

Master Graduation Thesis

Revolutionizing Pelvic Exams: A Sustainable, Patient-Centered Redesign of the Vaginal Speculum



Ariadna Izcara Gual

MSc Integrated Product Design
Faculty of Industrial Design Engineering

Supervisory Team

Prof.dr.ir. Jan-Carel Diehl (chair)

Ir. Anna Ruiten (mentor)

MSc. Tamara Hoveling (mentor)

The vaginal speculum

A common instrument in gynecology

Invented in 1845, it helps spread the
vaginal walls



“It was developed using three enslaved women, without anaesthesia or consent. And here's the real issue—it **hasn't changed** much since then”

What are the hospitals doing
to **solve it?**

*Plastic single-use
speculums*





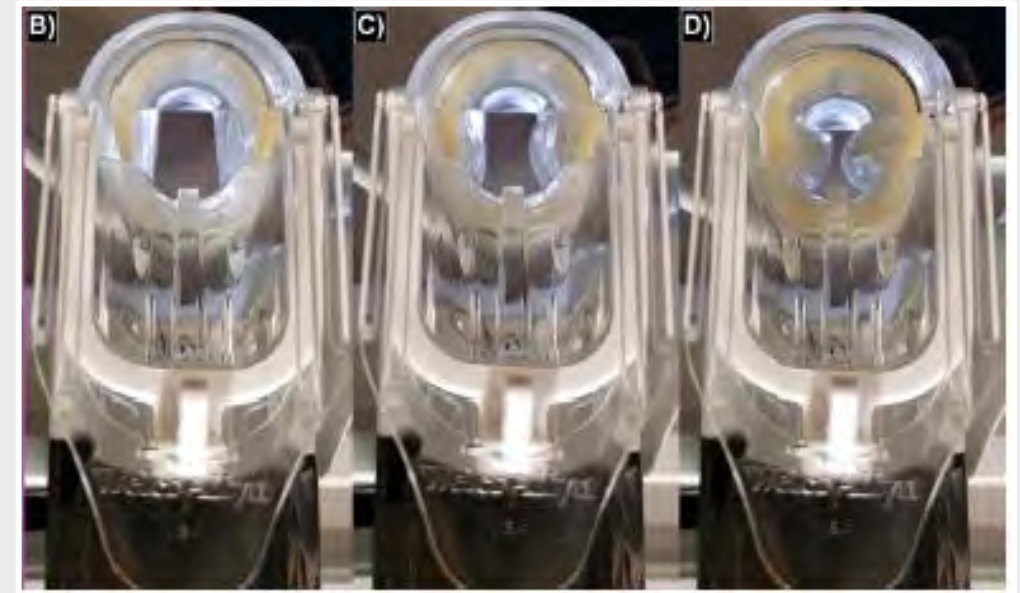
**GENERATES
WASTE.**

There is another problem....

There is another problem...

Vagina wall prolapse

It occurs when a woman's pelvic floor muscles, tissues and ligaments **weaken** and **stretch**



Test result by Yerrabelli et al. (2023)

The current speculum...

- Not liked by the patients
- No optimal visualisation
- Not Sustainable





UNDERSTANDING.



10	7	i
1	0	0
10	1	0

→

5000

5000

“It looks like a **torture** tool from **middle-ages**”

“It looks like a **gun**”

“It looks like a tool to **fix my car**”

Transfer in perception



Transfer in perception



“By giving patients the **option to decide**, we’re changing the dynamic, **empowering** them”

A hand is shown holding a white, cylindrical device with a small opening, positioned over a red shoe that is placed on a white, contoured mold. The scene is set against a plain, light-colored background. The word "PAINLESS." is overlaid in large, bold, yellow capital letters across the center of the image, with a small blue dot at the end of the period.

PAINLESS.

Lilium is designed to **reduce** physical pain

- By using the adequate **dimensions** in the tip
- By allowing a soft **rotation**

