TURBO CLEAN®

GMBH

SONDERMASCHINENBAU

Turbo-Clean GmbH

Precision Cleaning
Degreasing
Mass Produced Parts

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Turbo-Clean GmbH

Oil Removal & Recovery For Re-Use

TURBO CLEAN® GMBH SONDERMASCHINENBAU

Automated In-Line Cleaning

- Continuous Production operations
- Clean, Degreased & Dry components – End Of Line Process
- No intermediate handling of Oily Components
- Compact - Reduced Operating Footprint
- Reduced Storage Requirement
- Improved Production Efficiency
- Reduced Operation Costs

TURBO CLEAN® GMBH SONDERMASCHINENBAU

Optional Technology Formats

Rotary Vibratory Oscillation

Using vibratory centrifugal forces acting on a circular chamber equipped with a rising helix on the inner wall, individual components submerged in the chamber undergo a surface cleaning process as they travel up the helix. They climb through the surface of the solution and travel around the freeboard displacing excess fluid before they exit the chamber via a discharge chute.

The discharged parts can be directed to a further chamber for additional processing or to a conveyor or collection box.

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Optional Technology Formats

Centrifuge (Oil Removal)

A cluster of randomly collated components loaded within a horizontal axis rotating chamber is gently spun in a controlled action to separate the parts and displace free oil from the component surface. The displaced oil is drained from the chamber and discharged to a collection vessel.

The oil can be suitable for recovery and re-use as it is not contaminated by the removal process.

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Optional Technology Formats

Centrifuge (Component Cleaning)

A cluster of randomly collated components loaded within a horizontal axis rotating chamber is gently spun in a controlled action to separate the parts whilst a cleaning solution (Aqueous + Detergent) is sprayed over the parts.

The cleaning solution is recirculated by pump through treatment filters and oil separation equipment. Washed parts are spun dry prior to discharge.

The wash cycle can be an independent activity from oil removal or it can be a combined oil removal plus wash process within the same machine.

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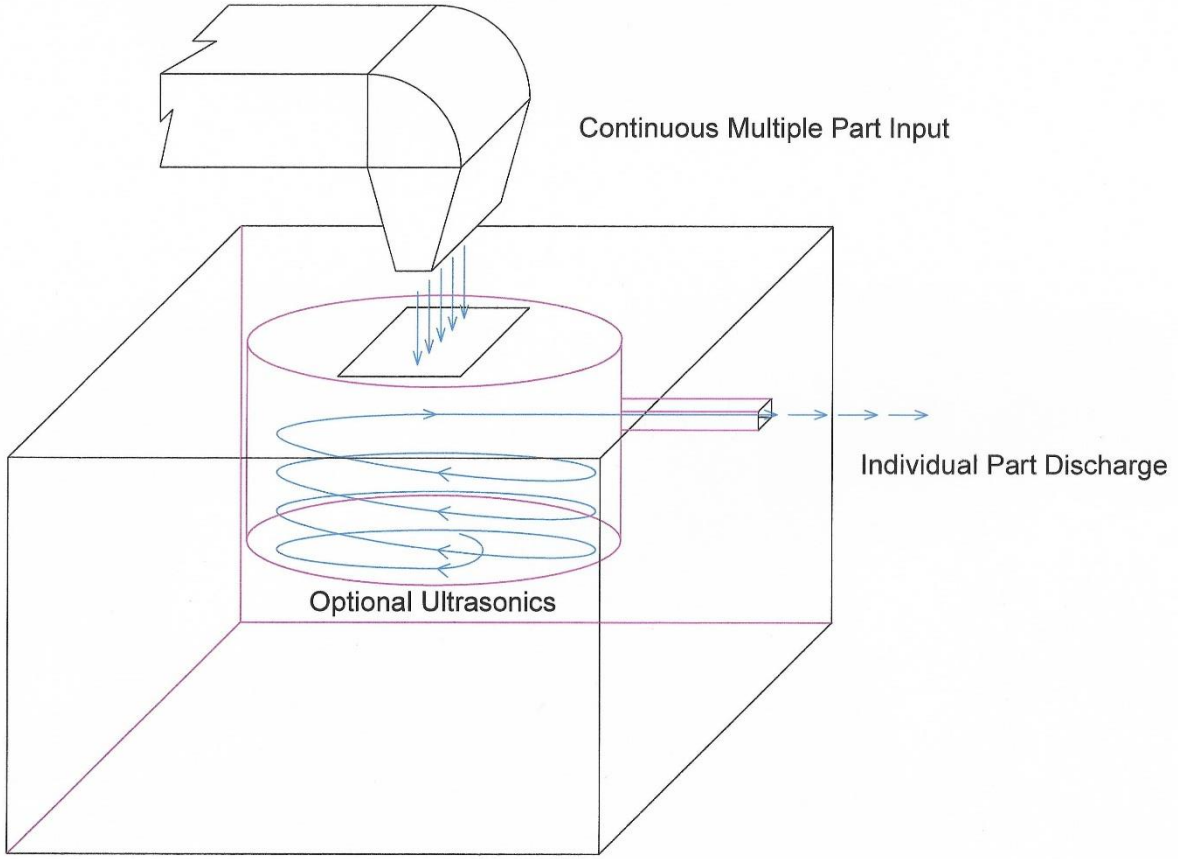
Rotary Vibratory Oscillating Process



