Electrolux Microwave

THE SCOPE

ENGINEERING PSYCHOLOGY IN THE WORLD

Engineering psychology focusses around the relationships that people have with the products and systems they use. More than other fields, engineering psychology grounds itself in a scientific backing. To that end, myself and a small team took to evaluating a top of the line microwave oven, the Electrolux EMT25507, according to the core principles set out by the study of human-machine interaction.

Time: *April, 2019*
Status: *Complete*

A COUPLE

KEY ASPECTS

- Evaluate a physical system according to **human factors and ergonomic** principles
- Multi-stage approach including **field research** and **expert analysis**
- Clear and practical **suggestions for improvement**

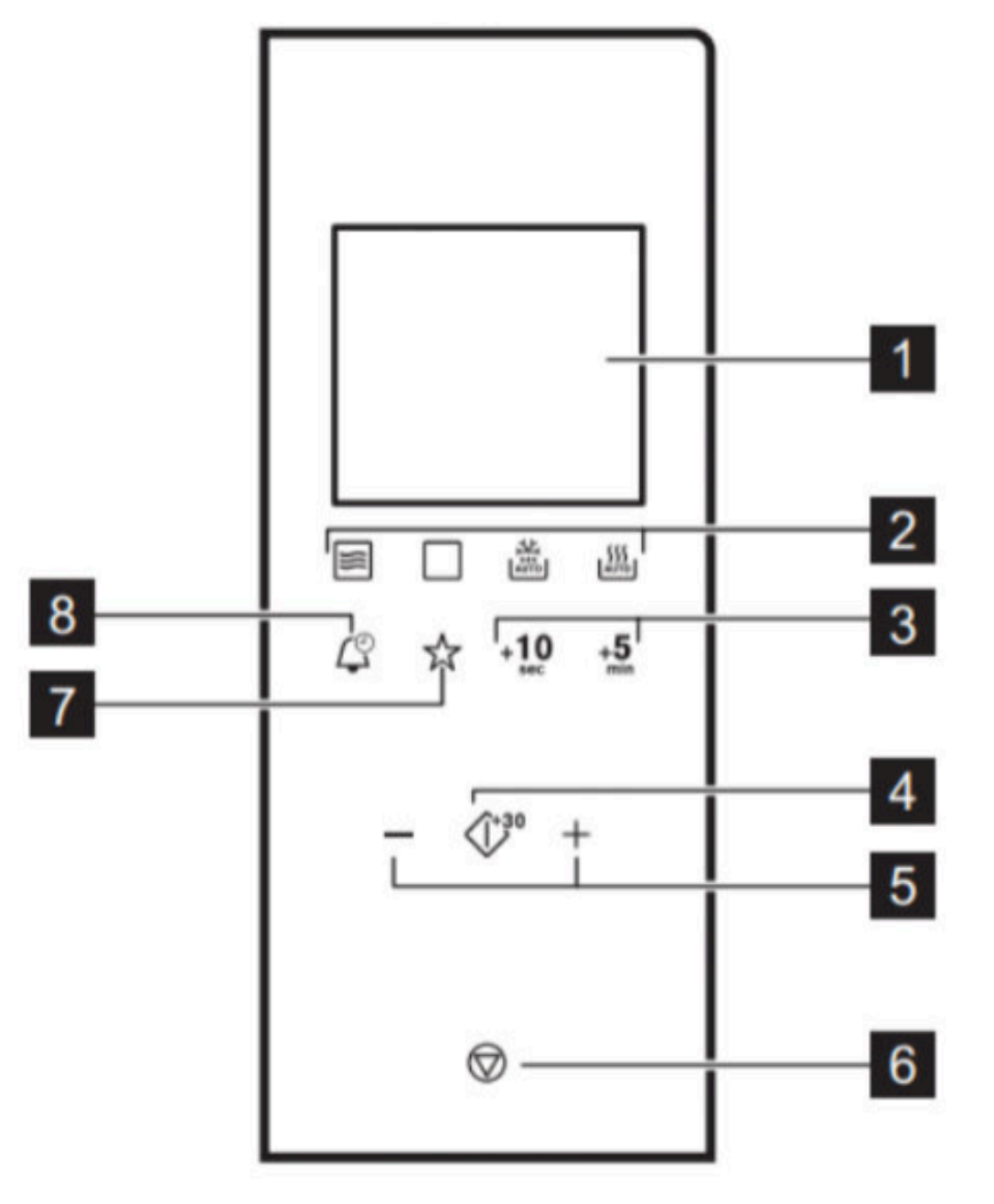
WARMING UP

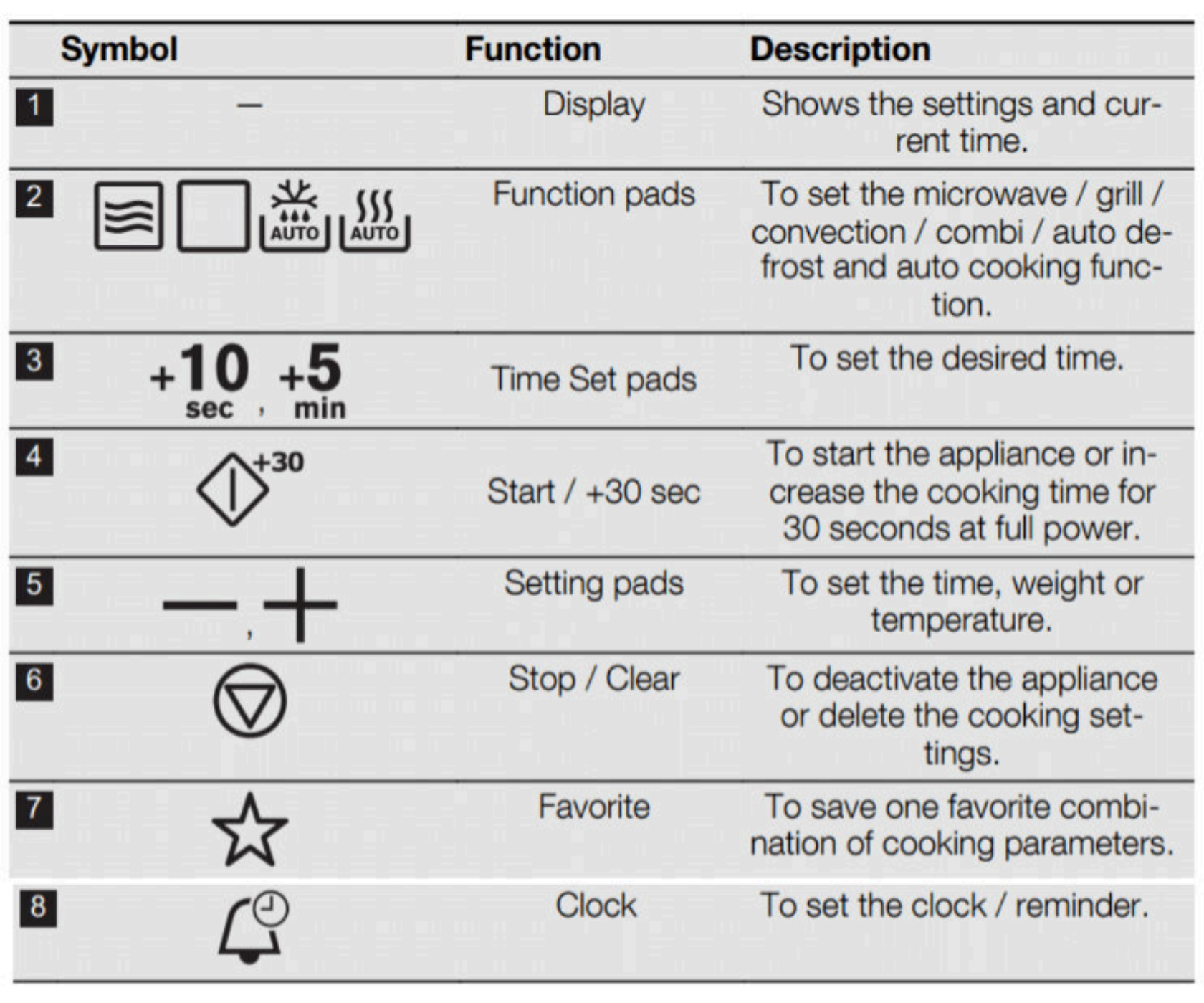
THE MICROWAVE OVEN

A VITAL KITCHEN APPLIANCE
The Electrolux EMT25507 is a high end microwave. As is more often the case for countries in Asia, the *oven* part of microwave oven is much more meaningful than in most microwaves found in North America. The EMT25507 can act both as a traditional microwave or with the functionality of an convection oven. This increased functionallity paired with minimalist and (tactile) buttonless design, however, results in a large number of usability problems.

