# DISC FINISHING MACHINES

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## Application

- Processing of small parts
- Larger parts (from approx. 50 g weight can also be processed individually)
- Thanks to high rotational speed and high relative speeds, reduction of processing times compared to vibratory systems
- Cleaning and rinsing processes can be well integrated
- Perfect for multi-stage machining (grinding and polishing) → easy handling
- Ideal for deburring, grinding, smoothing and high-gloss polishing of bulk materials such as e. g:
  - Stamped parts
  - Small milled and turned parts
  - Jewellery
  - Implants

# DISC FINISHING MACHINES

## Application procedure

- The process takes place in an open top process container where the bottom is formed as a disc. This disc will rotate on its own axis.
- Work pieces and abrasive or polishing media in the process container will be set into a twister like motion by the rotative movement of the disc.

- In between the work pieces and the media there will be a very intense processing.
  - Around 20 times more effective than in conventional vibratory machines.
- In the wet process the removed material from the work pieces will be flushed out by a water-compound-mixture.

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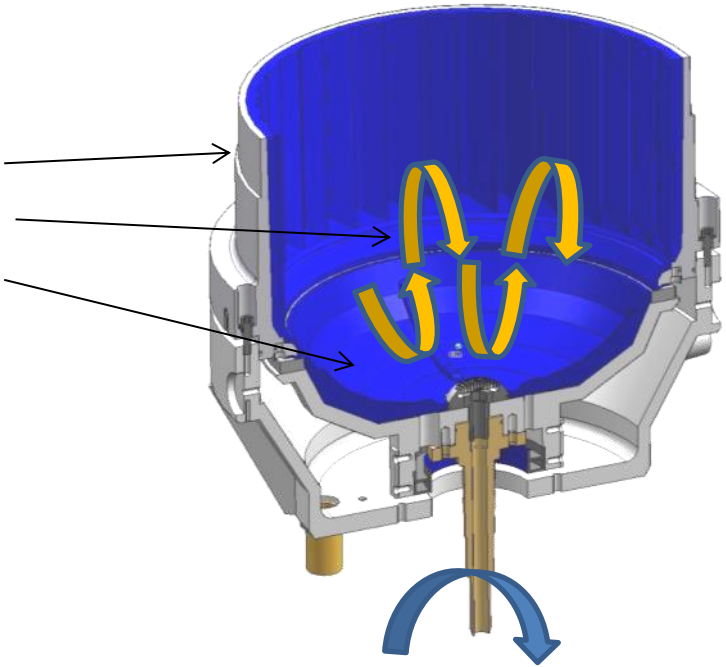
## Cross section of a process container

- Stationary cylinder
- Movement of the media
- Rotating disc



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## Design

- Modular structure:
  - For table machines (up to 18 litres) up to 2 processing containers
  - For stationary machines (from 9 litres) up to 4 processing containers
- Independent control
- Wet and dry process possible

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## Available sizes

- The CF disc finishing machines from OTEC are available in the sizes:
- 5,9,18,32 and 50 litres (total volume of the process container)

- Useable volume (volume of media and workpieces):
- CF 5 Useable volume: 2 litres
- CF 9 Useable volume: 5 litres
- CF 18 Useable volume: 9 litres
- CF 32 Useable volume: 16 litres
- CF 50 Useable volume: 28 litres

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## Sizes of workpieces

Maximum workpiece sizes are determined by the container diameter (only for wet processing)

- CF 5: approx. 40 mm length
- CF 9: approx. 60 mm length
- CF 18: approx. 80 mm length
- CF 32: approx. 100 mm length
- CF 50: approx. 120 mm length

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## Media

- Typical workpiece-media ratio:
  - Deburring: 1:3
  - Fine grinding: 1:6
  - Polishing: 1:12

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## Compound/water mixture

- Compound usually is a tensides containing cleaning agent which has the following tasks
  - Corrosion protection
  - Keeping the workpieces and abrasives clean
  - Removal of the processes waste
  - Creates bright surfaces if required

