BROTHER® HL-2230 • 2240 • 2270 • 2280 • DR420 • 450
OPC DRUM CARTRIDGE REMANUFACTURING INSTRUCTIONS

BROTHER® DR420 OPC DRUM CARTRIDGE

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REMANUFACTURING THE BROTHER HL-2280/DR420 OPC DRUM CARTRIDGE (DR2200 EUROPE/DR2225 ASIA)

By Mike Josiah and the Technical Staff at UniNet

First introduced in December 2010, the HL-2280 laser printers are the next generation of Brother's newer higher quality engines. As with all previous Brother engines it has its quirks but is better than the previous engine. Read further for an explanation of a very large quirk in this cartridge.

The HL-2280 series of printers are based on a 21-27ppm, 2400 x 600 dpi machine that comes standard with a duplexer built in. With a list price of $149.00 USD, including the duplexer, these machines are going to be very popular. The DR420 has a list price of $104.99 USD.*

***List price, as of September 2011, in U.S. American Dollars.**

CURRENTLY MACHINES BASED ON THE HL-2280 ENGINE

DCP-7055
DCP-7060D
DCP-7065D
HL-2130
HL-2220
HL-2230
HL-2240
HL-2240D
HL-2270DW
HL-2280DW
MFC-7360N
MFC-7460DN
MFC-7860DW

The OEM stated yield is ESTIMATED at 12,000 pages. This number is based on the number of actual drum rotations, not the pages printed. There is a “start rotation” at the start of every job, and a “stop rotation.” So, if one page is printed, there is the start rotation, 3 1/2 for the page; and the stop rotation, for a total of 5 1/2. The larger the average print job, the longer life the drum will have. Just keep this in mind if your customer is complaining about a short drum cartridge life. This is all explained in detail in the user manual and also the service manual.

IMPORTANT: Brother print systems have always been different, and this one is no exception. It’s even different from the traditional Brother systems. In the past, the drum cartridge had a “charge brush” that attracted the waste toner to it, and at the correct time, repelled it to the drum so the developer roller could pick it back up. This new cartridge has done away with the charge brush! There is no mention of any theory in the service manual, so we are looking into (many of) Brother’s patents to see how this works now.

Our personal educated guess is this: the developer roller has always put the toner out there for the drum to print with, and they have always picked up the waste toner from the charge brush through the drum. We believe that Brother has just eliminated the “middle man” so to speak. The developer roller still presents the good toner in the same way, but it also is picking up the waste all pretty much at the same time. Time will tell, but if this is how it works, then the multi use life of the drum cartridge has been greatly extended. This is a simpler but also (timing wise) much more complicated system. As we obtain more info on this, we will update these instructions.

CARTRIDGE THEORY

The following cartridge theory has been modified to fit the previous explanation. We also left in the “charge brush” theory, so you see what the previous potential issues were. This is all important to know as failure to clean the toner cartridges properly causes backgrounding. We believe this will still be the case, the culprit this time, instead of the charge brush, will be the developer roller. It is more important than ever to clean out the toner cartridge properly, and to also make sure the developer roller is clean. There are dedicated-Brother developer roller cleaners on the market that are perfect for this. We do not recommend any kind of alcohol as it will remove some of the conductive layer and cause issues with density and now also backgrounding.

The cleaning section of typical Brother drum cartridges consists of a "cleaning brush" and a recovery blade. This brush has two opposite charges placed on it during the print cycle. The first attracts any remaining toner off the drum. The second repels the toner off the brush back onto the drum where it then transfers back into the toner cartridge. This is all done in a timing sequence that does not interfere with the printing process. If the cleaning brush becomes contaminated with bad toner that will not charge, the brush will not be able to clean itself, and back grounding will occur. It seems to be the nature of contaminated toner that it will accept most of the charge to be cleaned off the drum, but it will not accept the charge that would allow the brush to clean itself off at all. A properly working cleaning brush will at any given time have only a small amount of toner on it. Once contaminated, toner will accumulate, which will only cause the problems to get worse.

Since the developer roller actually contacts the drum, some toner is transferred back into the supply of the toner cartridge. Once you print with a bad toner cartridge, the drum unit will become contaminated. Even when you change out the toner with a good properly recycled or new OEM cartridge, the drum unit will transfer some of the bad toner back into the good toner cartridge, which will again cause backgrounding. Both cartridges will be contaminated again.

