



NEW GEAR

EVERYTHING OLD IS NEW AGAIN

BY PAWEL ACHEL B.ENG(HONS) M.SC

I was born in Warsaw, Poland and I have a master's degree in structural engineering. I moved to Sydney with my family in 1991.

For the past 15 years I have been making natural history films, mostly underwater and I have filmed from equator to Antarctica.

I have received "Best Documentary" award at the New York International Film Festival, two awards at the International Wildlife Film Festival and the First Prize, Gold Camera Award at the US International Film and Video Festival.

My underwater filming passion was always associated with my drive to achieve better images underwater. I have always been designing and building optical ports, housings and underwater lighting. Four years ago I designed a CinePort™ which to my knowledge still remains the sharpest and the highest contrast underwater port ever made.

Over a year ago I started feasibility and performance testing of Nikon Nikonos submersible lenses with the intention to adapting them to the new RED Epic camera. In the process, I designed and patented an innovative lens mount that wraps the camera around, like an underwater housing, but exposes the lens to the water.

As a scientist, I knew that I could not improve anything without ability to measure or quantify the performance of underwater optics. I have built several testing rigs allowing me to measure MTF (modulation transfer function) of underwater ports and lenses. From those tests I learned that Nikonos lenses were the only underwater optics

actually able to match (and surpass) the performance of the RED Epic Sensor.

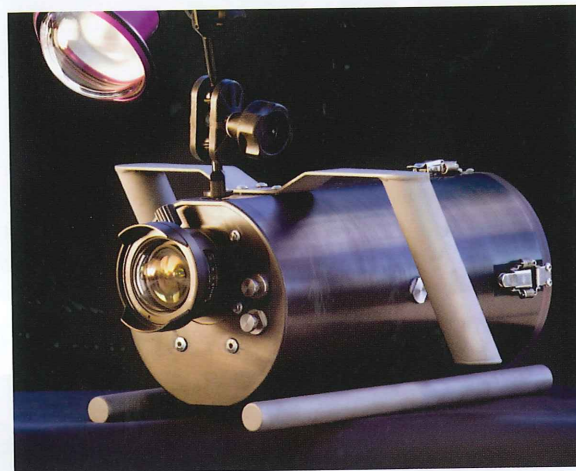
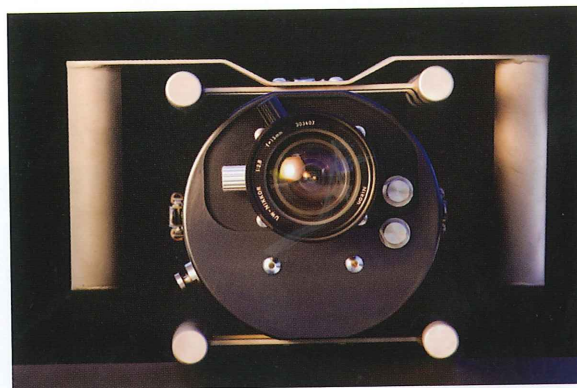
On the other hand, traditional underwater ports performed very poorly. Even the best dome ports were unable to resolve the equivalent of standard definition quality in the corners and flat ports performed even worse. It was clear to me that, in the age of 4k and 5k cameras the progress of underwater cinematography lies in overcoming the defects caused by optical ports.

One of the problems caused by dome ports is image plane curvature.

This defect increases with the size of the sensor exponentially and domes that used to produce good results with 2/3" chip cameras performed badly with S35 and larger sensors. Even my Master Prime 14mm lens looked like someone smeared Vaseline on the edges when placed behind an 8" underwater port. It did not resolve standard definition on the edges of the frame.

Flat ports are even worse. The same 14mm Master Prime lens failed to achieve 1/10 of the standard definition sharpness in the corners when placed behind a flat port. On top of that the image had severe pin-cushion distortions and suffered from coma and astigmatism.

It was a great discovery that the old and wonderful Nikonos had no



problem resolving 5k RED Epic sensor right up to the Nyquist limit of the sensor. There is probably some more good left in those beautiful lenses and I'm awaiting the release of the 6k 30mm wide Dragon sensor to test them even further.

While the sensor sizes increase, the already poor performance of traditional dome ports gets worse. In the DeepX that uses Nikonos lenses, it gets even better. ☒