

Attachment 4

Need a huge time to phase-out PFAS used for printers
EVEN IF the substitute material of PFAS is available in the
future

*The substitute materials instead of PFAS to fulfil for many of necessary
functions required in printing process is not available yet.*

In our comments on this consultation, we request the “time-unlimited
for duration of derogation” or “at least 12 years duration”. This
attachment provides with the supplementary explanation of the
reasons.

Challenging issues to be addressed for substitution of PFAS

We expect that it will take a huge time to explore alternative materials to fulfil the superior properties of PFAS, even if we focus only on PFAS containing in toner itself.

Since toner closely interacts with various components and units in the whole printing processes, a change of toner materials will have a large influence on various mechanical components, electrical setting, sequential process and software and so on, which are mutually influence each other. As a result, all of them will need to be changed, so a long period will be necessary for research and development for alternative materials.

Please note that the above situation is the same as ink other than toner.

Material

Toner and carrier materials affect various behaviors.

In case of changing a material of toner or carrier, a various properties such as charging properties, fluidity and adhesion, etc. will be changed, but only certain property cannot be changed. It is quite possible that extending one property degrades another. In particular, since PFAS is a material that satisfies many excellent properties simultaneously, it is impracticable to substitute materials for the toner and carrier while maintaining the same properties.

In addition, when the material of the toner and the carrier is changed, the mechanical device, the electrical device, the sequence, etc. must be changed.

Mechanical devices

In case of the toner material changes, the behaviors between the toner and the various mechanical components are also changed. (For example, a change in sliding behavior, torque of a motor, etc.)

In addition, the size, angle, thickness, strength, and material of the component may have to be changed to satisfy the physical behavior.

Changing the toner requires adjusting them. Because they interact in complex ways, they cannot be changed independently, and a lot of time is needed to satisfy all conditions.

Software

The printer and copy processes and operations requires precise movement of various parts, components and units in conjunction with each other.

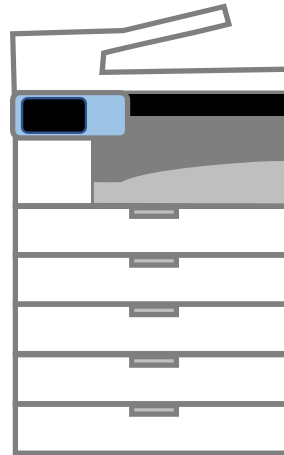
Each timing, elapsed time, voltage magnitude and application time, heater temperature and operation time, motor driving speed and time, etc. must be precisely controlled.

In case of changing a certain material in the toner, it is absolutely necessary to change all of these timings, operation times, intensities, and sequences.

They also affect each other, so it takes a lot of time to find a configuration change that meets all requirements.

