

## Tulips for Mom – The story behind the Space Poop Challenge

I wanted my old mom a clean, hygienic solution.

I just wanted her to have a comfortable pooping.

My mom is very old, can barely move herself and has to stay in bed almost all time. Her mind is still clear, and she surely enjoys good food, adapted to her limited chewing and swallowing capabilities. Most important, however, is that she does enjoy eating. Ah, and, of course, she is the happiest person in the world when we come to see her.

Albeit her limitations, she still enjoys life.

Life for her is not free from typical concerns for a person in such conditions, like bed sores and dealing with caregivers trying to help her, but I'd say she is managing the whole thing quite well.

But for one issue – the basic necessities, pooping and urinating while lying in bed, as she can't raise herself and go to the restroom. I frequently saw how difficult it was, even assisted by well-trained caregivers, to do the pooping and cleaning as hygienically as possible, and how much mom suffered each time. I felt it in my flesh and shivered each time.

I'm an engineer with some patents in my career, and I was thinking very hard how I could create "something" to remove that hurdle, lessen that suffering, and make her a bit happier.

And then the "Space Poop Challenge" popped in my life.

That must be a godsend, I thought, and quickly gathered all my thoughts and focused efforts into one project. Hygiene was my main concern, followed by usability. Everything should be as clean as possible.

The fundamental of my concept was to create an (external) extension of the intestine, through which poop could be conducted to an end disposable collector. Similar principle should be used for pee. A sealed environment for collecting poop and pee. Poop is usually a thick paste, so it had to be softened by a spray of water or saline solution, spray-washed in the anal region to a quasi-liquid state that can be pumped to a disposable collector away from the body. Notice that this works like an extension of the intestine, with the spray making the poop back to a quasi-liquid state that continues its journey to the disposable end collector. No mess, everything sealed, the spray always washing the anal region for hygiene. A finishing drying airflow could be added.

Pee collector for women also resembles a menstrual cup, which uses a gentle airflow to drag the urine into tubing that is sucked into another disposable collector. The airflow may spray momentarily some water for hygiene, followed by a finishing drying airflow. Pee collector for men resembles a condom with space around for airflow and localized spray.

1. An anatomical soft silicone tube/collector is attached to the anal region with medical hypoallergenic adhesive to implement a sealed environment. Medical adhesives currently available provide strong positive adhesion to the body, however also removable without much hassle. As such, this extremely flexible tube/collector firmly adhered to the skin around the anus

works as an extension of the intestine, guiding the “liquefied” feces away to the disposable end collector.

2. A gentle spray “liquefies” the poop, which then may be pumped, or sucked to the end collector, as described in [1.] above.
3. The spray also washes the anal region to provide good hygiene.
4. Another anatomical soft tube/collector is provided to collect urine. When peeing, an air stream drags the urine into the tube that leads to the urine end collector. Water spray is momentarily activated for hygiene and also to help drag. A finishing, drying airflow is provided as needed.
5. The concept can also handle menstrual fluid, using a specific collector resembling a menstrual cup with a drain tube. Internally it also has a spray to provide good hygiene. The drain tube guides the fluid to the end collector. The end collector could be combined with the urine collector.
6. Poop and pee, and all end collectors, as well as the suction pumps, are combined and placed in a convenient location close to the body, probably in the back of the astronaut with other life equipment.
7. For a good adhesion, all affected areas are to be shaved.
8. A super absorbent diaper should be used for some leakage that might occur.
9. Chance of leakage is minimized in this concept, as the sealed environment always works in “negative pressure”; the pump is always sucking while in use.
10. If poop is too hard, a proper solution may be used to help dissolve. By nature, it can handle some diarrhea.
11. The concept shall be able to stay put for several days, as all collected matter is stored in a separate container, and all tubing may be washed as necessary. For disconnection of the device, an extra flush of spray in all collectors interface region shall be used to wash away residual matter. Drying airflow shall help.

I imagined the concept resembling a flower with petals opening to collect poop, and the image of a tulip popped immediately in my mind. It was then christened “Tulip”, not only for its beauty, but because it also means “trust” in the language of flowers. That it is. Not only a trustful device, but of clean, hygienic nature.

I just hope I will be able to provide mom some comfort.

