

OPPORTUNITIES FOR AUTOMATION IN BEER PROCESSING

1. OBJECTIVES

To study the viability of implementing automated systems in an industry, considering different production capacities and focusing the research on beer, a product highly present in our culture and with a significant impact on our country's industry.

2. BEER PROCESSING

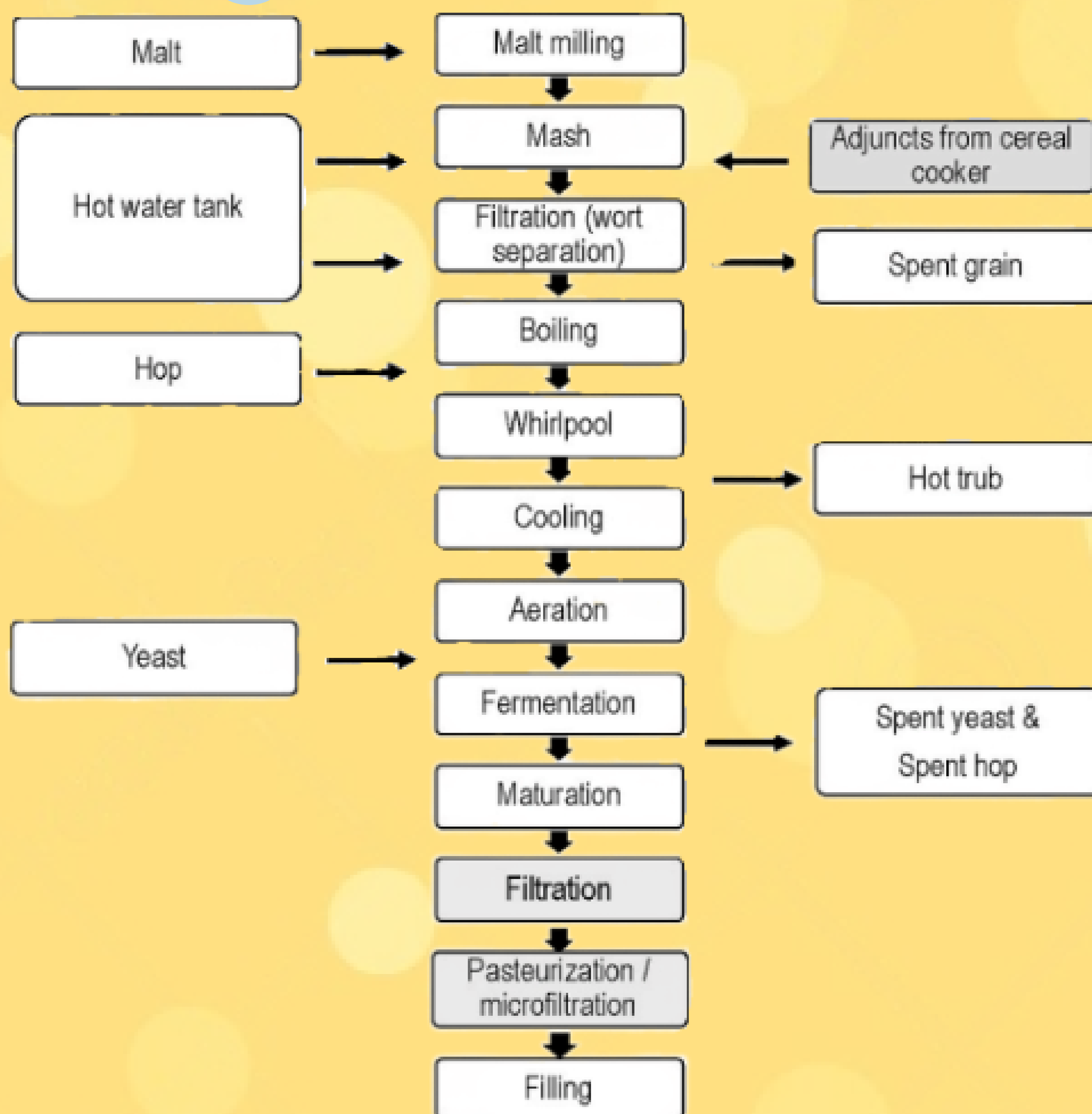


Figure 1. Flowchart of industrial beer processing, highlighted in dark are the operations not typically used in artisanal production. Source: (Villacreces et al. 2022).

