

This is a photo report on tube manufacturing plant at LOMO, St. Petersburg.

The plant has been equipped by Olympus in late eighties – early nineties as part of a joint venture endoscope design and manufacturing company. The principal technical staff undergone extensive training at Olympus plants in Japan.

The tubes made initially were intended for LOMO endoscopes designed similarly to Olympus devices. LOMO has been producing many thousands of scopes annually. The capacity of the tube manufacturing plant is up to 12 thousand units annually. As parts of the endoscopes the tubes have been tested per Olympus and EC requirements and certified for biocompatibility, toxicity, sterilization compatibility, etc.

The current LOMO facility is the only one outside Olympus which uses Olympus supplied equipment and technology, Olympus testing methodology and the best materials acquired in Japan, USA, EC and Russia.

Most of the manufacturing is located on one floor with an area of about 250 sq. m. Machining and coil manufacturing are outsourced to other LOMO departments. Design and engineering support groups are located in the adjacent areas.

#### Main tube manufacturing sections



Braid making



Tube core manufacturing



Extrusion



Printing



Coating



QA inspection & testing



Making the braids starts with weaving multi-strand flat cable on this machine. The Plant uses special steel wire and Kevlar thread (for large sizes); wire and Kevlar come from US, EC (European Community) and RF (Russian Federation)



This is original equipment that was supplied by Olympus and has been maintained on a regular basis by licensed staff



Then the flat cable is woven into braids; there are two machines tuned for different braid sizes



This is also original equipment supplied by Olympus



What comes out is a continuous braid which is cut into pieces and removed from the core



The braids then go to a tube core manufacturing section where they are strung over spring coils. Coils are manufactured from flat wire, coming from US, EC and RF, in the machining section in a separate building. The core assembly is done over a silicon rod. Once assembled, the cores are soldered "to spec" on distal and proximal ends



The clips are attached to the tube core, washed and degreased, and joined together to form a continuous chain of tube cores that will remain like that until the exit from extrusion machine. This is done on a device supplied by Olympus

There are two sinks where the tube cores are pressure washed and degreased



Here under negative air pressure the primer is prepared for application to the tube core The core chain is coiled on the drums and then passes through primer application and heating chambers





The primer application line is original equipment supplied by Olympus. In the end of the primer application cycle the tube core chain is coiled on a drum which is then transferred to the extrusion line.



This is the beginning of extrusion line. The line was supplied by Olympus and then modernized by LOMO and OEM technicians. It can make extruded tubes in the range from 4.0 to 15.0 mm, which is better than the range available on originally supplied line

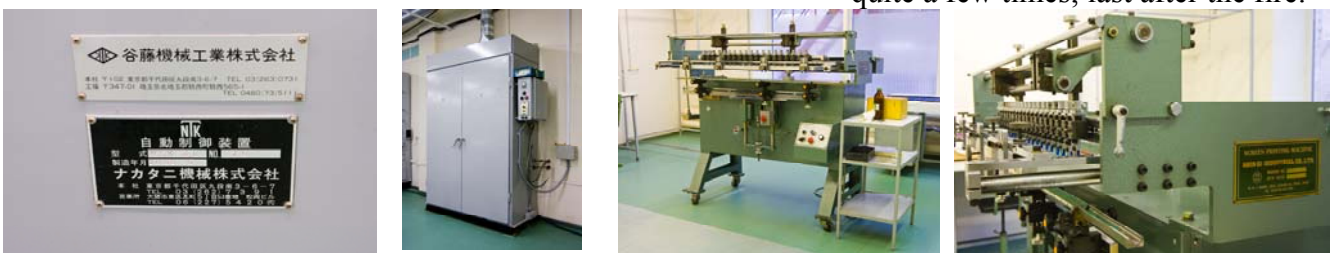


Here are the other components of the extrusion cycle line. All were supplied by Olympus. The polymers for extrusion are imported from Japan.



The polymer extruded tubes are coiled on a drum. This particular photo shows extrusion results for colono tubes; yellow color is because of Kevlar strands woven into the braid

The “brain” of extrusion line. This computer has been updated and upgraded by licensed technicians quite a few times; last after the fire.



The original device label

Polymer pellets preparation chamber

Printer; the original Olympus supplied printer was replaced a few years ago by a more sophisticated one from the same manufacturer.





Tube printing: loading, removing, drying after printing

Dry tubes ready for inspection



Printed tubes inspection

Inspected printed tubes ready for coating

Coating clean room: solution preparation chamber, stand for coating shorter tubes, chamber for THF preparation



Coating clean room. Left to right: long tubes coating; on the wall - humidity control unit, on the right – primary drying chamber, in the center – secondary drying chamber and final open drying. The cycle takes up to seven days



The clips are removed and tubes are cut to size

QA – on the right rigidity measuring device and visual inspection area

Olympus designed and supplied rigidity measuring device, Rheo Meter



Electrical test, equipment was supplied by Olympus

Inspected and sorted tubes ready for laser labeling

Laser engraving: brand, cat. number, s/n, lot number, dates: private labeling option and full traceability. Last step before packaging