# Reduction of can material thickness - consequences related to can pressure and potential deformations

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# Introduction to GDC Liquid Foods


**Reduction of can material thickness**

# Reduction of can body gauge

The presentation is based on one of real projects looking at reduction of can material in one of Unilever's factories.

The aim of this presentation is to share the experience and identify possible traps.

The presentation will cover only aspects of thermal treatment in respect to lower can thickness.

# Reduction of can body gauge

Reduction of can thickness is very interesting to the can industry as this can bring high benefits:

- environmental
- economical

# Reduction of can body gauge

This seems to be an ideal offer, but it brings also some difficulties.

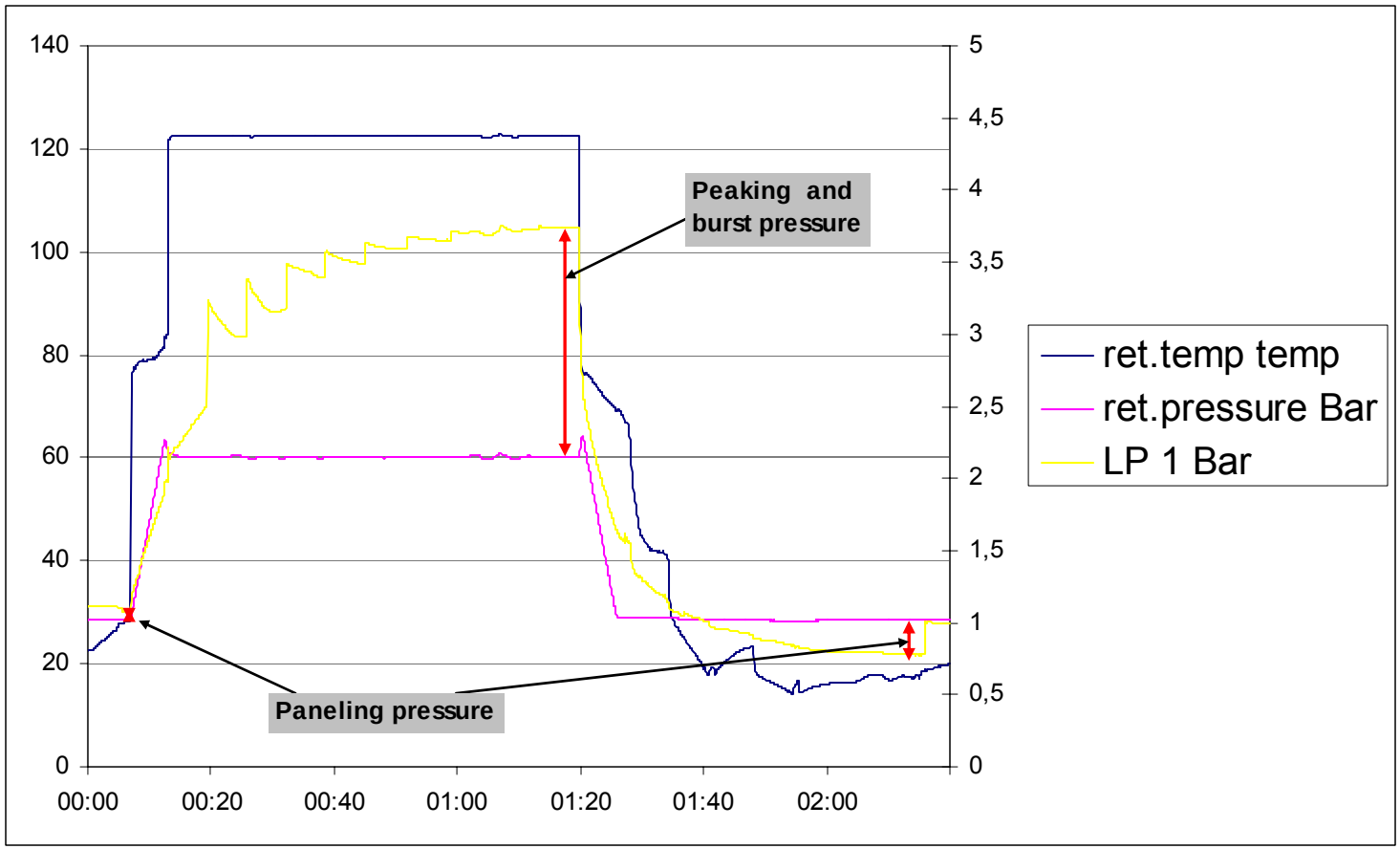
Apart from all aspects of handling of the thinner can, which may require investments, there is thermal processing part where change of one element requires verification of the whole setup of overpressure profile of all products involved in the change.