The DR420 cartridge, since it does not use a charge brush, has the reverse charge on the developer roller which allows it to pick up the waste toner from the drum. Again, it will be critical for the developer roller to be clean!

The rest of the print theory is the same as previous engines.

The remaining 80 grams, or so, of "toner" in the toner cartridge is just below the bare minimum that can maintain the proper charge level. When the “change toner” light comes on, the toner will not charge up to the proper level and will cause the backgrounding. As the toner cartridge reaches the end of its useful life, the printer senses the “low charge” level in the toner supply and will try to keep the charge level up. This constant charging keeps an almost "empty" cartridge from backgrounding. Once the printer cannot get the remaining toner up to the minimum charge, the “change toner” light comes on. The cartridge at this point will still be printing properly. If you were to take that same cartridge out of the machine for a few days, and then put it back in the printer without doing anything to it, the cartridge will shade. This will happen because the charge level that the printer was trying so hard to keep up has dissipated out and the materials left can no longer accept a proper charge.

What does this all mean?

1. Make sure that your cartridge technicians thoroughly clean out the supply chamber of the toner cartridge.
2. In the event that they forget, and you have a shading cartridge, the toner must be completely cleaned out again (do not use the toner over) and NEW fresh toner MUST be installed.
3. The developer roller must be cleaned with a dedicated developer roller cleaner.

SUPPLIES REQUIRED

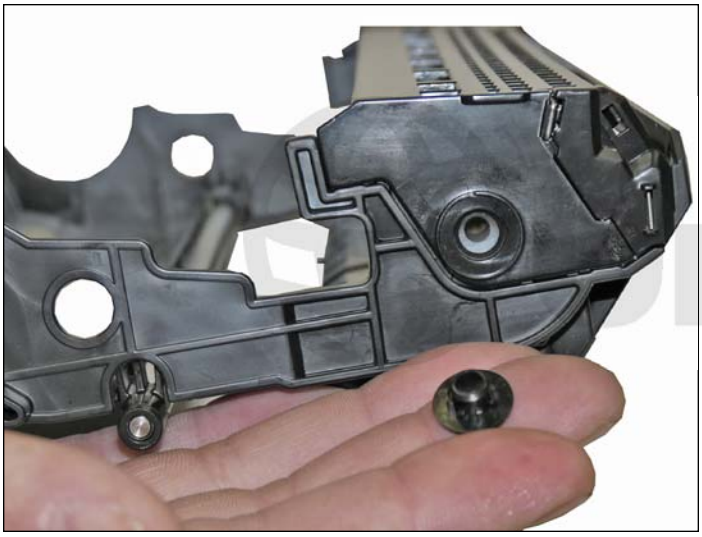
1. New drum for use in Brother DR420
2. Cotton swabs
3. Isopropyl alcohol
4. Drum padding powder

TOOLS REQUIRED

1. Small common screwdriver
2. E-ring pliers
3. Vacuum approved for toner

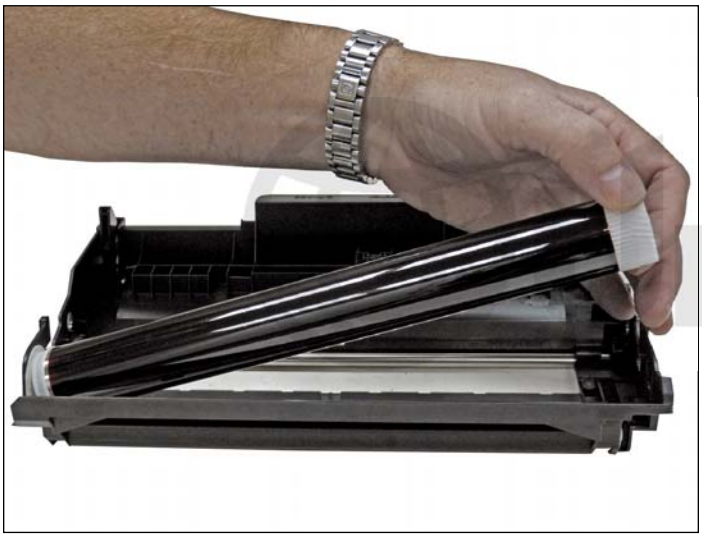
1. Remove the E-ring from the non-gear side of the drum axle shaft.