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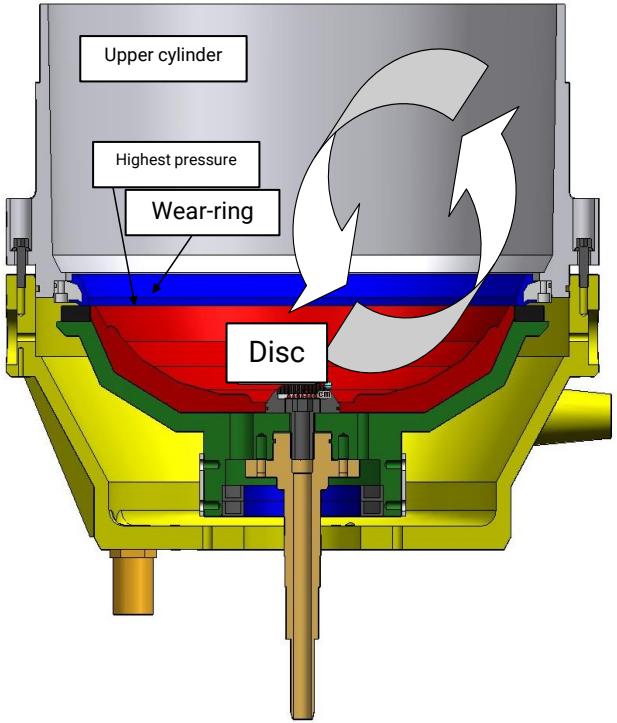
## OTEC process container design

- Aluminium process container
  - Very light
  - Corrosion-free
  - Easy emptying
- Low water consumption
- Homogeneous design of the process container with small and uniform ribs
- “Slowly-end” function of the process possible
- Various designs of the ribs of the process container available
  - Perfect adaption to the media-workpiece process
  - Round ribs for thin work pieces
  - Flat ribs for fine media



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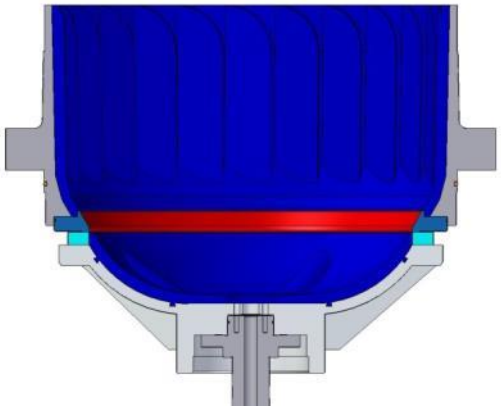
## OTEC wear-ring

- The greatest wear in the gap area is due to the fact that the work intensity in this area is the highest.
- Replacement of the wear ring possible without replacing the complete upper cylinder.

→ Low maintenance costs



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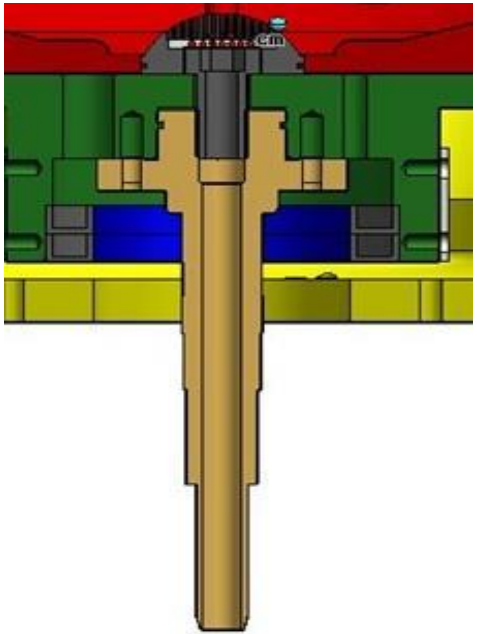
## OTEC hollow stainless steel shaft

