

# **Proposal of a new removal pellicle structure**

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# Requirement of Removal pellicle

- **Desirable to prevent particle addition during inspection and handling of a mask**
- **Should be removed and attached before and after exposure under vacuum environment**

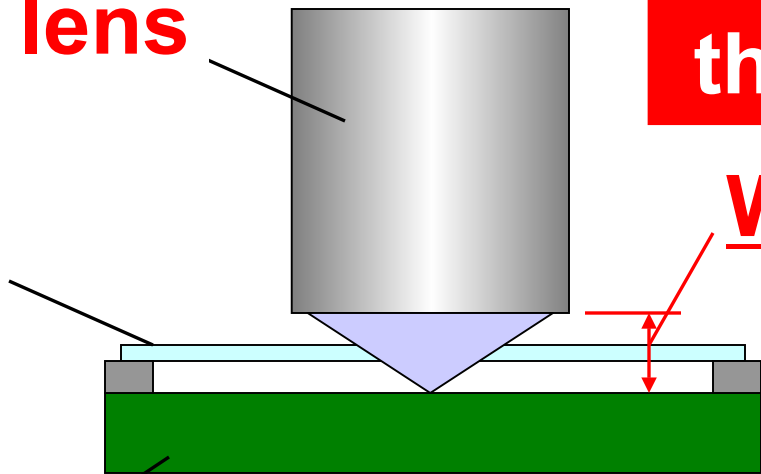
# Requirement of low stand-off

During a mask inspection

Objective lens

Removal pellicle

Substrate



The lower WD,  
the easier design.

Working Distance

Stand-off

< 2mm  
is desirable.

# Comparison of Pellicle type

	<b>Thickness compensation of an objective lens</b>
<b><u>Soft-pellicle</u></b>	<b>Not necessary</b>
<b><u>Hard-pellicle</u></b>	<b>Necessary</b>

