christof industries

Safe Disposal of Microbiological Waste

By Christof Systems GmbH

Environmental

Revolutionary solutions – also for your sector

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- Chemical
- Construction and Primary
- **Environmental**
- Fertiliser
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- Storage and Conveying Systems
- Waste to Energy
- Waste Utilisation
- Wood and Chipboard

Innovative Solutions to Waste – for People and for the Environment

'Thinking forward' is a watchword throughout Christof Industries – and nowhere more so than at Christof Systems GmbH. It shapes everything we do, creating the ideal breeding ground for innovation in all branches of our work. We draw on the experience that we have gained in the successful implementation of more than 4500 large-scale projects across the globe as well as the excellent abilities of our engineers and technicians to find the best solutions for our customers.

The development and construction of specialised facilities is, in addition to the construction of industrial plants, a central focus of our portfolio. Our goal in this field is to develop revolutionary solutions and devices that provide an exact match for our customers' requirements – in terms of their ease of use, as well as their technical perfection and economic efficiency.

We attach particular importance to another aspect in the treatment of infectious waste. Devices such as sinTion ensure not only the environmentally-friendly disposal of infected matter, but also ensure that it no longer represents a danger for human health. For us as a family firm, this responsible approach and the high degree of safety it guarantees for everyone involved in the disposal of waste are important principles.

Safe and Environmentally-Friendly Disposal of Microbiological Waste

Every day, thousands of tonnes of microbiological waste are produced – in hospitals, private clinics, doctor's surgeries and laboratories across the globe. The growing use of disposable products in this field is also leading to a rapid increase in infectious waste. What can be done with such enormous quantities of dangerous waste matter? New responses to this challenge are needed.

The traditional solution: incineration

Vast quantities of infectious waste – in particular in developing countries – are still dealt with by means of incineration, with the result that significant volumes of toxic gases such as hydrogen chloride, hydrogen cyanide, and dioxins are released into the environment when the disposable products employed in this field, many of which are made of plastic, in particular PVC, are burned. The use of emission filters serves only to displace the problem and not resolve it, as the filters too have to be disposed of at the end of their lifetimes. For this reason, the incineration of medical waste at small-scale facilities is banned in most European countries and in the USA. Only special large-scale facilities with highly complex filtering capabilities are permitted to carry out incinerations of this kind. This however results in further problems: long transport routes, specialised storage facilities, and longer storage times for infected waste – during which bacteria can proliferate. In summary: the incineration of medical waste has numerous disadvantages, from both an economic and an ecological perspective.

The sinTion concept: safe disposal on site

Christof Industries has consciously chosen to take a different path with its sinTion technology. Instead of transporting and incinerating dangerous waste, we make safe, easy and efficient disposal possible directly on site. The principle:

- Sterilisation and disinfection of the waste by means of patented technology developed in-house.
- The advantage: The combination of saturated vapour and microwave energy ensures the maximum possible effectiveness and high rates of throughput.
- The result: Disinfected and sterilised waste that can be shredded (integrated system with shredTion).
- The waste, the volume of which is significantly reduced by the shredding process, can be added to the normal garbage collection.

sinTion is in use across the globe – not only in Central Europe but also in the Middle East, Asia, Africa, Latin America and Australia. The device has earned all important international accreditations and certifications, e.g. from the Robert Koch Institute (RKI) Berlin, and the Austrian Society for Hygiene, Microbiology and Preventive Medicine (ÖGHMP).

Master Plan for Microbiological Waste Disposal

sinTion

- Unique combination of steam and microwave
- No chemicals
- Compact construction

In-house solutions

Clean

One concept 100% safe, environmentally friendly, efficient

Certificated by Robert Koch Institute Berlin

- Hospitals
- Laboratories
- Hygiene facilities
- Nursing homes

- Volume reduction (shredTion)
- Safe disposal of waste

sinTion

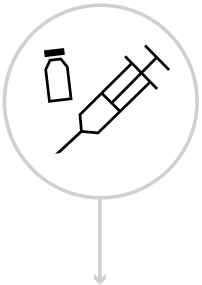
by christof systems

sinTion: Maximum Safety thanks to Unique Technology

The idea of sterilising and disinfecting medical waste directly on site is not new. It is sinTion's patented technology that sets it apart from all other devices on the market. The combination of saturated vapour and microwaves not only ensures maximum effectiveness in less time, but also makes higher rates of throughput possible. This – combined with the device's ease of use – is what gives it a decisive edge in real-world applications.

