Developing the world's smallest 20,000 lm projectors[1]

At Epson, we're constantly evolving and enhancing our projectors. The exceptionally well-received EB-PU2200 Series – which includes the world's smallest 20,000lm projectors[1] – is a perfect example.

High-lumen projectors, used in large conference rooms, auditoriums and commercial spaces, need to deliver great picture quality while being compact, making them easy to install and transport. In the evolution of the EB-PU2200 Series, we set ourselves an ambitious goal: to develop 20,000 lm projectors that were less than half the size of their predecessors, with an uncompromising approach to miniaturisation, dust protection and easy maintenance.

Easy to transport and install

To make it easy for customers when transporting, our 20,000 lm projectors are approximately 60%[2] smaller than their predecessor and require half as many people to lift and install.

Developed for improved cooling

High-lumen projectors need to be cooled due to the heat generated by their laser light sources and circuit boards. Typically, as products become smaller, component density increases and cooling is more difficult. With the EB-PU2200 Series, we needed to dramatically improve cooling performance to achieve the compactness we were looking for. Applying our knowledge of heat generation and transference, we've rearranged the cooling components and optimised the dimensions of the coolant tank and pump to improve heat dissipation while reducing the overall projector size.

Easy to maintain

Making the projectors smaller, dust resistant and also easy to maintain, was a major challenge. Reduced size means more tightly arranged components and less room for maintenance. We addressed the problem using aluminium pipes and cooling tubes to dissipate the heat more efficiently in a smaller space, and integrated anti-dust cushions and seals on the optical engine. We also adopted a modular component design, improving the maintainability compared with the predecessor models.

Optimised for space saving

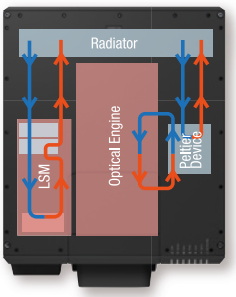
Shrinking the power supply – without shrinking the power – was another key consideration. We redesigned the power supply unit, making it approximately 70% smaller in cubic volume than the unit used in the previous product (the EB-L20000U). Moving beyond the technology seen in earlier laser projectors, the power is now driven by a bridgeless circuit design, a first for projectors.

Improved

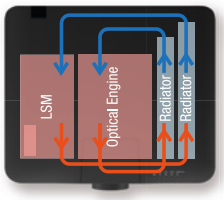
EB-PU2220B / 20,000 lm
586 × 492 × 185 mm (W × D × H)

EB-L20000U / 20,000 lm
620 × 720 × 280 mm (W × D × H)

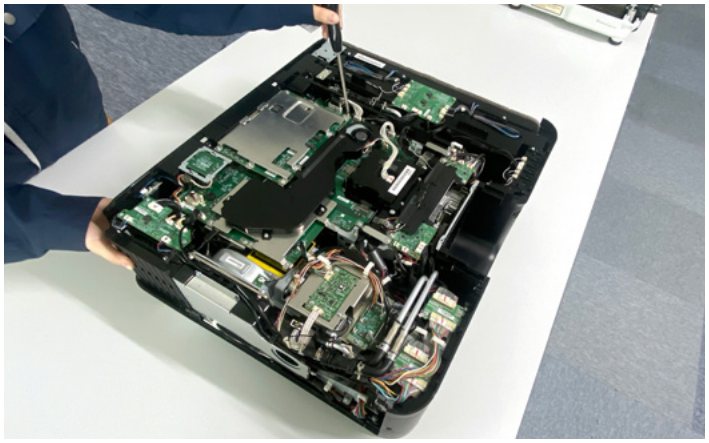
Optimised cooling system



EB-L20000U



EB-PU2200 Series



Internal projector structure featuring a modular design for easy maintenance

Lens shift mechanism designed to prevent dust from getting inside the projection lenses

Designed for rapid repair

Projectors used for projection mapping and events must be easy to maintain and repair, to avoid interruptions to a customer's business. Our design engineers visited rental companies, hearing first-hand about their needs and challenges, feeding this in-field insight into the product planning and development process.

In traditional projector design, parts are closely stacked and layered on top of each other, making repairs lengthy, as each layer has to be removed to get to the specific part that needs replacing. With the EB-PU2200 Series, the key projector components (light source, optical engine, power supply) are easy to access.

Far fewer steps are needed to remove these parts, fewer screw types are used, and the number of connectors on boards is reduced by consolidating unit wiring. We've also used screws that can be retightened rapidly and adopted a modular component design.

Dust resistant

The optics inside the projectors are sealed against dust to maintain excellent image quality and brightness, even when they're used outdoors or in harsh environments. This reduces the amount of dust on the lens by around 80% compared to the EB-L20000U.

To prevent dust from getting inside the lenses, we needed parts that would maintain a seal while performing lens shift movements. Following extensive prototyping using origami bellows of various designs, we developed a silicon rubber seal with more pronounced bellow pleats to eliminate gaps and 'rolling up'.

Filter-free

Our customers told us how important low-maintenance is to them, so we have developed a filter-free product with a sealed optical engine and light source module providing IP5X[3] dust resistance. In addition, we ran simulations to predict where dust would accumulate on the board components, then based on our in-depth analysis, we coated each substrate component to provide enhanced protection.

Customers are delighted with the new projectors. Their compact size means installation flexibility and efficiency. Improved dust resistance expands where and how the projectors can be used. The new design makes maintenance far easier and more cost-effective.

But this is just the beginning. We will continue to listen to our customers and deliver ever-better picture quality and usability to ensure amazing visual experiences.

[1] As of October 2022. Main unit including standard lens (ELPLM15). 20,000 lm in accordance with ISO 21118.

[2] Comparison between the EB-L20000U and EB-PU2220B (excluding protruding parts). EB-PU2220B Dimensions (W × D × H): 586 × 492 × 185 mm, Weight: 24.4 kg (excluding lens) / EB-L20000U Dimensions (W × D × H): 620 × 720 × 280 mm, Weight 49.6 kg (excluding lens).

[3] IP5X certified in accordance with IEC Standard 60529. The IP5X certification is applied to the optical engine and light source module.

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