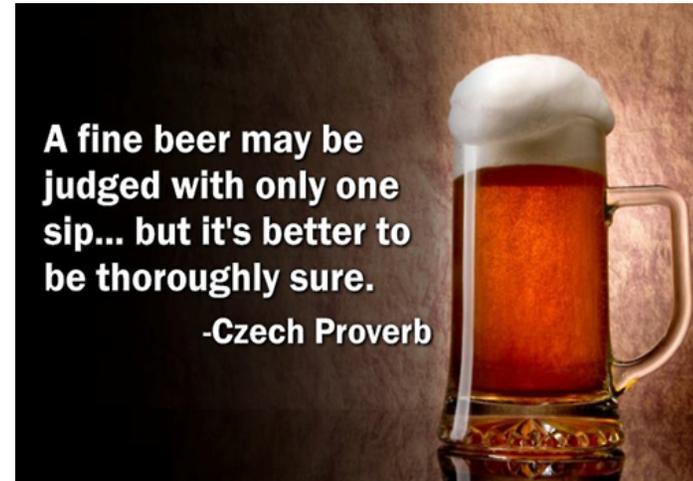
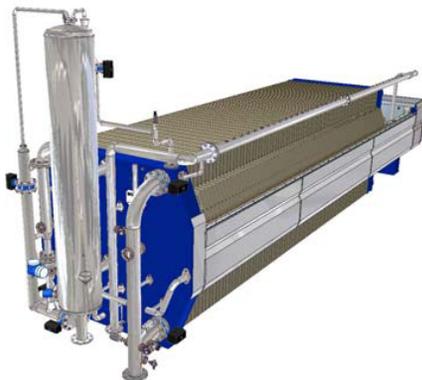


The Meura Mash Filter



It's not German



But, it works

More popular outside the US



- Used in production of 35% of the World's Beers
- Everything from Coors Light to Heineken, Bass, Guinness, and Chimay
- Many installations in Africa



Invented in 1901

- By Phillippe Meura



- 100 year old Meura mash filter in service at Brasserie de Brunehaut, originally installed at Chimay
- The Meura 2001 Membrane Assisted mash filter was introduced in 1987



Traditional Mash Filter

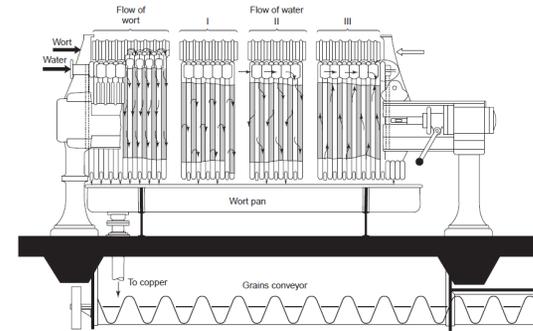


Fig. 6.19 A schematic longitudinal section through an older pattern of mash filter (Hind, 1940).



Meura's Competitors

- Nortek – traditional MF
- Landaluce – Sparge flexible, air drying
- Ziemann – Mash Filter with membranes

How does it work?

$$Q = \frac{dV}{dt} = \frac{\Delta P \cdot A}{\mu R_f}$$

ΔP (N/m²) : filtration pressure
 A (m²) : filtration surface
 μ (Ns/m²) : dynamic viscosity
 R_f (m⁻¹) : resistance of the filter $R_f = R_c + R_m$, where R_c : resistance of the cake and R_m : resistance of the filter cloth

Darcy's Law – describes liquid flow through a porous media

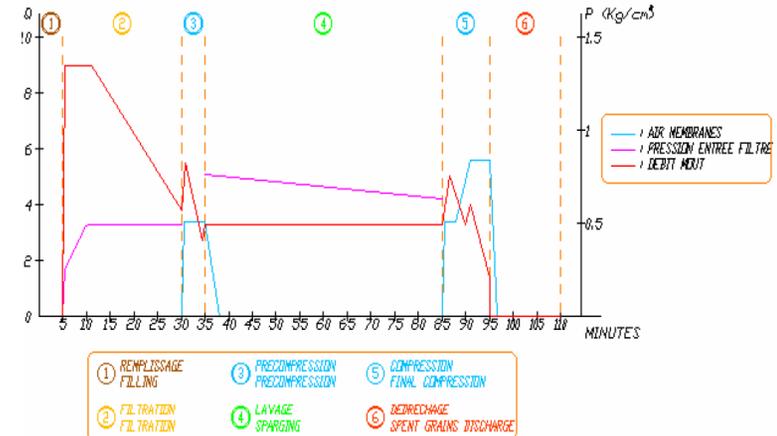


Meura's Specs

- **High Productivity**
- (at least 14 brews per day)
- **High Extract Yield**
- (min. equal to laboratory yield)
- **Very Bright Wort**
- < 5 EBC Haze before boiling (Imhoff < 5 ml/l post boil)
- **Low Oxidation**
- (Completely enclosed environment)
- **Very Dry Spent Grains**
- Maximum Moisture Content <70%