Vibratory Oscillating Parts Cleaning Machine

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Rotary Vibratory Oscillating Process

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Rotary Vibratory Oscillating Process

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Wash → Rinse → Discharge

Vibro-Oscillation : Multiple Process

- Multiple process chambers arranged to form required process
- Typical process: Detergent Wash + Rinse
- Higher specification process can include additional pure water rinse
- Drying is available
- Post clean application of an oxidation inhibitor available
- Ultrasonics of optional power and frequency rating available

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Multiple Process: Detergent Wash

- Detergent Wash (Immersion) – Removal of Oil/Swarf/Particles
- Towns Water + Detergent/Process Chemical
- Heated Temperature controlled
- Controlled mechanical activity – (Minimal risk of Damage)
- Motive separation and movement of complex closely packed components
- Options:
  - Ultrasonics
  - Oil Separation
  - Recirculating multi-stage filtration

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Multiple Process: Post Wash Rinse

- Rinse (Immersion) – Removal/Dilution of Wash Detergent
- Towns Water (TW) or Reverse Osmosis (RO)
- Heated Temperature controlled
- Controlled mechanical activity – (Damage Free)
- Motive separation and movement of complex closely packed components
- Options:
  - Ultrasonics
  - Oil Separation
  - Recirculating multi-stage filtration

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Multiple Process: Pure rinse

- Pure Rinse (Immersion) – Removal of Carry-Over Rinse 1 Solution
- Reverse Osmosis (RO) or Deionised Water (DI) or RO + DI (High Purity)
- Heated Temperature controlled
- Controlled mechanical activity
- Motive separation and movement of complex closely packed components
- Continuous Rinse Water Flow – Can be cascade from Purer Rinse stage
- Return used water for filtration & recycle RO/DI

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Multiple Process: Ultra-Pure Rinse

- Ultra-Pure Rinse (Immersion) – Final Precision Surface Specification
- Reverse Osmosis (RO) or Deionised Water (DI) or RO + DI (High Purity)
- Heated Temperature controlled
- Controlled mechanical activity
- Motive separation and movement of complex closely packed components
- Continuous Rinse Water Flow fed from RO/DI water production Unit
- Feed used water by cascade to reduced quality Pre-rinse stage

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Multiple Process: Drying

- Heated Air Drying – Recirculated within the machine
- Heated - Temperature controlled
- Controlled mechanical activity
- Motive separation and movement of components
- HEPA Filtration option

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Validated Process

Projects can be tailored to suit specific customer requirements including according to industry validation standards.

- Machine design configuration
- Machine and Process control
- Mechanical and Electrical construction and assembly
- Process monitoring and Data recording
- Project Documentation – Testing and Approval systems

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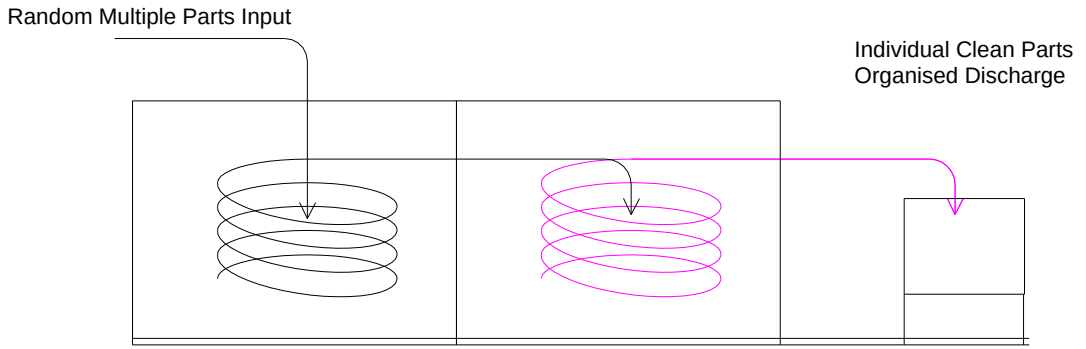
Multi-Stage Process : Vibro-Oscillation

