

# ROBOT-POLAR SYSTEMS



FULLY AUTOMATIC SYSTEM FOR BATCH-TREATMENT OF METAL SWARF BY DEOILING, DRYING, CRUSHING, SEPARATING, SCREENING, TRANSPORTING AND STORING.

- Separate treatment of different swarf materials and cooling lubricants
- Can be used for almost all metals and plastics
- Solid material in the swarf can be processed easily
- Residual moisture below 2% possible
- High throughput due to short cycle times
- High flexibility due to universal and versatile combination options
- Swarf crusher not necessary for optimised batch services
- Integration of coolant lubricant treatment possible
- Minimum operator involvement due to full automation of workflows
- Linking with system components on site possible



## THE ROBOT-POLAR SYSTEM FOR PROCESSING SWARF

Due to continually increasing requirements on the properties of workpieces to be manufactured, selection of suitable work materials and cooling lubricants for the production process is becoming more important. In the case of continually increasing material costs as well as the increasing costs for technically perfected cooling lubricants, it is absolutely necessary to recycle the „swarf waste“ from the production process.

Depending on the swarf material and the swarf geometry, this „swarf waste“ contains between 15% and 50% cooling lubricant. This proportion of cooling lubricant is wasted if the swarf is discharged without further treatment and this increases the costs for procurement of additional cooling lubrication.

Now, the requirements on recycling of swarf are almost as high as on the basic work material itself. The requirements on non-ferrous metals according to the European DIN EN 12861 non ferrous scrap are particularly high with respect to material purity and expected residual moisture.

For example, in the case of Cu-Zn alloys, only a very small proportion of extraneous material can be accepted. The following specifies the expected residual moisture in this DIN standard:

„The expected moisture content is smaller than 2% (percent by weight). Moisture content between 2% and



4% (percent by weight) must be subtracted as weight deduction. Moisture content between 4% and 6% (percent by weight) must be doubled and subtracted as weight deduction“.

That means the more material is mixed and the higher the proportion of residual moisture, the lower the resale value of the swarf.

These values are now not only used by all well-known recyclers for Cu-Zn alloys according to the „scrap standard“, but are also applied to swarf from steel, aluminium, stainless steel, titanium, magnesium etc. The required values cannot be achieved without intelligent and professional swarf treatment.

The Robot-Polar system is the perfect solution for separate treatment of swarf materials and cooling lubricants. Due to the modular structure of the individual system components, swarf treatment can be individually combined for any application and can be adapted to special requirements. Batch treatment of swarf and separate processing of cooling lubricants guarantees almost completely separate processing of the media from discharge up to storage. When selecting the optimum batch size and a centrifuge adapted to the application case, it is possible in many cases to disclaim crushing the swarf with a swarf crusher. It is also possible to treat long pieces of swarf, swarf bundles and swarf containing course parts.

## OPERATION

The machine tool fills the swarf directly into the centrifuge basket and is transported to the system with the help of a manual pump truck. Alternatively, onsite swarf trolleys can be used that empty into the centrifuge basket with the help of a lift and tipping device. After filling, the centrifuge basket is automatically inserted into the centrifuge. Treatment takes place fully automatically according to prior selection of the swarf type and cooling lubricant. After centrifuging, the centrifuge baskets are put into the discharge station of the container loader. The container loader moves to a free location in the selected container and empties the centrifuge basket. After discharging, the basket is returned to the filling position of the system.

Two different systems are used for filling the container: ceiling or floor fixing. This flexible system allows the container to be filled evenly and almost completely. Since containers are usually located in an unheated room, the wall opening for transfer of the movable discharge station is closed by an automatic lift gate to keep heat loss as low as possible.

The Robot-Polar system is controlled fully automatically via a PLC. Operating takes place via a touch panel. During automatic operation, the type of swarf and if required, the cooling lubricant must be selected, after which the system runs fully automatically according to the preset programme parameters.

