Kentech Instruments Ltd.

START

Kentech Instruments Ltd.

Brief History

- Started in 1983 by four members of the Plasma Physics Group at Imperial College
- Two of the founding members are still with the company, Jonathan Hares and Tony Dymoke-Bradshaw
- Originally our customers were mainly US defence Labs. but now we sell to a wide range of customers
- We have concentrated on high voltage fast pulse generators and fast imaging systems but we now make a range of ancillary equipment also.

www.kentech.co.uk

Kentech Instruments Ltd.

Areas of Expertise

- Large experience in the design, building and application of fast high voltage pulse generators.
- Pulsers have been built for:-
  - Laser systems,
  - Radar,
  - Time of flight diagnostics,
  - Electron and ion beam manipulation,
  - System characterisation,
  - EMC testing,
  - NMR imaging enhancements,
  - High speed photography,
  - Numerous other applications.

- Have developed high speed imaging systems, Gated imagers and streak cameras both Optical and soft X-rays.

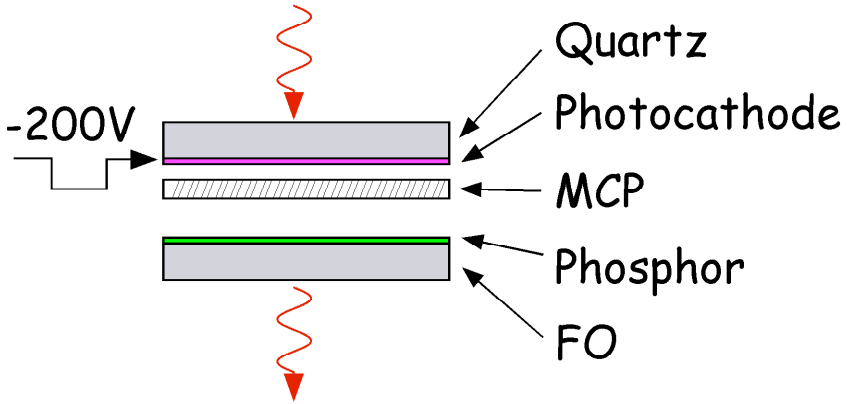
- High speed electronics for:-
  - signal digitization,
  - timing circuits,
  - arbitrary waveform generation
  - a variety of signal processing.

- The strong physics background of the three directors enables us to approach new areas and develop novel solutions to problems.

Gated Imagers

Technology
Based upon gated proximity focussed tubes.

Optical gate the cathode



Optical
Gate voltage of a few volts will turn the tube on/off but ~ 100 volts for good spatial resolution to maintain proximity focussing. Rep. rates to 200MHz.

Extinction ratio
> 10^7 for red light. Drops off in the UV due to direct excitation of MCP

Minimum Gate width for Direct gating
Limited by RC diffusion of charge. R is set by the cathode resistivity, C by the cathode to MCP gap.

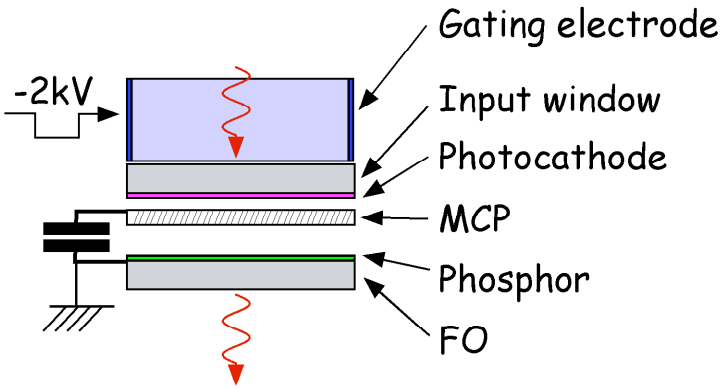
Capacitive Gating in Optical Gated Imagers

