FPM-Trinity:
3D Printing & CAD Flow

26th Oct 2023

Naohiko Hiramatsu

Process engineer

Development center

FUJI Corporation

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FUJI by the numbers

FPM-Trinity

Foundation
April 1959
65 years

Number of employees*
2,848 people

Net sales
FY2023
153 billion yen

Overseas sales ratio
FY2023
90%

Operating profit ratio
FY2023
17.7%

ROE
FY2023
9.4%

Market capitalization*
215 billion yen

Equity ratio*
89%

Dividend payout ratio
FY2023
37.7%

The data marked with * is accurate as of March 31, 2023.

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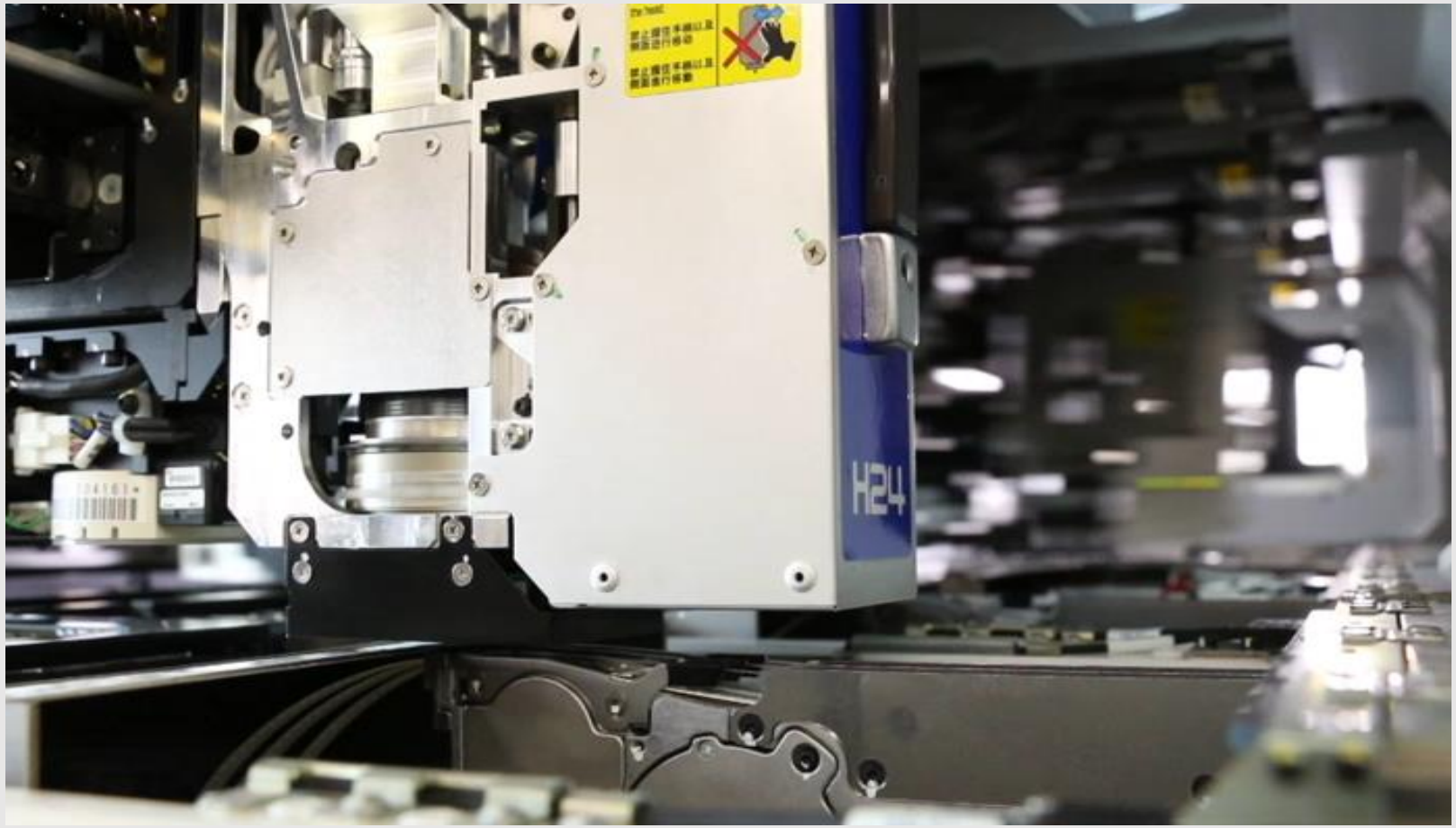
FUJI's main product