# Features of Removal pellicle

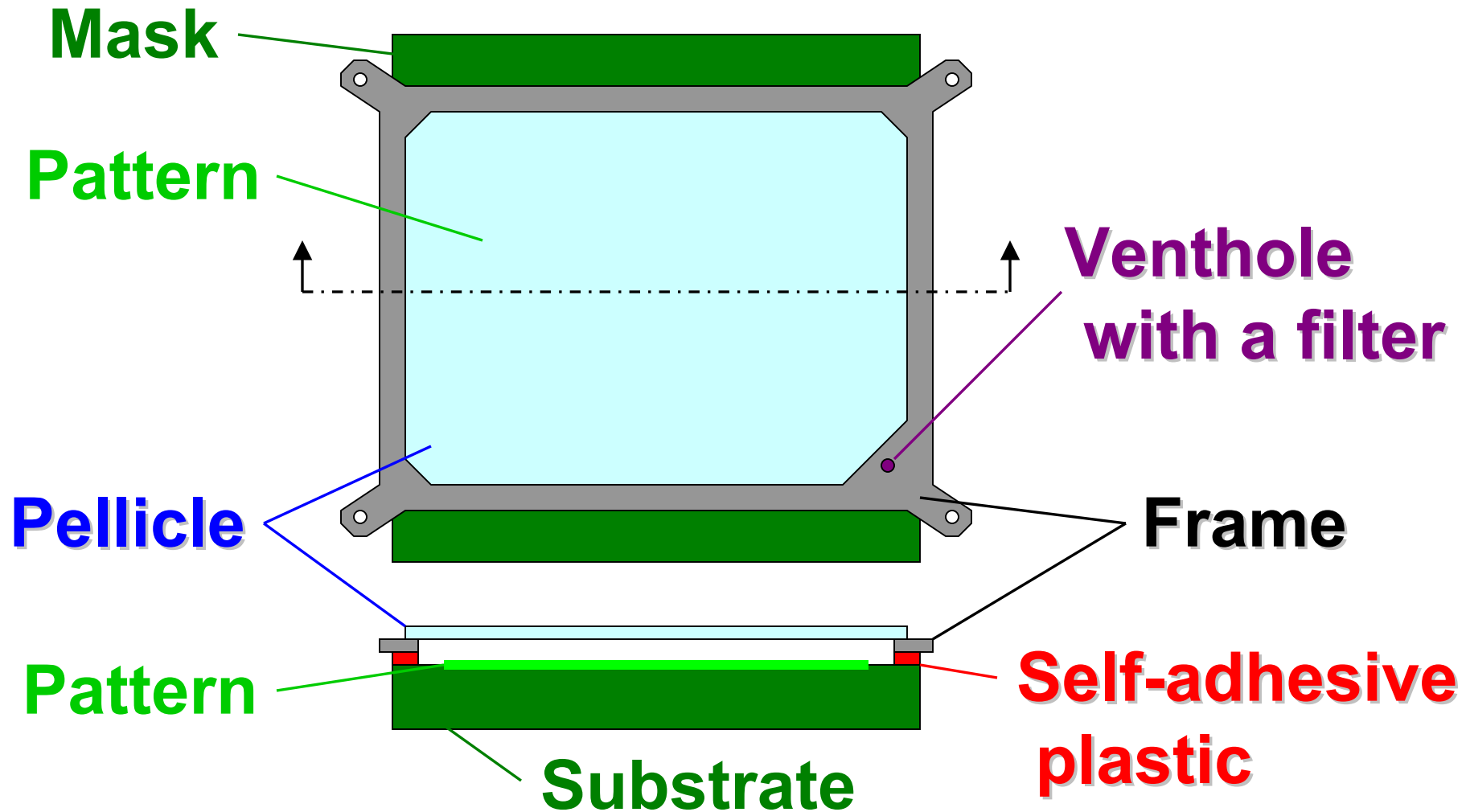
- **Simple structure**

- **Easy to remove and attach**

- **Low outgas**

- **No particle generation**

# A structure of Removal pellicle

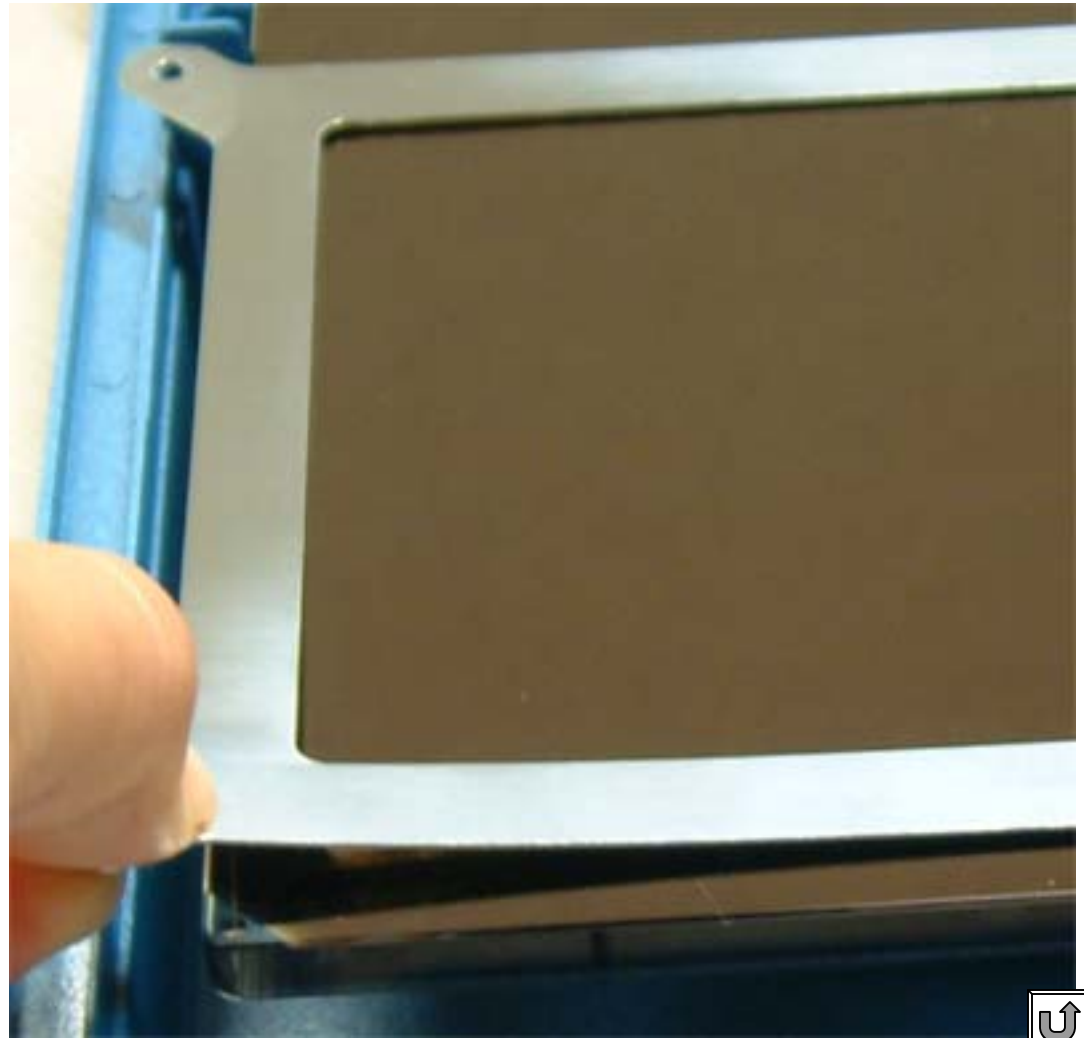


# A prototype of Removal pellicle



# Frame

- **Stainless-steel**
- **Thin and Flexible**
- **Easily bended by a small force**



# Self-adhesive plastic

**Backside**

**Frame**

**Self-adhesive plastic**

**Molding is desirable  
for mass production**

