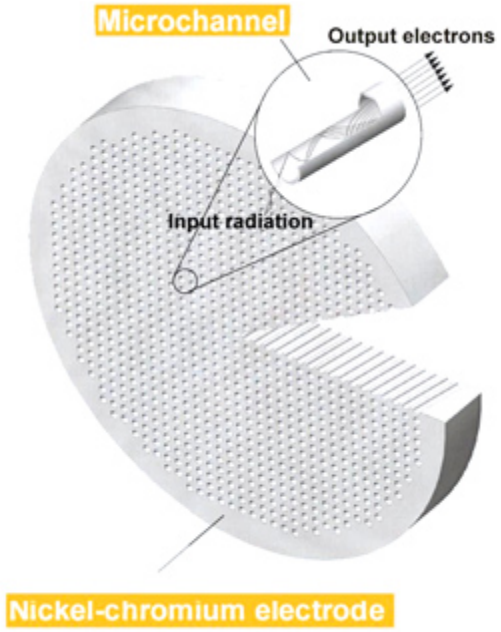
How an MCP works



For over thirty years, PHOTONIS (formerly Philips Photonics, Galileo and Burle) has consistently set the standard in electron multipliers and related products. Today, an extensive R&D program coupled with unsurpassed expertise in microchannel plate (MCP) technology continues to deliver a succession of product and process improvements that push aside previous technology limits. This expertise is used to mass-produce MCPs for our image intensifier tubes as well as for a variety of custom scientific applications. This, plus the ability to meet your product requirements, makes Photonis the preferred choice of professionals the world over.
A microchannel plate (MCP) is an electron multiplier for detecting X-rays, ultraviolet radiation and charged particles. The output is a two-dimensional electron image which preserves the spatial resolution of the original input radiation, but with a linear gain up to 1000. This may be used for exciting a phosphor screen placed close to the output, giving a visual representation of the radiation pattern. Alternatively, the electron image can be read out by, for example, a wedge-and-strip or fast delay-line anode array.

Important features of MCPs are:
high electronic gain
immunity from magnetic fields
fast response
low noise
low power consumption
high spatial resolution
small size and ruggedness

Each plate consists of an array of tiny glass tubes fused together to form a thin disc. Both faces of the disc are metal-coated to provide parallel electrical connections to all channels. In a vacuum, and with a potential difference (usually 800 to 1400 V) across the plate, each channel becomes a continuous dynode electron multiplier, operating on the same principle (electron avalanche) as its cousin - the single-channel electron multiplier.
MCP

Special MCP's

Micropore optics
Photonis has developed the first-ever square-pore radially-packed X-ray focusing MCP optics and is currently refining the technology with continued support by ESA. For special projects, options are available, such as a square-pore square-packed X-ray optics with pore sizes of 10 to 100 µm, plates with a thickness of several millimeters, formed with a spherical radius or with metal-coated pore walls for optimum reflectivity can be developed and supplied.

Curved-channel MCPs
The curved-channel MCP was invented by the Philips LEP laboratory 1973 and produced in our factory in Brive in 25 µm pore, 25 mm diameter for some time. It was seen as a new way to prevent ion feedback at high gain with preserved spatial resolution. The major application was invention of the Multi-Anode Multi-Array (MAMA) tube by Timothy et al. at the time. Today, improved MCP readout arrangements in the form of "wedge & strip" anodes, fast delay-lines or Vernier anodes offer equal or better spatial resolution with the MCP stacks mentioned above. As the curved-channel MCPs were very difficult and costly to make in large formats they are only used for a few MAMA tubes, offered by competitors who copied the process after our patents expired.