Illustration of common two stage Process Format with Optional Features



Detergent Wash	Rinse 1 (Detergent Removal)
Towns Water	Towns Water
Heated - Temp Controlled	Heated - Temp Controlled
Ultrasonics	Ultrasonics
Recirculating Filtration	Recirculating Filtration
Oil Separation	

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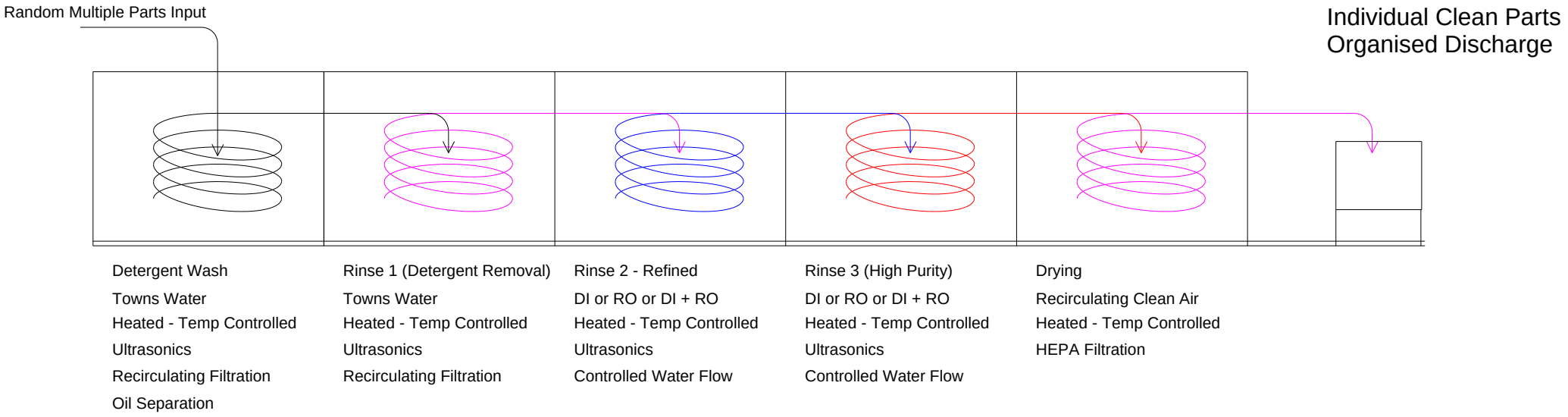
Multi-Stage Process : Vibro-Oscillation

Illustration of Advanced Process Format with Optional Features in Individual Stages



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Rotary Vibratory Oscillating Process

Clean Components discharged as individual items
Can be collected in Tote box or by active conveyor

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Optional Technology Formats

Centrifuge (Oil Removal)

A cluster of randomly collated components loaded within a horizontal axis rotating chamber are spun in a controlled action to separate the parts and displace free oil from the component surface. The displaced oil is drained from the chamber and discharged to a collection vessel.

The oil is not contaminated by the removal process and can be suitable for recovery and re-use.

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Optional Technology Formats

Centrifuge (Component Cleaning)

A cluster of randomly collated components loaded within a horizontal axis rotating chamber are spun in a controlled action to separate the parts whilst a cleaning solution (Aqueous + Detergent) is sprayed over the parts. The cleaning solution is recirculated by pump through treatment filters and oil separation equipment. Washed parts are spun dry prior to discharge.

The wash cycle can be an independent activity from oil removal or it can be a combined oil removal plus wash process within the same machine.