## SWARF FEEDING

The swarf feeding into the Robot-Polar system can take place in different ways:



**Centrifuge basket:** swarf is filled directly into the centrifuge basket at the processing machine. This basket is then transported to the Robot-Polar system using a manual pump truck, put into a stationary filling station for the treatment process. The manual pump truck is adapted to the respective requirements.



**Swarf bins up to 180 l:** swarf bins with a batch volume of up to 180 l can be filled at the machine tools and put into a lift-tilting device for automatic filling of the centrifuge basket. The size of the centrifuge basket is selected according to the volume of the swarf bin.



## SWARF FEEDING



**Swarf bins larger than 180 l, short pieces of swarf:** swarf bins with a volume of more than 180 l of short swarf can be filled at the machine tool and then fed to a scraper conveyer or vibrating conveyer with the help of a lift-tilting device or a forklift. The swarf is then gradually dispensed into the corresponding centrifuge basket for treatment.



tem, where the swarf is emptied directly into the centrifuge basket.

**Swarf bins larger than 180 l, long swarf:** when adding long swarf from swarf bins with a volume of more than 180 l, a swarf crusher is usually necessary. The size of the swarf crusher to be used, depends on the volume of the swarf bin and the required throughput capacity of the system. The swarf bins are either emptied directly or put onto a lift-tilting device using a manual pump truck or forklift and then into the swarf crusher. In the case of tilting swarf bins, it is possible to tip directly into the funnel of the swarf crusher.

After crushing, the swarf is then gradually dispensed into the corresponding centrifuge basket for treatment.

In case of swarf bins with a volume of 500 l at max. 500 kg, it is possible to use the RF12 Robot-Polar Sys-



## CENTRIFUGES

The centrifuge is the heart of every swarf treatment system. For different applications, two different centrifuges are used and equipped with various different op-

tions and extensions according to the swarf to be processed.



**RP-type industrial centrifuge for short swarf:** speeds up to 980 rpm. depending on the type of swarf, centrifuge motor is mounted on an elastically supported motor clamping flange.

**RF-type industrial centrifuge for long swarf:** speeds up to 400 rpm. depending on the type of swarf, rigid mounted centrifuge motor.

## TECHNICAL DATA

Throughput	RP 5 RF 5	RP 6 RF 6	RP 7 RF 7	RF 8	RF 12
max. basket filling volume	50 Liter	80 Liter	120 Liter	180 Liter	500 Liter
max. basket filling weight	100 kg	150 kg 300 kg	150 kg 300 kg	300 kg	500 kg
max. batch per centrifuge / h <sup>1</sup>	10	10	10	10	6
Centrifuge baskets	RP 5 RF 5	RP 6 RF 6	RP 7 RF 7	RF 8	RF 12
Diameter	506 mm	606 mm	708 mm	808 mm	1,200 mm
Height	475 mm	495 mm	550 mm	550 mm	800 mm
Rotating speed	980 rpm 400 rpm	735 rpm 400 rpm	735 rpm 400 rpm	400 rpm	350 rpm

<sup>1</sup> Depending on the required centrifuging time and system size

Type suffix „H“ for optional heating, e.g. RP6H

Subject to technical and content-related changes.

## SWARF DISCHARGE

The discharge of the processed swarf in the swarf container can be done in different ways:



▲ **Stationary discharge station:** Discharge of processed swarf directly or through a vibrating conveyor to a swarf container placed below.

► **Movable discharge station:** Discharge of the processed swarf into several swarf container placed below.



▲ **discharge station with sieve separator:** The processed swarf is discharged onto a sieve to separate swarf from parts.



**Movable discharge station with container loading for floor or ceiling fixing:** the processed swarf is put onto the movable discharge station in the centrifuge basket. This discharge station is moved to the container carriage with the help of a motor. The container carriage moves the preselected container and looks for a free location in the container by means of fill level monitoring where the swarf can be tipped out of the centrifuge basket. This allows almost 100% use of the container volume. The centrifuge basket is subsequently transported back to the system and back to the filling station by means of the transport station. The container carriage can be supplied in different configurations. Boom carriage, ceiling carriage und portal carriage. The container loading system can be combined with almost all swarf containers.

