

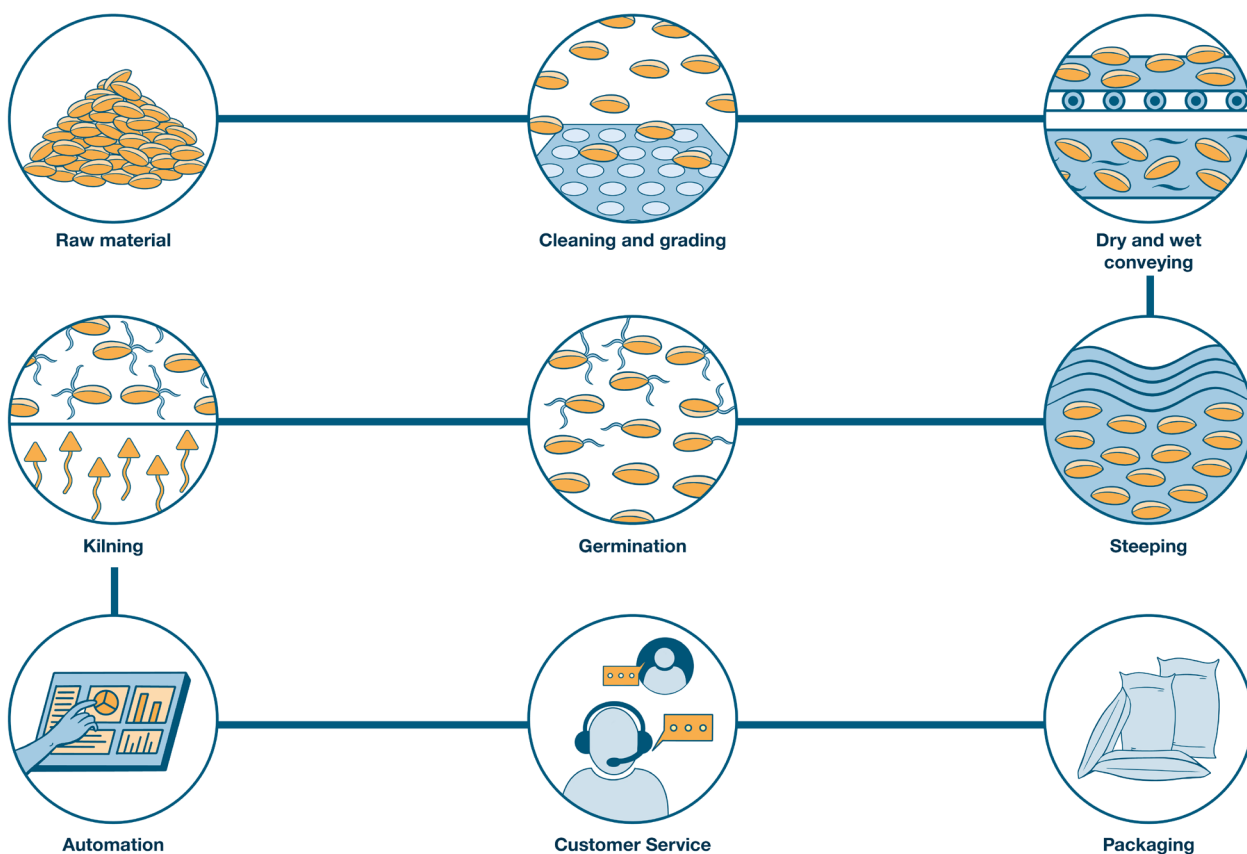


All-in-one
malting solution.

RimoMalt.

Bühler malting systems. **Your perfect partner for the best malt.**

Every year around 2 billion hectoliters of beer and more than 25 million metric tons of malt are industrially produced worldwide. With our extensive portfolio solutions, we support you all the way – from the raw product to the best malt.



All-in-one malting solution. **RimoMalt.**

For small-scale malting in large-scale style. RimoMalt combines all three process steps – steeping, germination and kilning – in a single solution, and offers a yearly production capacity up to 17,000 metric tons of malt.