60,000 cph per robot



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Outline

1. What is the value that AM provides?
2. Why can FPM-Trinity manufacture substrates so quickly?
   - -Manufacturing processes of the printing and SMD P&P
   - -CAD data flow
3. Why does FPM-Trinity make it easy to create 3D shape?
4. Summary

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1. **What is the value that AM provides?**
2. Why can FPM-Trinity manufacture substrates so quickly?
   - -Manufacturing processes of the printing and SMD P&P
   - -CAD data flow
3. Why does FPM-Trinity make it easy to create 3D shape?
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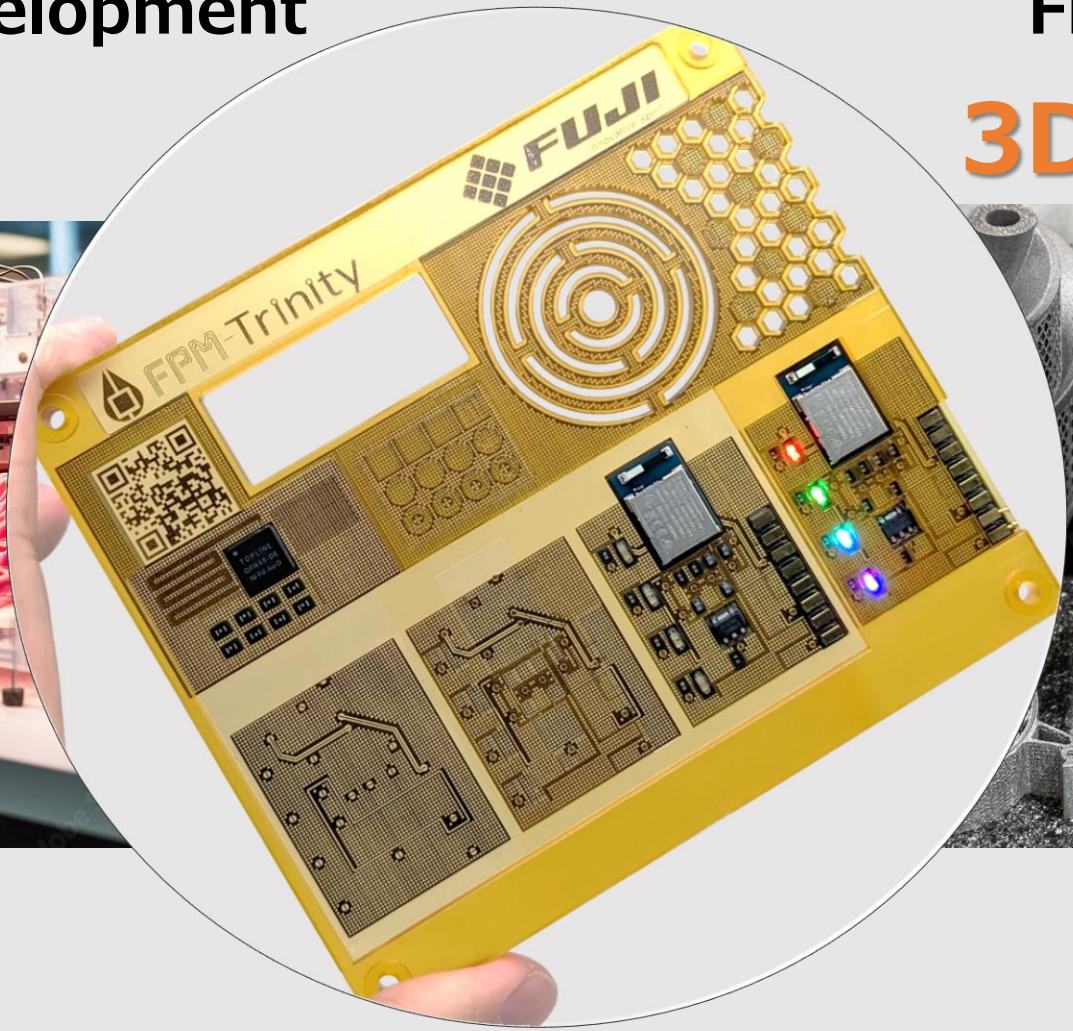
What is the value that AM provides?