Alternatively, it is also possible to equip the movable discharge station with a fixed container, in which the swarf can be discharged out of the centrifuge basket, e.g., when discharging the swarf through the hall ceiling.



## SWARF DISCHARGE



Container loading with movable discharge station for centrifuge baskets on boom carriage for floor fixing



Container loading with movable discharging station for centrifuge baskets on portal carriage



Container loading with movable discharging station for centrifuge baskets on portal carriage



Container loading with permanently fixed container on movable discharging station. Filled via scraper conveyor.



Container loading with permanently fixed container on movable discharging station, filling from centrifuge basket via hall ceiling.

## EXAMPLES FOR ROBOT-POLAR SYSTEMS FOR SWARF PROCESSING



System for two swarf types (titanium and stainless steel), swarf feeding by means of centrifuge basket on basket transport.



RS300E swarf crusher and lifting-tilting device



Filling station, centrifuge, transport station and discharging



System with type RP and RF centrifuge



Discharging in four containers

## EXAMPLES FOR ROBOT-POLAR SYSTEMS FOR SWARF PROCESSING



System with RS500E swarf crusher for steel and feeder for grey cast iron



Centrifuges with swivelling discharge sockets for two different types of oil, oil cleaning with magnetic separator

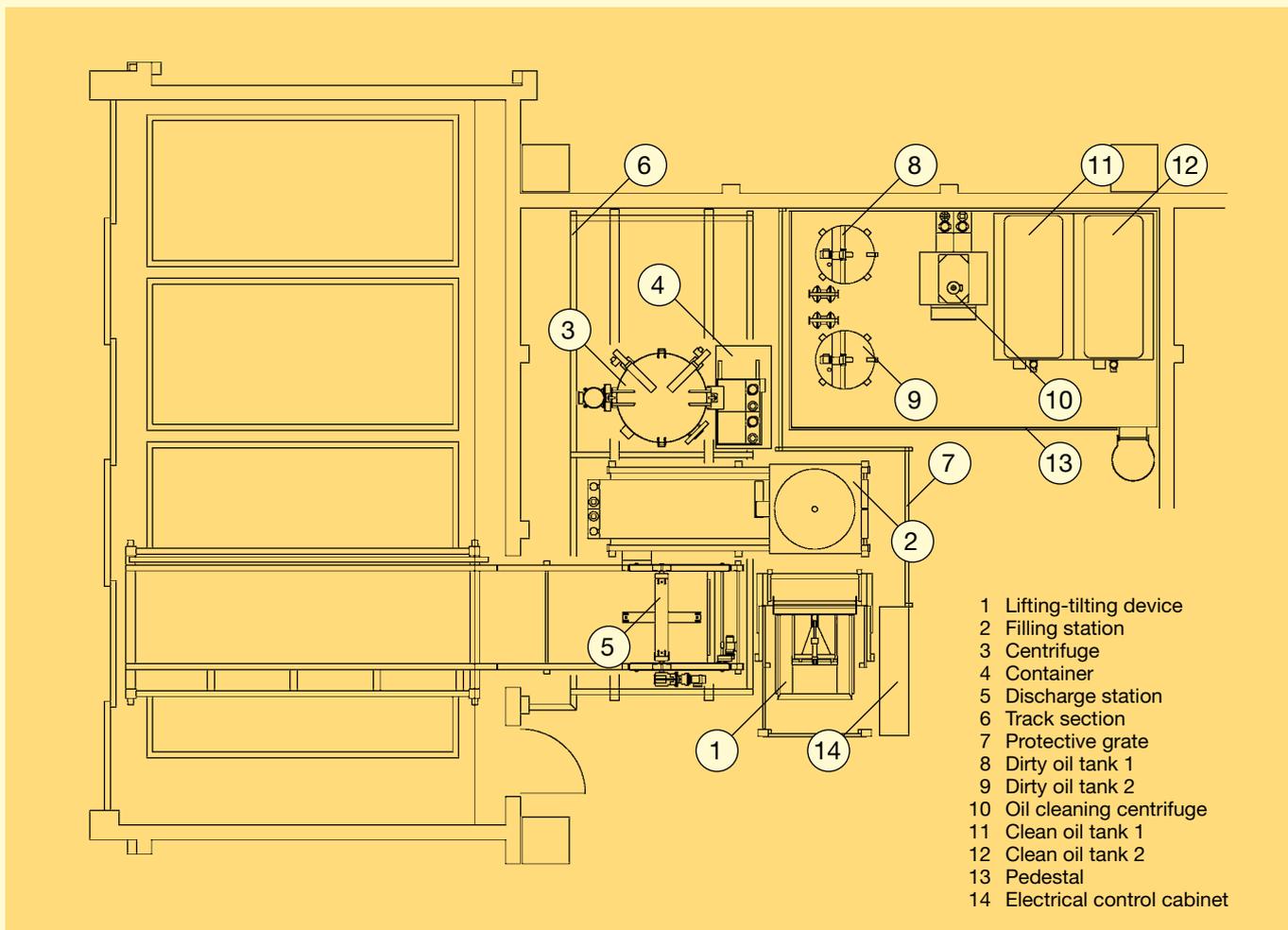


Feeder situation for three different swarf types



Robot-Polar system with RF12

## EXAMPLES FOR ROBOT-POLAR SYSTEMS FOR SWARF TREATMENT



Swarf processing with oil cleaning system

### Robot-Polar System for de-oiling steel swarf wetted with two different types of oil.

Feeding the swarf takes place via four different swarf bins, into the lifting-tilting device. The feed quantity is max. 500 litres/batch with a batch weight of max. 500 kg. Swarf can be short or long and clustered. The throughput of the systems is 3,000 litres per hour.

De-oiling of the swarf in a type RF12H centrifuge with a basket diameter of 1200 mm. Feeding of the de-oiled swarf via the movable discharging station in four swarf containers each of 20 m<sup>3</sup>.

Both spun-off oil types are cleaned almost unmixed with an oil treatment system and recycled to the tool machines.