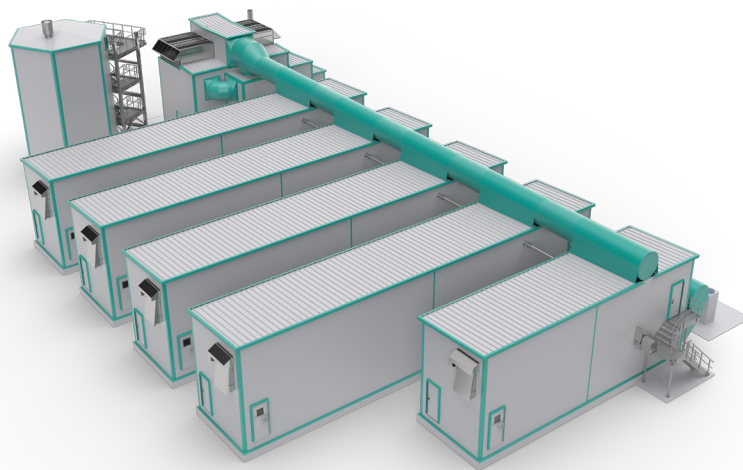


Figure 1: RimoMalt 4x32 / 1x16

RimoMalt provides a unique modular structure that is able to grow with your demands.

The combined germination and kilning units receive the steeped barley from one cylindro-conical steep. The steep is available in one size and only needs to be adjusted in height via additional rings to extend the batch size. Sizes range from 16 metric tons up to 56 metric tons.

The same principle is used for the germinating-kilning units.

Starting with a batch size of 16 metric tons, each germinating-kilning unit can be extended via intermediate modules to a batch size of 56 metric tons. Unlike other comparable malting systems, RimoMalt is designed for outdoor installation and therefore needs no additional building to operate.

Advantages at a glance:

- No building needed - designed for outdoor installation
- Batch increases possible
- Modularly extendable - up to 24h batch cycle
- Individual / combinable heating systems (gas/hot water/steam)
- Highly and quickly adjustable to changing demands
- Access to product at anytime, anywhere
- Space-saving and standardized solution
- Quick installation thanks to pre-assembled modules
- Independent aeration and cooling system
- The most up-to-date malting automation system
- Effective design for waste and fresh water reservoir
- Combinable with roaster for caramel and roast malt production

Your suitable malting solution.

What is RimoMalt?

RimoMalt is the first fully modular all-in-one and standardized malting plant. It provides full flexibility to customers who produce between 1,000 and 17,000 metric tons of malt per annum. You can have 4 or 5 germination days with the system at following capacities:

RimoMalt example: 4 germination days	16	24	32	40	48	56
1st GKU with steeping unit	969	1,454	1,939	2,424	2,908	3,393
2nd GKU	1,939	2,908	3,878	4,847	5,817	6,786
3rd GKU	2,908	4,362	5,817	7,271	8,725	10,179
4th GKU	3,878	5,817	7,756	9,694	11,633	13,572
5th GKU	4,847	7,271	9,694	12,118	14,542	16,965

RimoMalt example: 5 germination days	16	24	32	40	48	56
1st GKU with steeping unit	810	1,215	1,620	2,025	2,430	2,835
2nd GKU	1,620	2,430	3,240	4,050	4,860	5,671
3rd GKU	2,430	3,645	4,860	6,076	7,291	8,506
4th GKU	3,240	4,860	6,481	8,101	9,721	11,341
5th GKU	4,050	6,076	8,101	10,126	12,151	14,176
6th GKU	4,860	7,291	9,721	12,151	14,581	17,012

Consumption data per produced metric ton of malt

- Heat demand per mt of malt: 600-650 kWh
- Electrical demand per mt of malt: 130 kWh
- Fresh water consumption per mt: 3-4 m³
- Waste water consumption per mt: 2,5 m³

For effluent water treatment plant (customer supply):

- COD-value: 500-900 mg/l waste water
- BOD5-value: 400-800 mg/l waste water

Scope:

- Bühler delivers everything above ground (steeping unit, heating unit, germinating-kilning unit)
- Bühler provides design for fresh water reservoir below steeping unit
- Bühler provides design for waste water reservoir below germinating-kilning unit
- Bühler will send an installation team to install Bühler's scope
- Delivery time is 6-8 months

Service

Bühler will send an experienced supervision team. The customer only provides the personnel for installation.