Electrical properties

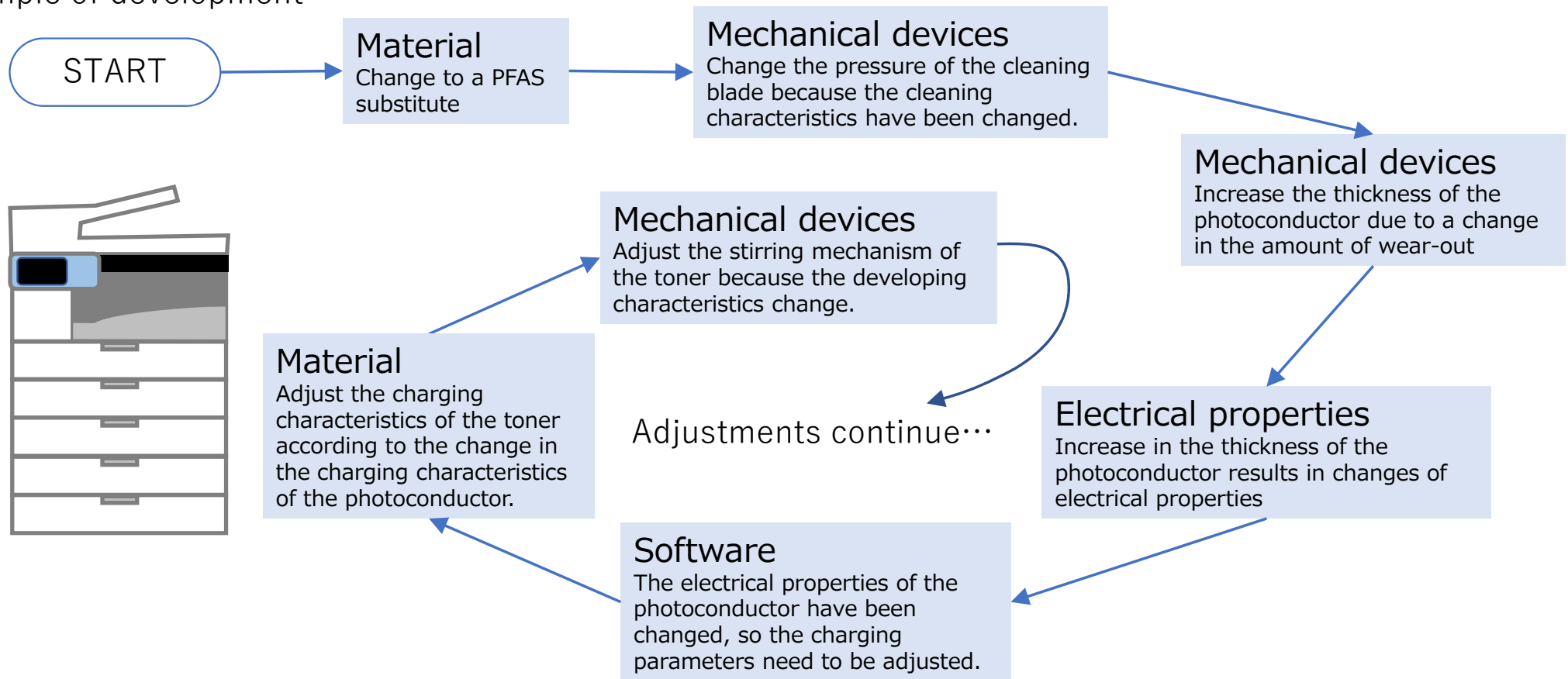
In the printing and copying operations, the toner must adjust its electrical characteristics with a photoconductive drum or an intermediate transfer belt. When the toner material is changed, the electrical settings must be changed too, but because various variables affect each other, it takes a lot of time to find an optimized setting change that meets all the performance requirements.



Challenging issues to be addressed for substitution of PFAS

The material change of a certain part will have an influence on many of various components and properties, which are mutually influence each other. As a result, all of them will need to be changed, so a long period will be necessary for research and development for alternative materials.

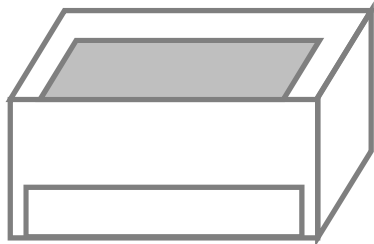
Example of development



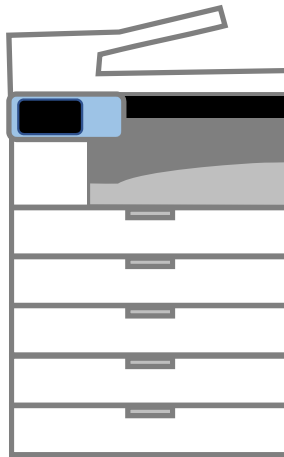
Can the development period of copiers and printers be shortened?