HEATING UP

THE INVESTIGATION





	Symbol	Function	Description
1	–	Display	Shows the settings and current time.
2	☰ ☐ AUTO AUTO	Function pads	To set the microwave / grill / convection / combi / auto defrost and auto cooking function.
3	+10 sec , +5 min	Time Set pads	To set the desired time.
4	+30	Start / +30 sec	To start the appliance or increase the cooking time for 30 seconds at full power.
5	—, +	Setting pads	To set the time, weight or temperature.
6	▽	Stop / Clear	To deactivate the appliance or delete the cooking settings.
7	☆	Favorite	To save one favorite combination of cooking parameters.
8	🔔	Clock	To set the clock / reminder.

METHODOLOGY
Four participants agreed to take part in the study. None of the participants had long term use with this microwave and therefore were representative of new users. The study was perfomed in a home kitchen. Each participant was given multiple tasks to complete and were following the think aloud protocol. A selection of the tasks are shown below. After the test session participants were asked directly about their experiences.

EXAMPLE TASK

GRILL

Participants were asked to grill a piece of food for five minutes. This was a baseline for users to come to grips with the system. All participants failed to complete the task on their first attempt, not realizing they had not set the microwave to the grill function. Furthermore, from the default time of ten minutes participants had many creative ways of getting to the desired time, including resetting the clock, counting up, and subtracting down.

EXAMPLE TASK

PRESET VEGETABLES

Preset functions can be useful accelerators, removing the need for users to set variables like time, weight, and power manually. However, this proved one of the most difficult tasks. The ideal path would take users twelve button presses, which is already quite high. One participant input **150 button presses** before electing to end the task trial and give up.

EXAMPLE TASK

SET THE TIME

Setting the time is a feature most users do rarely, typically only when the power shuts off or for daylight savings time. This makes it an interesting candidate for study as it is still an important feature and most people tend not to want to dig out the manual to relearn how to do it. This had the highest average time to completion at 85.5 button presses. Users were universally frustrated by the inefficient method of changing the time in one minute increments.

HIGHLIGHTING

PROBLEMS AND SOLUTIONS

SEMIOTICS

IMPROVE ICONOGRAPHY AND LANGUAGE

The single biggest complaint that can be levied against the Electrolux EMT25507 is the lack of clear communication with the users. While sleek and modern, this comes at the cost of usability. Many users stuggled to idenitfy the power/start button, which one would think would be the most important option. It was this lack of clear iconography and failure to speak the user's language that cause the majority of usability issues and the astromically high button press counts. Redesigning to be inline with standards or adding in text (as simple as "on", "veg", "pwr") would go a long way to improving usability.

FEEDBACK

AUDIO AND VISUAL

Participants were often confused over which buttons could or could not be pressed, resulting in many errors. Including the option for an error sound, or backlighting the currently available options would signal to users what options are currently available to them.

BUTTONS

PHYSICAL INTERACTION

The capacitive buttons, while sleek, aren't the most reliable, ergonomically usable, or rich in affordance. The buttons are currently rather small, meaning participants must expend more effort to hit the target. The capacitive buttons also fail to accept valid input on occasion, and this failure rate goes up if one's hands are messy or wet as is often the case in the kitchen. Dome cap buttons work no matter the state of the users hands, and provide automatic, physical feedback letting the user know they successfully pressed the button.

A FULL OVERALL

EMBRACE TOUCH INPUT FULLY

Electrolux may explore using a touchscreen as an input device as opposed to the static capacitive buttons. Several participants interacted with the LCD display panel as though it may be a touch device (swiping, tapping, etc.). In the modern day, people are familliar with touch devices, and there is precedent for their inclusion on household appliances such as Samsung's line of "smart fridges" or on food and beverage machines such as Coca-Cola's Freestyle machines.

CHECK OUT THE FULL REPORT

The full report including details on tasks, error analysis, heuristic evauatin, Fitt's law analysis, emotional response, full redesign suggestions, and more can be found here.