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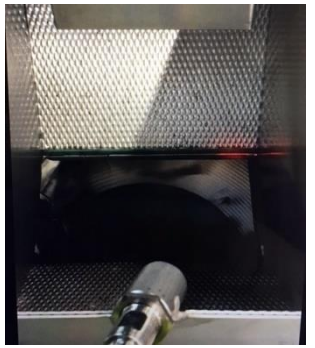
Centrifuge Technology

Parts Input



Cycle Start

Discharge

T50 Oil Removal System
Installed in-line

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Centrifuge Oil recovery and Cleaning

- Components are continuously collected in a buffer atop the cleaner
- The buffer contents fall into the chamber via a door and chute
- Buffer door closes to collect next load
- De-Oil or Cleaning process takes place (or De-Oil + Cleaning)
- Door in base of cleaning chamber opens to discharge components
- Repeat to process next load

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Centrifuge Oil Removal

- Oily components are spun within the chamber
- Gentle radial action spreads components across the chamber
- Components separate free from collective clusters
- Free running oil is displaced from the separated components
- Oil collects on the inner wall of the chamber and drains to a tank
- Recovered oil is filtered and re-used

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Centrifuge Component Cleaning

- Optimises production efficiency
- Standardises operational process
- Minimise cost of component cleaning
- Compact design – minimum floor space required

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Centrifuge Component Cleaning

Integrated processes

- Following oil removal components can be spray washed
- Oil recovery and washing integrated within one machine
- Separate wash chamber rises within the oil separation chamber
- Water/detergent solution is sprayed into the chamber
- Components can be rinsed and dried.
- Processed components are discharged via a door and chute

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Centrifuge Component Cleaning

- The centrifugal cleaning process can be used without oil removal
- High cleaning performance to validated standards when required
- Eliminates inter-stage handling (no boxes/baskets)
- Automated process – minimum labour requirement
- Integral fluid management systems with automated process control.

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Centrifuge Component Cleaning

- Particularly suited to processing low heat mass and buoyant components e.g. light metal and plastic parts.
- Gentle radial action ensures separation
- Spray wash & rinse ensures thorough precision cleaning
- Centrifugal action achieves drying by displacement.
- Eliminates complex inter-stage handling – no floating issues
- Eliminates drying issues with complex low latent heat products

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Centrifuge Component Cleaning

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Centrifuge Component Cleaning

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High Specification Construction

Component	Standard Specification	Special Application
Process Chamber	Stainless Steel	Stainless Steel Coated for Component Protection
Outer Framework	Heavy Gauge Steel Section Powder Coated	Stainless Steel (Customer Finish Specification)
Outer Panelling	Heavy Gauge Steel Panels Powder Coated	Stainless Steel (Customer Finish Specification)

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Multi-Industry Applications

- Aerospace
- Automotive
- Motor Sport
- Medical
- Electrical
- Construction
- Furniture Manufacture

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Multi-Component Applications

- Fasteners – Screws – Bolts - Nuts - Rivets
- Springs – Wire components
- Pressed parts – Plates – Forms – Blades -
- Hinges – Dowels – Pins - Locks – Brackets
- Balls – Barrels – Tubes
- Rings – Circlips - Washers
- Machined parts

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Dimensional Ranges

Spherical, Cylindrical Tubular	Linear 3D Flat
Ø 0.5 mm to 3.0 mm	0.5 x 0.5 x 3.0 mm
Ø 3.0 mm to 200 mm	40 x 40 x 200 mm
Ø 40 mm to 200 mm	100 x 100 x 200 mm
Ø 100 mm to 200 mm	100 x 0.5 x 200 mm

Operational process dimensions can be tailored to accommodate specific customer requirements.

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Automated In-Line Cleaning

- Continuous Production operations
- Clean, Degreased & Dry components – End Of Line Process
- No intermediate handling of Oily Components
- Compact - Reduced Operating Footprint - Fewer Load Boxes
- Reduced Storage Requirement
- Improved Production Efficiency
- Reduced Operation Costs

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Automated In-Line Cleaning

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Automated In-Line Cleaning

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Aqueous Detergent

- Modern bespoke aqueous based cleaning formulae
- Ideal alternative to costly, heavily regulated solvent degreasing
- Proven degreasing performance
- Simple single stage process options :- PH Neutral chemistry
- High efficiency water processing and cleansing technology
- Continuous production with minimum maintenance
- Automated operation with chemical dosing technology

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Aqueous Detergent

Significant process benefits :-

- Highly efficient degreasing performance
- Surface Cleaning to specific technical parameters
- Surface treatment to achieve specific substrate conditioning
- Controlled and specific processing
- High purity rinsing and Drying
- Validation available for specialist applications

