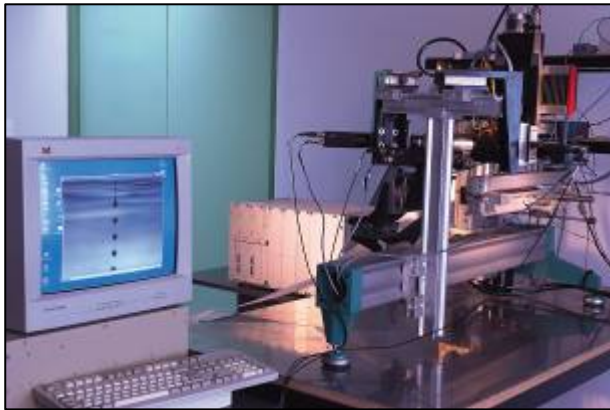
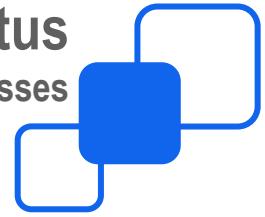
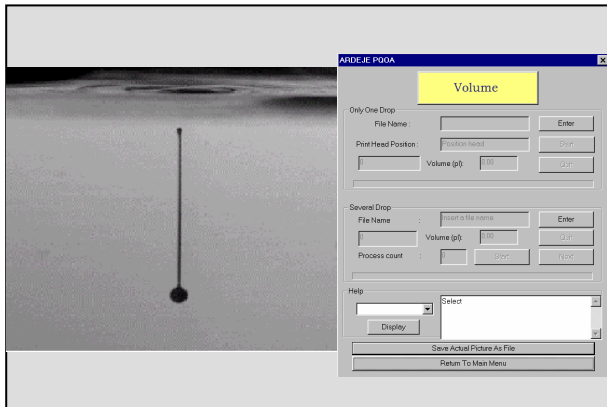
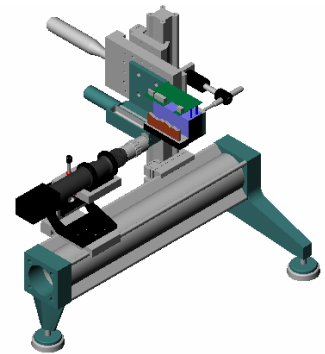


Print Quality Optimization Apparatus

Investigation of small objects during ultrafast processes

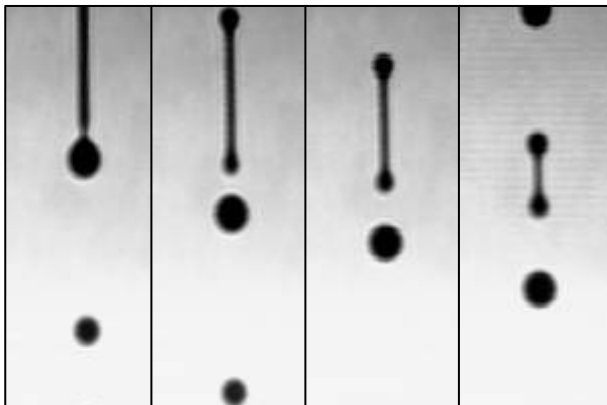


Print Quality Control
Optimization of Printing
Printed Dot Analysis
Drop Formation Control
Drop Impact Control
Visualization
Measurements
Analysis



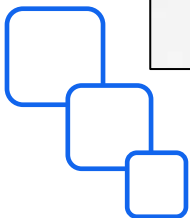
This system provides several measurements at the nozzle plate and can support wide range of print heads:

- Nozzle observation
- Distance between nozzles to nozzle
- Nozzle plate pollution



And the PQOA allows visualization during the flight:

- Volume $\pm 1\text{pl}$.
- Average Speed $\pm 0.1\text{m/s}$
- Speed, Volume, Physical characteristics for filament
- Speed, Volume, Physical characteristics for a possible satellite
- Follow-up of Drop formation



Measurements Methodologies

The PQOA system provides several measurements with two types of methodologies:

Automated results

- Snap and store the image of the objet under consideration
- Images are processed and the characteristics of the target object are determined
- Further mathematical analysis is performed to obtain the expected results
- Predefined data sheets are performed with graphical results

Semi-automated results

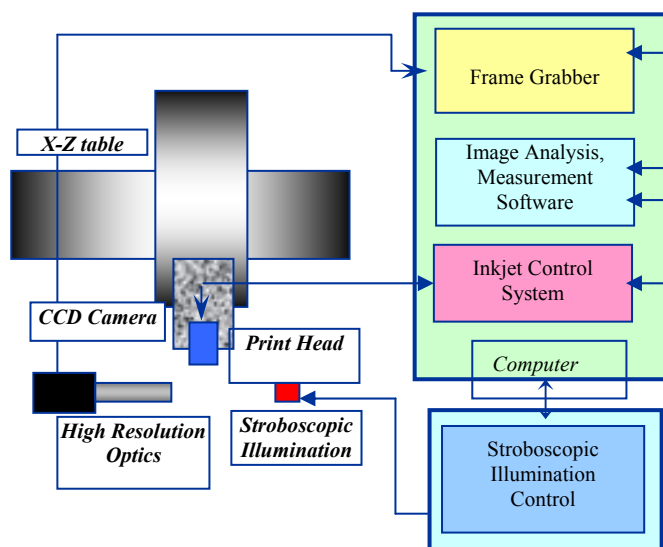
Require manual intervention during the process to determine:

- The speed
- The volume
- Physical characteristics of a satellite, for one given time and for each nozzle

Hardware Architecture

The PQOA proposes locations for image acquisition: drop formation at the nozzle plate and drop in flight.

A very high precision mechanical support is provided to perform the control of the head.



Optical System and Image Acquisition

The PQOA uses CCD cameras available with a frame grabber, which acquires images with adjustable magnification.

The electronic stroboscopic illumination control includes two types of illumination sources, laser diode and high luminosity LED.

The apparatus is capable of providing pseudo-cinematographic movies of the entire drop formation. This is useful for rheological and instability studies.