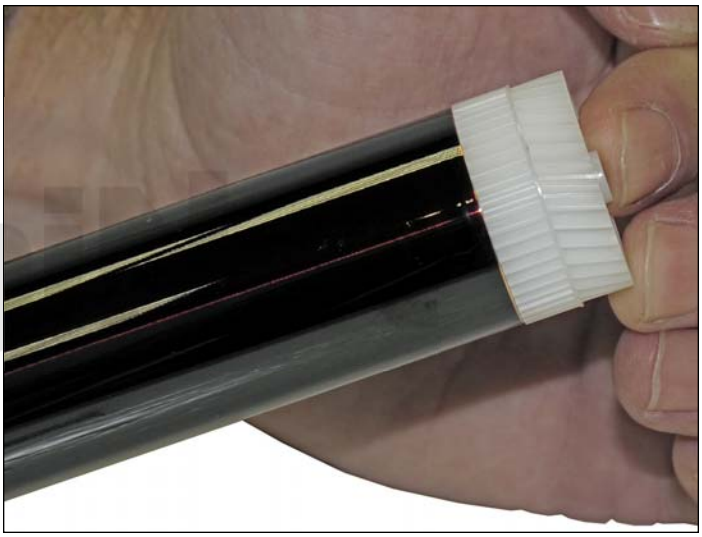
2. Remove the drum axle from the non-gear side of the drum. If you try to pull it out from the gear side, the shaft will jam up on the drum's ground contact, and damage the contact.



3. Be careful not to lose the round drum bushing, from the non-gear side of the cover!

4. Carefully pry up and lift off the top cover/corona wire assembly from the cartridge.

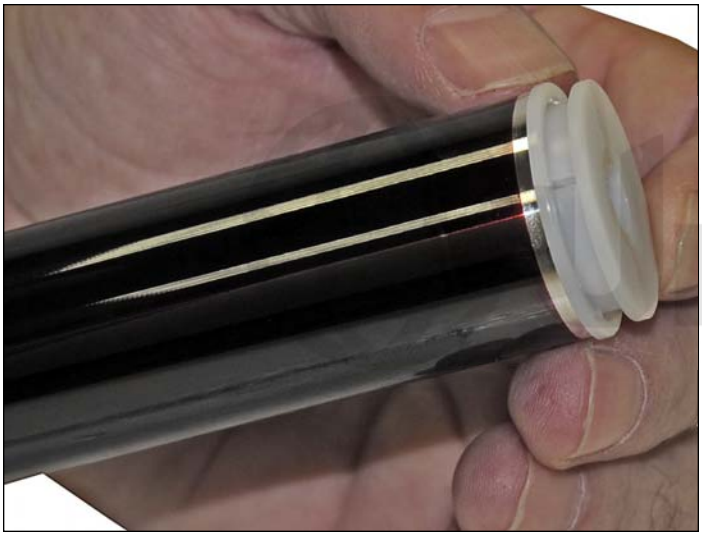




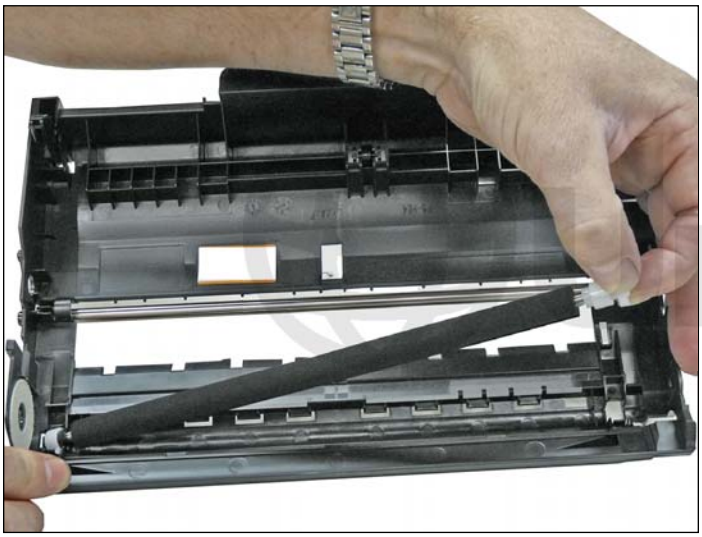
5. Carefully remove the drum.

