

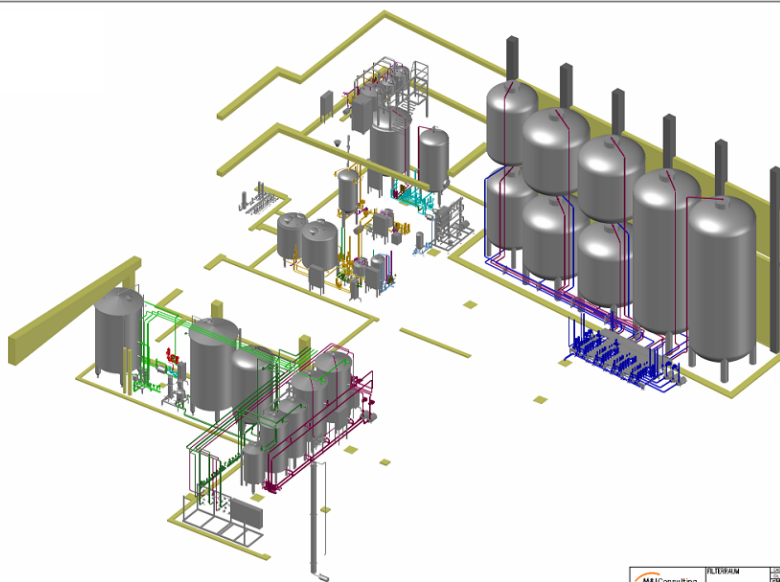
Filtration in the past, today and tomorrow!

Summary developed by Ernst Meier / M&L Consulting, Switzerland

From where we come...



...and where we are!



History over last 70 years



1940 – 1960; Mass Filtration / manual works, huge water consumption

1960 – 1980; Kieselguhr Filtration by mainly plate & frame Filters

1980 – 1995; Kieselguhr Filtration by Horizontal Screen or Candle Filters

1995 – 2010; Kieselguhr Filtration by mainly Candle Filters

2010 – 2025; Kieselguhr Filtration by Candle Filters and Start Membranes...

Remark:

There are also some Filters with regenerable product on the market but according to M&L not with the expected success respectively necessary power or strategy... it would be interesting from economical point of view!

When we talk about Filtration, what does it means?



- Is it the Filter Equipment?
- Or is it the Filter Periphery?
- Or is it the combination of it?

Fact is, Filtration is one or even the most complicated process during Beer production!

Filtration is sensitive, difficult and sometimes we even make it complicated!

In Switzerland we say:

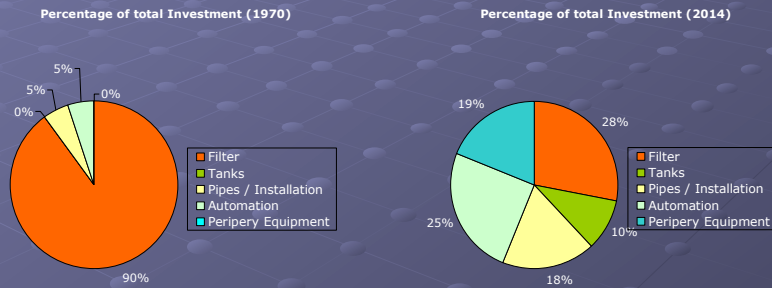
The employees they make always the same mistakes...

...and the Engineers they make always new mistakes!

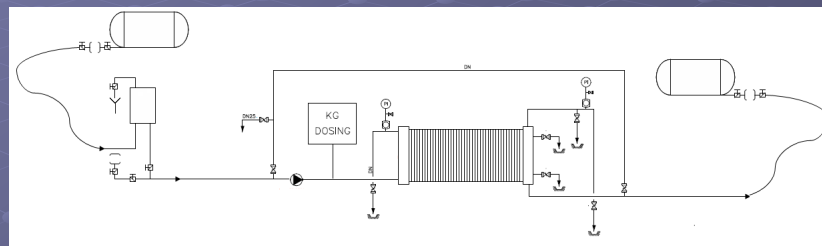
Filtration development independent of Supplier or System

If we have a look to the development within filtration during last 30 years we can see dramatic changes.

Comparison of investment costs within Filtration area:

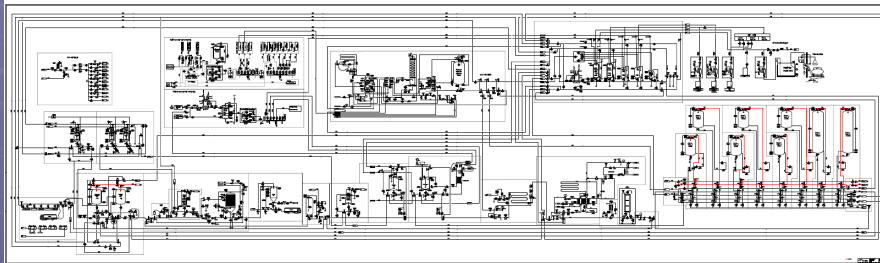


Layout of Filtration Cellar in the seventies...