- Series: CF 9/18/32/50
- 100% drainage of the water after the process
- No water during separation
- No corrosion
- Long service life time
- Low maintenance costs
- Short processing time
- Shaft seals run on ceramic sleeves →longest service life



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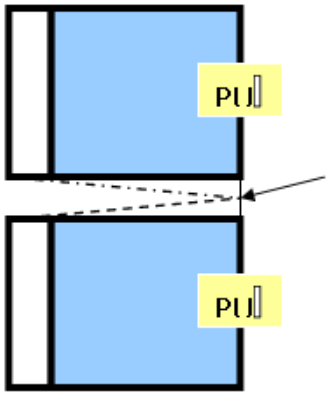
## Commonly on the market used gap technology

- Customary in the disc finishing machine market is to use polyurethane in the contact area of disc and upper cylinder.

- Disadvantages:
  - The gap gets narrower due to the fact that polyurethane absorbs water, swells, heats up (friction)
  - Relatively high water flow is necessary to cool the system
  - Longer processing times
  - Low grinding pressure
  - Gap setting up to 0.8 mm necessary
  - Damaging of the gap system due to penetration of work pieces.

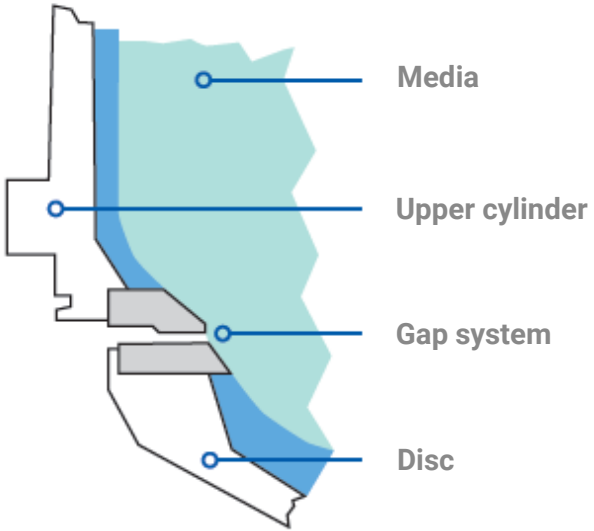


# DISC FINISHING MACHINES

## Innovative OTEC gap technology

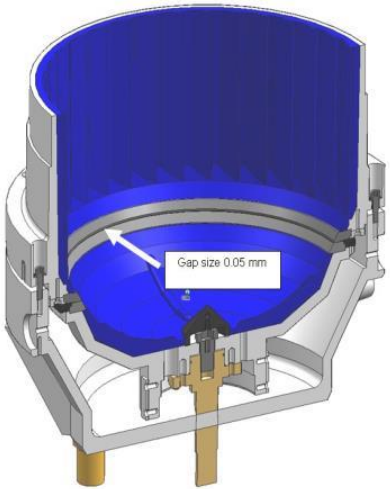
- The gap system is the key factor for the economic efficiency
  - Selection of the gap system for the particular process technique (wet or dry processing)

- Advantages:
  - Low maintenance effort
  - High process reliability
  - Absolute dependability of the system