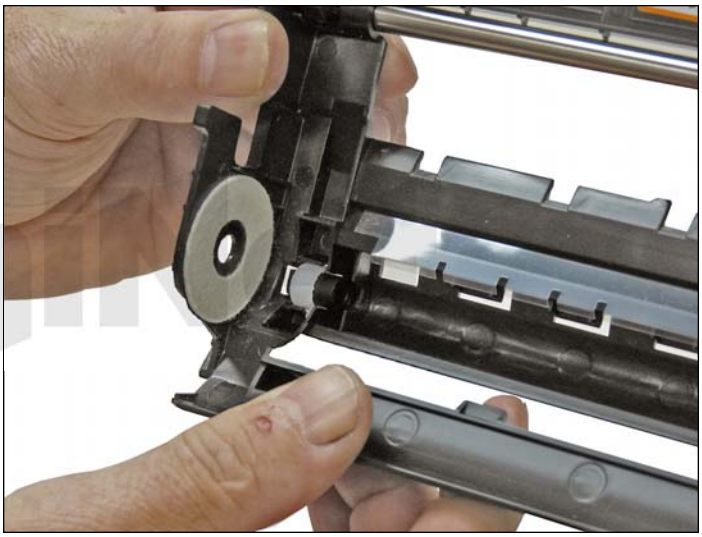
Note that there is a one-piece drive gear, not two, as in previous Brother drum units.

The hub side is also spring loaded, and is not easily removable.

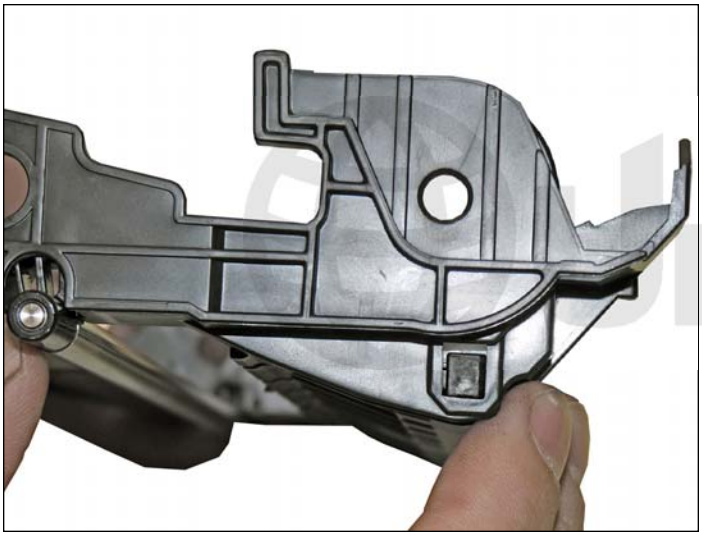


6. Carefully lift out the transfer roller from the gear side. Be very careful not to touch the roller with your skin. As with any transfer rollers, the oils naturally present in your skin will be absorbed by the roller and interfere with the transfer process, causing light print.





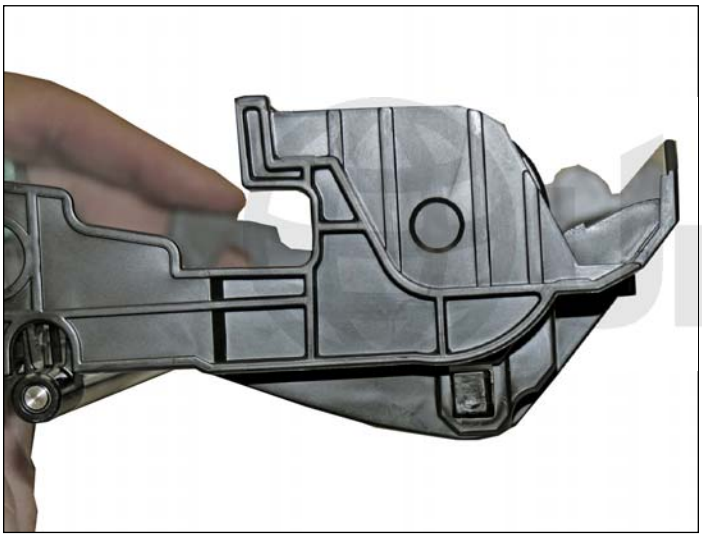
7. **IMPORTANT**: Note that there will be a small white bushing with an internal black plastic spacer left in the cartridge. This spacer keeps the transfer roller touching the electrical contacts on the left side of the cartridge. Be very careful not to lose this spacer! The cartridge will either print very light, or half pages, if it is missing. It is best to remove this spacer and bushing while cleaning the cartridge. With compressed air, blow off the transfer roller. Unless you have a statically grounded vacuum, do not vacuum this roller.