Typical Performance



Mash Volume Flexibility

Type	Weight Proportion	Malt equivalent
1000 kg husked malt	30%	1000 kg malt equivalent
1000 kg husked barley	30%	1000 kg malt equivalent
1000 kg dehusked barley	30%	350 kg malt equivalent
1000 kg sorghum	30%	900 kg malt equivalent
1000 kg rice	25%	350 kg malt equivalent
1000 kg maize	30%	500 kg malt equivalent
1000 kg starch	20%	150 kg malt equivalent

From 80% to 125% rated capacity



Hammer Time



Grind it up

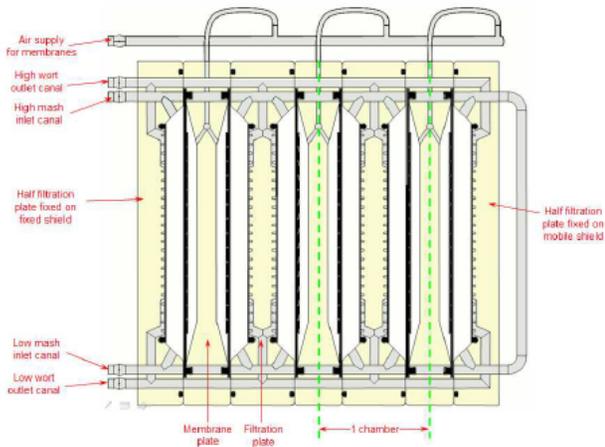


Mashing

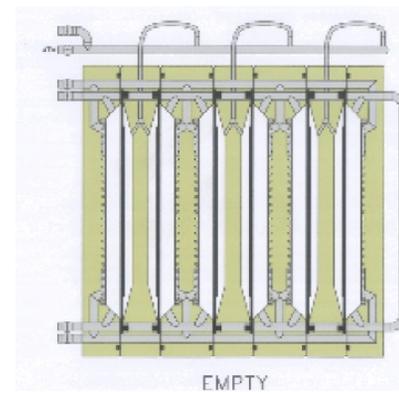
- Finely Ground Grist Allows for Quicker Conversion Times
- Thicker Mash Allows for Higher Gravity First Worts => 24P



Plate Layout



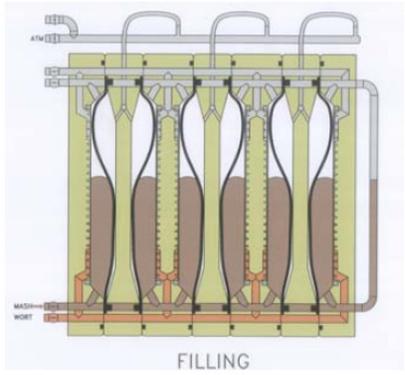
Mash Filter is Empty



- Filter empty in closed position
- Calls for mash



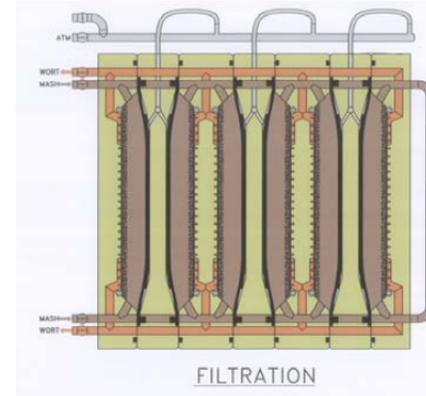
Mash Filter Filling



- Filled from below at a flowrate to fill the 29 chambers in 6 minutes
- First Worts begin to drain to kettle immediately (!)



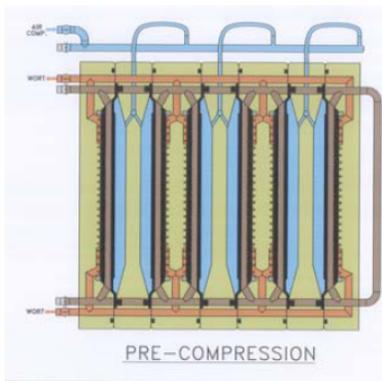
Mash Filtration



- Filter is full and back pressure builds
- Mash Tun pump begins to throttle to maintain a constant pressure
- Mash is transferred over a period of 25 minutes



