

**"We don't study technical problems.
We solve them!"**
UMTEC

Flush on Demand

Sanitary Engineering



Fig. 1: Flush controlled by paper consumption

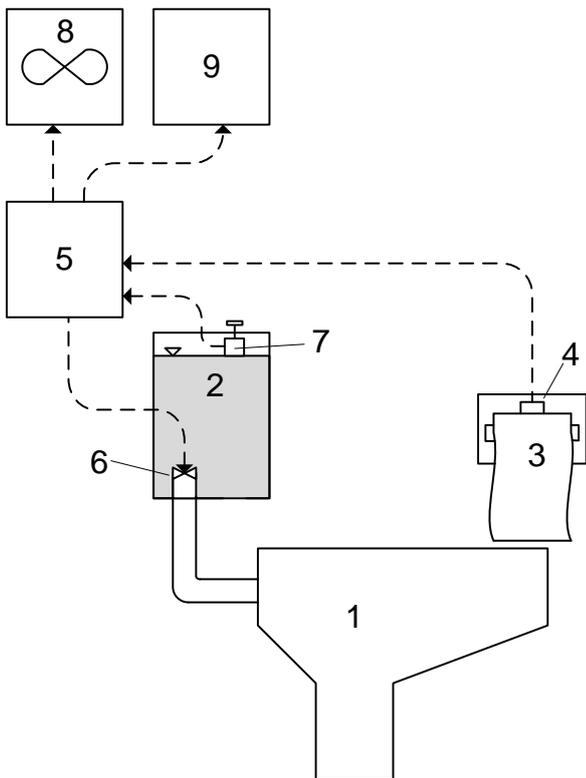
Minimizing Water Consumption

The Issue

Each year, central Europeans are flushing as much as 10'000 liters of water per capita down the toilet. No wonder the toilet flush is responsible for the highest consumption of drinking water within a household. Nowadays, many types of toilets offer two different buttons to flush: the smaller one releasing three liters, the larger one six liters of water. Unfortunately, most people still push the large button after finishing their business, even if the small flush would have been sufficient. Our field studies have shown that toilets with two flushing buttons only lead to a water reduction of one third of their full potential.

The Solution

We came up with an innovative solution that derives the necessary water volume from the amount of toilet paper that has been used (FONDE). Basically, a sensor on the toilet paper holder measures the paper usage and transfers the collected data to the flush regulator. The flushing process is still initiated manually. However, based on the paper usage, the regulator controls the length of time that the flushing valve remains open. If a lot of paper has been used, a large amount of solid waste needs to be flushed away. Therefore the full amount of water in the flushing tank is released into the toilet bowl. Similarly, if only a small amount of paper has been used, a short flush is triggered. Apart from controlling water disposal the sensor can also regulate ventilation. Furthermore, it can also send an alarm when toilet paper is running low.



- 1 Toilet
- 2 Flushing tank
- 3 Toilet paper
- 4 Sensor for paper usage
- 5 Data processing/control
- 6 Actuator 1: electronically controlled valve
- 7 Flushing button
- 8 Actuator 2: ventilation
- 9 Actuator 3: alarm

Fig. 2: Functional diagram of FONDE

UMTEC's laboratories have designed a model of the FONDE (Fig. 2). As soon as toilet paper is unrolled (3), the sensor records the paper usage (4) and transfers details of the amount to the flush regulator (5).

A manually operated valve triggers the flush, and the required amount of water is delivered according to the time an electromagnetic valve remains open (6).

A survey carried out by UMTEC showed that both women and men use less than seven sheets of toilet paper after urinating (Fig. 3). Therefore only the small flush amount of three liters is released after pushing the button.

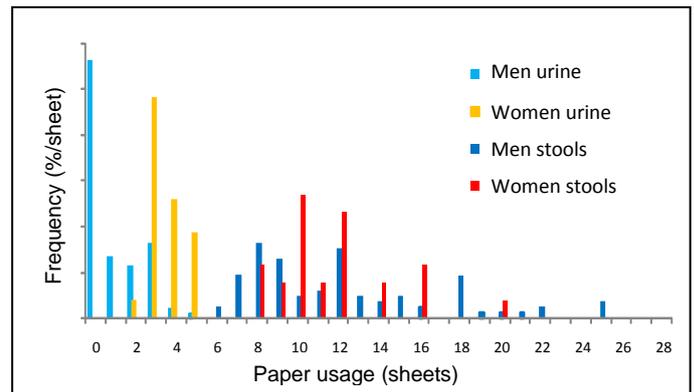


Fig. 3: Paper usage by men and women

If seven or more sheets are used, this triggers the large flush amount of six liters. There is an automatic flush after 90 seconds in case the user forgets to flush.

In addition to controlling water appropriation, the sensor can also regulate ventilation (8). Ventilation starts as soon as more than six sheets of toilet paper are being unrolled. It then stops after a time delay, for example 180 seconds after the flush was started. Furthermore an alarm (9) is activated when toilet paper is running low. In our prototype, paper usage was determined by means of an incremental sensor that rolls over the paper on a friction wheel (Fig. 4).



Fig. 4: Toilet paper measurement

UMTEC has filed an international patent application for this invention (PCT). At the moment, we are looking for potential license holders.