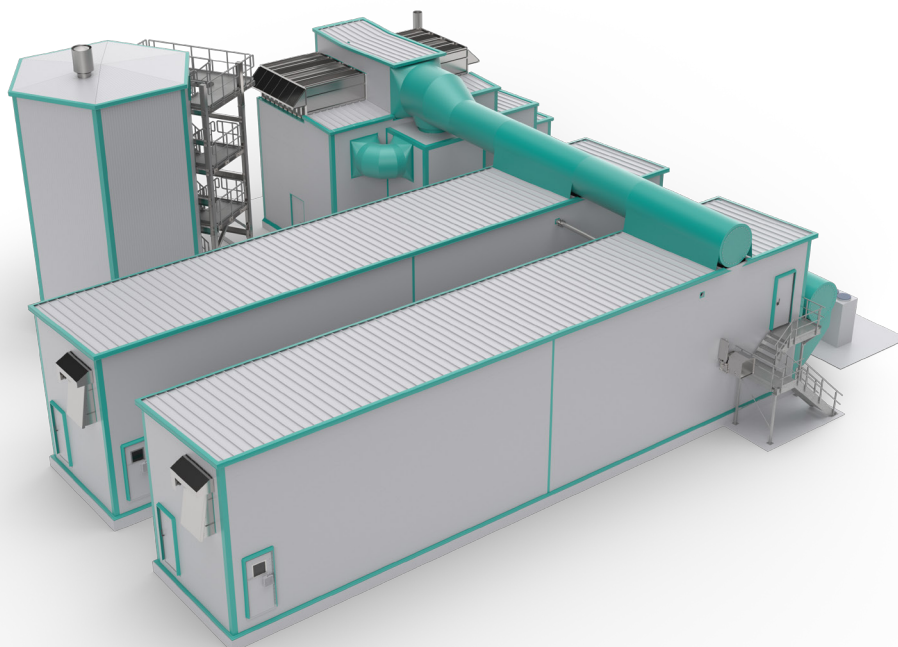
Products

- Barley
- Wheat
- Rye
- Others on request

Footprint:

- RimoMalt 16 - 1,000 mt/a:
15m x 24m (height max. 9,5m)
- RimoMalt 56 - 17,000 mt/a:
45m x 45m (height max. 13m)

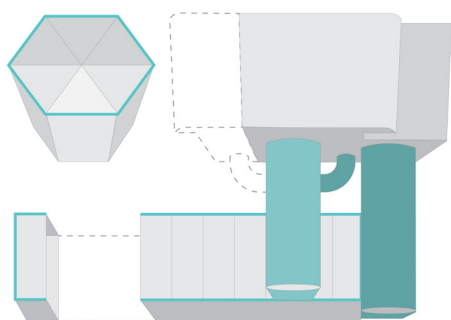
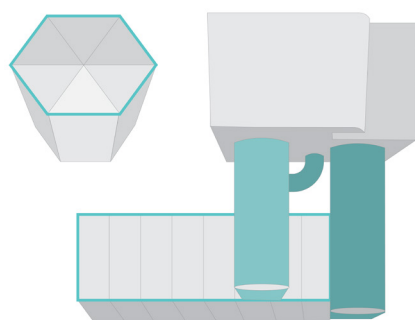
mt = metric tons



Modularity and flexibility

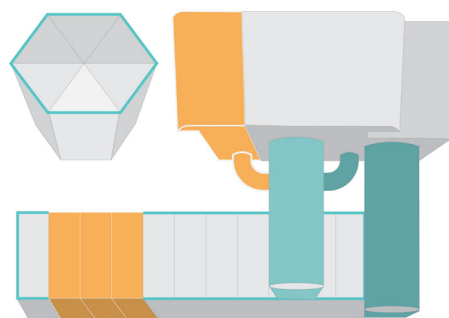
Growing with your demands.

Each RimoMalt unit starts at a batch size of 16 mt – the smallest version available. Changing demands and requirements however can mean that an extension of the existing plant is required, and this is where the unique modularity of RimoMalt comes into play.



Thanks to standardized intermediate modules the GKU can be extended in 8 mt steps, beginning at 16 mt and going all the way up to a maximum batch size of 56 mt per unit. The steeping unit can be extended in two extension levels according to the main size of 16 mt, 32 mt or 56 mt.

