Video 7 documentation

Solar roofs

Solar Thermal Collecting System with Changing Images Generation

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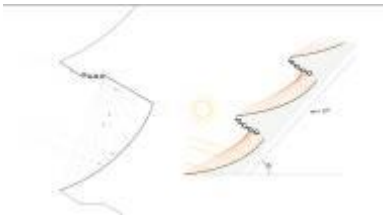
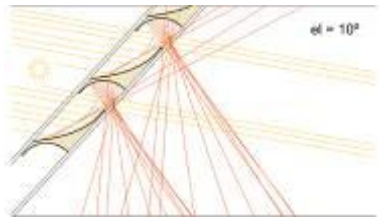
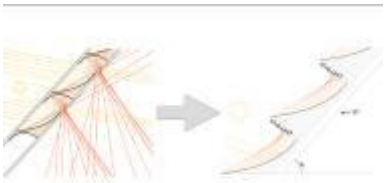
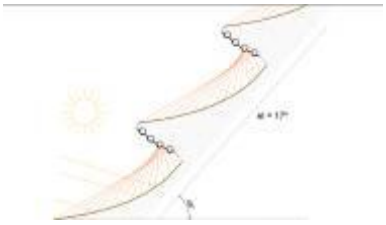
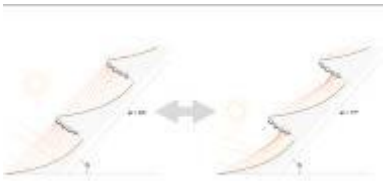
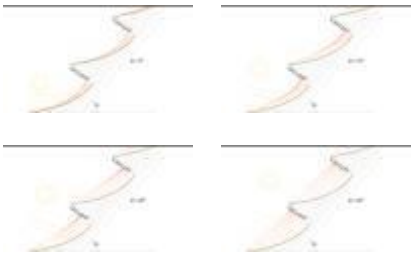
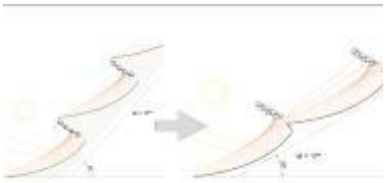
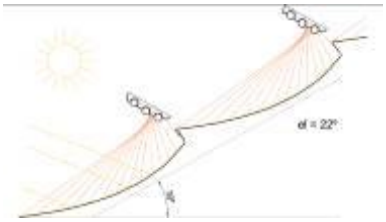
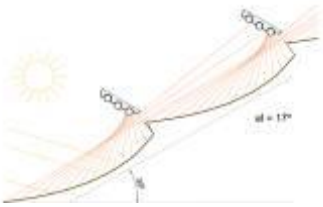
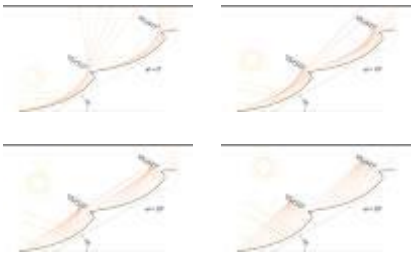
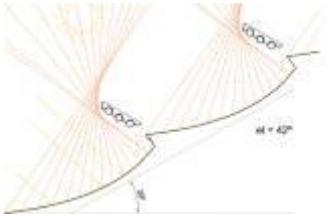
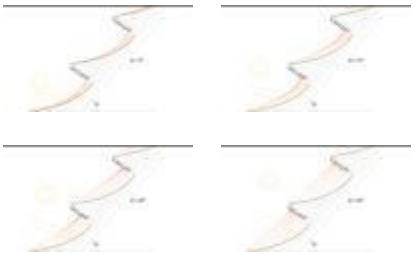
Solar roofs

	That video is about roof solutions. Actually, the vertical walls solutions are a particular case of slope surfaces.
	At the **video 4, about slats and sun screening**, it was already talked about solar illumination systems according to the demand curve, for roofs or sloped surfaces.
	To absorb solar energy, the key points' placement of the geometry is basically the same.
	
	
	If the roof has a high slope, the roof solution will not be really different as the vertical solutions. The next concentrator begins above the absorbing area.

	The main point to adapt the demand curve is that the sun only absorbs energy between a maximum and minimum sun elevations. Those elevations are determined at the system optimizations which are obtained to several cities from the whole world.
	The solution is to place the absorbing area on a specific place, such as is shown at this sequence. In addition, it shows how the radiation is reflected, in a dispersed way, when inclination of sunbeams is high, cooling down the roof.
	It is also observed, when the sunbeam inclination is low, the reflected sunbeams don't fall on the absorbing area either. This was already justified at the video 3, about background and optimizations. Otherwise, the absorbing area should be pretty higher, decreasing the concentration and the absorbing efficiency.
	When the roof slope is lower, under 35º or 45º, this roof solution is not efficient anymore and it is more convenient to use the roof configuration with a separated absorbing area.
	
	In this solution, each concentrator finishes when the previous one do it. Despite this, they should keep continuity between them, assembling one above the previous one. That characteristic is really appropriate to build the roof.
	The absorbing area stays separated above that surface of concentrators.
	That configuration has an important advantage in relation to the previous one. This configuration lets increasing the concentration around a 25%. That is due to the reduction of the absorbing area. But, the absorbed sunbeams which are not been absorbed, should fall on upper absorbing area.

	As a result is obtained this sequence. The radiation is harvested between the same maximum and minimum elevations. But a smaller absorbing area is used, which decreases the heat losses.
	The optimization of this geometry is not obvious and, to a great extent, it is based on the step between concentrators, whose vertex is where would start the absorbing area at the previous configuration (which has a no-separated absorbing area).
	There are simple construction solutions, to keep the absorbing area separated from the roof without losing their waterproof qualities. This makes it into a valid roof closing, and it has a cost which could be comparable to a conventional one. In addition, it has the advantage that it is absorbing thermal energy for the building.
	From time ago, there is a current of thought in favour of paint the roof with white. That lets to reflect the radiation toward the sky and, in this way, to compensate the global warming.
	In fact, it is affirm that 10 m2 of white roofs are equivalent to a tonne of CO2 per year. Whether the 100 main cities of the world do this, it would be compensated the effect of gas emissions which produce the greenhouse effect.
	However, other currents of thoughts affirm that effects would be much smaller, because the saved energy in summer will be spent in extra energy for heating in winter.
	The great advantage of those systems is to absorb the winter heating, besides the surfaces are more reflexive than the white colour. It reduces, in a very important way, emissions due to the heating, which are around the 15% of the total of the world.