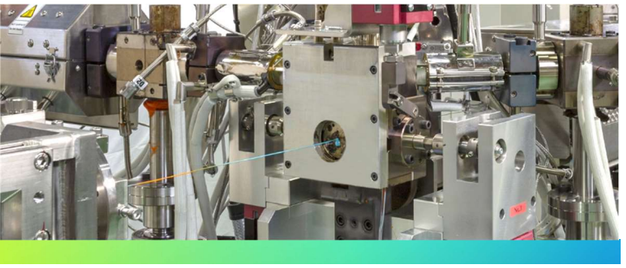
We prove innovation is still possible in extrusion and medical tubing



The latest extrusion mold, Hybrid Head, is suitable for "variable stiffness" catheter tube production, including the "soft tip".

PLA GIKEN CO.,LTD.

We, PLA GIKEN CO., LTD (Osaka, Japan), design & manufacture extrusion equipment, through which bring innovations to your medical manufacturing

Since 1977, we have designed and manufactured "custom polymer extrusion lines" for diverse industrial applications in Japan and worldwide. The key features of our machines and services include:

- **Complete, Custom Line Offers,** configured to meet the industries' most challenging goals; minimizing the defects, streamlining the existing process for cost reduction, or even developing a novel manufacturing approach, with the success guaranteed.

- We deliver **"Turn-key" Solutions** straight to the customer site; from the process development, test-runs to the successful start-up, our team of skilled engineers are ready to assist the customer through the project.

MIX-mini is a catheter tube manufacturing system, which won us the Monodsukuri Nippon Grand Award (Prime Minister Award).

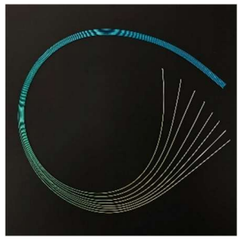
In the field of medical equipment manufacturing, we are one of the forerunners in the supplies of highly-integrated manufacturing systems for vascular access catheter tubes, endoscope insert tubes and other medical tubes

PUSHING THE ENVELOPE OF MEDICAL EXTRUSION

While the designs of medical tubing and catheters are becoming increasingly complex, streamlining the existing manufacturing approach is crucial in making such advanced medical technology more accessible and affordable. Our rich portfolio of solutions and close collaborations with medical equipment manufacturers have allowed us to rationalize medical manufacturing processes through innovations in extrusion.

One of our most notable R&D achievements is the extrusion molds specially designed for **automated production of tubes with variable stiffness**, such as components in medical catheters, endoscopes, etc. These molds, used in junction with multiple extruders, can intermittently change the resin to extrude, from the hard to the soft, and create a seamless change in tube stiffness.

The mold lineup offers variations, based on the desired lengths of the stiffness transition.



"Variable stiffness" tube samples made with a specially designed mold, Mixing Head.

The **MDX-series** are now high-in-demand medical extrusion lines that feature the "variable-stiffness" extrusion and enable an **automated production of flexible tubes** (such as catheter tubes) with a greater cost-efficiency and quality control, in comparison to conventional manual assembly methods (see the **FACT SHEET** below).

WHEN SHOULD YOU CONTACT PLA GIKEN?

If you need a new extrusion equipment for a specific, but have never built a line on your own, look no further than Pla Giken!

- **Machine Performance is Guaranteed**
  We do not just offer machines, but also success of your extrusion process. As our policy, we invite customers to in-house test runs of the finished machine for evaluation of the machine performance prior to shipment. We run the process and show that the products meet the required tolerance.

- **Powerful R&D Facility to Ensure Your Success.**
  Our research equipment includes a rheometer and various lab extrusion lines customizable for prototyping.

PLA GIKEN R&D Center

This experimental lab extruder that allows you to see the polymer behavior inside the barrel, suitable for testing a newly developed polymer material.

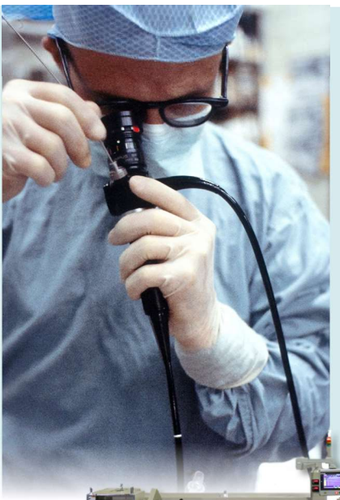
With our lab equipment, we can also help identify the causes of issues you currently have with your process, or find the optimal design for your needs.

Tell us about your process goals / specification of your products. We are here to help you!

CONTACT US

Website: http://plagiken.co.jp/en/
Phone: +81 6-6330-4851
E-mail to International Sales Staffs
Hiroki Iwai (Mr.) global@plagiken.co.jp
Eri Aida (Ms.) global2@plagiken.co.jp

Office Address: 39-6, Toyotsu-cho, Suita-city, Osaka, 564-0051 JAPAN



The flexible insert tube (left) is usually a metal braid and coil structure with a polymer coating over it. PLA GIKEN developed an extrusion line (bottom) which enables to create this polymer coating with **variable stiffness** by intermittent extrusion of several materials.

The variable stiffness extrusion was first developed to boost **catheter tube** production and its applications are ever expanding.

PLA GIKEN has designed & manufactured extrusion lines for:

- Medical tubing (multi-layer, multi-lumen)
- Endoscope insert tubes
- Catheters (including the braiding process)
- Guidewires (automated line)
- PVC sheets & tubes for blood transfusion bags, etc.

Image: tube samples made with Pla Giken extrusion lines and related medical equipment.

FACT SHEET : Catheter Manufacturing Approaches – Comparison

	Conventional Approach ("reflowing" method)	PLA GIKEN Approach (Integrated line)
Jacket Manufacturing	Manual assembly of jacket parts, using with heat-shrink tubes	Automation with "variable-stiffness" extrusion coating
Production time per piece	6 hours	5 mins
Required Equipment & Labor	Multiple extrusion lines (1 per jacket part required) + manual assembly personnel	1 extrusion line + 1 operator
Facility Cost	Millions USD	800k USD

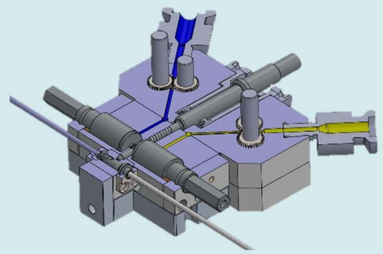
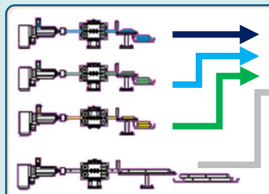
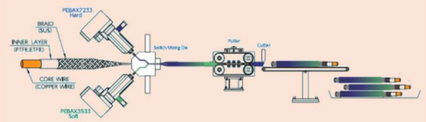


Image: 3D model of an early-design Mixing Head (patented), which enables "variable stiffness" extrusion.

PROCESS FLOWS : Conventional versus. PLA GIKEN



The catheter assembly is a painstaking process that involves mass-production of jacket parts and the core, manual assembly, bonding with heat-shrink tube and removal of the shrink tube.



With the **PLA GIKEN's extrusion approach**, the catheter tube manufacturing becomes a singular process of directly coating the core with 2~3 different polymer materials, with greater control over the output quality and at a lower cost.