Technology

Based upon gated proximity focussed tubes with no fast connection to cathode

Gate Technique

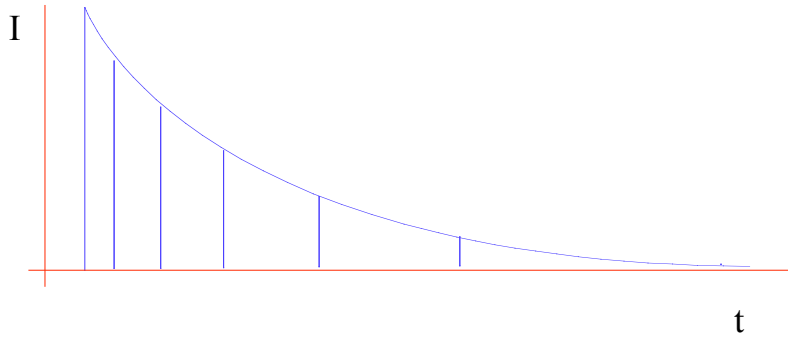
Put the whole tube in a gated electric field. Capacitively couple the MCP input to ground. Rep. rates to 10kHz



Minimum Gate width

Limited to 50 - 60ps by non uniformity effects

Kentech Instruments Ltd.



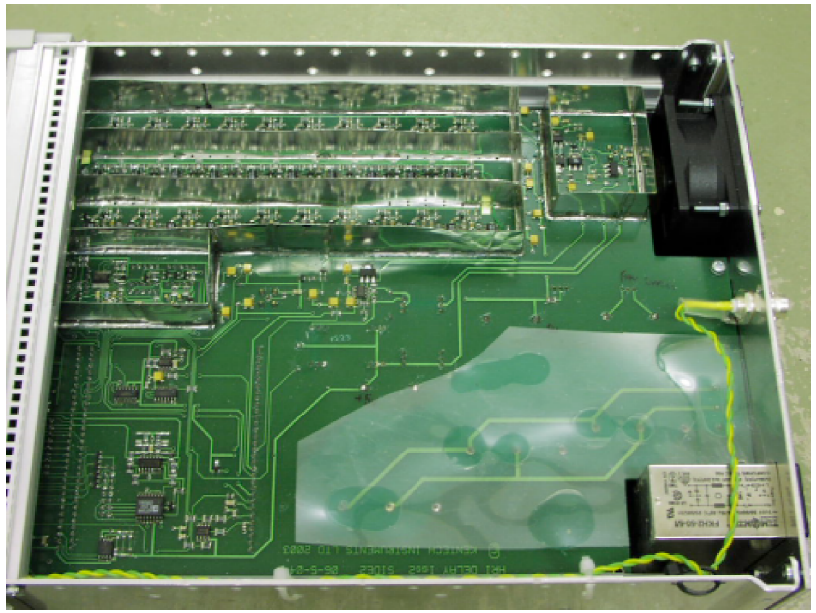
For optimum light gathering one needs to sample longer gate widths at later times on successive acquisitions

Need electronics that can allow both the gate width and the delay to be changed quickly.

The next generation of our HRI will have rapid gate length control but initially it wil be at the expense of very long gates (ms).
To achieve a system that can have long gates and quick change gate speeds needs a serious overhaul of the design.

Agile Delay generator, has to work in time domain, it cannot be a simple phase shifter.

Kentech Instruments Ltd.



Agile Delay Generator

Uses an array of time domain delay stages giving a wide frequency range and a delay range of several cycles of the trigger signal.

Kentech Instruments Ltd.

Current plans for the Future

i) Construction of integrated camera and delay system with rapid gate width control

ii) Firmware to allow the automation of delay scans

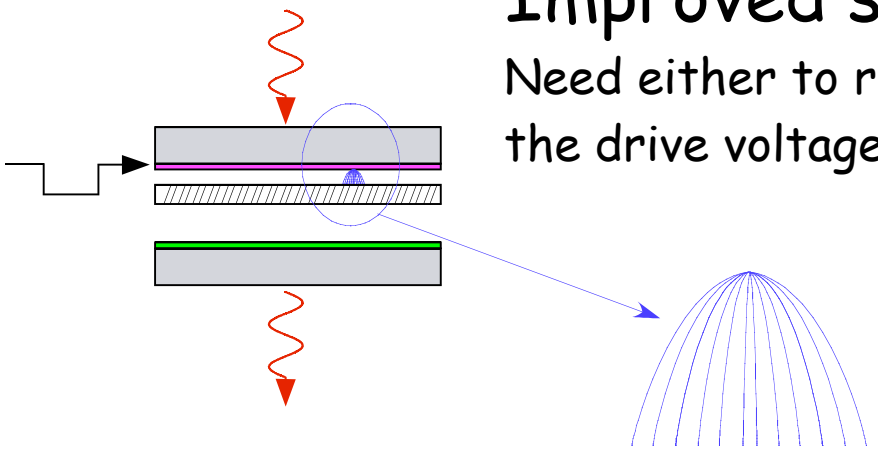
iii) Integration of gate width control scan and delay scan for optimisation of the signal level

