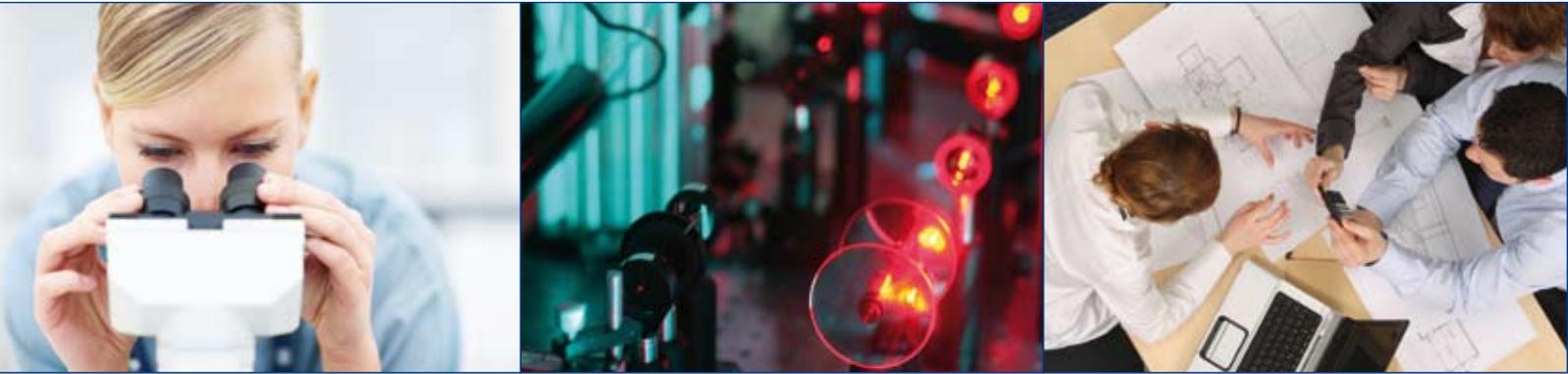


**Carbon** *Vision*



# **Carbon Fiber Breadboards**

# Welcome to the World of CarbonVision



**“Creating Performance Technology” is CarbonVision’s mission. All its breadboards, refine high-quality products and allow for more efficient use in science and industries. This enhances the quality of research and preserves the continuous development.**

## Strategy

A growth strategy, that is both sustainable and systematic is one major factor for success, excellent products another.

CarbonVision’s activities in the fields of research, development, sales and services are, therefore, consistently focused on customers and partners.

This is the only way to develop solutions in line with market needs and ensure customized implementation.

As a result, CarbonVision enhances the efficiency of its customers, boosting their competitive lead. This strategy works well.

## Customising

Structures made from Carbon Fiber Reinforced Plastic (CFRP) have been used for aerospace and space structures due to their low weight, high strength and good thermal stability for years.

CarbonVision combines the beneficial material properties with a modern manufacturing technology to high-end breadboards.

Innovations in design and material are based on a close and continuous cooperation with our partners in research and science.

Thus our breadboards follow exactly the needs of our customers and present state-of-the-art products in carbon fiber technology.

## Light Weight

**Increasing performance by reduced weight.**

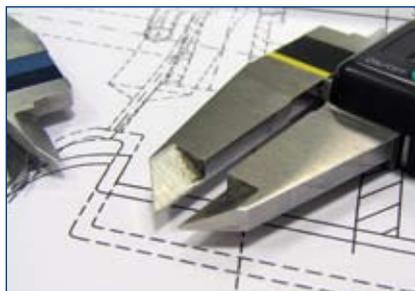
The use of high strength or high modulus carbon fibers reduces weight significantly while keeping the stiffness high. The low weight of our breadboards allows expanded application ranges for precisely mounted devices on breadboards. For use in mobile services in the field, in labs with limited floor capacities or in complex test set-ups with breadboards mounted "on top", 75 % less weight in comparison to steel breadboards enhance your performance capabilities.



## Precision

**Sophisticated devices need precise supports.**

We focus on manufacturing our breadboards for those areas, where precision is particularly needed – at the attachment locations of your devices. The raised mounting surfaces are ground to achieve a flatness of  $\pm 50 \mu\text{m}$  or better. The lateral precision of  $\pm 100 \mu\text{m}$  is realised by the conceptual design and mounting processes when inserting the fixation elements. If you go for nano-precisioning platforms and stages, our high precision breadboards will be at your side.



## Damping

**Minimising vibrations is a key for the success in high performance applications.**

The physical properties of carbon fibers embedded into a resin matrix, complemented by the advantages of the orthotropic behavior of carbon fiber composites, facilitate damping coefficients of up to 60 % higher than steel. Supplementary added, adaptive elements inside the carbon fiber tubes, allow to modulate natural frequencies, which helps you to adapt breadboards to your varying dynamical needs.