Extending the already installed GKU is facilitated by inserting new modules in between the starting and end module. The GKU is opened at pre-defined extension points to allow installation of the intermediate module. As with all other modules, the intermediate module comes preassemble on site for fast installation and reducing the plant's downtime to a minimum.



Your malting process starts. **Steeping unit.**

The CCS unit is fully enclosed, insulated and cladded. The elevator for the grain is located at the opening, enabling you to bring your grain to the top of the steeping unit. From here the grain enters the CCS via pipe so steeping can begin.

Attached stairs allow you to access the roof of the CCS via a mounted door, with another door located at the bottom so you can also reach the lower part easily.

Our steeping unit is highly flexible and is easily extendable by adding height-extending rings. This process consists of three steps, so you can choose 16 mt, 32 mt and 56 mt steeping units.

Steeping is the beginning of the germination process, and determines malt quality and yield. After steeping is finished, the steeped material is pumped into the germinating-kilning unit.

Pressure aeration rate in wet phase: approx. 8 m³/h and mt.

CO₂ air extraction rate: approx. 100 m³/h and mt.



Figure 2: CCS for RimoMalt 16



Figure 3: CCS for RimoMalt 32

Continuing the process. **Germinating-kilning unit.**

Combined process solution

RimoMalt includes of a combined germinating-kilning unit, which means that no additional product conveying is needed. This also enhances malt quality.

Standardized equipment

Each unit is equipped with a turning, loading and unloading machine, which guarantees an even layer of product for germinating and kilning as well as fast unloading. Each unit also comes with its very own germination fan for maximum flexibility during the malting process. Even when you decide to extend your RimoMalt, standardized germination fans are

available for all extension stages – 16mt, 32mt and 56mt.

Easy extension

By adding an intermediate module between the starting and end modules, each unit can be extended in 8 metric ton steps – completely independent from the other units.

Specific deck load: approx. 425 kg/m² barley as steeped barley

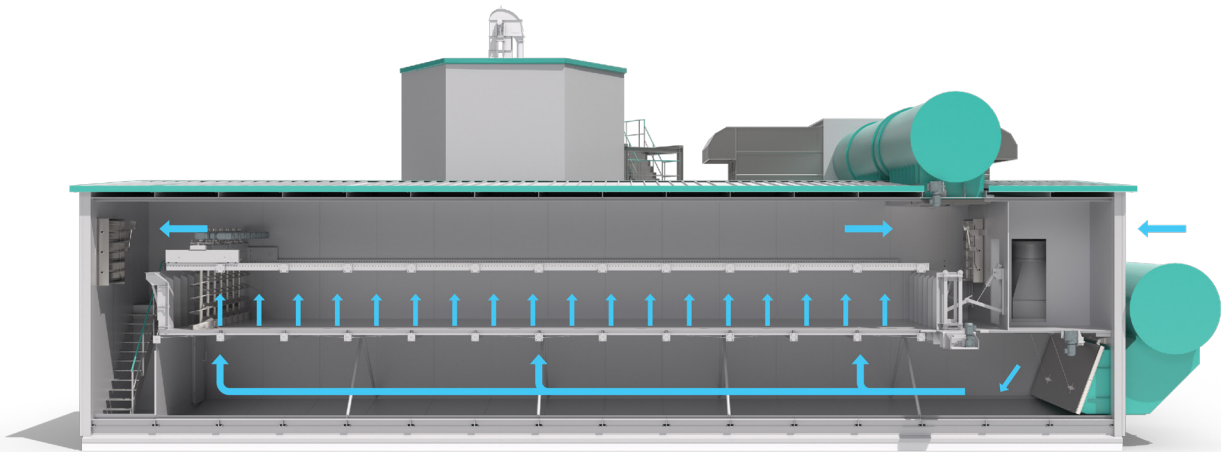
Aeration airflow rate during germination: approx. 600 m³/h and mt