# Can critical limits

There are three critical limits related to pressure for cans: peaking pressure, burst pressure and paneling pressure.

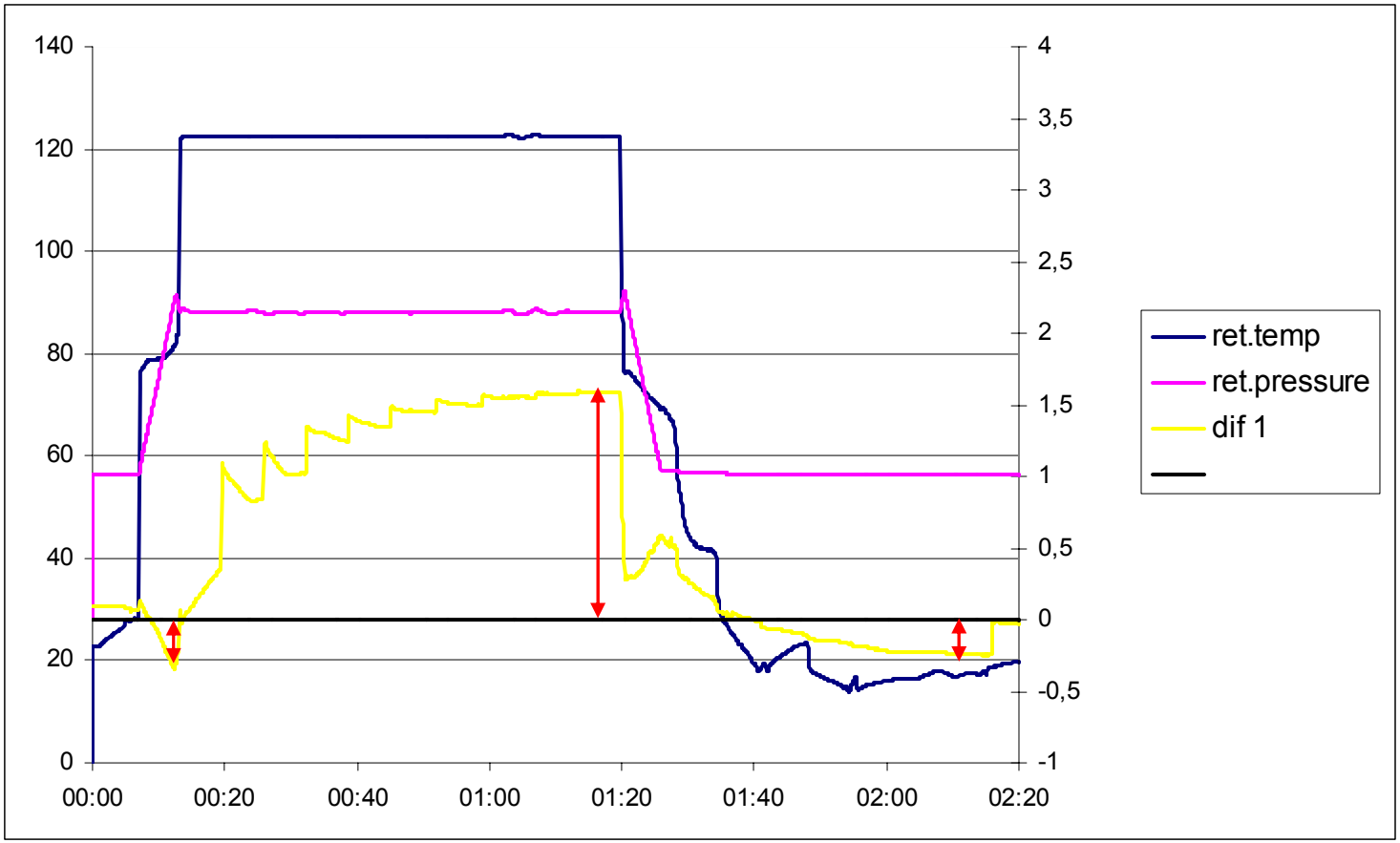
All of them are identified in material specification and most likely all of them will change when changing can thickness.