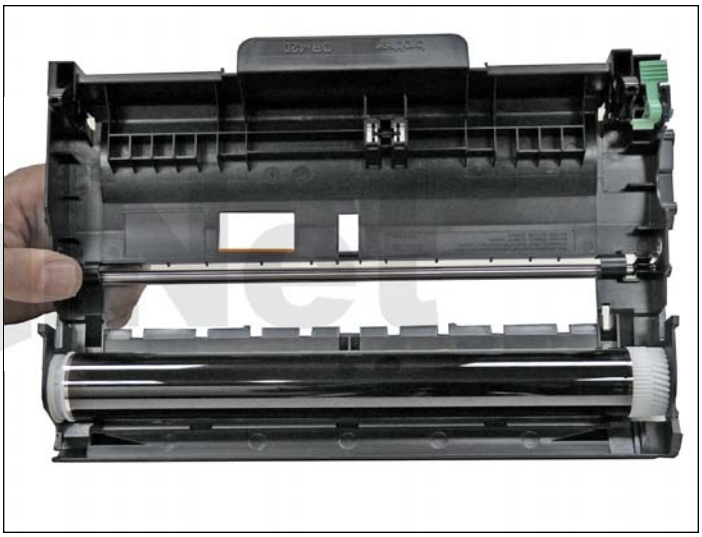
8. Reinstall the small black transfer roller spacer and bushing.

9. Install the transfer roller.

Make sure that both the white plastic bushings are clean.



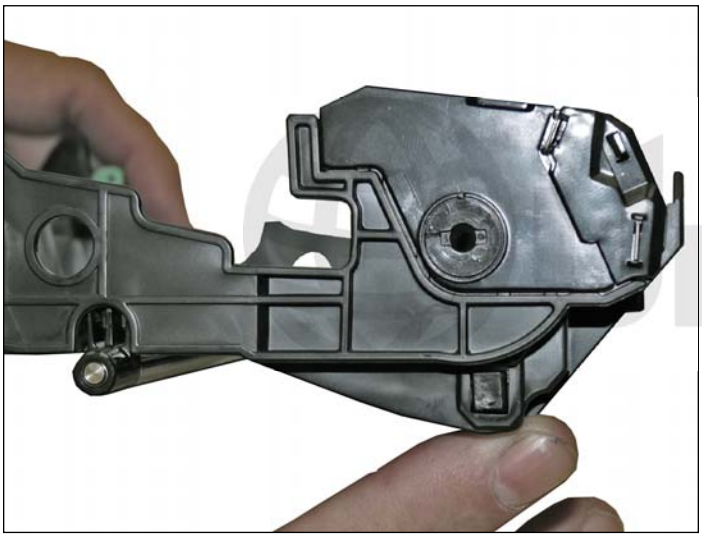
10. Check the outside of the cartridge to make sure that the small black spacer is correctly positioned.



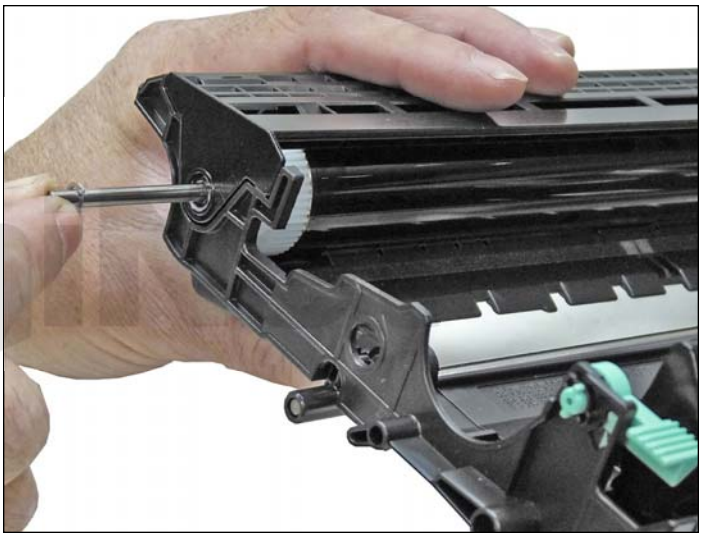
11. Install the drum, hub side first. You will have to compress the hub spring slightly for the drum to fit properly.