TURBO CLEAN® GMBH SONDERMASCHINENBAU

Turbo-Clean GmbH

- Family owned Company since 1972
- Originally manufacturing pressed part machinery
- Developed component cleaning specifically for press part industry
- Cleaning evolved into an independent concern
- 1993 Turbo-Clean GmbH

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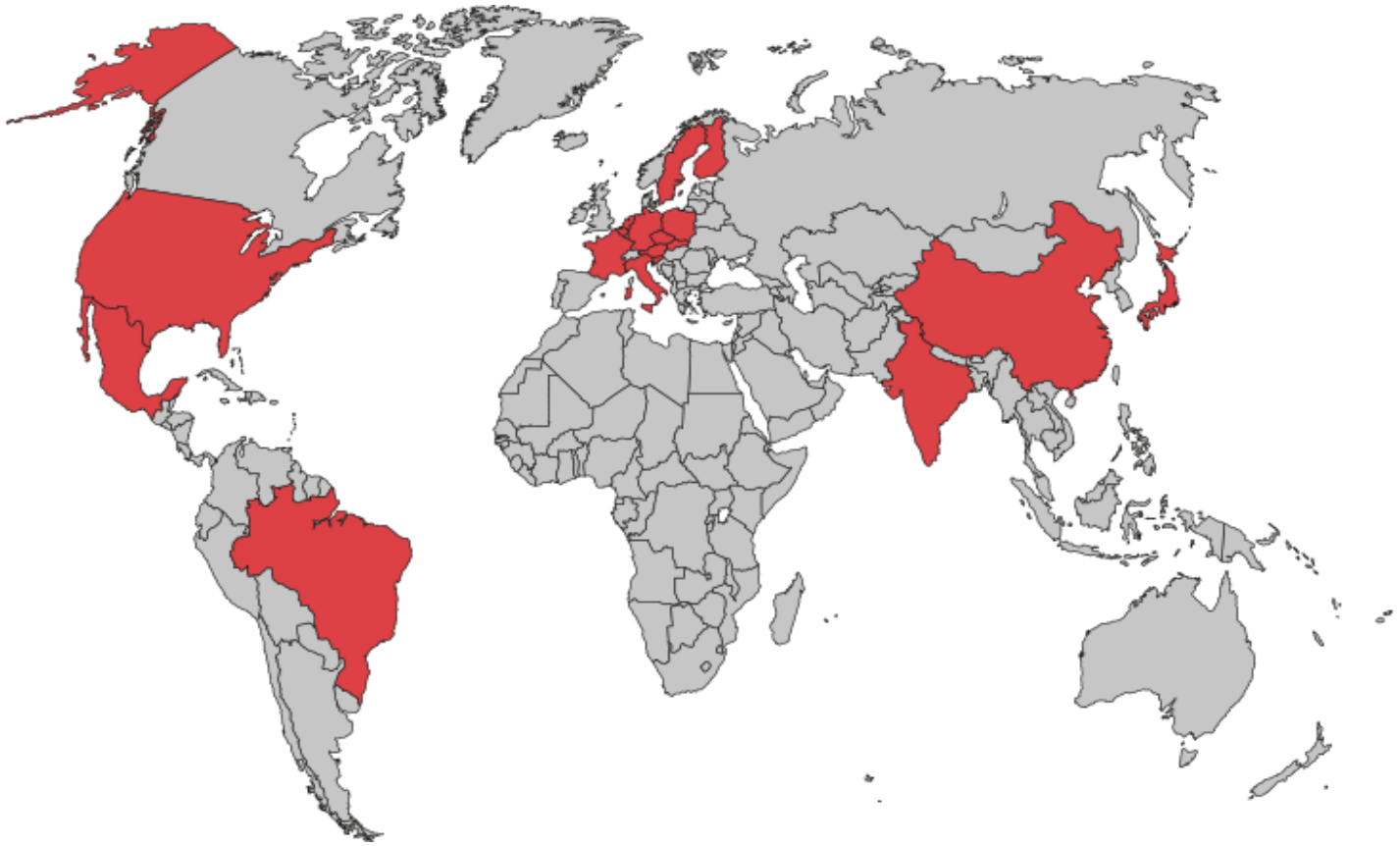
Turbo-Clean GmbH

Global Installations



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Thank You