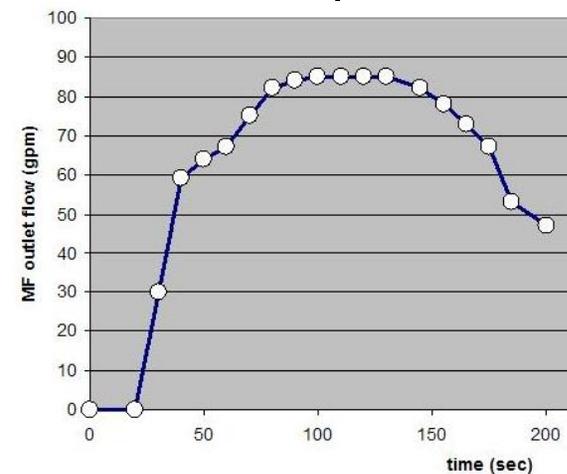
Pre-Compression



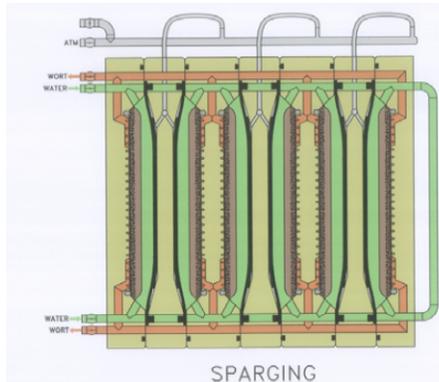
- Mash Transfer is complete
- Air Bladder inflates and compresses the mash bed ~5 mins
- All First Worts are collected in 30 minutes (!)



Pre-Compression



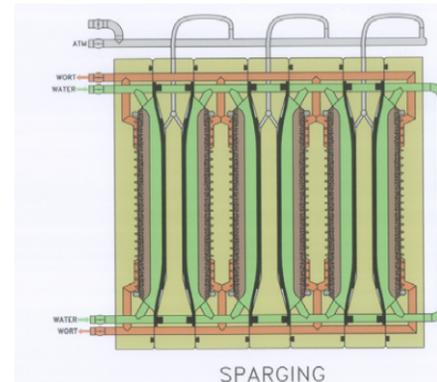
1st Sparging Cycle



- Sparge Water is added by the Mash Pump at a constant pressure while air is released from the bladder – 5 mins



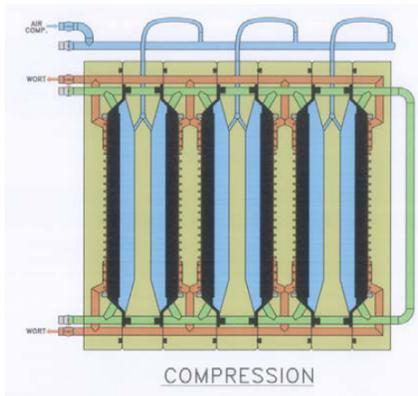
2nd Sparging Cycle



- Filter is full
- Sparge water is added
- Controlled by flowrate or pressure



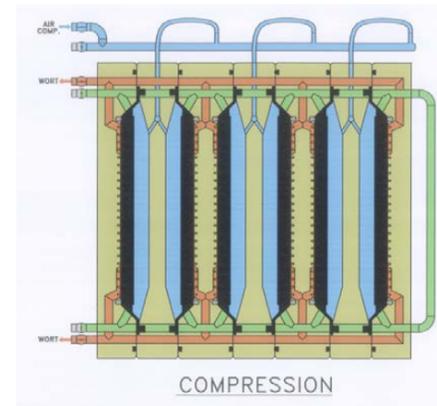
1st Compression



- Air pressure is added at 0.5 bar to the elastic membranes for 5mins



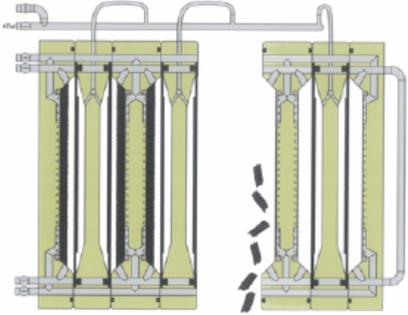
2nd Compression



- Longer than the first compression at up to 1 bar and from 5 to 15 minutes
- Spent Grains at 30% solids
- Current Lauter Tun Avg – 18%



Spent Grain Discharge



- Filter Drain < 30 gals
- Automated machine moves the frames
- Cake drops free from the frames
- Empties in less than 10 minutes



CIP

- Brewer rinses plates
- Soak Cleaning once a week with 2% Caustic
- Mild Caustic followed by mild acid for neutralization.



Pre - Warming

- If the filter sets idle too long, the filter must be pre-heated

Room temperature > 10 °C



Table 3: Quality and Composition of Wort

		Meura 2001	Lauter Tun
Polyphenols	ppm	161	145
Amino Acids	ppm	1995	2074
β Glucans	ppm	181	171
Total Nitrogen	ppm	700	695
Dextrins	ppm	425	291
Fatty Acids	ppm	18.5	166

Table 4: Beer Composition and Taste

		Meura 2001	Lauter Tun
Beer Analysis			
Polyphenols	ppm	200	210
Total Nitrogen	ppm	700	695
Esters	ppm	31.5	32
Degree of Fermentation	%	85.4	85
Foam	secs	125	122
Staling Factor	3 days at 40C	5.35	5.5