**“Creating Performance Technology”**

## Clean Room

**Limiting the risks of contamination by an “open design” concept.**

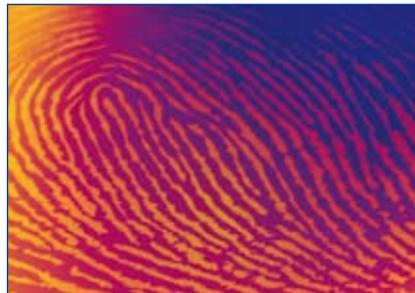
Our breadboards have an “open design” when made for cleanroom applications. The carbon fiber tube which is located underneath each fixation element, allows easy cleaning by “pushing” the particles out of the breadboard. In the CA-version, the side walls can be completely removed, enabling you to clean the breadboard entirely. No more hidden particles will impact your performance in the cleanroom.



## Thermal Stability

**Superior thermal stability enhances high precision measurements.**

The coefficient of thermal expansion for carbon fiber composites is typically only 1/10 th of those made of steel. By selecting specific fibers or resins and by orientation of carbon fibers into optimised directions, the co-efficient can even be less. For applications with varying thermal environments, the time for the thermal adaptation of the test set-up will be reduced significantly, which gives you more time for testing and measurements.



## Flexibility

**Varying demands in the test set-ups require a flexible design.**

Our breadboards can be adapted for mounting components on the „back“ side easily. Particular fixing elements are inserted into the carbon fiber tubes, which enables you to mount components from the backside. The “open” design in the CA-version covers and protects sensitive devices inside the stiff carbon “cage” of the breadboard. Versatile objects can be installed with the help of mounting angles along the sides of the board.



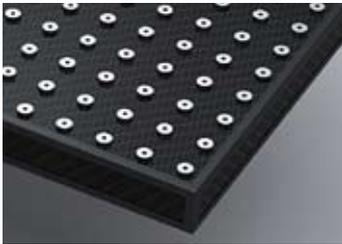
**is CarbonVision’s mission.**

# Carbon Fiber Breadboards



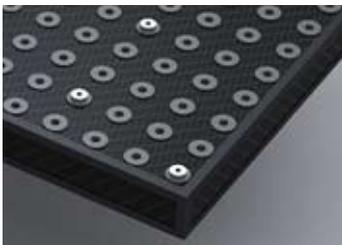
- stainless steel inserts (M6)
- 8 mm through holes at corners
- Aluminium edge protection
- CFRP sidewalls
- mounting pattern 25 & 50 mm
- individual layouts on demand

## EC-Series



Cost effective series of breadboards based on honeycomb panels with various core materials. Stiffness and thermal stability can be increased by bonding additional CFRP plates on top/bottom side of the board.  
Areal weight approx. 14 kg/m<sup>2</sup>.

## AD-Series



Enhanced version of EC-series. At each mount location a CFRP tube links the top and bottom shell. The CFRP tubes allow easy cleaning of the board, to install removeable additional mounts at the bottom side and to tune the natural frequencies and vibrational damping by inserting adaptive elements.  
Areal weight approx. 15 kg/m<sup>2</sup>.

## CA-Series



Boards of CA-series are entirely made from carbon fibers. Top and bottom shell consist of several mm thick CFRP shells, structurally joined by tubes made from CFRP. In addition to the advantages of AD-series, boards of CA-series allow the integration of optical/electrical components inside the stiff carbon shell and to route easily wires and optical fibers. Side walls can be installed removeable.  
Areal weight approx. 19 kg/m<sup>2</sup>.

## Sizes

Typical dimensions (mm) are shown in the table:

	300	600	750	900	1200
300	●	●			
600	●	●		●	●
750			●		●
900		●		●	●

Thickness: 25, 50, 100 mm (Other sizes & thickness are available on demand)



## **CarbonVision GmbH**

CarbonVision GmbH was founded in 2009 as a spin-off from the Ingenieurbüro für Strukturmechanik Schlossmacher. CarbonVision® Breadboards were mutually developed by the Ingenieurbüro für Strukturmechanik Schlossmacher, Munich and the Max-Planck-Institut für Astronomie, Heidelberg.

## **Partners**

### **Ingenieurbüro für Strukturmechanik Schlossmacher**

The Ingenieurbüro was founded in 1994 by Wolfram Schlossmacher.

The main field of activities focuses on performing structural analysis of components and systems for aerospace, space and defence. Metal and fiber composite structures are analysed in linear and non-linear static modes, with frequency and transient response modes for dynamic problems and crack propagation tasks with damage tolerance tools. The company offers with feasibility studies, finite element idealisations and stress justification reports for Airworthiness Authorities to conception and performing of structural tests, integrated services for stress engineering.

### **Max-Planck-Institut für Astronomie**

The Max Planck Institute for Astronomy (MPIA) in Heidelberg is one of approximately 80 institutes of the Max Planck Society. Its establishment in 1967 was based on the realization that a supraregional institute equipped with powerful telescopes would be needed in order to be internationally competitive in astronomical research.

Together with the Center for Astronomy at the University of Heidelberg (ZAH) and the Department of Astro- and Particle Physics at the MPI for Nuclear Physics, it constitutes a worldwide renowned center for astronomical research in Heidelberg.

## **Contact**

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