# Can critical limits




**Reduction of can material thickness**

# Can critical limits




**Reduction of can material thickness**

# Can critical limits

Feature of ends / can bases caused by excessive "internal" pressure

Feature of can body walls caused by high “external” pressure

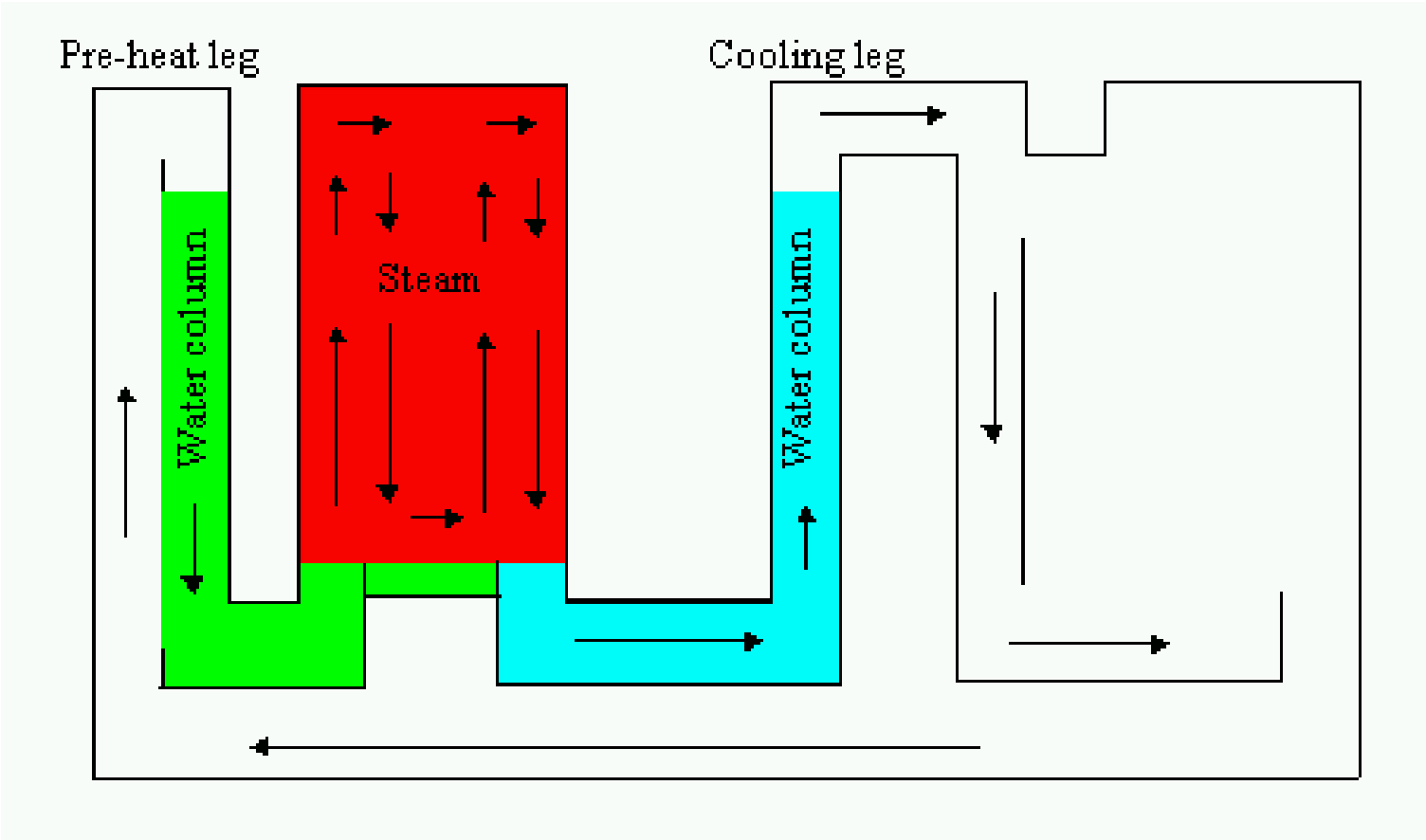
# Can critical limits

- Those three parameters will most likely, despite all the efforts by supplier, change – decrease.
- This means the same product produced in the same conditions can cause irreversible deformation of cans.
- In most of cases this problem can be solved by adjusting overpressure profile. But there are situations where this is not possible….