FPM-Trinity

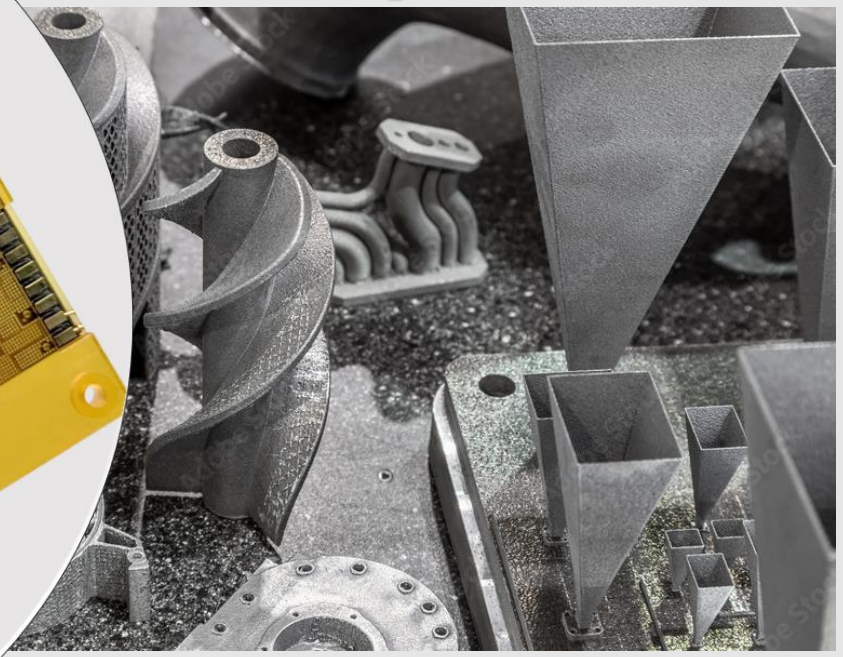
Speedy development

24Hr



Freely design

3D shape board



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1. What is the value that AM provides?
2. **Why can FPM-Trinity manufacture substrates so quickly?**
   - **Manufacturing processes of the printing and SMD P&P**
   - CAD data flow
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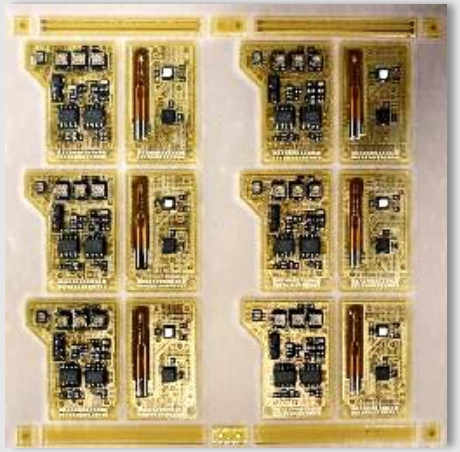
Why can FPM-Trinity manufacture substrates so quickly?

FPM-Trinity

Integrated AME + SMT

Circuit CAD design

24H



Parts placement
- Parts mounting head
- Vision system

Parts supply
- Alternative unit for feeder and tray

Inkjet heads
- UV resin ink
- Ag nano ink

Post printing process
- IR Heater
- UV exposure

Air dispensers
- Ag paste
- Epoxy glue paste

Post parts placement process
- Press heater

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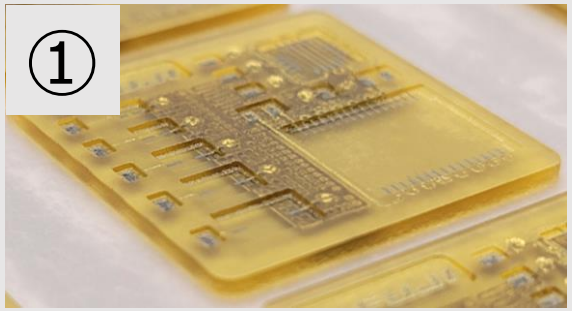
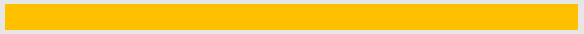
FPM-Trinity manufacturing processes

