEX.....	2
TECHNICAL SOLUTION.....	3
INTRODUCTION.....	3
THE SOLUTION IN BREF.....	3
SMART DATA CLOUD.....	4
WEB ACCESS:.....	5
1- MAIN PAGE:.....	6
2- WORST FARMS DETAIL:.....	7
3- BIG DATA ANALYTICS FUNCTIONALITIES FOR ROOT CAUSE ANALYSIS:.....	8
3.1- ACCESS TO DETAILED ANALYSIS STRING/MODULE AREA:.....	9
3.1- ACCESS TO MODULE LEVEL VIEWER:.....	9
3.2- DETAILED ANALYSIS STRING/MODULE AREA:.....	10
4- PREDICTIVE ANALYTICS:.....	11
5- PREDICTIVE ANALYTICS DEFECT EVOLUTION:.....	12
6- DEFECT IMPACT:.....	13
7- SMART REPORTING:.....	14
8- STANDARD DELIVERABLES:.....	15



Technical Solution

Introduction

Aeroprotechnik is a leading PV inspection company that provides Smart Aerial Inspection Services using Unmanned Aerial Vehicles as well as proprietary software analysis tools. A cost-effective inspection solution is presented, as well as high safety standards (UAS certification), risk analysis and flight plans emergency procedures.

The high technology of the UAV, the highly qualified engineers and pilots, together with a committed R&D team, allow us to provide a unique solution in the market.

The solution in brief

Smart PV





Automated Data Collection

- Dynamic flight plan as per sun inclination:
- Maximized irradiance
- Optimum incidence angles
- Up to 20% more defect detection (higher sensitivity)
- Fully automated.



Advanced Geo-Location Algorithms

- Precise Geo-location down to Individual Module ID.
- Optional Module ID serial number.



Automated Failure Detection Algorithms

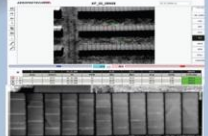
- Automated defect detection and characterization.
- Root Cause analysis.
- Automated report generation
- Automated implementation plan generation (excel & kml)



Smart Cloud & Analytics

- Cloud based proprietary solution.
- Correlate and transform huge amounts of inspection data into actionable information.
- Root cause analysis.
- Multi-level data aggregation.

SMART SOLAR PV THERMOGRAPHY



Data collection



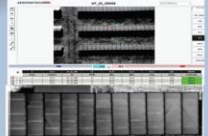
Smart Geo-Locator



Cloud & Analytics



AFDA (Automated Failure Detection algo)



Smart Data Cloud

Aeroprotechnik Smart Data Cloud is a Web Platform specifically developed for advanced follow up of defects in PV large facilities. It allows the customers to access their data everywhere, correlate it and transform it into actionable information to support real-time business decisions.

The solution is able to follow up degradation and support on proactive optimization by detecting, classifying and quantifying existing as well as tracking upcoming anomalies.

Bellow a list of main functionalities:

Access:

- Access by username and password

Main Page:

- General information about the plants inspected
- Plants Geo-Location
- Global Analytics concerning the Assets

Worst Farms Detail

- Filtering capabilities
- Asset Map Geolocation
- Major defects identification

Big data Analytics functionalities for root cause analysis:

- Filtering capabilities
- Farm and defects Geo-location
- Access to Detailed Analysis String/Module Area

Detailed Analysis String/Module Area:

- Access to the IR and RGB images

Predictive Analytics:

- Filtering capabilities
- Correlation between defects and module manufacturer
- Instalation degradation over operation years

Predictive Analytics Defect Evolution:

- Filtering capabilities
- Defect Type, Criticality and Delta Temperature evolution by period

Defect Impact:

- Filtering capabilities
- Detailed view of the impact of each defect in the installed power

Smart Reporting:

- Customizable report generation

Standard Deliverables:

- Standard report

Web Access:

<https://www.aeroprotechnik.com/acciona>

Login: ACCIONA
Password: ACC354

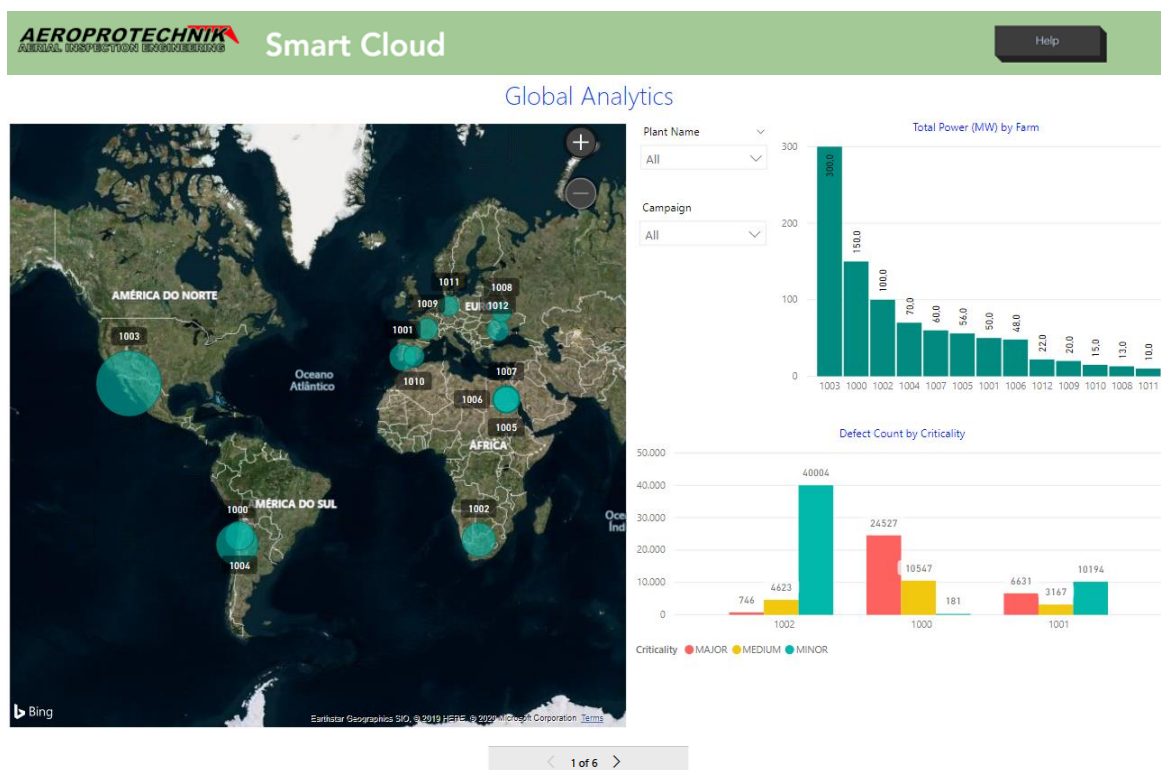
Guest Area

Please enter the password below.