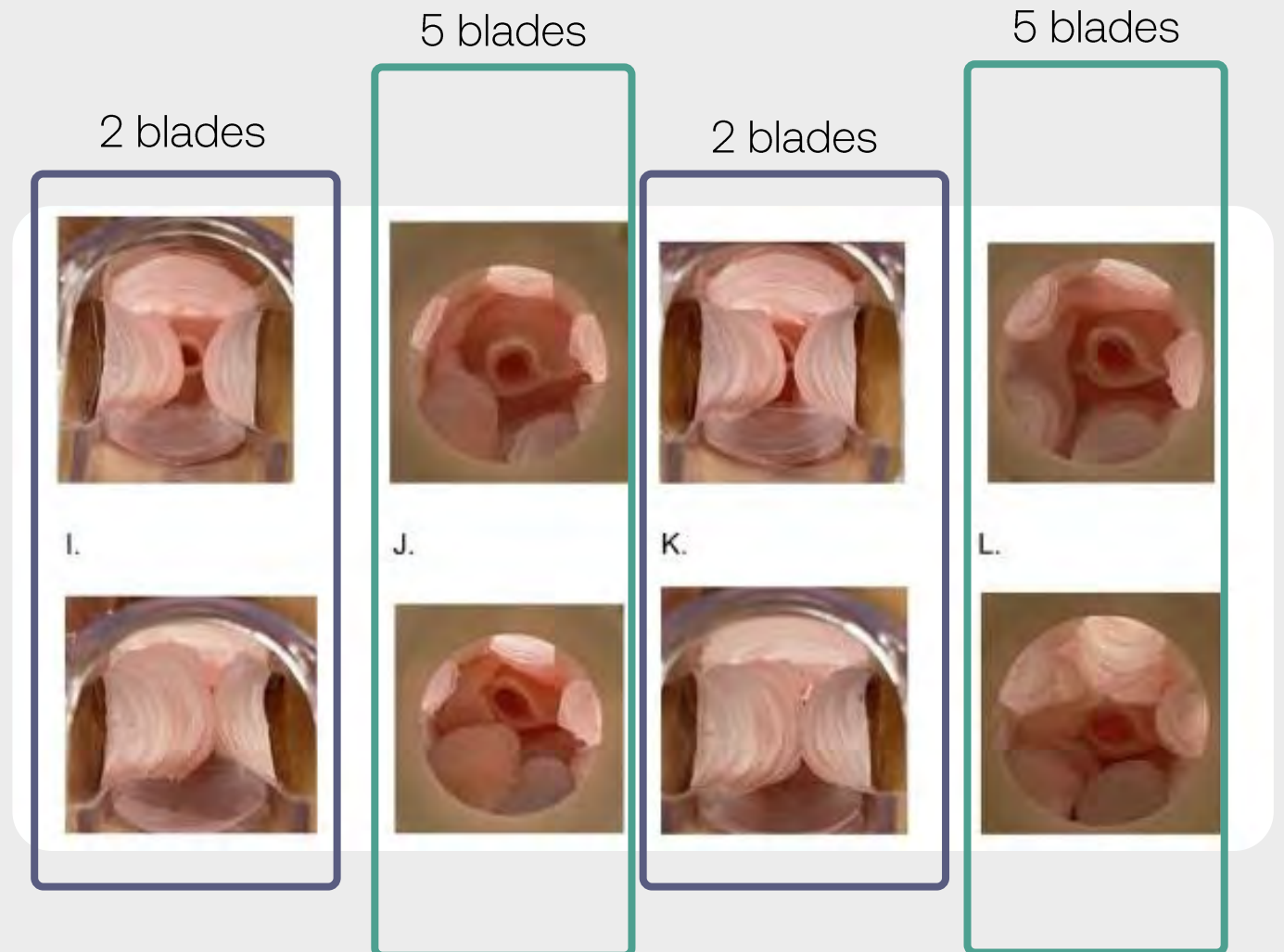


A hand holding a white prosthetic hand against a light grey background. The prosthetic is a simple, white, cylindrical device with a textured surface and a small opening at the wrist. The text "BETTER VISUALISATION." is overlaid in large, bold, yellow letters.

BETTER VISUALISATION.

The advantage of 3 blades

- Hold better **wall prolapse**
- Provide a **better fixation**.
- 3 allows for more **strength**.





CIRCULARITY.

“Sterilization can be **costly** for both hospitals and the environment. Liliu needs to **be a solution**, not a new problem”

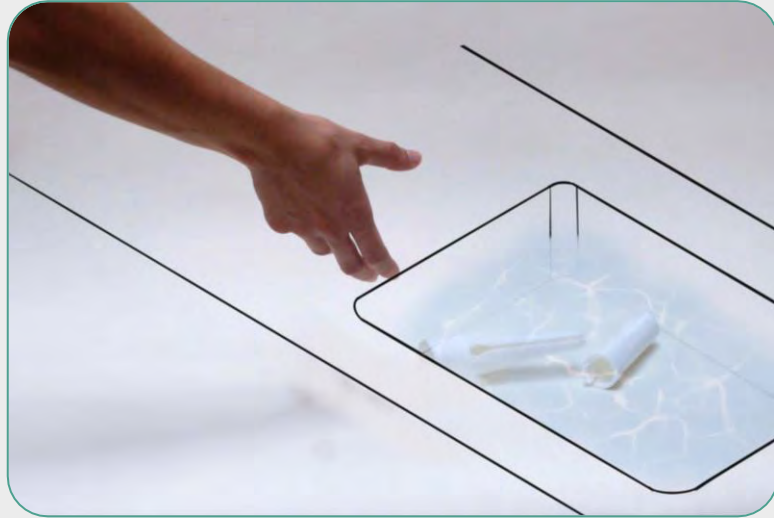
Autoclave

*Hospitals already have
equipment
Familiarity with the process*

↳ Material: **TPV**



“We didn’t just pick a more reusable material, we rethought every **design detail** to create a truly sustainable solution”



R2: Reduce strategy



Thank you :)