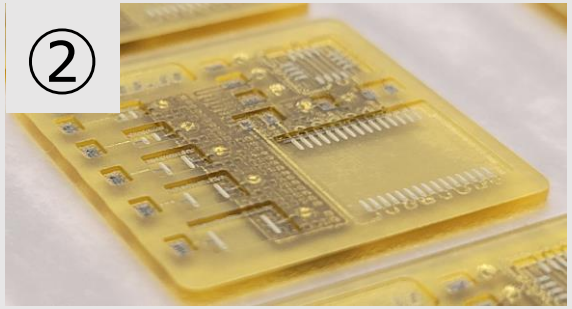


・Resin ink printing
・UV exposure

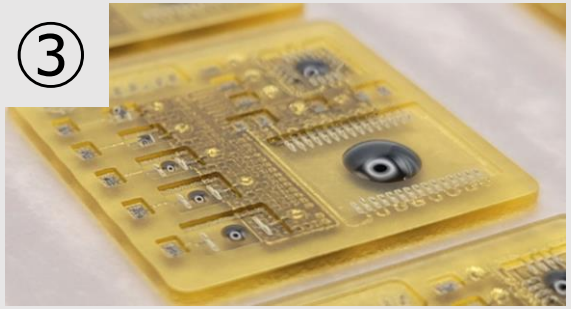


・Ag nano ink printing
・Drying and Sintering

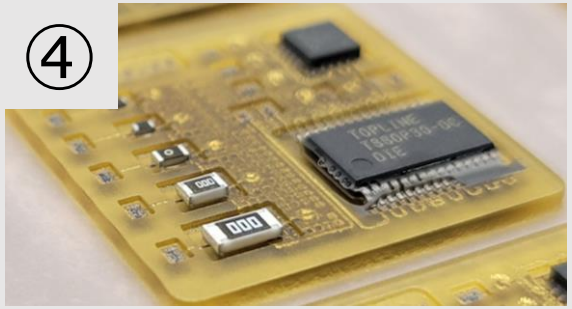
・Iteration of resin and Ag formation



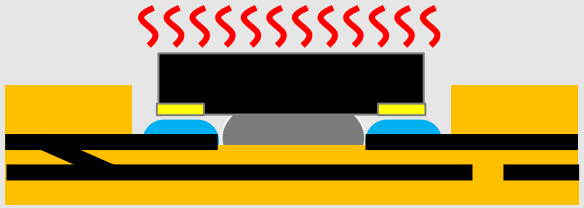
・ Printing Ag paste bump

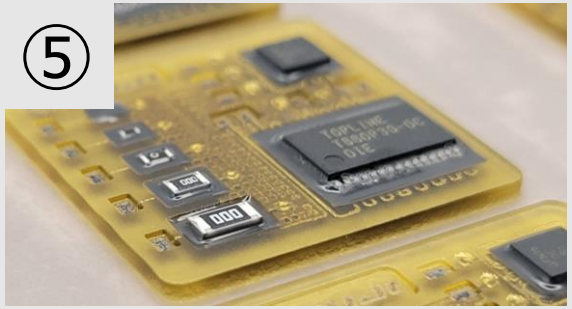


・Printing epoxy glue paste under SMDs



・SMD pick & placement
・Press curing





・ Printing epoxy glue paste around SMDs

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1. What is the value that AM provides?

2. **Why can FPM-Trinity manufacture substrates so quickly?**

   -Manufacturing processes of the printing and SMD P&P

   -**CAD data flow**

3. Why does FPM-Trinity make it easy to create 3D shapes?

4. Summary

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CAD data flow

FPM-Trinity

Trinity Host App

INPUT

E - CAD

M - CAD

3D — STL

2D — GBR

Parts data — TXT

Processing

- Line width correction
- Conversion to resin PNG image
- Conversion to circuit PNG image
- Panel layout
- Making target mark
- Machine command transfer

● : auto

Output

・Machine command

・Panel layout PNG image

PRINT SMD P&P

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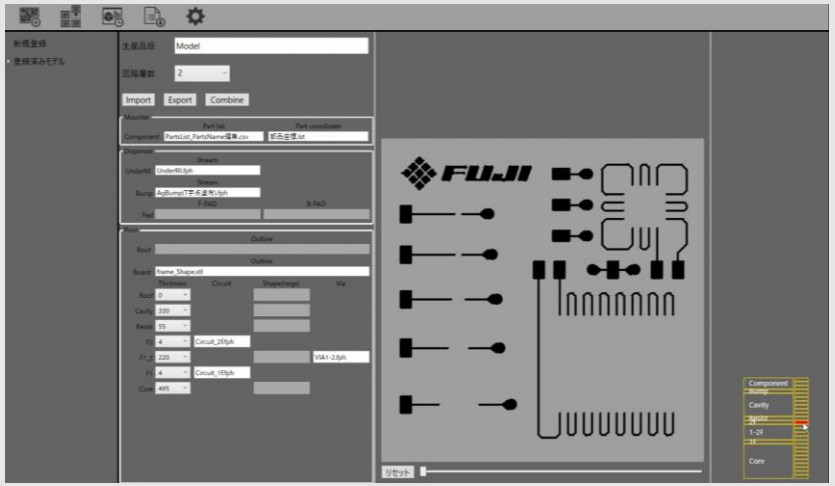
Trinity Host App “registration of boards”