Go

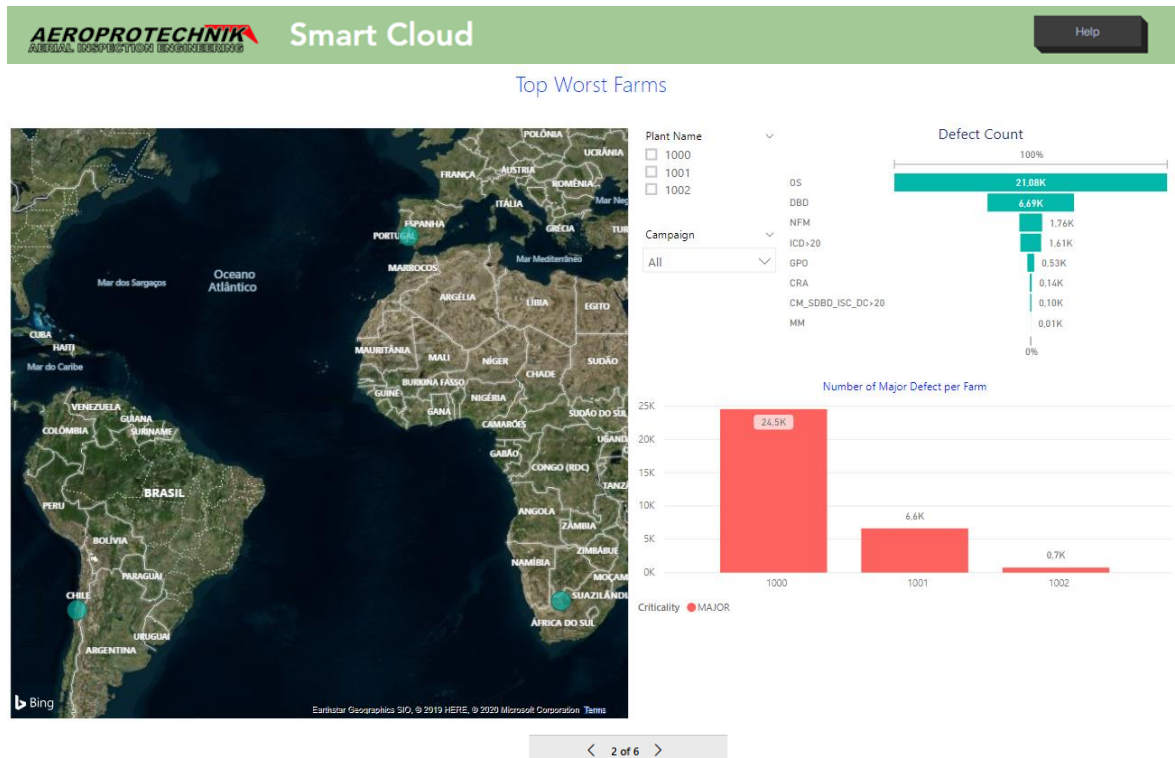
1- Main Page:

- Filtering Capabilities
- Asset Map Geolocation
- Access to full portfolio



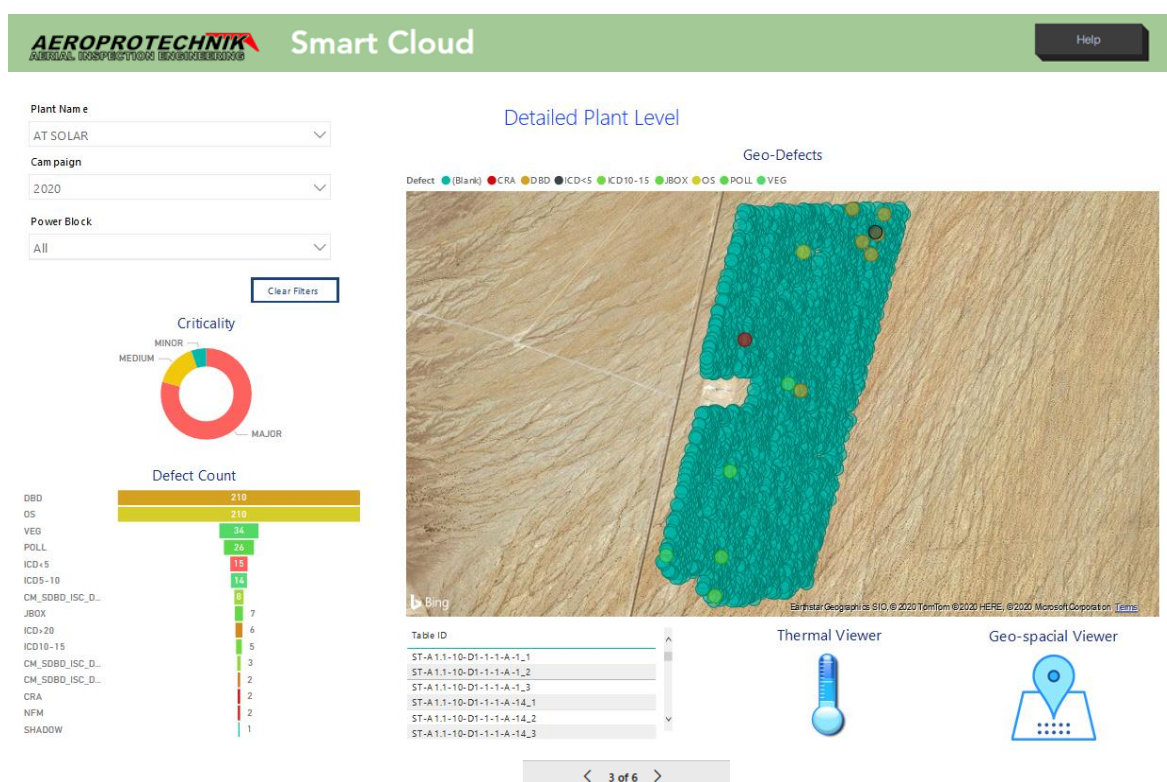
2- Worst Farms Detail:

- Filtering capabilities
- Asset Map Geolocation
- Major defects identification
 - Major Defect Count per defect type
 - Major Defect Count per Asset Owner



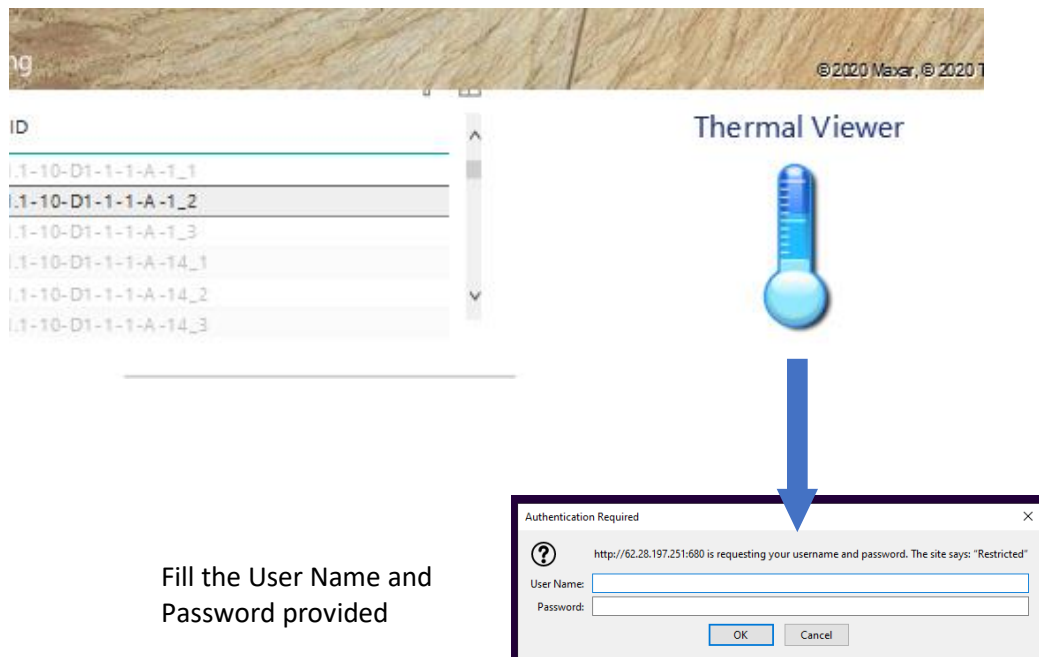
3- Big data Analytics functionalities for root cause analysis:

- Filtering capabilities
 - Criticality filtering capabilities
 - Defect type filtering
- Farm and defects Geo-location
 - Access to each area geo-located
 - Defects detail for each area
- Access to Detailed Analysis String/Module Area



3.1- Access to Detailed Analysis String/Module Area:

- Select a defect type
- Select an area in the Geomap to go into detailed
- Click "Thermal Viewer"
- A link will open in the browser
- Fill the User Name and Password provided



3.1- Access to Module Level Viewer:

- Click "Geo-spacial Viewer"
- Open kml file with module level detail for the plant and year selected



3.2- Detailed Analysis String/Module Area:

-String Selection Area:

Select String for visual / IR Analysis.