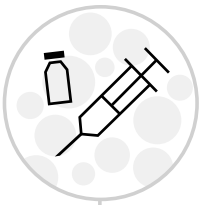
The sinTion process in three steps

sinTion's unique patented solution ensures maximum safety at every stage of the disposal process – for operators as well as for patients and the environment. An overview of the fully automated processing cycle:



Phase 1: Removal of air

After the waste has been placed in the disinfection chamber, the air is sucked out so that a vacuum is created. The advantage: in the next stage, water vapour can find its way around complex forms and into elements with surfaces that are difficult to reach, such as tubes.



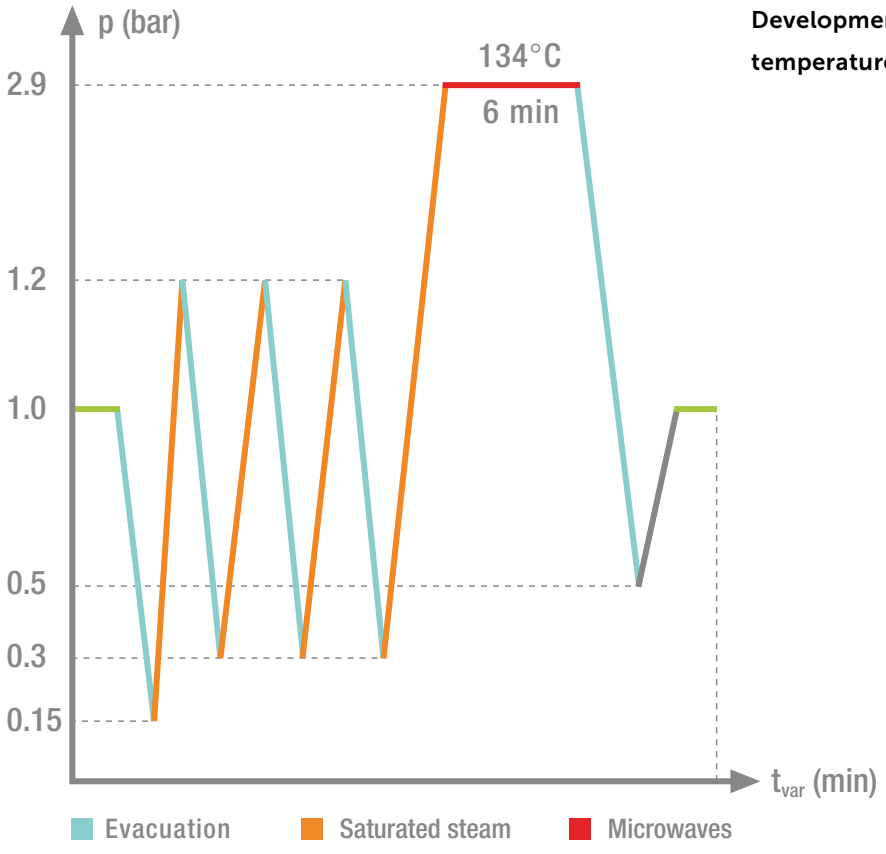
Phase 2: Introduction of water vapour

Saturated vapour finds its way into all elements of the waste. Thanks to the vacuum already created and the vapour's low density, the vapour spreads even to those areas that other substances would not reach, which does not happen if using other techniques (e.g. water-based washing). The vapour is generated by a highly efficient in-built steam generator, ensuring the reliable destruction of all bacteria by eliminating "cold spots" in the disinfection chamber.

Phase 3: Heating the vapour using microwaves

Using a combination of microwaves and water vapour, infectious waste (e.g. bottles) is also heated from within. All types of infectious waste are heated equally, which ensures that all micro-organisms are killed, even in hollow containers, remains of creams or ointments, etc. The advantage: rapid treatment cycles of 20 minutes on average are sufficient to ensure a highly effective sterilisation and disinfection of the waste.

