

An aerial photograph of a vast solar heliostat field in a desert. The heliostats are arranged in neat, curved rows that recede into the distance. The ground is a reddish-brown color, and the sky is a clear, bright blue. The heliostats are square and reflective, catching the sunlight. The overall scene is one of a large-scale renewable energy project in a remote, arid location.

# ABENGOA

Power

Advanced heliostat design &  
manufacturing

October 2020



# Índex

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2 Advanced Heliostat design & manufacturing

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# Abengoa Heliostat Evolution

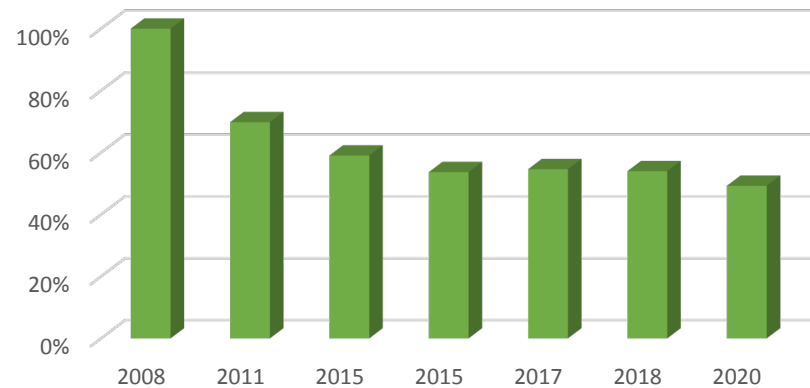
## Heliostat design evolution:

- ▶ Solucar 120 in PS10-20
- ▶ ASUP140 V1 in Khi solar one
- ▶ ASUP140 V3 in atacama
- ▶ ASUP140 V5
- ▶ ASUP140 V2.6

## Next generation:

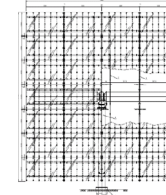
- ▶ Improving in facet design
- ▶ High precisión drives
- ▶ Improved sensor capabilities
- ▶ Autonomous heliostat
- ▶ Medium range Heliostat design

Heliostat Capex evolution in Abengoa plants & offers



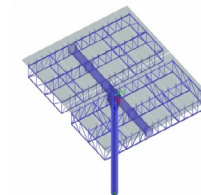
### Solucar 120

Solid tube structure / framed arms  
120 m<sup>2</sup> reflective surface  
Mounted on solucar complex PS10-PS20



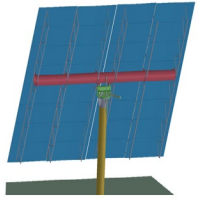
### ASUP 140 v1

Solid tube structure / framed bolted structure  
140 m<sup>2</sup> reflective surface  
Mounted on !Khi solar plant (SA)



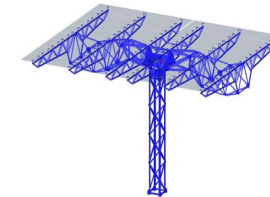
### ASUP 140 v2

Solid tube structure / welded structure  
140 m<sup>2</sup> reflective surface



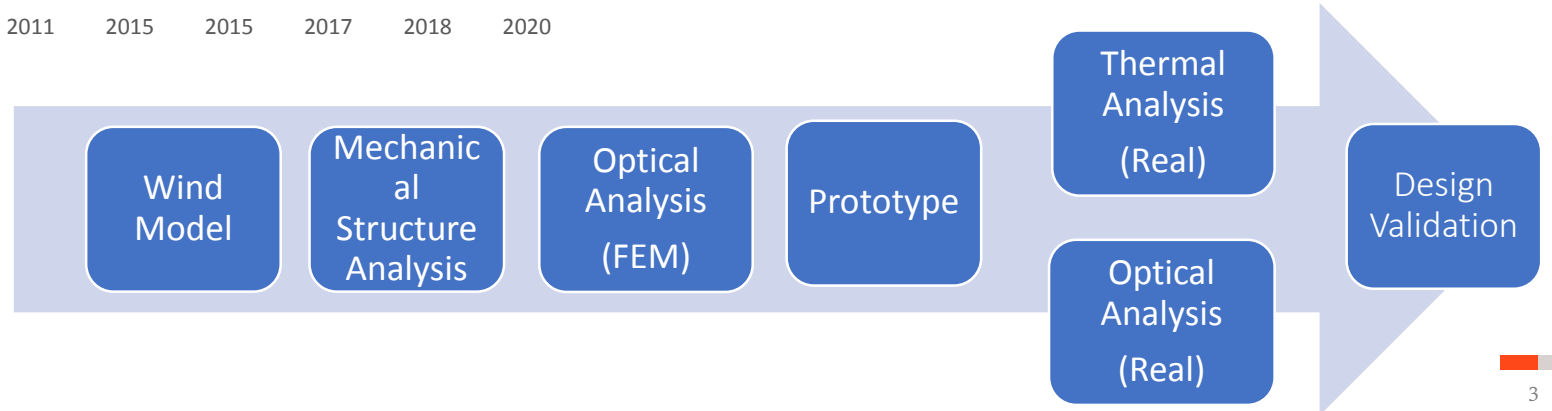
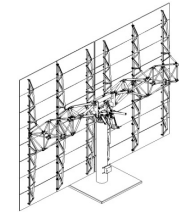
### ASUP 140 v3