Drag and drop

File

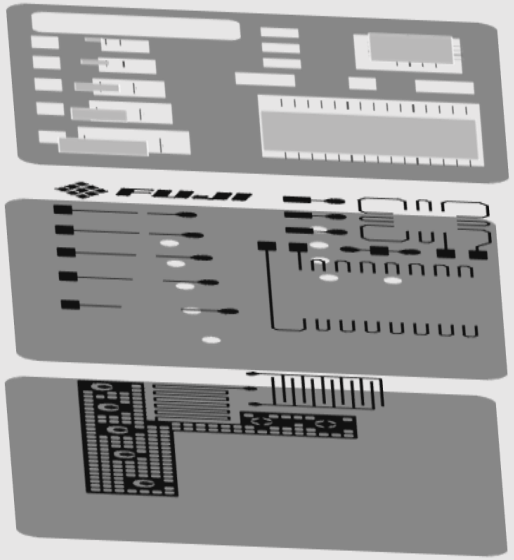
・Gaber data
・STL data
・Parts information

Trinity Host App



Conversion to PNG automatically

The registered board



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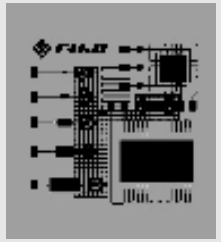
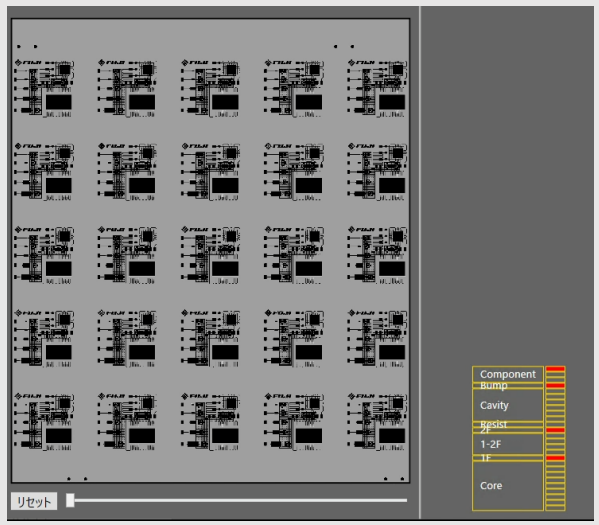
Trinity Host App “board layout” and transfer data

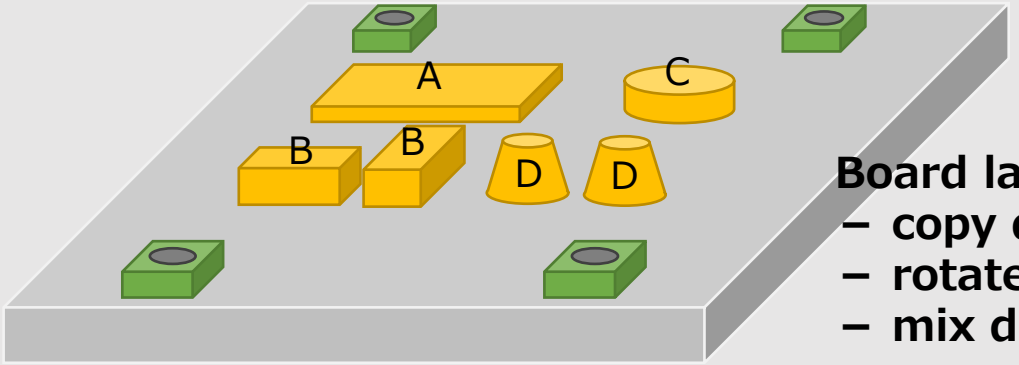
The registered board



Free
board layout

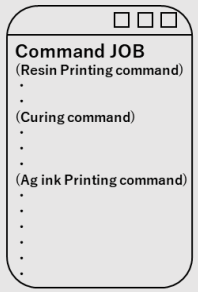


Target marks are automatically generated.

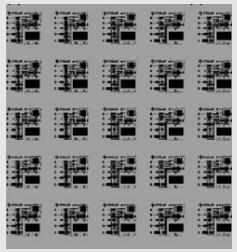


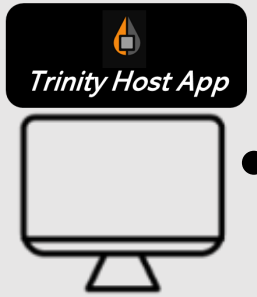
Board layout
- **copy designs**
- **rotate designs**
- **mix different designs**