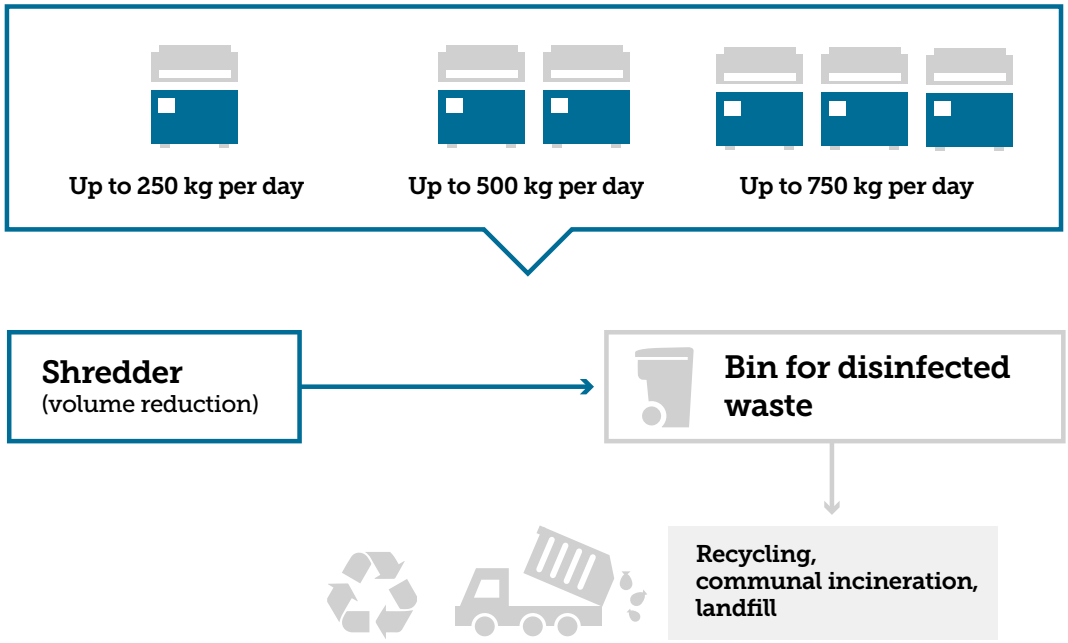
The result: 100% eradication of all micro-organisms (confirmed by the University of Graz, Austria, and the the University of Iowa, USA).



Development of pressure and temperature at each phase

High Throughput and Low Costs in Waste Disposal

The sinTion disposal pathway



The sinTion programs' maximum microbiological effectiveness

Disinfection program

Reference bacterium:

bacillus subtilis

Reduction rate: > 10 log5

- All viruses such as hepatitis A, B, C, HIV, polio
- All pathogens such as tuberculosis, anthrax, tetanus, cholera and typhus
- Anthrax spores
- All parasites and fungi

Sterilisation program

Reference bacterium:

bacillus stearothermophilus

Reduction rate: > 10 log6

- All viruses such as hepatitis A, B, C, HIV, polio
- All pathogens such as tuberculosis, anthrax, tetanus, cholera and typhus
- Anthrax spores
- All parasites and fungi
- Ebola and botulinus and gas gangrene spores

Number of sinTion devices required to process waste

Disinfection program

Infectious waste per day and bed (may vary due to the degree of waste separation)

Number of beds	0.3 kg	0.50 kg	0.75 kg	1 kg	1.5 kg	2 kg
30	9	15	23	30	45	60
50	15	25	38	50	75	100
70	21	35	53	70	105	140
100	30	50	75	100	150	200
120	36	60	90	120	180	240
150	45	75	113	150	225	300
180	54	90	135	180	270	360
200	60	100	150	200	300	400
250	75	125	188	250	375	500
300	90	150	225	300	450	600
400	120	200	300	400	600	800
500	150	250	375	500	750	1000
750	225	375	563	750	1125	1500
1000	300	500	750	1000	1500	2000
2000	600	1000	1500	2000	3000	4000

Sterilisation program

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400	120	200	300	400	600	800
500	150	250	375	500	750	1000
750	225	375	563	750	1125	1500
1000	300	500	750	1000	1500	2000
2000	600	1000	1500	2000	3000	4000

1 sinTion unit 2 sinTion units 3 sinTion units

Much higher throughput thanks to saturated vapour technology

Throughput disinfection

Cycle	Duration	Quantity	Bag volume
1 load	20 minutes (average)	8-12 kg	70 litres
3 loads	60 minutes	25-36 kg	210 litres
	8 hours	200-280 kg	~1680 litres
	16 hours	500 kg (4 m^3)	~3360 litres

