



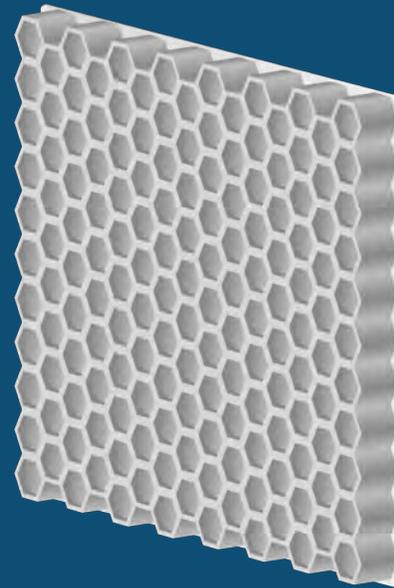
HONEYCOMB COOLING PROPERTIES

THE ALUMINUM HONEYCOMB

Mitrex Aluminum Honeycomb is a patented innovative application that replaces the conventional solar PV module frame and backsheet functionalities, keeping solar modules cooler and providing a more robust structure.

Modules equipped with Aluminum Honeycomb well outperform conventional modules by increasing output, prolonging lifespan and reducing shipping volume, for the same price as conventional modules.

Tested in several climate field installations, the honeycomb backing has been adopted by Mitrex for newly assembled PV modules. Same watts, more output.



1 MORE OUTPUT

Boost output up to 7%¹ by reducing operational temperature that cuts back heat losses and by preventing the buildup of dust and dirt with a frameless structure.



LOWER TEMPERATURE



LEST DUST & DIRT



2 LONGER LIFETIME

Reduce degradation up to 20%² by minimizing bending and high temperature cycles, while preventing damage due to humidity.



LOWER TEMPERATURE



LESS BENDING



HUMIDITY BARRIER



3 SMART STRUCTURE

The intelligent structure gives robust stability and is mounted easier than a conventional frame. 50%³ less stacking volume reduces transport costs.



FRAME REPLACEMENT



SMART STACKABILITY



MOUNTING SYSTEM



4 ECO-FRIENDLY

Ecologically-friendly packaging, production and transport help to reduce energy usage and to minimize waste for a lower carbon footprint.



ECO-FRIENDLY PRODUCTION



LOW CARBON FOOTPRINT



5 AUTOMATED ASSEMBLY

The Honeycomb Assembly Station provides high-speed production capacity and is integrated in standard operation procedures.



HIGH-SPEED PRODUCTION



STANDARD OPERATING PROCEDURE

FOR MANUFACTURERS

Produce PV modules that meet the high demands of customers with high performance in kWh and lifetime, at no extra cost of investment. Mitrex Honeycomb is easily integrated into existing PV module production. Lamination processes are unchanged, and framing is replaced using automated assembly with Honeycomb profiles. Cost competitive and high speed.

FOR USERS, INVESTORS & EPCS

Enhance PV module performance in output and lifetime with Mitrex Honeycomb. Don't waste Watts - especially in high irradiation areas, where the nominal operational cell temperatures (NOCT) cause high heat losses and speed up degradation. Mitrex Honeycomb lowers the levelized costs of energy (LCOE) and upgrades module quality. Same Watts, more output.

+

7%
OUTPUT

+

20%
LIFETIME

¹Proven extra instantaneous output, depending on local irradiation and wind ²Based on lower temperatures per temperature cycle during lifetime ³Based on optimized container transport volume

HONEYCOMB TECHNOLOGY

Mitrex modules are backed using a unique, laminated, composite material structure for extreme strength, low-weight, and ductility. The panels are made from 3003 aluminum alloy foil in the form of a honeycomb cell core sandwiched between two continuous layers of solid aluminum sheathing.

HONEYCOMB PERFORMANCE

Mitrex Honeycomb outperforms “standard” modules, delivering up to 10% more instantaneous output by lowering operational temperature in modules and by preventing the buildup of dust & dirt. Output performance is proven. Cooling is achieved by efficient heat transfer from PV cells to the backsheet through the hexagon-shaped profiles on Honeycomb. Natural convection creates a chimney effect that dissipates heat effectively, lowering temperatures by an average of 10°C and gaining an extra 3-5% output.

1 Array Temperature Distribution During Running

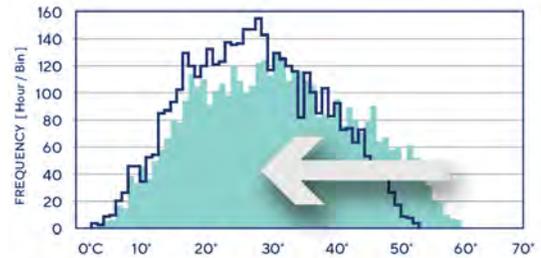
Lower cell temperatures due to higher heat dissipation (Uc) in arrays with Honeycomb.