Machine command



Panel layout PNG image





Transfer data
to FPM-Trinity

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4. Summary

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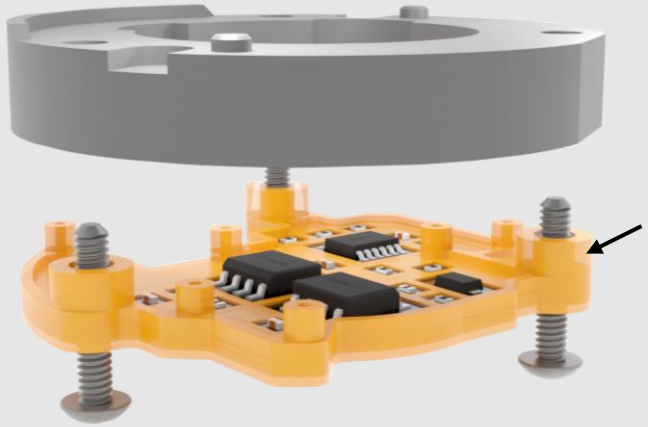
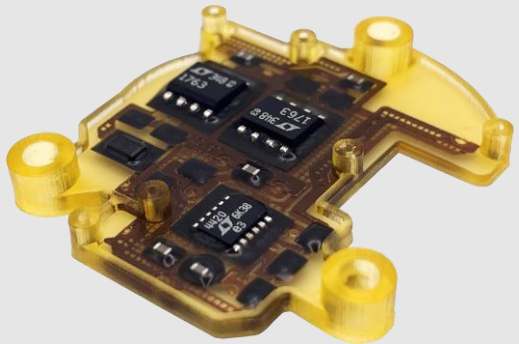
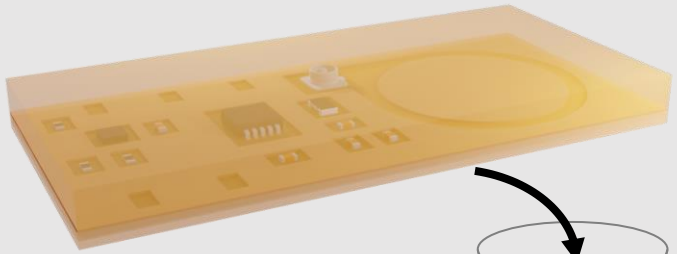
3D shape that FPM-Trinity can create

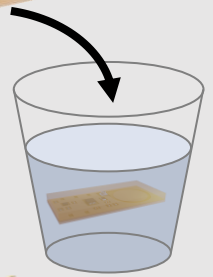
Adding spacers and openings

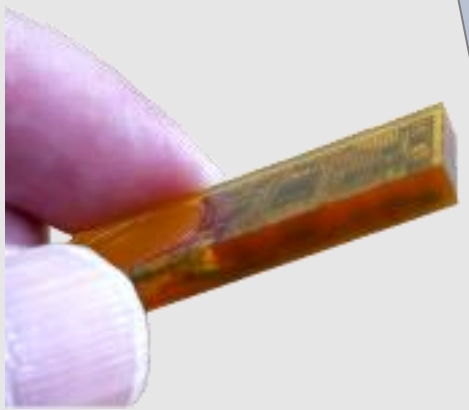




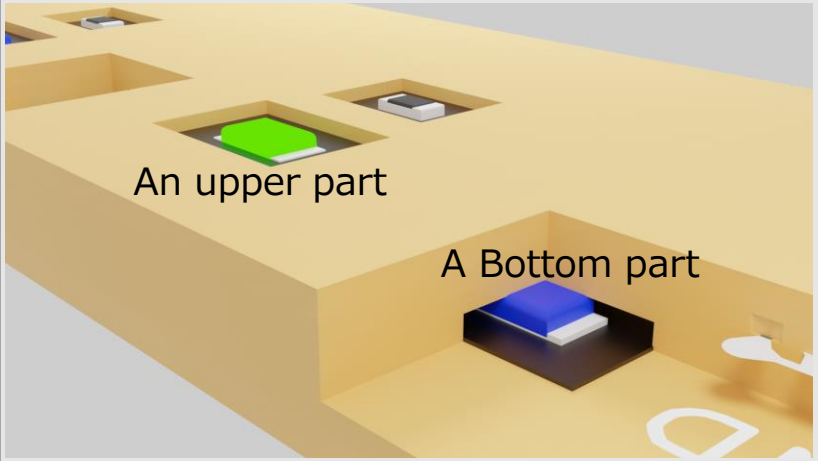
Embedding parts into the board







Three-dimensional placement of parts



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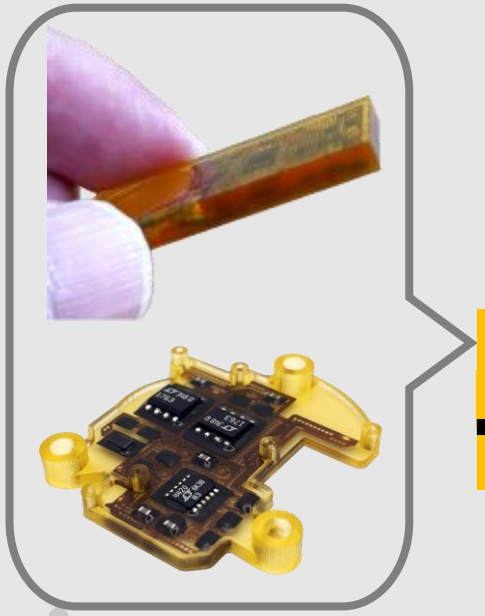
The process of creating 3D shape by FPM-Trinity