# Self-adhesive plastic

- **Material : Polyurethane**
- **Adhesion is not too strong.**  
**(possible to tune the adhesion)**
- **There was no residue on the mask.**  
**(We have checked using QSM400)**
- **No plasticizer**
- **Low outgas**
- **Water washable**  
**(Adhesion recover to initial level)**

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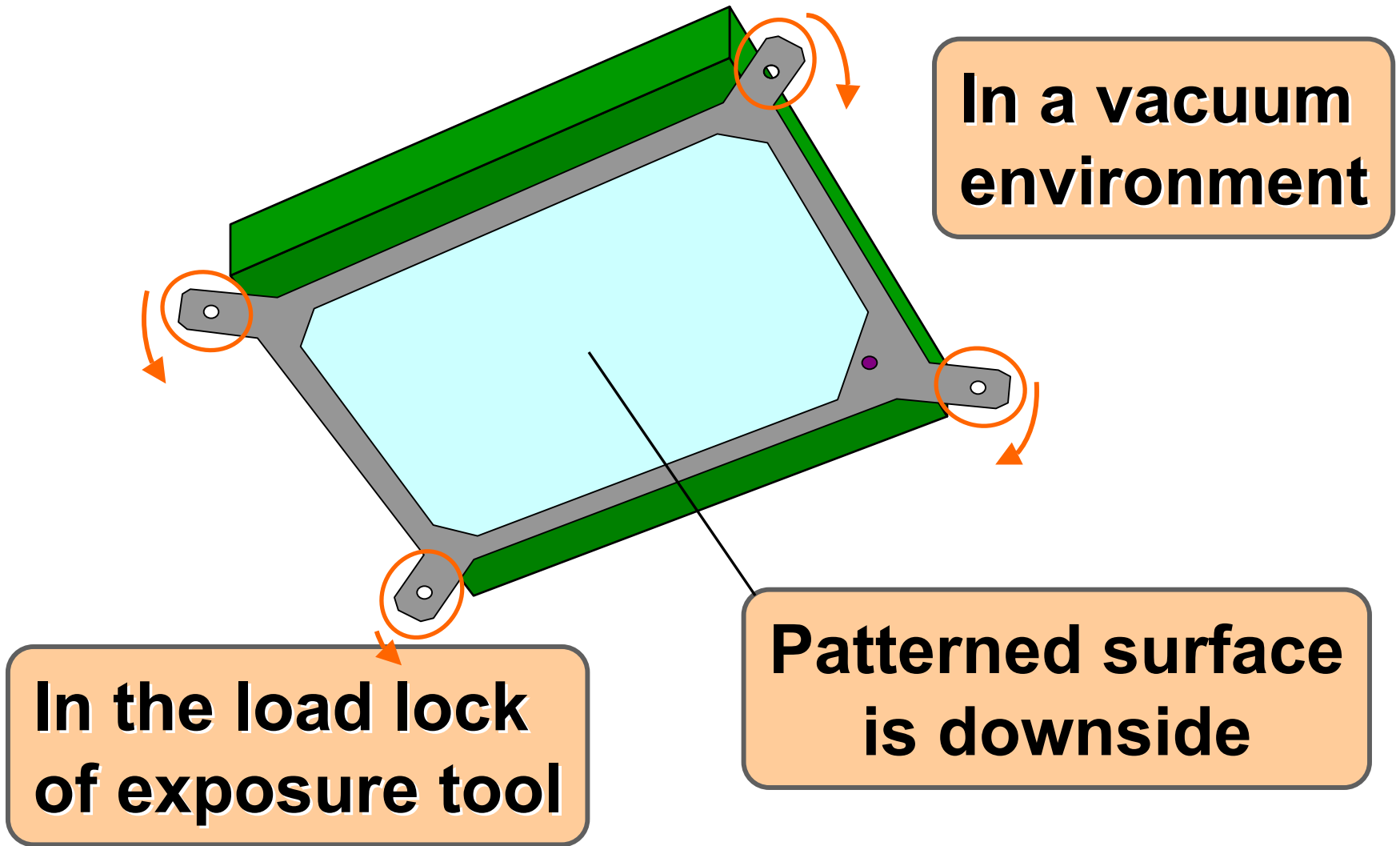