12. Clean the primary corona wire and grid with a cotton swab and alcohol.

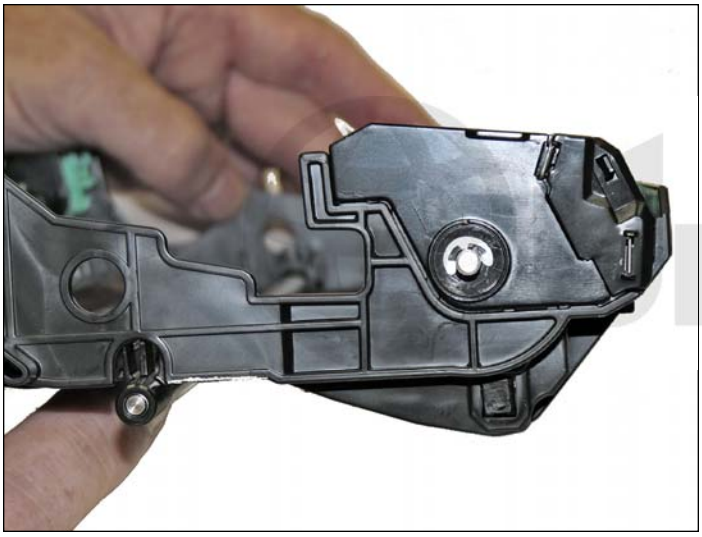
13. Install the top cover, pressing down so it snaps in place.



14. Install the black drum axle spacer.



15. Install the drum axle from the drum gear side of the cartridge.



16. Install the E-ring on non-gear side of the drum axle shaft. Press the axle bushing in slightly so that the e-ring slot is accessible.

RESET PROCEDURE

If the machine is asking to change the drum unit, do the following:
NOTE: If the drum unit was cleaned because of contamination, the reset is not necessary.

For HL-XXXX units:
1. After replacing the drum unit, keep the front cover open (make sure the power is on).
2. Press and hold the "GO" button until all four LEDs are lit.
3. Once the four LEDs are lit, release the “GO” button and close the front cover.
4. Make sure the drum LED is off.
5. The counter is reset!

For HL-228X, MFC-XXXX, and DCP-XXXX machines:
1. Open the front cover and press the “CLEAR” button.
2. To confirm you are installing a new drum unit, press the “UP” arrow.
3. When the screen shows “ACCEPTED,” close the front cover.
4. The counter is reset!

TROUBLESHOOTING

Backgrounding or gray streaks: This is usually caused by contaminated toner. See the explanation at the beginning of this article for more information. With the removal of the charge brush from this cartridge, backgrounding can now also be caused by a worn or dirty developer roller. This is also explained at the beginning of this article.

Dark black vertical streaks: This is normally caused by either a dirty primary corona wire, or that the blue corona wire cleaner is not in its "home" position on the left side of the cartridge.

Light print: Can be caused by a dirty or worn transfer charge roller. These rollers are located inside the cartridge. So far in our tests, they should last at least 2-3 cycles. See next section also.

Light or half-page prints: This is caused by a missing transfer roller spacer. The spacer is a small piece of black plastic that sits next to the right end of the transfer roller. This piece keeps the transfer roller touching the electrical contact on the opposite side of the roller. If missing, the roller will move and can cause light or half-page prints.

Black or white horizontal lines: Black lines normally appear when there is a build up of toner; white lines when there is a dead spot or contamination of the roller.

Solid black pages: Caused by a bad drum ground contact, probably from the drum axle shaft to the contact gear, inside the drum.

Perfectly straight, thin black lines down the page: This is caused by a scratched drum.

Black dots that repeat every 94.2 mm: Caused by a chipped drum or something stuck to the drum surface.

REPETITIVE DEFECT CHART

OPC drum:	**94.2 mm**
Upper fuser roller:	**53.4 mm**
Developer roller:	**32.5 mm**

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