①1st SMT

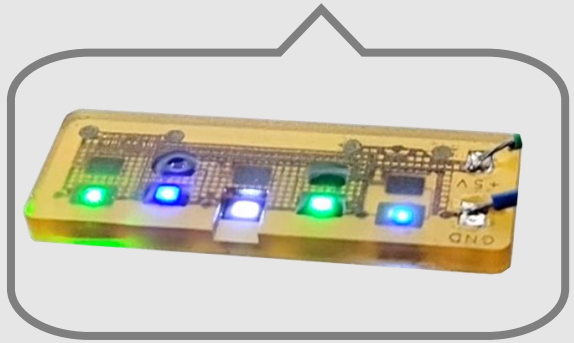
②Printing resin



③Printing Ag ink

④Ag paste filling

⑤2nd SMT



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Why does FPM-Trinity make it easy to create 3D shape?

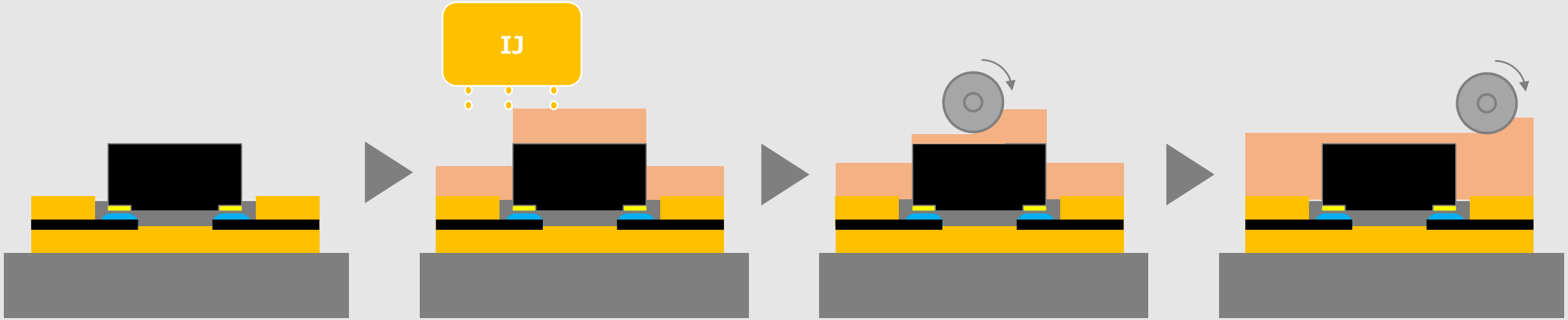
FPM-Trinity

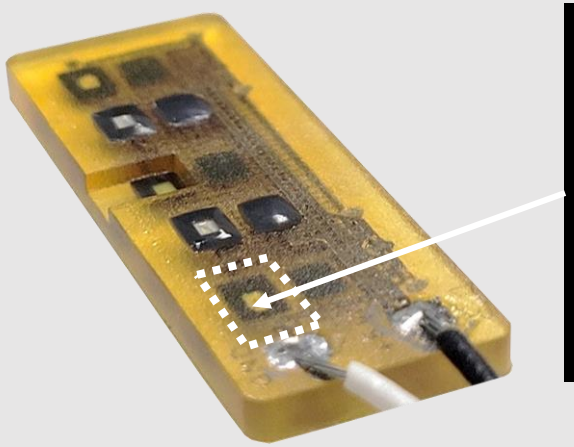
①1st SMT

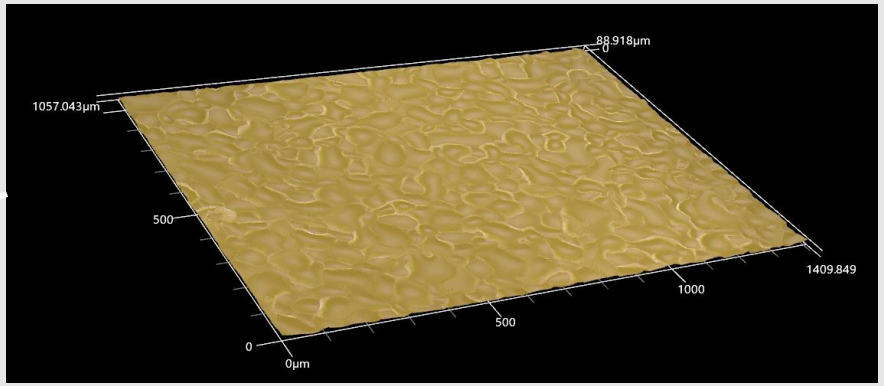
②Printing Resin

③Flattening

④Repeat(②→③)