# Can critical limits

….hydrostat where overpressure is controlled only by steam pressure and temperature.

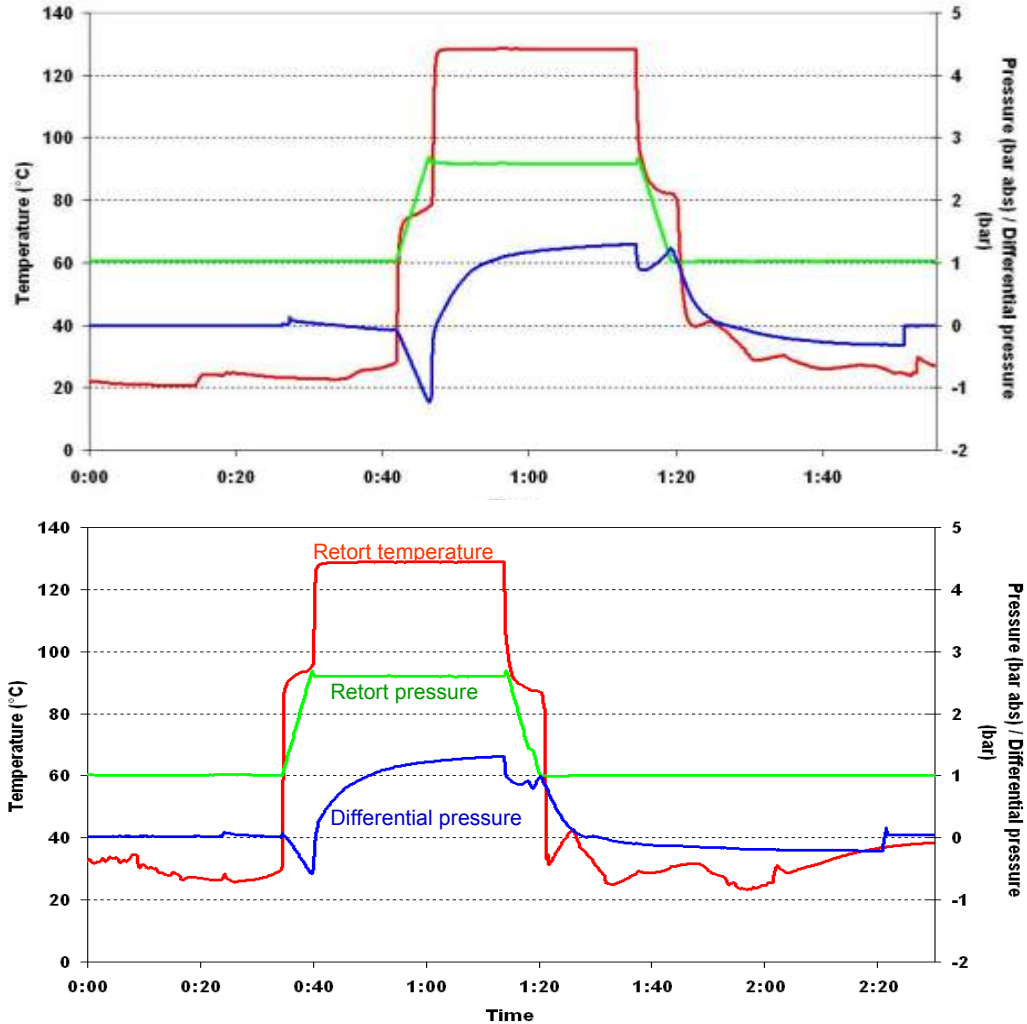
# Can critical limits



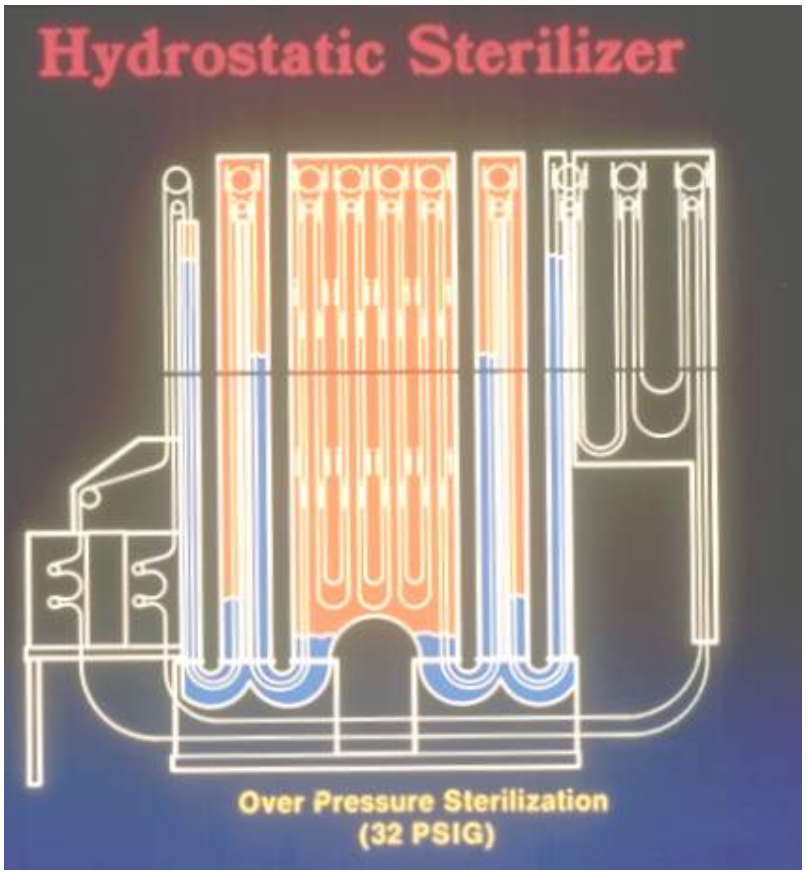