=> **We believe that it will be Impracticable**

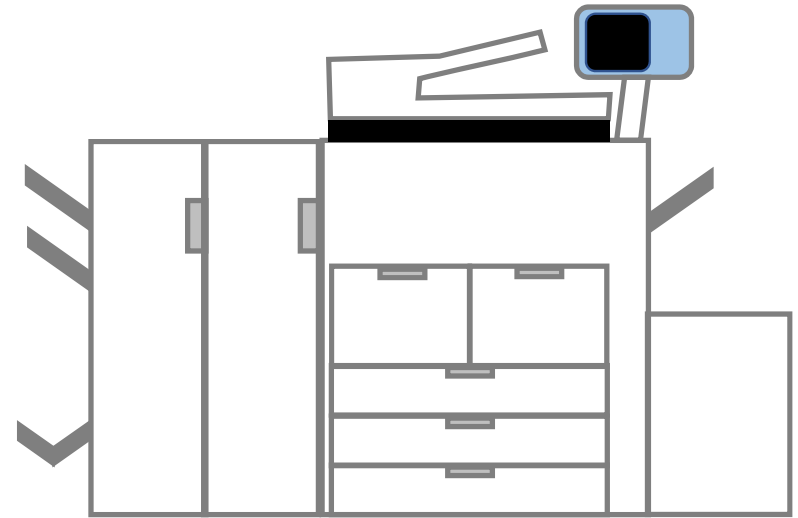
Performance requirements for copiers and printers, quality requirements for printed and copied images, and durability vary by model. Since there are few common development items in these developments, it is not easy to shorten the development period. For substituting materials, it will take at least two or three years for equipment development, matching with toner and ink, and production preparation respectively, and multiplied by the number of models.



Consumer model



Office model



High-performance/production model

Examples of
performance
required

- Maintenance Free
- Space-saving

Examples of
Output

- Documents used at home

Examples of
print volume

- 10~100 sheets/month

- High productivity (speed)
- energy-saving property

- Office documents

- 500~5000 sheets/month

- Printed image quality
- low running cost

- Catalogs, publications, posters, etc.

- more than 10000 sheets/month

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**This page refers to toner as an example of consumables, but also ink.*



exploration and development of materials

toner development

development of equipment & Matching

production preparation

Delivery/
Sales/Service

The substitute material for PFAS is currently not available for toner, so the joint research and development with materials manufacturers will be required.

- confidentiality agreement
- joint development agreement
- Testing of chemical substances and registration
- Screening test for basic characteristics
- Performance tests for material selection
- Adjustment work for improving characteristics (Material shape, size, mixing ratio, etc.)

Development of toner & carrier takes time even after material determination

- Matching of new raw materials with other materials
- Adjustment of properties such as friction coefficient, dielectric constant, electrical resistance, fluidity, and thermoplastic properties
- Adjustment of charging characteristics in developing device
- Durability to maintain performance over long periods of time
- Maintaining characteristics under various environments such as high temperature and humidity

After the development of the toner & carrier, it is necessary to verify whether the functions are appropriately work in the copying and printing processes.

- Is it properly discharged from the container? Is it necessary to adjust the discharge mechanism?
- Is image development is appropriate? Is it necessary to change the agitation?
- Is it necessary to adjust the nip width between the developer and the photoconductor?
- Is the toner remaining in the photoconductor properly cleaned? Is cleaner adjustment needed?

It is necessary to verify that the quality of the product meets a various requirements as final product prior to production processes.
(For example, it is necessary to measure VOCs emitted from machines and inspect that they fall below the permissible value specified by environmental labels, etc.)

- If production processes and / or facilities need to be changed, it is necessary to develop an investment plan and to carry out modification of facility or construction.
- It is necessary to carry out equipment tests, etc. depending on modification of facility or construction. In some cases, it is necessary to undergo statutory inspections and occupational safety audits.

Some countries require customs clearance procedures, so it is necessary to do so in advance.

It may take several months to ship products by sea.

For a stable delivery of products, it is necessary to establish a supply system by multiple raw material manufacturers. It is quite important from the view point of the Business Continuous Plan.

3-4 years

2-3years x models

2-3years x models

Few years

Each country's PL law under Council Directive 85/374/EC(Product Liability Directive) imposes product liability for 10 years, meaning that after selling, the company must continue to provide spare parts for another 10 years.

In other words, **the development period of equipment and parts (7 to 10 years or more) plus the provision period of spare parts (10 years) is required to complete the PFAS-free process.**