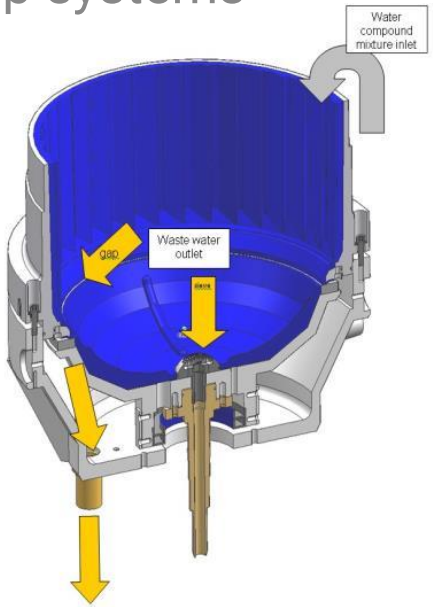


# DISC FINISHING MACHINES

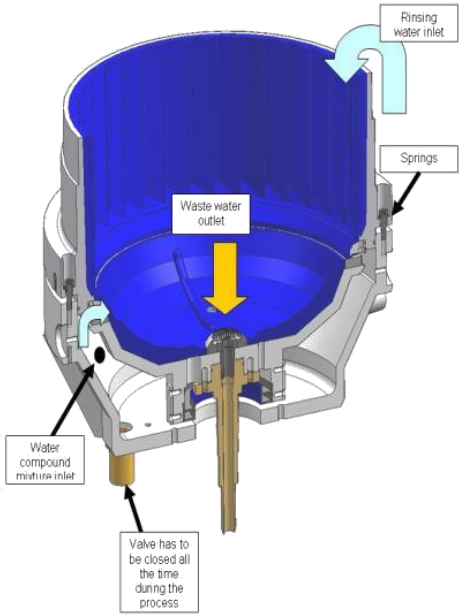
## Overview of different gap systems




Dry processing




Wet processing




Wet processing with zero gap system

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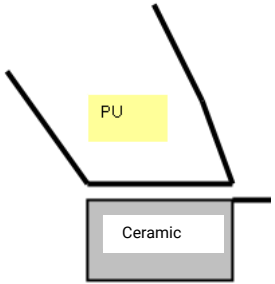
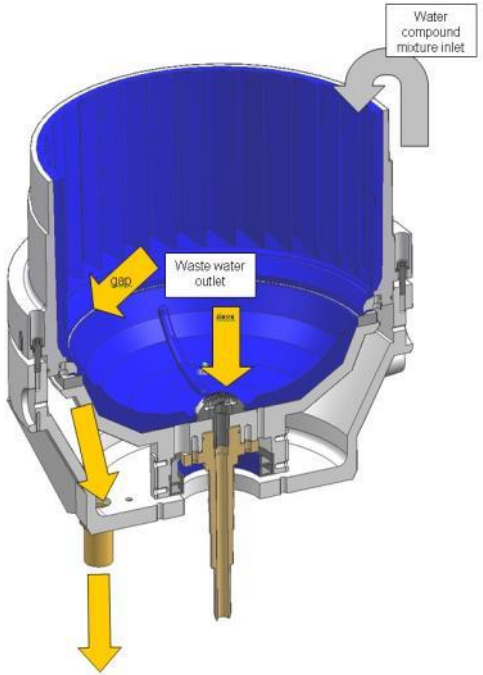
## 1. OTEC Ceramic/polyurethane-gap system

- Standard gap system for wet processing:
  - Combination of PU ring / ceramic ring
  - Fewer malfunctions, as thin workpieces do not block due to hard ceramic surface
  - Less water flow possible and shorter process times
  - Standard gap system is very stable and requires little maintenance

  - Possible media
    - Ceramic media larger than 1mm
    - Plastic abrasives
    - Polishing materials such as porcelain, zirconium oxide, etc.

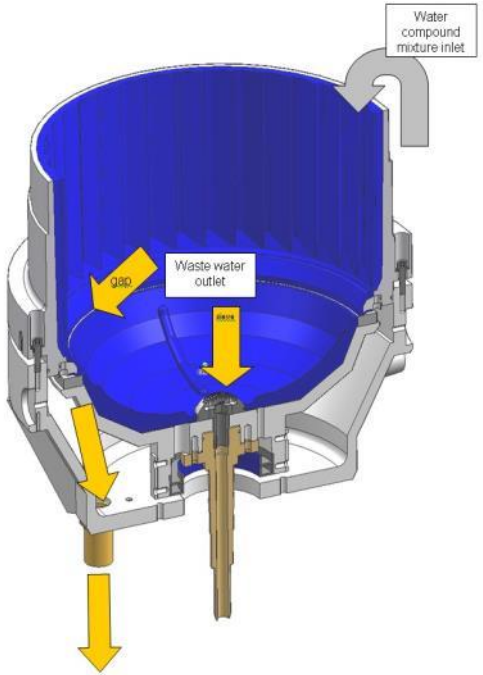


# DISC FINISHING MACHINES

## 1. OTEC Ceramic/polyurethane-gap system

- Advantages:
  - Stable gap system with low maintenance needed
  - Low water flow rate and thus shorter process times possible
  - Tailor-made processes according to customer requirements
  - Low susceptibility to faults
  - Prevents jamming and blocking of the disc due to hard ceramic surface
  - High process reliability