**Reduction of can material thickness**

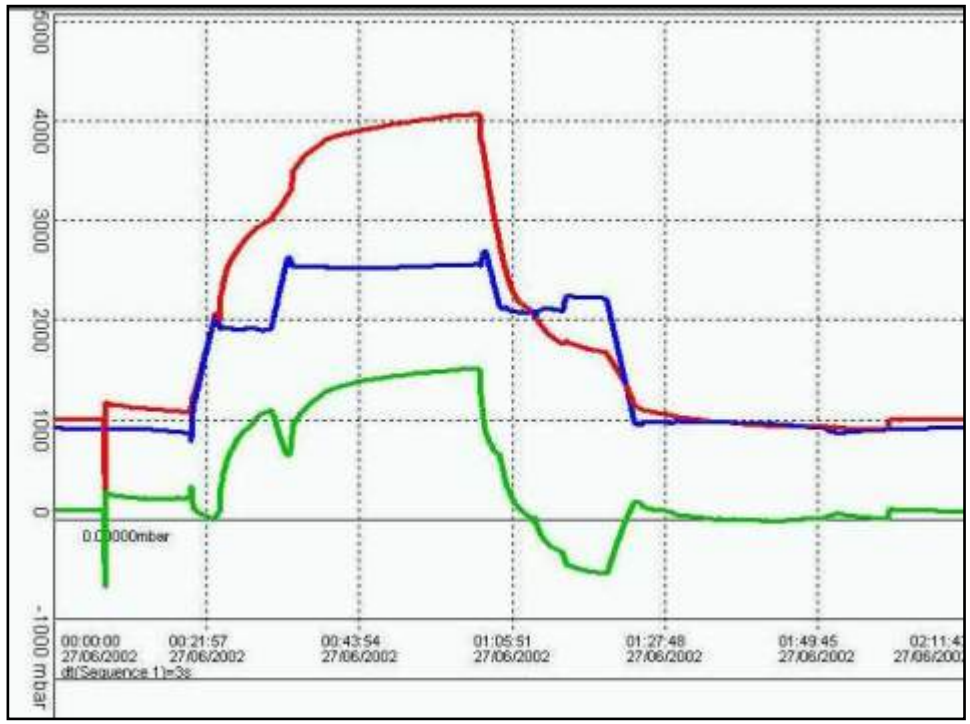
# Can critical limits

Panelling risk is created during the come-up phase of the sterilisation cycle.