3. PROCESS AUTOMATION

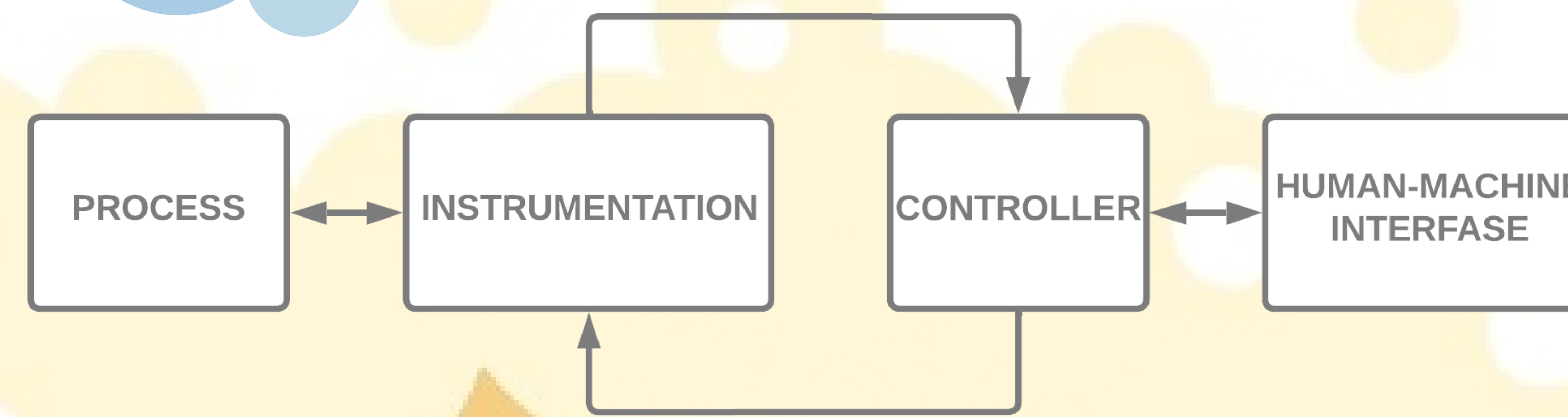


Figure 2. Basic structure of automatic systems.

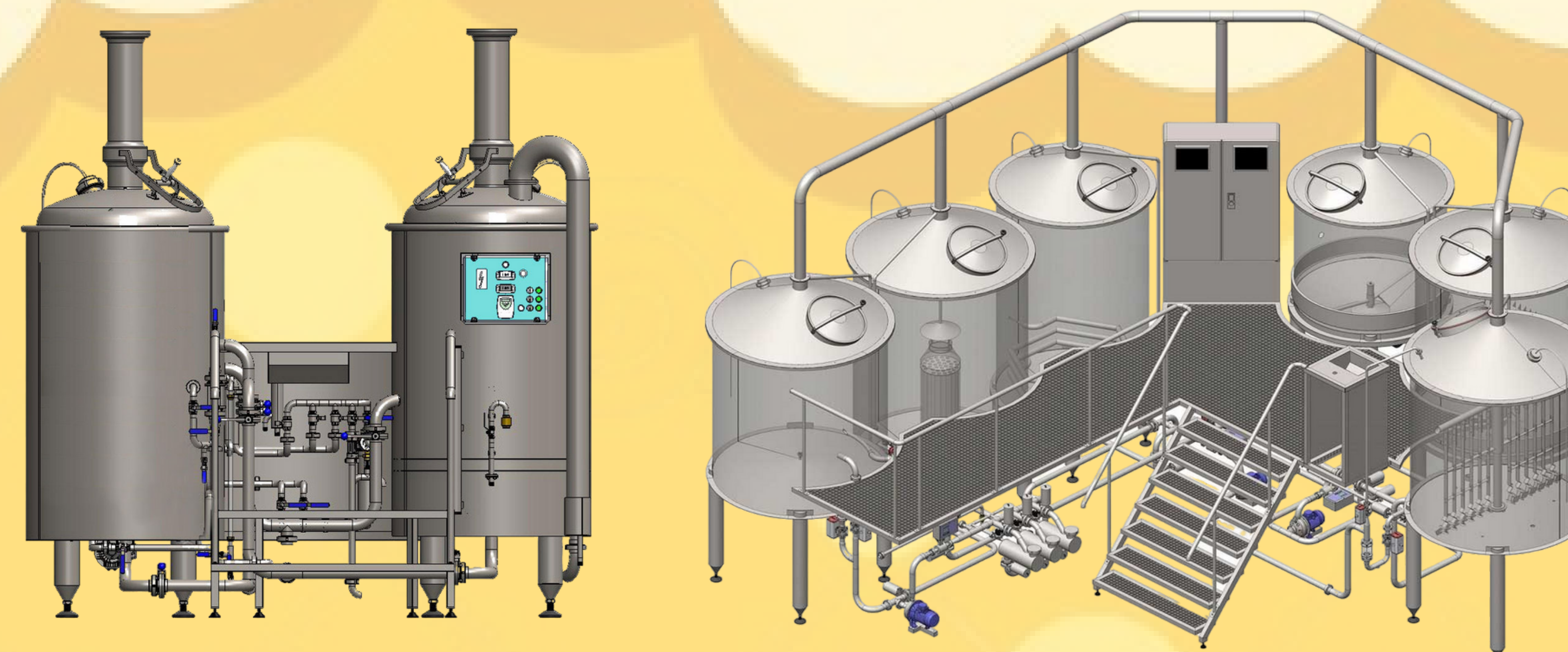


Figure 3. Traditional wort production line (left) and automated wort production line (right).