2 More Output in Watts per Minute *

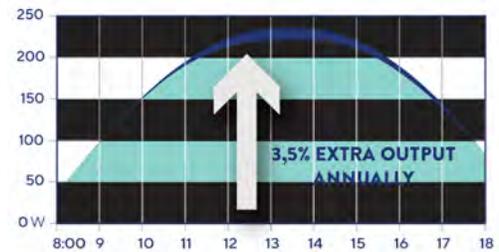
Honeycomb delivers up to 7% more energy, especially effective in areas with high irradiation. This results in an average annual increase of more than 3,5% (in seasonally-influenced locations).

- HONEYCOMB EQUIPPED MODULE
- STANDARD BACKSHEET / FRAMED MODULE

(1) LOWER OPERATING TEMPERATURE (°C)



(2) MORE OUTPUT (W/min)



HONEYCOMB DURABILITY

Mitrex Honeycomb modules outlast standard modules, extending a module's lifetime up to 20% by guarding against degradation. Lower temperatures, weather protection and a stable structure ensure reduced corrosion, material deterioration and microcracking in cells. This extra protection extends a module's lifetime and increases output over years.

3 Minimized Deflection*

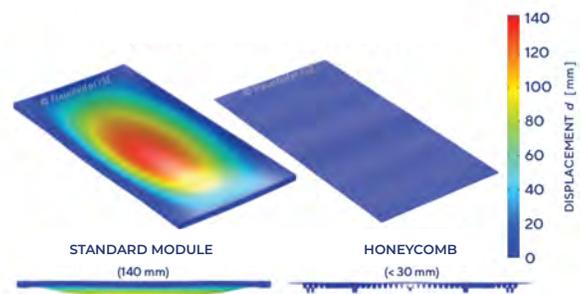
Honeycomb reduces tensile stress within solar cells at push and pull load, significantly reducing solar cell fracture probabilities.

4 Output Degradation versus Warranty Results

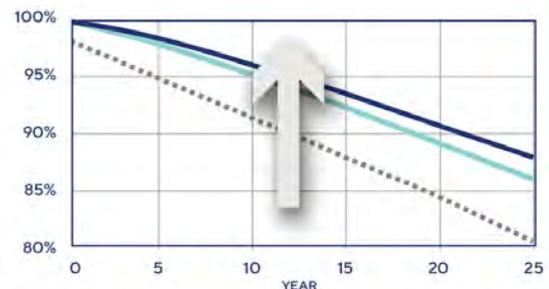
Modules with Honeycomb are stronger and cooler, reducing yearly degradation.

- HONEYCOMB EQUIPPED MODULE
- STANDARD BACKSHEET / FRAMED MODULE
- MODULE WARRANTY

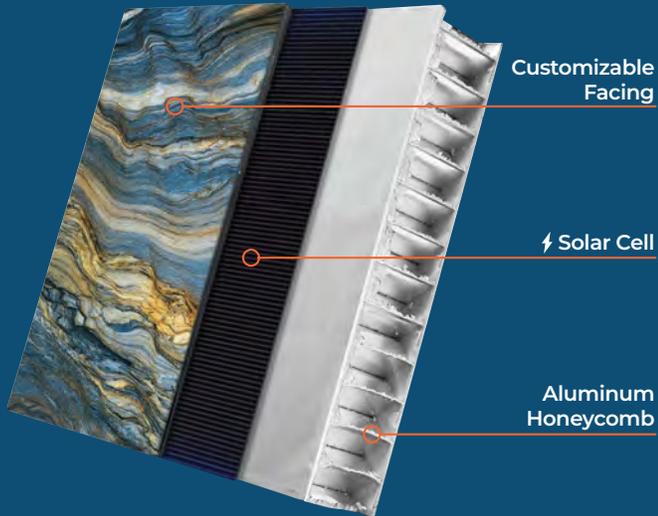
(3) DEFLECTION PROTECTION



(4) LESS DEGRADATION



INCREASE PROFITS ON SOLAR BIPV PROJECTS



Mitrex Honeycomb generates more energy by lowering PV cell temperatures and prolonging module lifetime.

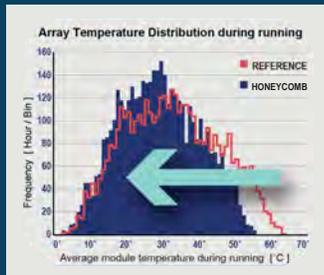
The patented product replaces the conventional solar PV module frame and backsheet at a competitive price, resulting in lower levelized costs of energy (LCOE).

Certified and extensively tested, Honeycomb has been adopted by Mitrex for newly assembled PV modules.

Solar PV systems enhanced with Aluminum Honeycomb modules give immediate benefits through increased profits and higher returns on investment.



LOWER TEMPERATURE



Lower cell temperatures due to higher heat dissipation (Uc)*

+



LONGER LIFETIME



Stronger and cooler modules reduce yearly degradation*

=



HIGHER PERFORMANCE RATIO



Performance Ratio improves due to Honeycomb

THE HONEYCOMB UPGRADE

+
3.2%
ENERGY

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