-String Sequence:

Provide indication of string sequence in the IR image.

-Temp Range:

Customizable min and max temp for optimum visualization. Temp color key can be changed as well.

-IR:

Thermographic.

-RGB:

Visual spectrum.

-Defects Area (Module ID Level):

In this area all the defects for selected string will be shown.

Detailed defect code.

Delta temperature

Precise module identification.



Smart Cloud

Help

22_1_W - LIST OF DEFECTS

Defect	ID	PVM	Min (°C)	Max (°C)	Avg (°C)	Delta (°C)	Criticality
VEG	22_1_W	2_2	20.81	41.13	25.62	15.51	MEDIUM
VEG	22_1_W	2_8	21.57	33.53	26.73	6.8	MEDIUM

TEMPERATURES

Input Minimum(°C): 13.6

Input Maximum(°C): 35.6

Color:

Submit

Current:

IMAGE

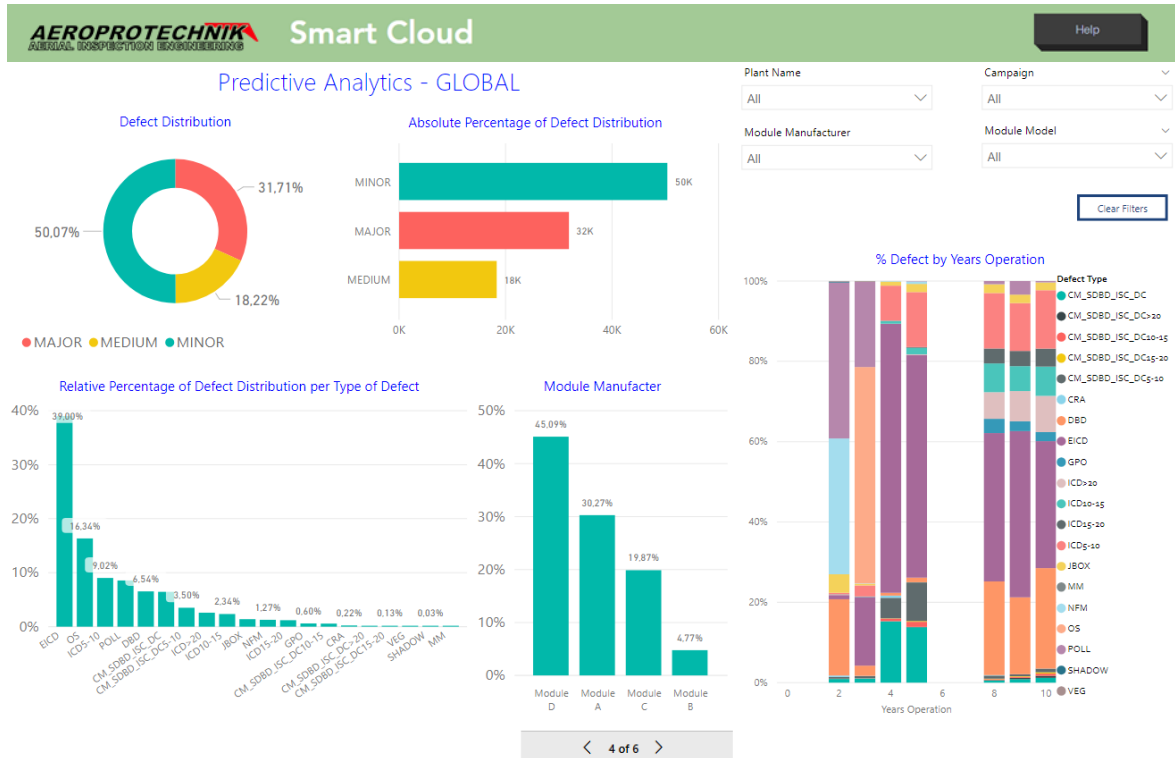


THERMAL IMAGE



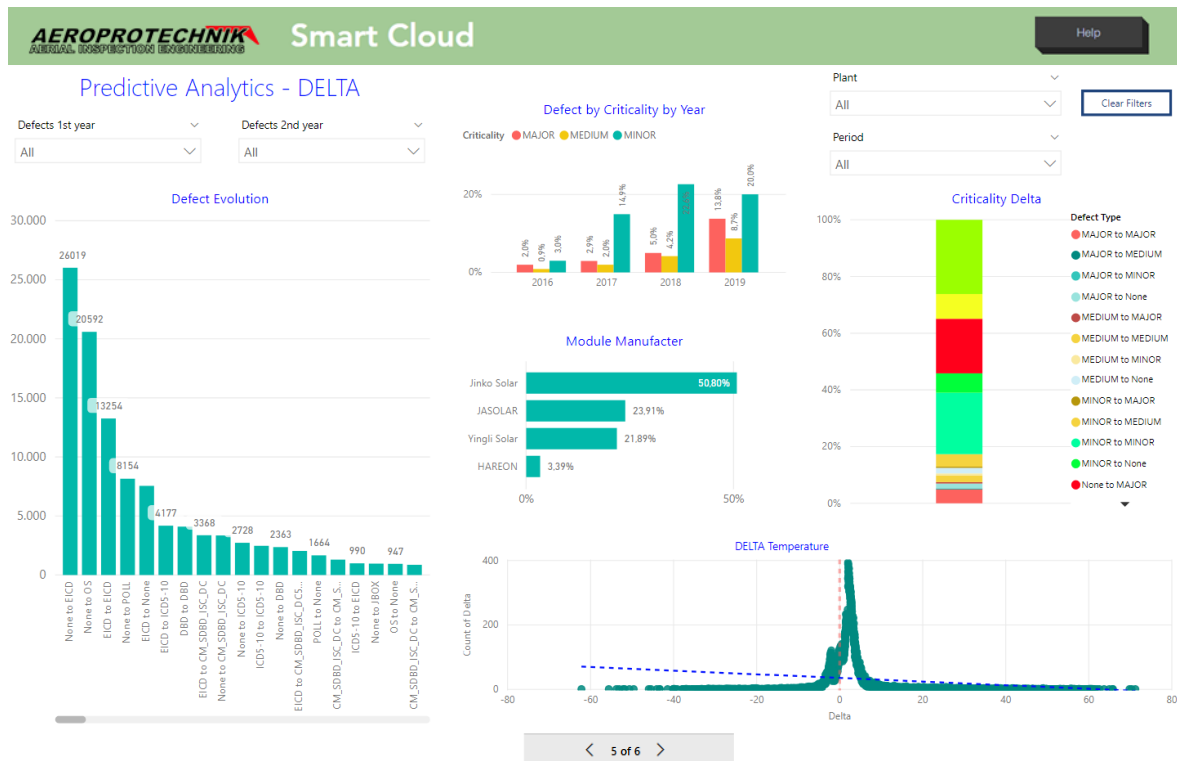
4- Predictive Analytics:

- Filtering capabilities
- Correlation between defects and module manufacturer
- Installation degradation over operation years