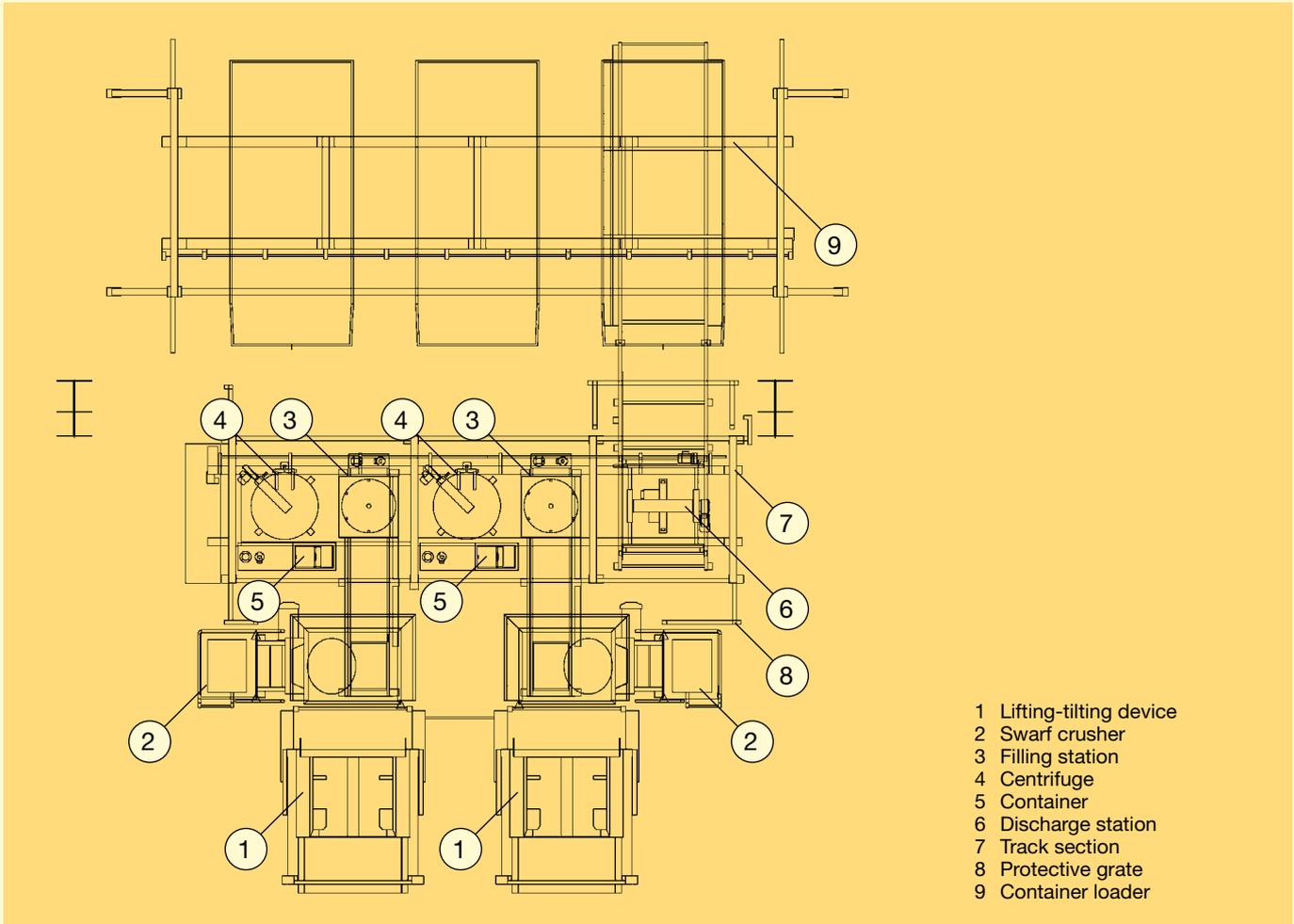


Filling station, centrifuge and container



Container loading as portal carriage

## EXAMPLES FOR ROBOT-POLAR SYSTEMS FOR SWarf TREATMENT



**Robot-Polar System** for de-oiling steel and aluminium swarf wetted with oil or emulsion.

Feeding of swarf takes place from tipping containers, content approx. 380 litres by means of fork-lift trucks into the pick-up of the lifting-tilting device for steel swarf with oil or into the pick-up of the lifting-tilting device for steel or aluminium swarf with emulsion. Swarf is crushed in the type RS500E swarf crusher and the type RP7H centrifuge, dried and emptied into the preselected container using the discharging station. The system works with different swarf and two different unmixed cooling lubricants.

The throughput of the systems is 2,200 litres swarf per hour.



Swarf feeding via lifting-tilting device



Container loading as ceiling carriage



RS500E swarf crusher and discharge station

## OUR TEST SYSTEM



In order to be able to select customer and practice-oriented and complete solutions from the Gebr. Steimel range, it is essential to previously determine the suitable machines and applications by means of tests. Steimel has its own test area that can be used by our customers to transfer the knowledge gained to planning.

We would be happy to determine the right machine and application for your case by performing tests with your material in our systems .

Our engineers will be pleased to develop project variants for you and provide corresponding quotes for a processing system specified to your needs.

## ADDITIONAL EQUIPMENT AND OPTIONS FOR THE ROBOT-POLAR SYSTEM

- 8-24 kW heater for supporting the deoiling process in the centrifuge
- Centrifuge baskets specially customised for the swarf
- Swivel-mounted discharge supports for separate processing of different cooling lubricants
- Basket socket as special version for preventing excessive aerosol formation
- Scales for determining the actual system throughput of each swarf material
- Flow meter for determining the amount of regained cooling lubricant
- Cooling lubricant treatment system with storage tank for purified KSS
- Linking of PLC data to an existing data processing system such as an ERP system
- Linking with existing system components on site



Lifting gates



Swiveling discharge sockets



Heating



Special baskets



Oil cleaning centrifuge



Magnetic separator

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**COMPETENCE AND PASSION.**