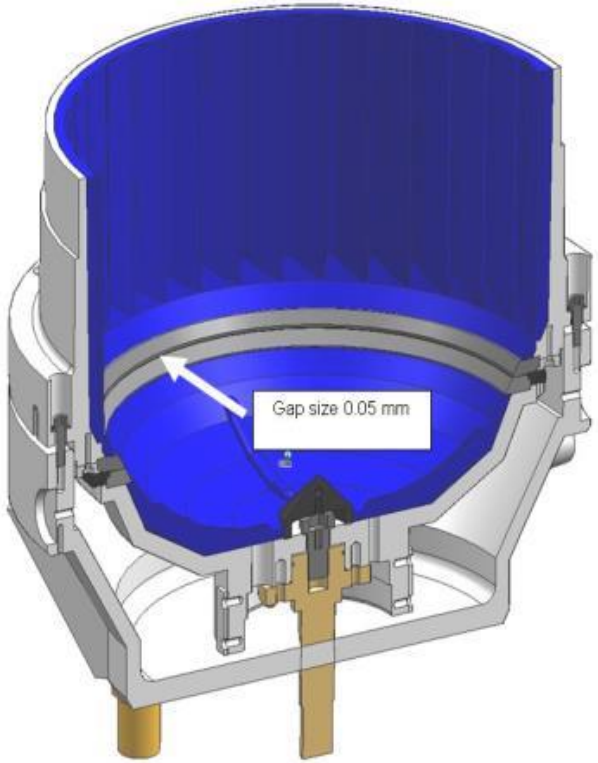


# DISC FINISHING MACHINES

## 2. OTEC gap system with ceramic/ceramic

- Combination of ceramic ring on the disc and ceramic ring on the upper cylinder
- Gap setting of 0.05 mm
- For dry processing
- Very high life time

- Advantages:
  - Use of very fine polishing granule for perfect results
    - Dry polishing media such as walnut shells with a grain size of 0.2 - 0.4 mm or more
    - Corn
    - Plastic

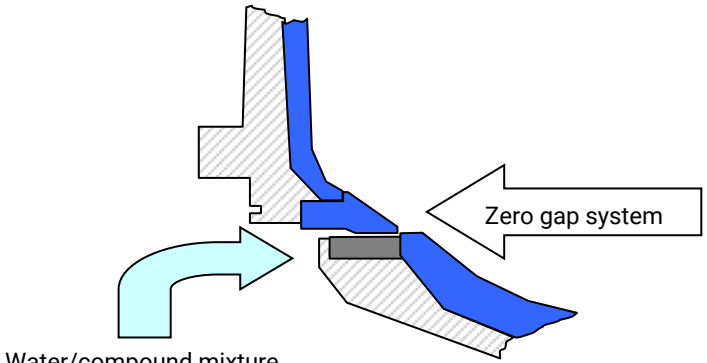


# DISC FINISHING MACHINES

## 3. OTEC zero gap system

- For wet processing of very thin work pieces, the gap which is usually in between the disc and the upper cylinder, can be reduced to zero.