# Can critical limits




Typically two stage hydrostat

**Reduction of can material thickness**

# Worst case design for pressure

What is impacting internal can pressure built up?

- fill level – head space
- initial temperature of the product
- thermal expansion properties of the product

What is generating internal can underpressure?

- fill level – head space
- initial temperature of the product
- product temperature at the entrance to sterilization zone

# Worst case design for pressure

What is my worst case for pressure?

It becomes essential to investigate the whole considered portfolio with respect to potential „pressure” problems:

- compare lowest and highest initial temperatures
- verify filler performance

# Worst case design for pressure

| Can size | Product description | Process | Minimal initial temp | ml | Gram | Can volume | Can filled in %: |
|---|---|---|---|---|---|---|---|
| 73*126 | Asparagus cream soupe | 65-122°C | 55 | 460 | 492 | 530,44866 | 86,72 |
| 73*126 | Champignon cream | 65-122°C | 55 | 460 | 490 | 530,44866 | 86,72 |
| 73*126 | Vegetable soup | 60-122°C | 60 | 460 | 490 | 530,44866 | 86,72 |
| 73*126 | Curry soup | 65-122°C | 55 | 460 | 480 | 530,44866 | 86,72 |
| 73*138 | Zuppa di ceci | 70-122°C | 60 | 515 | 500 | 580,96758 | 88,65 |
| 73*138 | Zuppa di fagioli | 55-122°C | 60 | 515 | 500 | 580,96758 | 88,65 |
| 73*138 | Minestrone di verdura | 55-119°C | 40 | 515 | 500 | 580,96758 | 88,65 |
| 73*138 | Minestrone di legumi | 50-122°C | 60 | 515 | 500 | 580,96758 | 88,65 |
| 73*138 | Minestrone di verdura e cereali | 60-119°C | 40 | 515 | 500 | 580,96758 | 88,65 |