Aeration airflow rate during kilning: approx. 3,000 m³/h and mt



Figure 4: Turning-, Loading and Unloading machine

Process details. **Germination.**

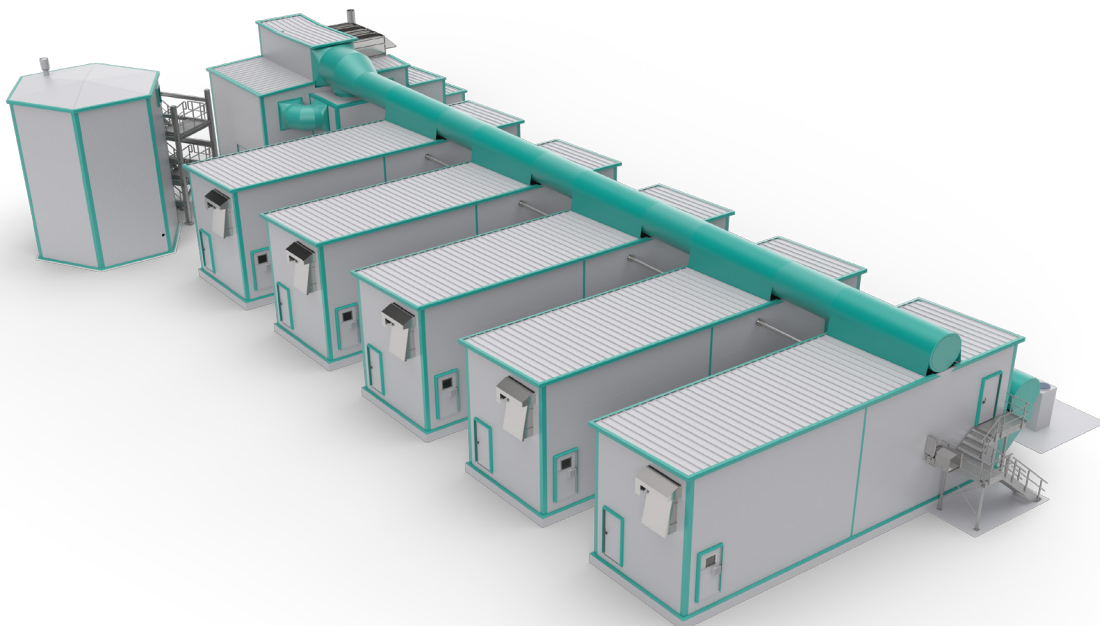


Decentralised germination fan

Using the axial fan located at the starting module of each germinating-kilning unit, fresh air is sucked in via a set of flaps. The fan blows the air into the intermediate modules where it flows via the perforated floor deck and through the product. This design also allows for individual operation of each unit.

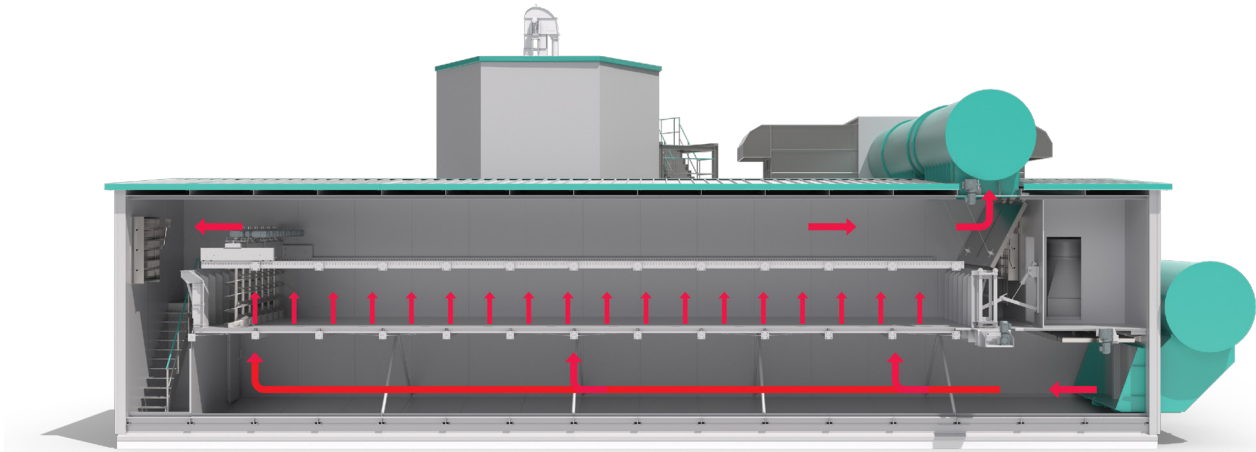
Gentle product transport and handling

After steeping, the product is gently pumped into the germinating-kilning unit. The machine provides an even product layer for optimal aeration during germination.