Maturation Tanks => Filter => Bright Beer Tanks

Layout of Filtration Cellar today...



There is everything in...

View into just commissioned Filter Cellar...



Kieselguhr Candle Filter...



Syrup & flavour station directly implemented in Filter Line...



Flush Pasteurizer directly implemented into Filter Line...



Valve Manifold BBT Filling / Emptying...



CIP Station covering everything from CCT to inlet Filler...



Dramatic Concept changes within filtration area



The previous statistics and pictures shows that filtration is much more than filtration, the filtration was getting a production in the production.

What are risks or consequences of this still ongoing trend?

- Implementation of island solutions without taking into consideration of existing situation
- Splitting of responsibilities between different suppliers (everybody is a Filtration Specialist...)
- Crowdie positioning of equipment => different control systems within same area => bad access for maintenance => not defined cleaning interfaces => unpleasant working place for operators and finally bad efficiency of the plant

How we can avoid or minimise such potential troubles in the filtration area?

Planning and Design



In order to avoid troubles within filtration area it is always important having a clear execution concept before starting any activities.

In new filter cellars this problem is smaller, the risk for making things wrong exists mainly within existing installations where extensions or modifications are planned

The support of an external Consultant can help you to bring in new ideas, giving you the chance to stop with "we did it always like this..." and to combine tradition and modern "state of the art" solutions

Furthermore an external Consultant has an other approach, he is not pushed to sale you equipment and you can expect a more neutral position from him

What else you can find in a modern and flexible filtration cellar?

State of the art Filter Line



A "complete / complex" Filter Line has the following equipment / areas:

- Beer transfer line from maturation to filtration area
- Centrifuge
- Stabi – Dosing (dosing point most in front of filter cellar)
- Unfiltered Beer Buffer Tank
- Hop Dosing
- Kieselguhr Filter (Membrane Filter / Filter for regenerable Filter Aids)
- PVPP Filter
- Filtered Beer Buffer Tank
- Additive Dosing Units (Antyoxydant, Caramel, Alginate, Colour, etc.)
- Blending / Carbonation Unit
- Final Particle Filtration (Trap Filter)
- Pre & Last Run Tank (Head & Tail Tank)
- CIP Station
- Centralised Preparation Station for Filter Aids (Kieselguhr Filter)
- Chemical Concentrate Station (Membrane)
- De-aerated Water Plant
- De-aerated Water Distribution manifold
- Flush Pasteurizer (not often, but it is there...)

Comparison of existing Kieselguhr Filtration Systems

Plate & Frame Filter:

- in new investments more or less not seen anymore / usage of existing filters or in combination with modifications
- Positive aspect of this system; good filtration quality regarding yeast cells, good turbidity
- Negative aspect of this system; many manual works to do, bad for automation / oxygen value during start up not optimal and long down times

Summary:

If filter is there, use it but if possible working with de-aerated water and fine tuned process, life time endangered!

Comparison of existing Kieselguhr Filtration Systems

Horizontal leaf Filter:

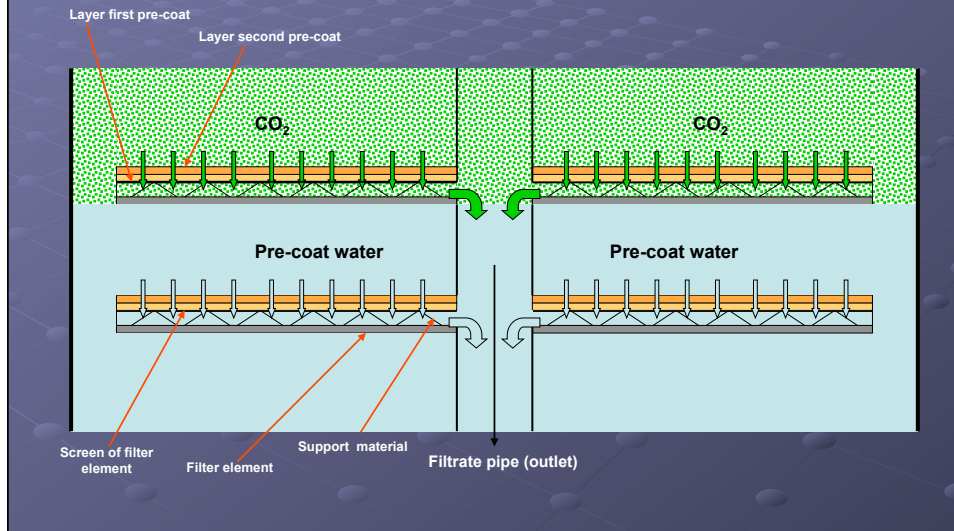
- in new investments more or less not seen anymore / usage of existing filters or in combination with modifications
- Positive aspect of this system; you can stop the filtration and continue the other day...
- Negative aspect of this system; based on maintenance and repair costs you pay the original investment price twice or even more / filling and emptying process with CO₂ gives long down times / in general too high running costs compared with other systems

Summary:

In new investments not foreseen anymore (or very, very seldom), not really economical system !