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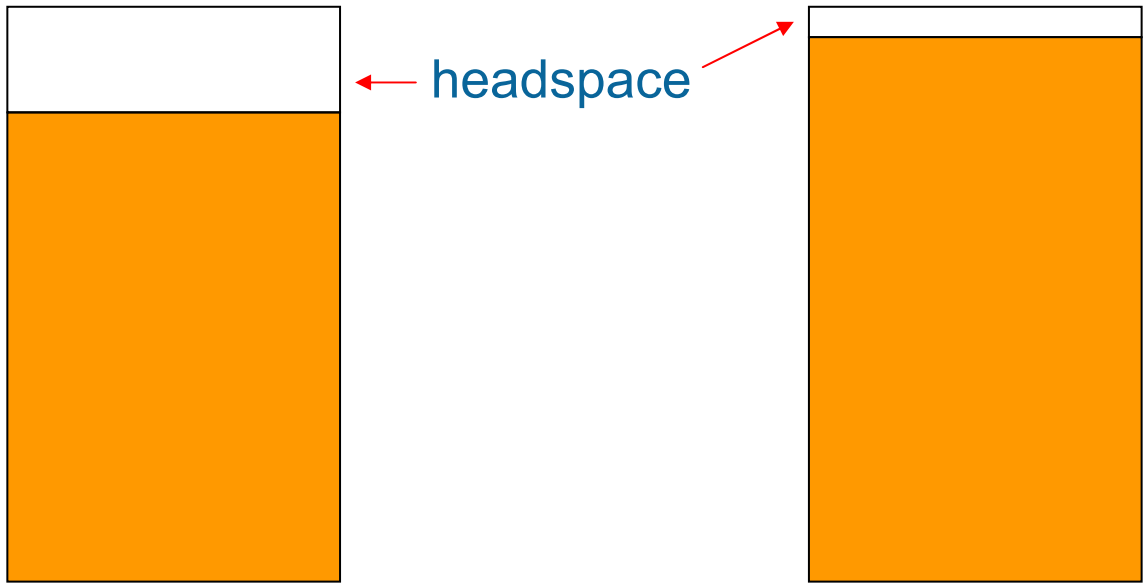
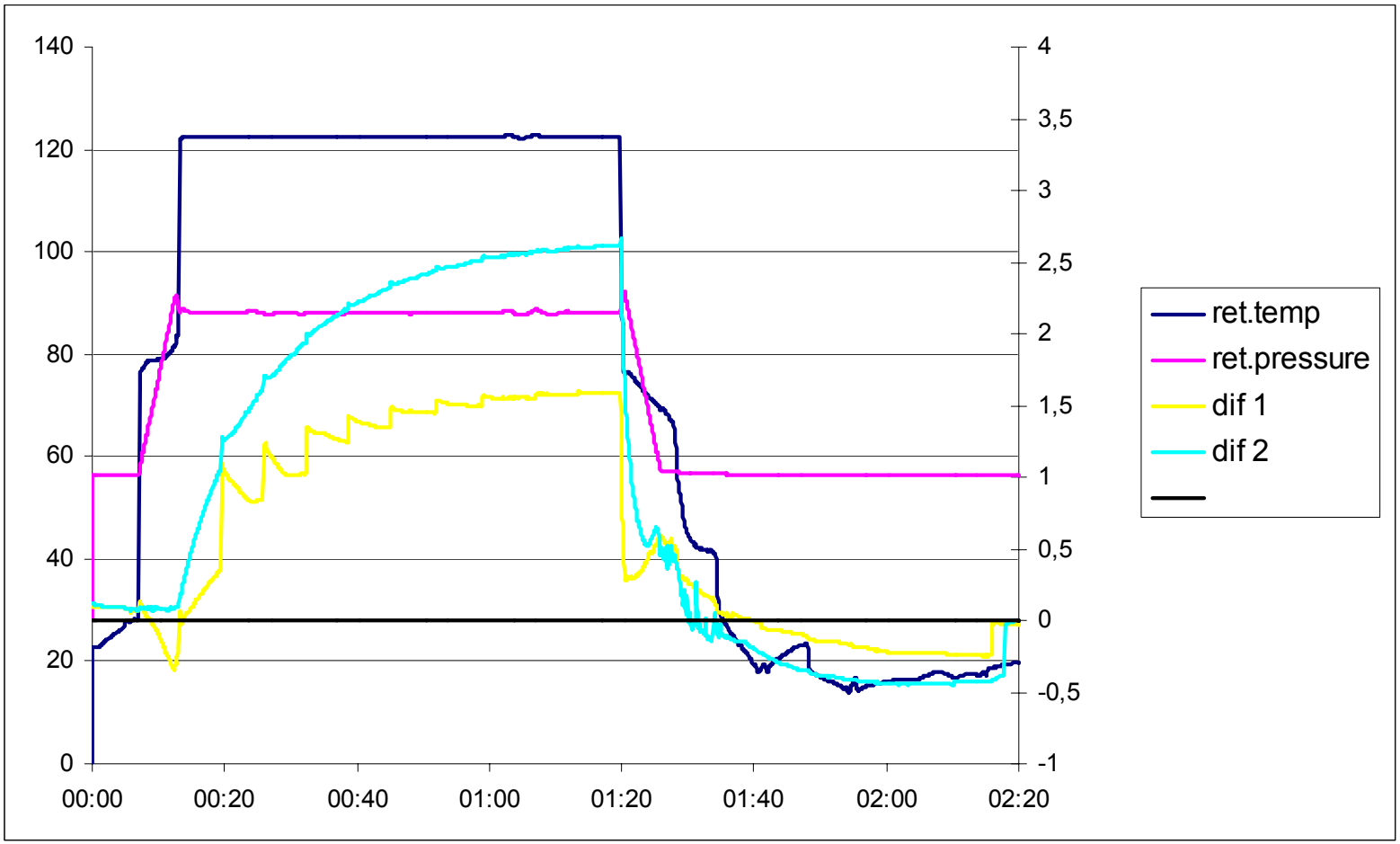
# Worst case design for pressure

## Minimum and maximum fill level



# Worst case design for pressure



# Reduction of can body gauge

At the end we may face a situation where we will need to revisit product design, not to loose the benefits the project can bring:

- change of product initial temperature
- change of product fill weight

Thank you.

# Questions ?