Process details.

Kilning.



High operating temperature

To allow for increased production variety for malt, RimoMalt is designed for kilning temperatures of up to 120° C - thanks to its centralized heating unit.

Smart air supply system

Each germinating-kilning unit is directly connected to the heating unit and can be supplied with hot air independently. The revert air channel

ensures energy-efficient use of the glass-tube heat exchanger located on top of the heating unit.

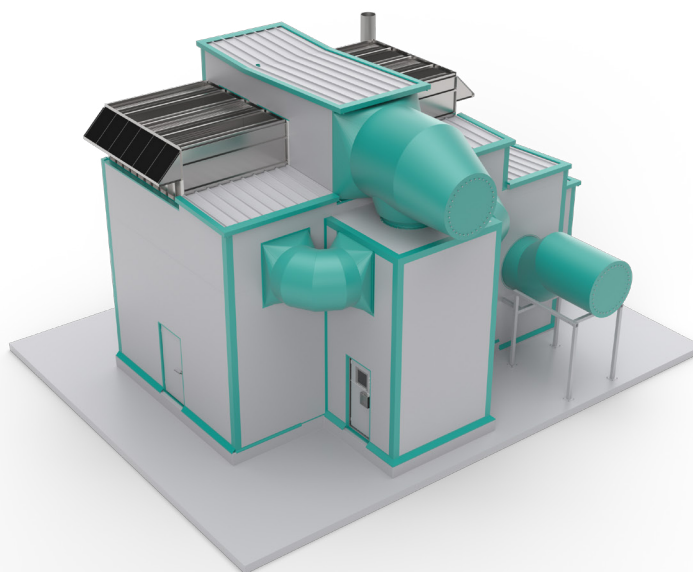
Best malt quality

RimoMalt has a combined germinating-kilning unit, which means that no additional product conveying is needed. This also enhances malt quality.

Process details.

Heating unit.

During the kilning process, hot air is directed through the hot air channel from the heating unit to the germinating-kilning unit(s) via a central kilning fan, and returned to the heating unit via a revert air channel. Aeration takes place by means of a central kiln fan, which is located in the heating unit. The heating unit is connected to the start module(s) of the germinating-kilning unit(s).



During the kilning process, the central kilning fan from the heating unit introduces tempered air from the gas burner and/or heating coil (hot water or steam) into the intermediate modules. In addition to the heating unit, at least one glass tube heat exchanger can also be integrated – RimoMalt 16 has one glass tube heat exchanger, while RimoMalt 32 and 56 have

two. There is also a control center in the heating unit that serves to control and monitor the RimoMalt.

The maximum heating capacity of the RimoMalt 16 is 800 kW, the RimoMalt 32 is 1,600 kW and the RimoMalt 56 is 2,400 kW.

Business case. **Brewing plant.**

Brewery in Germany with an annual throughput of 250,000 hl of beer

Quantity of malt required: $250,000 \text{ hl} * 0,015 \text{ mt/hl malt} = 3,750 \text{ mt malt}$

As the brewhouse and bottling is not usually running at the weekend, the heating is turned off after Friday's work shift and turned on again for Sunday's night shift.

The RimoMalt 40 with two germinating-kilning units allows the brewery to use their existing heat plant to heat the hot water / steam coil or gas register in the RimoMalt's heating unit.

The kilning process only runs on Saturdays and Sundays, with the steeping and germinating processes taking place during the week – this enables fully efficient use of the brewery's heating plant.