iv) Gating upgrade to existing camera system (improved tubes as available)

Kentech Instruments Ltd.

Improved spatial resolution

Need either to reduce the Cathode to MCP gap or increase the drive voltage.



Electron trajectories are parabolic

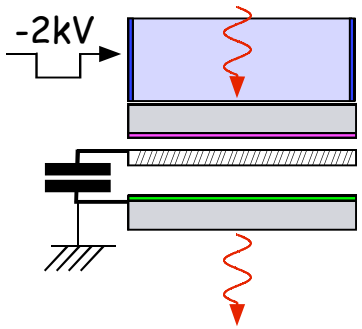
To keep the spot small one needs to accelerate the electrons quickly.

We are collaborating with Photek who will produce a tube with a smaller cathode to MCP spacing.

The smaller gap has more capacitance and so needs a higher current drive to deliver the same dV/dt and hence gate length.

Kentech will develop a faster and higher power amplifier to drive this new tube

Kentech Instruments Ltd.



Improved Temporal Resolution for Capacitive Gating

Need to isolate the cathode from the surrounding structure and yet have it very uniform.

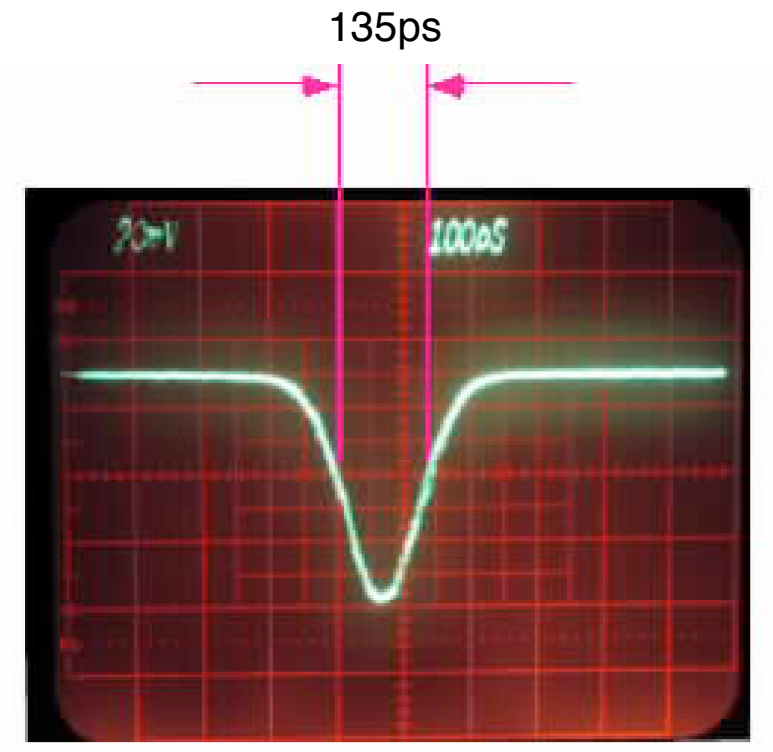
We are collaborating with Photek to produce a tube with a specially configured cathode that should allow uniform gating below 50ps

Kentech Instruments Ltd.

Improved Gate Speed for Direct Drive

Previously limited to around 250ps at 100MHz

New improved tube will do 135ps at 100MHz



This gate width measurement is obtained for whole tube gating.
It was obtained using a standard driver.
Future drivers will be optimised for this improved tube.

THE END