Throughput sterilisation

Cycle	Duration	Quantity	Bag volume
1 load	40 minutes (average)	5-8 kg	70 litres
3 loads	120 minutes	15-24 kg	210 litres
	8 hours	60-104 kg	~1680 litres
	16 hours	250 kg (4 m^3)	~3360 litres

sinTion: The Advantages

Highly efficient disinfection/sterilisation of all infectious waste

- Combination of microwaves and saturated vapour makes it possible to disinfect/sterilise all types of infectious waste
- Sterilisation programme more effective than the competition
- 100% eradication of all micro-organisms
- Creation of a vacuum before treatment and vacuum drying

High throughput rate, significant reduction in cost

- Shorter load times thanks to patented microwave/saturated vapour technology
- High throughput rate (up to 210 litres of waste per hour) leads to greatly reduced waste treatment costs

Easy to use, maximum safety

- The treatment cycles are fully automated, the device is as easy to use as a washing machine. A display shows the current phase of the treatment cycle
- sinTion is a closed system, there are no risks for the operators as a result of emissions, waste water, or electricity (tested inter alia by the TÜV and CSA)
- Risk of fire is eliminated by the vacuum phases and the controlled injection of steam

Environmentally-friendly and safe technology

- No chemical additives
- Avoidance of direct infections
- No need for pre-shredding, avoiding the spread of bacteria
- Documented waste pathways

Flexible system, strong service

- sinTion can be easily adapted to local conditions
- The system can be easily expanded
- Reliable after-sales service

Accreditations & Certifications

Microbiological accreditations & certifications

- Listed among the disinfection processes tested and accredited by the Robert Koch Institute
- Accreditation from the Hygiene Institute of the University of Graz
- Tested by HygCen Germany GmbH, Schwerin
- Expert analysis from the accreditation committee of the Austrian Society for Hygiene, Microbiology and Preventive Medicine
- Reviewed by the Hygienic Laboratory, University of Iowa
- Approval of the Department of Health, State of New York
- Tested by the Instituto Mexicano del Seguro Social, Mexico

Technical accreditations & certifications

- CE certification
- Bescheinigung der Baumusterprüfung TÜV Österreich, Geschäftsbereich Druckgeräte (Type test certification from the Pressure Equipment Section of the Austrian Technical Inspections Agency)
- Konformitätsbescheinigung EMV-Prüfzentrum Seibersdorf (Certificate of conformity from the EMV test centre in Seibersdorf)
- CSA Certificate of Compliance

Waste collection

Infectious waste is collected in a bin lined with a special plastic bag.

sinTion – disinfection and sterilisation

The waste should be sterilised or disinfected as quickly as possible in order to avoid the spread of bacteria, in particular in hot countries. The lid of the sinTion is easy to open, and the plastic bag can easily be placed inside. The controls have been kept simple on purpose, and the treatment cycles are fully automated.

Documentation

Every disinfected load is documented with its own record – containing a unique load number, date and time. Operating parameters such as pressure and temperature are also noted. This makes it possible to trace loads back if necessary.

```
**********          SINTION 1.1          **********
Ser.No.: 96/01/006                    load: 000003

operation parameter:
VS=2          OP=2.1 bar (121° C)     HT=0360sec
p (V1)= 0.15 bar                      p (S1)= 1.20 bar
p (V2)= 0.30 bar                      p (S2)= 2.25 bar

date: 96-03-04
start: 09:16   end: 09:33                dura.: 17:32
effective HT: 0360 sec
---------          DESINFECTION OK          ---------
```


Disposal

Following successful disinfection, the waste can be added to the normal garbage collection, or, if necessary, can be shredded (see shredTion).

shredTion:
Efficient Shredding of Disinfected Waste

shredTion is the cost-effective solution for the shredding of disinfected medical waste. The device is simple to install, efficient, and easy to use. It can be combined with sinTion (1 shredTion for 1-3 sinTion devices), reduces waste to granules and thus helps to reduce the volume of waste significantly.