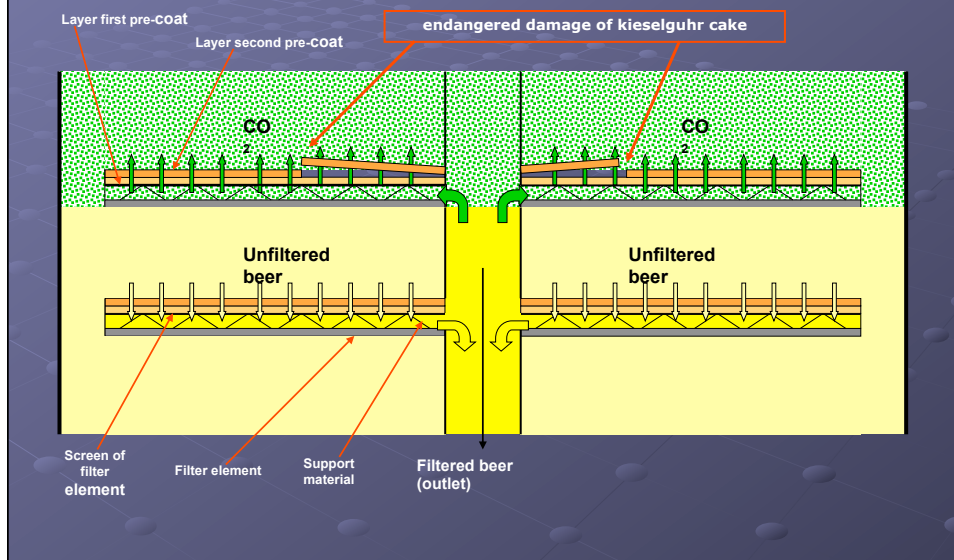
Strong or weak part of Horizontal Filter?

Picture E / Situation during emptying of filter after pre-coat



Strong or weak part of Horizontal Filter?

Picture F / Situation during re-filling of filter with beer after blow down with CO₂



Strong or weak part of Horizontal Filter?



Pictures from the practise after blow down Filter with CO2...

Picture C / damaged kieselguhr cake after emptying



Picture D / damaged kieselguhr cake after emptying



Comparison of existing Kieselguhr Filtration Systems



Candle Filter:

- Simple and most used Kieselguhr Filter
- Positive aspect of this system; simple machine, static filter, good filtration results, short preparation time and very low running costs
- Negative aspect of this system; filter has to be protected against power failure (but this is done since more than 20 years...)

Summary:

Still up to now the most used and most economical beer Filter worldwide

Benchmark data of a good Kieselguhr Filtration

Quality Aspects:

- Turbidity; depends on Malt, general beer production... 0,3 up 0,8 EBC
- Oxygen; less than 70 ppb after first extract arrives in BBT area; less than 30 ppb after switching to bright beer tank (of course also depends on oxygen value of arriving beer from maturation cellar)
- Oxygen; less than 10 ppb from inlet filtration line until end of line (during production)
- Yeast cells; less than 5 cells per 100 ml filtered beer

Economical Aspects:

- Efficiency; up to 20 hours real production time per day (18 hours is a must)
- Extract losses; less than 0,3% based on a 8 hour filtration cycle (also depends on HGB or not)

Summary of actual Filtration systems

Kieselguhr Candle Filter; still very popular and from economical point of view very interesting

Membrane Filter; Original manufacturers pushing very hard the market, some big global players pushing it too, from economical point of view still not reached "optimised" Kieselguhr Filter Lines / from environmental point of view according to M&L no improvement to KG (high consumption of chemicals for cleaning / electricity costs); positive; very clean area, nice working place for operators / flexibility to react against instable filterability is not really there

Filter with regenerable product; the final step is not done yet, would be interesting from economical point of view, long down times not acceptable (production break), very sensitive against pressure increase and turbidity / flexibility to react against instable filterability is not really there

What about the future?



What is clear, also during coming years we will have and Breweries will still invest into Kieselguhr Filtration systems

There it is mainly up to the suppliers of the Kieselguhr Filter Systems if they can make their filters more flexible using also regenerable products or not

Membrane Filters will still grow based on their strong pushing and partly support of global players

Suppliers of regenerable filter aids are not really Filter Manufacturer and therefore their efficiency and there power in the market is not like it should be to be successful at the end...

According to M&L the combination of the Kieselguhr Filter Suppliers and the regenerable product would be very interesting for the Brewers but not sure if everybody is thinking he can do it by himself...

One thing we shouldn't forget, many existing filter lines which we can't through away are not really fine tuned and therefore also these ones we shouldn't take out of the focus, not all of us can buy a new filter!



...Thank you for your kind attention!

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