Framed structure  
140 m<sup>2</sup> reflective surface  
Mounted on Atacama I solar plant (Chile)



### ASUP 140 v5 CP

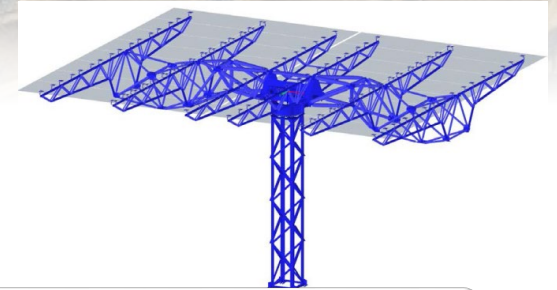
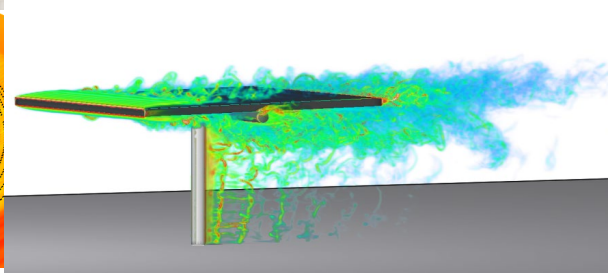
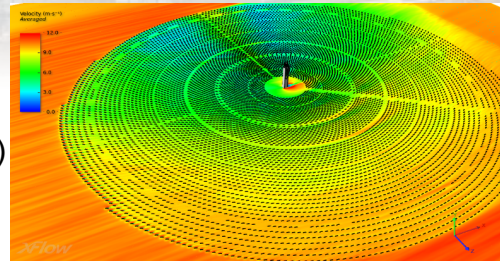
Framed structure. Steel & concrete  
140 m<sup>2</sup> reflective surface  
Better option depending on location



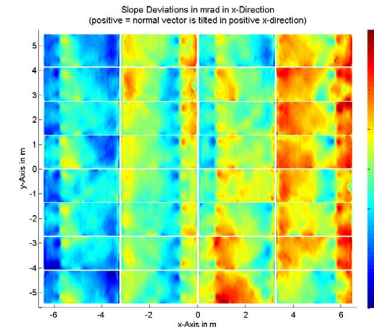
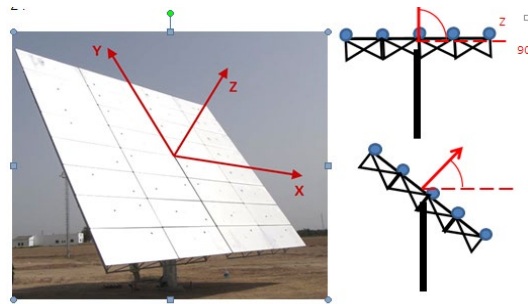
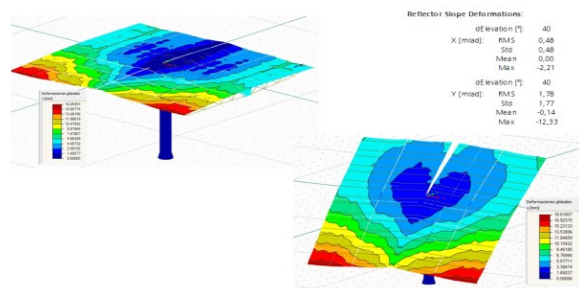
# Advanced Heliostat design & manufacturing

## Design & calculations

- ▶ Wind tunnel tests
- ▶ CFD calculations (X-flow +Fluent)
- ▶ Local wind velocities assesments
- ▶ FEM & structural models ( static+dynamic)
- ▶ 3D mechanical models & contact models
- ▶ Workshop drawings



## Optical Assesment



- ▶ Deviation optical shape
- ▶ Fotogrametry measurements
- ▶ Deflectometry measurements
  - ▶ Tracking & aiming test
  - ▶ Thermal evaluation
  - ▶ Final optical validation
- ▶ Calibration alternative methods

## Prototyping & Manufacturing process

- ▶ Prototypes station (solucar complex)
- ▶ Structural tests in Eucomsa platform
- ▶ Motion validation
- ▶ Lean Manufacturing process
- ▶ Manufacturing process validation
- ▶ Jigs & tools definition & validation