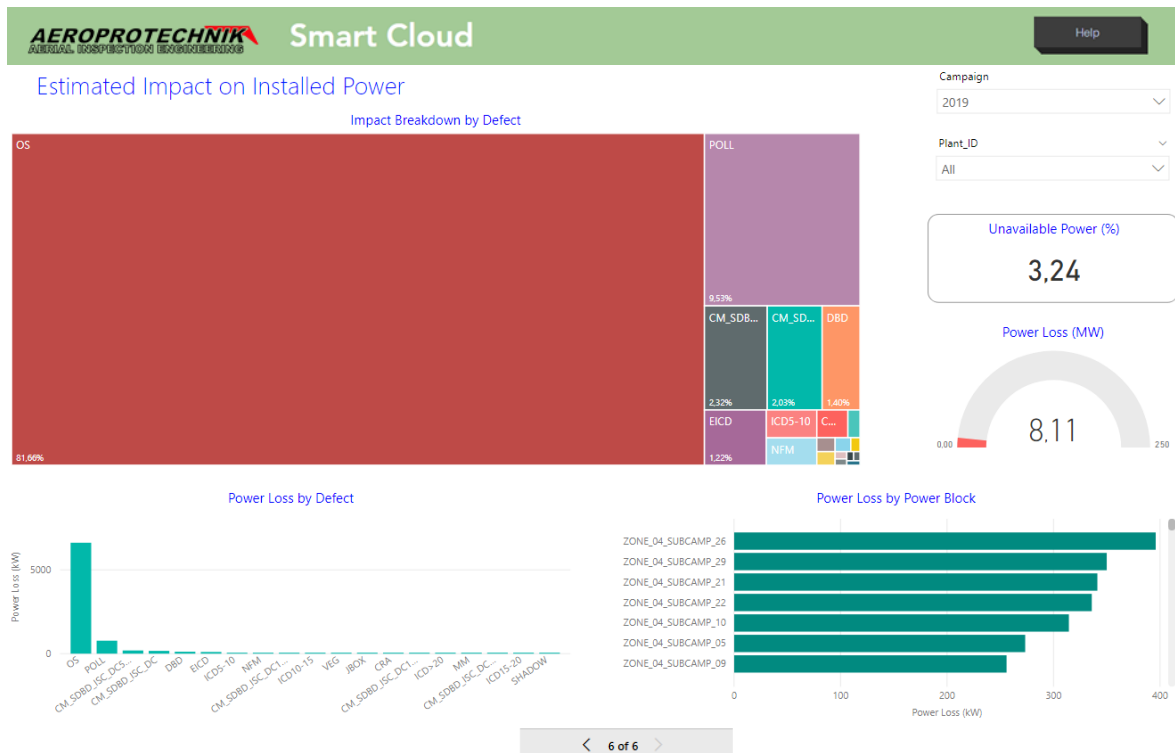
5- Predictive Analytics Defect Evolution:

- Filtering capabilities
 - Evolution from one year to the next
 - Evolution between first inspection and last inspection
- Defect Evolution: by period the defect type evolution
- Criticality Delta: by period the evolution of defect criticality
- Delta Temperature: by period the evolution of temperature defects delta



6- Defect Impact:

- Filtering capabilities
- Total unavailable power per year
- Detailed view of the impact of each defect in the installed power



7- Smart Reporting:

- Customizable report
 - Select Plant Name
 - Select Campaign
 - Select Power Block
 - Select the Criticality (single or all selection, no selection is the same as Select All)
 - Select the defects (single, several or all selection, no selection is the same as Select All)
- NOTE: User "Ctrl" key to select several defects**
- Select the delta temperature interval os the defects

The number of total selected defects is shown on the top of the map.

- Press the Report Link to download the report


Smart Cloud
Help

Smart Reporting

i Make all the selections for the report output

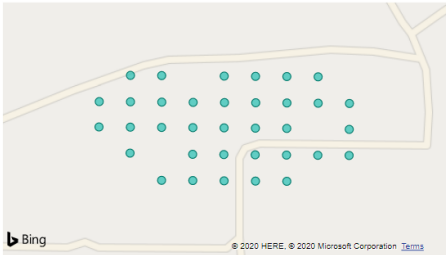
Plant Name
AMARELEJA
Campaign
2018
Power Block
AA
Temperature Delta Interval
1.51 34.53