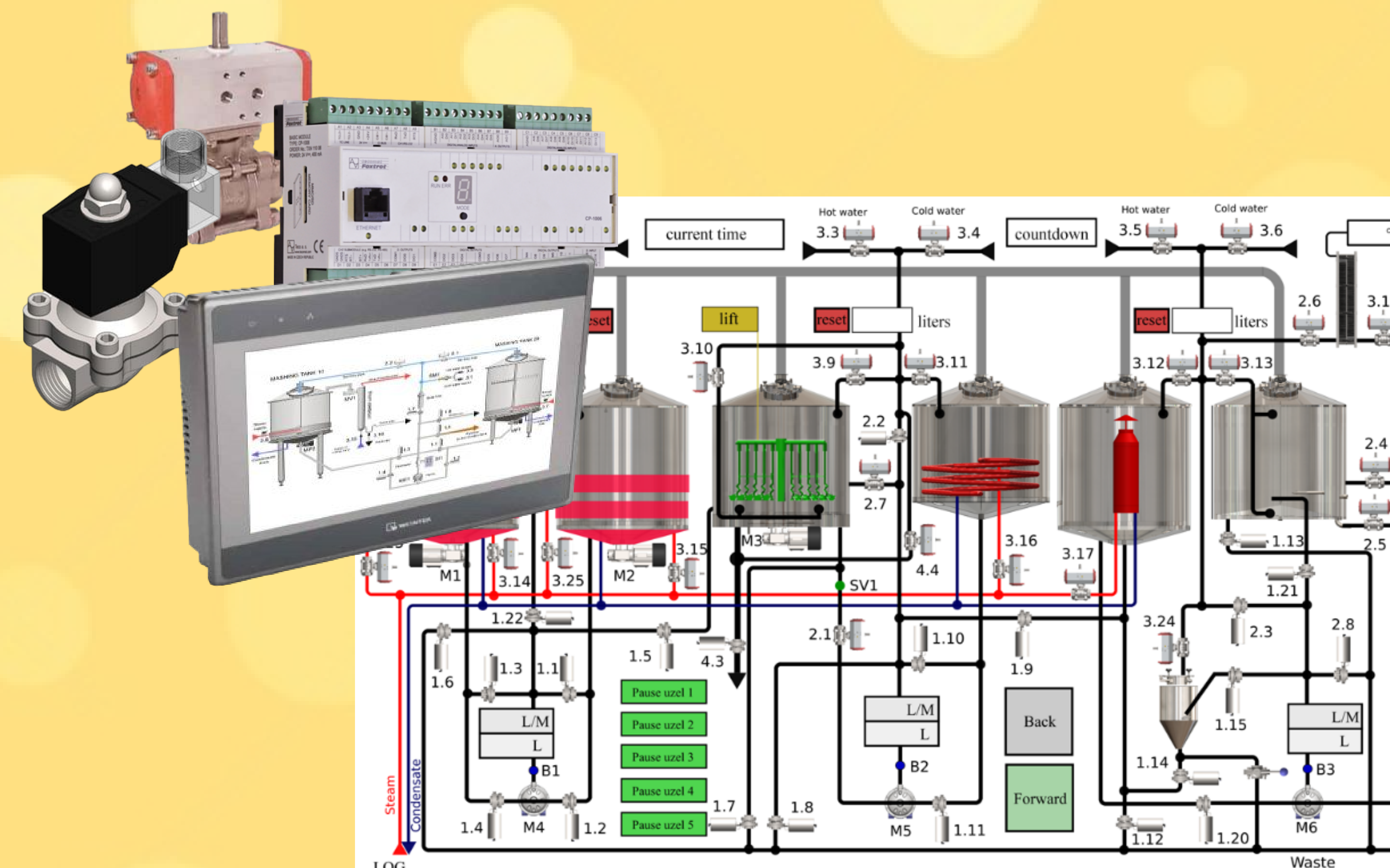


Figure 4. Systems involved in process automation, including instrumentation elements, programmable logic controller (PLC), human-machine interface (HMI), and control synoptic.

4. INVESTMENT VIABILITY

Table 1. Summary of the relevant parameters during financial evaluation.

	Production capacity	
	Low (50,000 hl/year)	Medium (500,000 hl/year)
Beer category	Craft beer	Industrial beer
Investment cost (€)	1,506,817	17,903,542
Net Present Value (NPV) (€)*	4,687,971	37,219,585
Internal Rate of Return (IRR) (%)*	117	81

*The values for NPV and IRR shown are relative to the investment project duration of 3 years used in the study.

5. CONCLUSIONS

- Access to machinery and automation at different production levels in the brewing sector is made easy thanks to the available offerings by the manufacturers themselves.
- The widespread lack of knowledge about high productions and automation among small brewers poses a barrier to the growth of small businesses. Therefore, the introduction to these systems should be facilitated in order to boost the artisanal sector.
- Ignoring the need for a more in-depth financial study and the assumptions made during the study, the NPV and IRR values shown in (Table 1) support the investment viability in both simulations.