Features

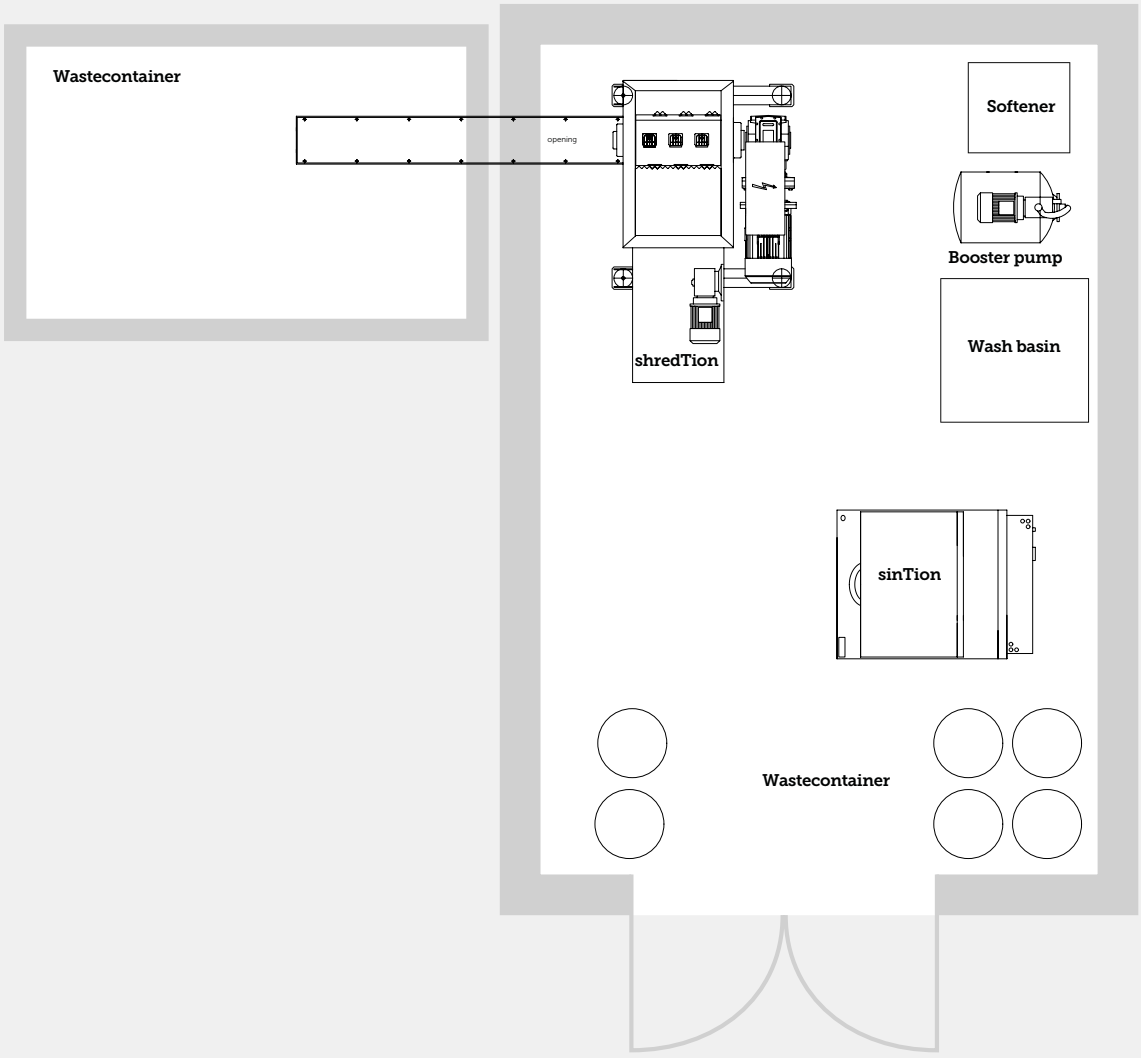
- High number of blades for efficient shredding of waste
- Sieve made out of high-grade special steel (determines the size of the shredded granules – can easily be exchanged if necessary)
- Rotating blades that are easy to replace and made of hardened metal to ensure their longevity
- Large drive shaft ensures quiet running and limits vibrations
- Filling funnel with lid and safety limit switch

shredTion – the advantages

- Cost-efficient reduction in the volume of disinfected medical waste
- Easy and safe operation thanks to a modern SPC and ergonomically appropriate positioning of controls
- One shredTion can take the output of 1-3 sinTion devices
- Weighted waste placement ensures a balanced burden on components
- Slow rotor (50 rotations per minute) ensures greater torque and reduces wear
- Discharge screw with a drain connection (high-grade steel)
- Simple set-up, problem-free installation
- Low maintenance costs