Criticality
☒ Select all
☒ MAJOR
☒ MEDIUM
☒ MINOR

Defect
☒ Select all
☒ CM_SDBD_JSC_DC10-15
☒ CM_SDBD_JSC_DC5-10
☒ DBD
☒ EICD
☒ ICD>20
☒ ICD10-15
☒ ICD15-20
☒ ICD5-10
☒ JBOX
☒ POLL

Clear Filters

Count of Selected Defects: 113



Bing © 2020 HERE © 2020 Microsoft Corporation [Terms](#)

Report Link

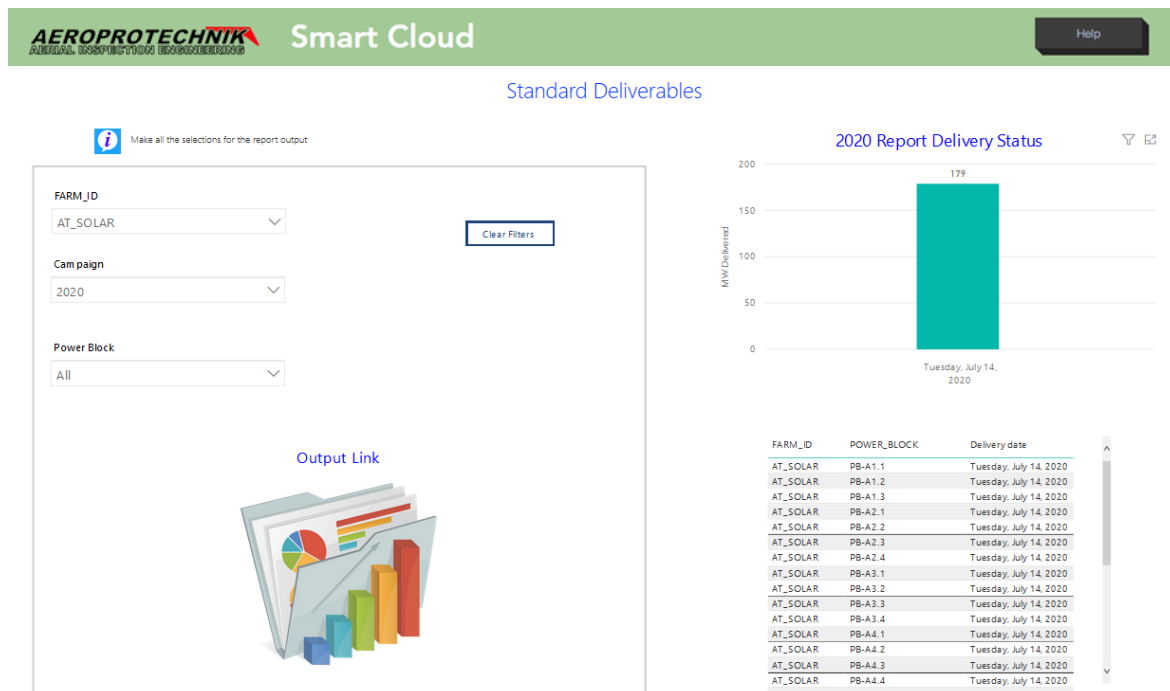

< 7 of 7 >

8- Standard Deliverables:

- Customizable report
 - Select Plant Name
 - Select Campaign
 - Select Power Block
- Press Open Link to download the report

In the Standard Deliverables you will be able to download:

- i) **Infrared Images – “IR”**
All Thermal images are organized and renamed as its position in the farm.
- ii) **Visual Images – “RGB”**
All Visual images are organized and renamed as its position in the farm.
- iii) **Technical Report – “REPORT”**
Report and list of all defects classified by its criticality
- iv) **Implementation Plan – “Implementation Plan”**
Excel list of all defects quantified, geo-located and classified by its type and criticality.
- v) **Distribution map – “Distribution_Map”**
KML files with geographical defect distribution at module level.



AEROPROTECHNIK
AERIAL INSPECTION ENGINEERING



+351 926502338



www.aeroprotechnik.com



info@aeroprotechnik.com