Flat even above the part

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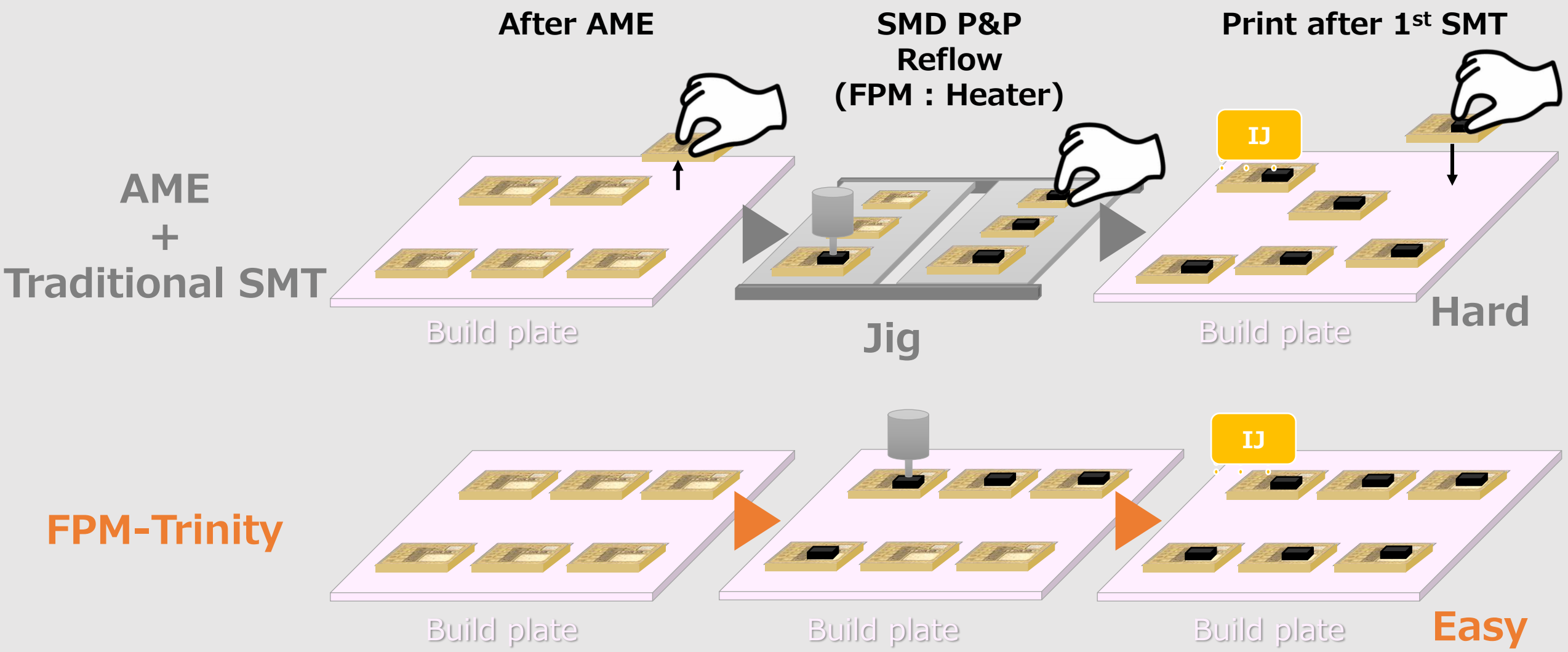
Why does FPM-Trinity make it easy to create 3D shape?



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1. What is the value that AM provides?
2. Why can FPM-Trinity manufacture substrates so quickly?

   the processes of the printing and P&P SMD

   Cad data flow
3. Why is it so easy to create 3D shapes?
4. **Summary**

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Fast testing cycles utilizing FPM-Trinity

Designing and improvement

Sample manufacturing

Sleeping for next ideas

Testing of samples

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What the hybrid of AME + SMT can achieve

- All in ONE !
- ONE stop !
- Within ONE day !
- From ONE piece !
- From ONE person !

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