External Waste Disposal – the Wastecontainer

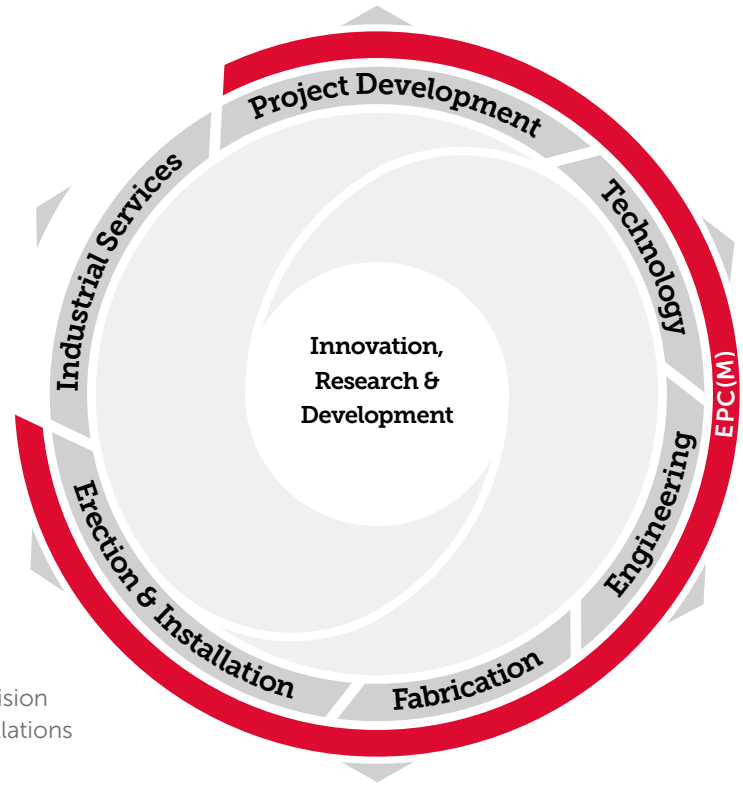
Many hospitals and clinics do not have the space to carry out the correct disposal of infectious waste in-house. Christof Industries' Wastecontainer provides the ideal solution for such a situation: a fully equipped, compact container (6 m x 2.4 m) containing a combined sinTion and shredTion, by means of which all waste can be sterilised, disinfected, shredded and subsequently disposed of. This solution is also easy for aid organisations, disaster response services, the military, etc. to implement, providing a highly mobile unit suitable for rapid installation in trouble spots, no matter where these might be.



Christof Industries' Services throughout the 360° Lifecycle of your Industrial Plant

- Industrial Consulting Services
- Front-End-Loading (FEL) Services
- Concept Studies
- Feasibility Studies
- Project Management
- Support for Planning/Permission Processes
- Process Development/ Industrialisation

- Plant Revamps, Upgrades & Modernisations
- Plant and Component Maintenance & Retrofits
- Plant De-bottlenecking & Optimisation
- Plant Relocations
- Turnarounds & Overhauls
- Oil & Gas Services
- Spares, Component Repairs & Replacements



- Waste-to-Energy/RDF Plants
- Biomass Power Plants
- Incineration Plants using Liquid & Gaseous Residues/ Waste Streams
- Industrial Waste Heat Plants
- Industrial Process Gas Cooling Systems
- Waste-to-Value Plants
- Infectious Waste Management

- Site Management & Supervision
- Interdisciplinary Plant Installations
- Plant Erection, Installation, Commissioning & Start-up
- Operator/User Trainings

- Conceptual Engineering
- Basic Engineering/ FEED Services
- Detail Engineering
- Technical Approvals & Permits

- Fabrication of Mechanical, Electrical and Automation Systems, Components & Spares
- Pre-Assembly of Technological Components
- SKID-Mounted & Containerised Solutions
- Prototyping

Christof Industries' Locations, 360° Portfolio Distribution Partners and Reference Projects across the Globe

● Christof Industries' Branch Offices ● 360° Portfolio Distribution Partners ● Countries with Reference Projects 🔧 Christof Industries' Workshops

Industry Sectors

- Agriculture and Animal Feed
- Automotive
- Chemical
- Construction and Primary
- Environmental
- Fertiliser
- Food
- Power
- Mining and Metallurgy
- Oil and Gas
- Pulp and Paper
- Storage and Conveying Systems
- Waste to Energy
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sinTion Partner

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Scan to see how it works.

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