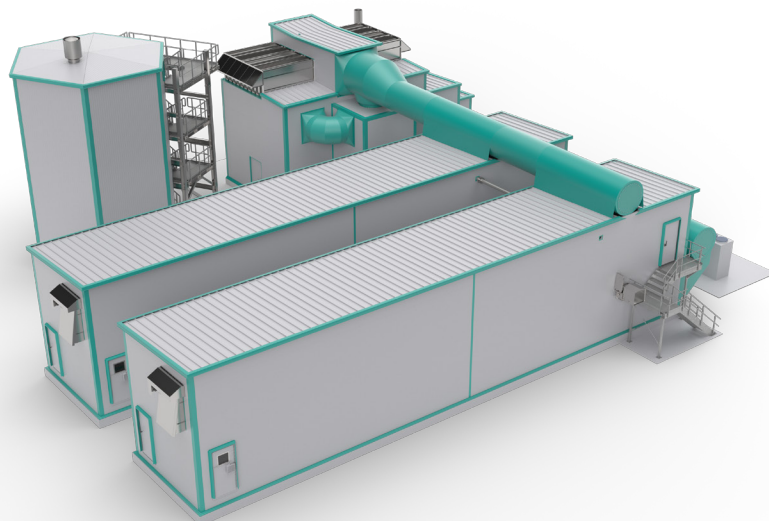
Solution:

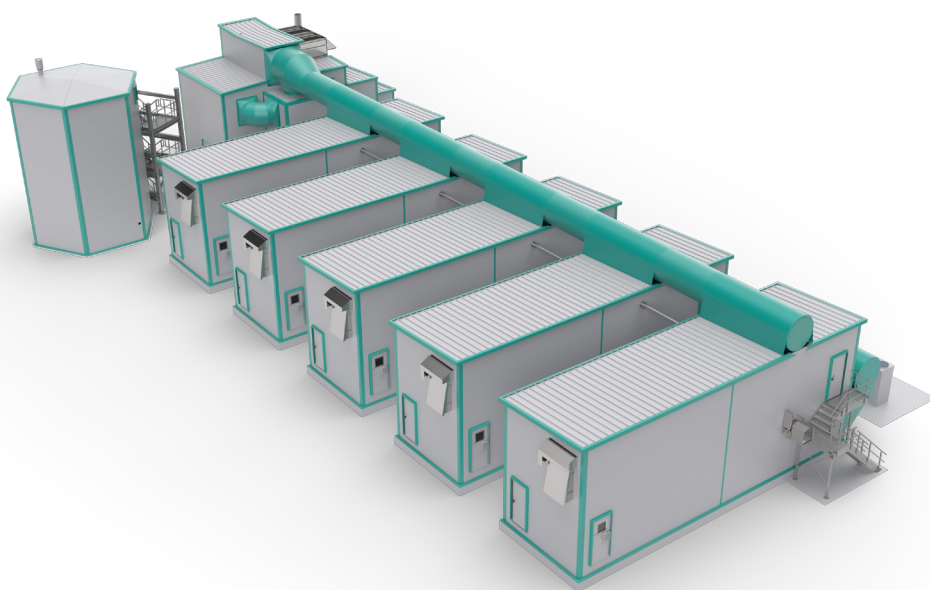
RimoMalt 40 with two germinating-kilning units:

Annual malt production: approx. 4,050 mt/a

If demand changes, the brewery can extend the RimoMalt 40 by adding intermediate modules to the existing germinating-kilning units to extend the batch size up to 56 mt.

Two germinating-kilning units of 56 mt mean that an annual capacity of 5,671 mt is possible, and if that's still not enough additional germinating-kilning units up to a 24h batch cycle can be added.





Business case. **Distillery plant.**

Distillery in Scotland with an annual throughput of 3,000,000 liters of whisky

Quantity of malt required: $3,000,000 \text{ l} / 644 \text{ l/mt} = 4.658 \text{ mt malt}$

Instead of malt intake, the distillery can buy local barley directly from farmers. Bühler supplies the right cleaning machines for barley intake and sorting/classifying machines before the barley is stored in silos. From there we connect the storage with the RimoMalt.

Solution:

RimoMalt 16 with five germinating-kilning units:

Annual malt production: approx. 4,847 mt/a

With four days of germination and one day for kilning, the RimoMalt 16 with five germinating-kilning units provides the distillery with one batch of distilling malt each day.

If the demand for distilling malt increases, the RimoMalt can be extended in batch size. The steeping unit can be extended by an additional ring in the cylindrical section, the GKU by an intermediate module and the heating unit through a bigger hot water / steam coil or gas burner and an additional glass tube heat exchanger.

It is also possible to designate one of the GKUs to produce just peated or smoked malt – here the GKU is only connected with the fresh air channel coming from the heating unit. There is no revert air channel to the heating unit to protect the periphery from contamination.



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