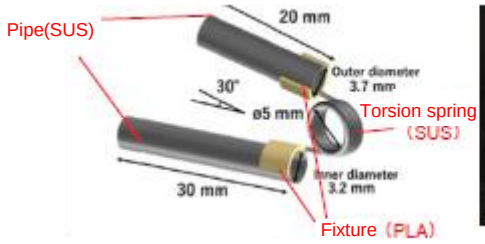
Tohoku Univ. Technology

Batch fabrication method by laminating method

Batch fabricating of complex parts using 3D printing robots

Objects of the present invention: Bent joint using torsion spring (left) and multi-directional active bending mechanism using shape memory alloy (SMA) wire (right)



Driving current : 300mA

Overview

In the fabricating industry, with the diversification of customer needs, the demand for high-mix, low-volume production and complex fabricating technology is increasing. In particular, for endoscopes, which are produced in high-mix, low-volume production, the parts processing and assembly work are generally carried out manually by skilled workers. However, there have been problems such as variations due to individual differences and time required for production by hand.

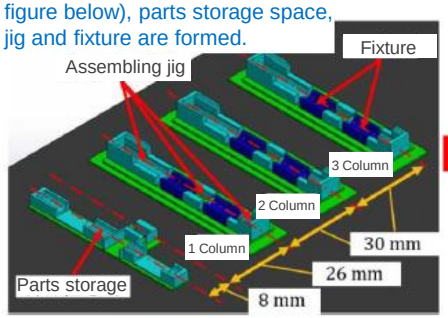
In order to solve the above problems, the present invention has developed a method for automatically and collectively creating complex parts fabricating and assembly processes using a 3D printer and a robot arm.

Specifically, a fixing table and a jig are laminated with a soluble material, and the parts are arranged on the main body using a robot arm. Then, the fixing table and the jig are dissolved (see right figure). We were able to test and confirm the operation of this technology by applying it to the joint of a chopstick endoscope used in otology (upper left figure) and a multi-directional active bending mechanism using shape memory alloy (SMA) wire (upper right figure).

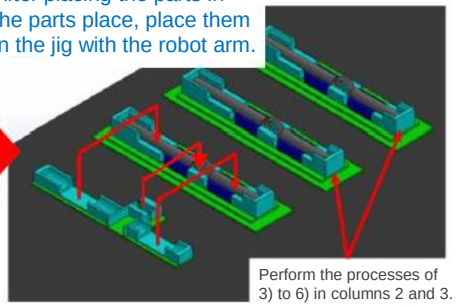
In the future, we aim to apply this technology to various minimally invasive medical devices and some consumer products by mounting various micro electronic components.

Outline of the batch fabrication process

The base (yellow green area in the figure below), parts storage space, jig and fixture are formed.

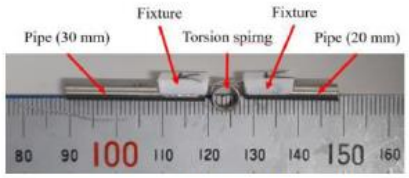


After placing the parts in the parts place, place them in the jig with the robot arm.



Perform the processes of 3) to 6) in columns 2 and 3.

Melt base and jig



Samples used in the present invention

Product Application

- Automation of high-mix, low-volume production
- Automation of complex parts processing and assembly operations

Related Works

[1] Proceeding of The 63rd Japanese Society for Biomedical Engineering (2024)

IP Data

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