# Venthole with a filter

- **Release air pressure inside pellicle**
- **PTFE is attached for example**

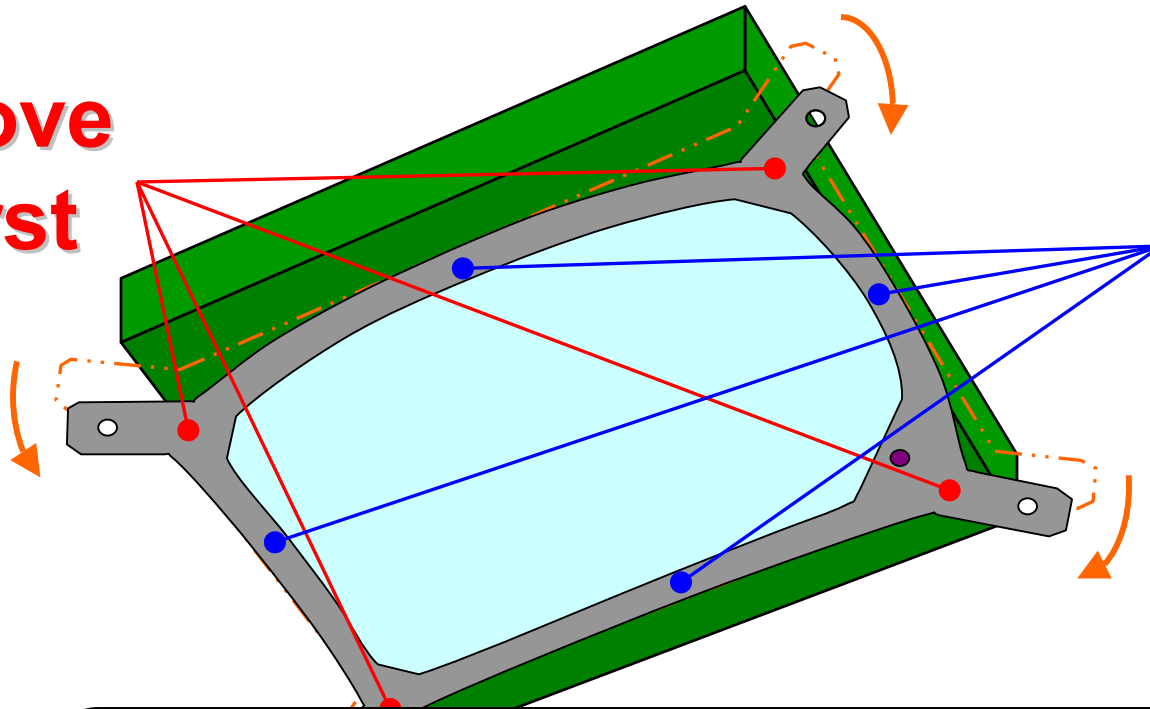


# Method of removal



# Method of removal

**Remove  
at first**



**Remove  
at last**

- **Peeled off by small force**
- **Simple mechanism**
- **Minimal particle generation**

# Method of removal and attachment



# Summary

- **Pellicle should stay on a mask during inspection and handling.**
- **Low Stand-off is desirable for inspection tool.**

**We have proposed a new type of removable pellicle with**

- **Simple structure**
- **Easy to remove and attach**
- **Minimal contamination**

# Future tasks

- **Evaluate particle generation in operating condition**
- **Investigate outgases of self-adhesive plastic under vacuum environment**
- **Optimize the stand-off height**
- **Minimize and evaluate leak paths**