- Advantages:
  - Use of very fine grinding media is possible
  - Impossible that work pieces jam in the gap
  - Processing of very thin work pieces possible. (Even thinner than 0.3 mm)



# DISC FINISHING MACHINES

## CF Dosing units

- Dosing unit
  - Automatic mixing system of water and compound including rinsing system
  - The mixing ration can be set at the touch panel
  - Display of the water flow on the touch panel
  - Dosing pump with suction device and float switch

- Advantages:
  - Higher process reliability
  - Compound concentration always correct
  - Less corrosion

# DISC FINISHING MACHINES

## CF Controlled dosing units

- Controlled dosing unit
  - Dosing unit with flow meter and water flow setting on the touch panel
  - Avoidance of operator errors
  - Supply of the same amount of water, even with fluctuating water pressure in the supply line
  - Signal for empty compound container or low water level
  - Automatic dosing of compound
  - Therefore stable processes

- Controlled dosing unit
  - Functions alike dosing unit
  - Additionally the water flow can be set on the touch panel

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## Touch panel Siemens S7/1200

- Programs for processes possible
- Easy handling and operation for storing and changing programs
- Touch panels of all machine types work similarly
- Error codes easily recognizable and traceable in error code history
- Several languages can be chosen
- Large display  with high resolution
- Display of compound in %
- Display of water flow litre/hour
- USB interface available, storage of more than 500 programs possible
- Some more parameters
  - Start stop function with zero gap processing (waste water exits via hollow shaft)
  - Slowly-end function (Speed reduction)

# DISC FINISHING MACHINES

## Pivot point of the process container

- The pivot point of the process container and the curved lever are well positioned.
- Little effort required
- Low drop height between process container and sieve
  - Workpieces and media do not fall deep → less scratches
- Curved lever, thus easy swivelling of the process container possible

# DISC FINISHING MACHINES

## Screening unit

- Ball-bearing mounted screening unit
  - Simple handling
  - No force required
  - Very user-friendly
  - Less noise
  - OTEC sieve drawer is deep, media and parts cannot fall out as easily as with a flat sieve drawer.

# DISC FINISHING MACHINES

## Optional accessories

- Spray system
  - Especially with thin, light workpieces there is a risk that they will stick to the wall of the process container and therefore will be not or only inhomogeneously processed. In order to prevent this from happening, a spray system can be used which loosens parts adhering to the wall of the process container.

  - The following, for example, can be programmed using the function “Intermediate rinsing”:
    - Intermediate rinsing: interval = 1 minute, interval duration: 2 seconds
    - As a result, the workpieces are rinsed off reliably from the container edge.

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## Optional accessories

- Hand shower for rinsing out the process container when emptying

- Signal lamp indicating the status of the machine:
  - Process running
  - Process is waiting to be started
  - Error

# DISC FINISHING MACHINES

## Industry 4.0

Component detection & traceability

- Bar code scanner for CF, DF and SF to detect workpiece batches and automatically call up a suitable program in the machine.

Machine Condition & Service

- Display of the capacity utilization via the HMI → inferences on load conditions

Network connection (additional option)

- “Remote maintenance”: Access to the OTEC machine via secure internet connection (only with consent)
- “Remote control”: Factory workers can monitor the HMI surface of all their OTEC machines within his network.

# DISC FINISHING MACHINES

## Advantages

- Fast, absolutely reliable and capable
- Economical processing, also of very small and thin work pieces. (e.g. turned parts with Ø 0.5 mm, sheet thickness 0.08 mm)
- Easy handling
- Wide range from deburring to high gloss polish
- Machine frame of aluminium profiles
  - No corrosion issues
  - Low weight
  - Low transportation costs.
- Drive assembly, disc, process container made out of stainless steel or respectively corrosion-resistant aluminium
- Sealing of the drive assembly with ceramic components
  - Considerably higher life time

# DISC FINISHING MACHINES

## Vorteile

- Reliable service life due to sophisticated gap systems
  - The first dry grinding machine has been developed by OTEC
- Low maintenance costs
- Disc and process container design based on many years of experience
  - Very good circulation
  - Very short process times
  - Very smooth surfaces
- Attractive design

# DISC FINISHING MACHINES

SERIES CF
SERIES CF-T
SERIES CF OIL
SERIES CF SP
CUSTOM MADE MACHINES CF

# DISC FINISHING MACHINES

## Series CF

- Modular system for up to 4 process containers
- For wet and dry processing

- Basic equipment CF:
  - Process container with hot cast inner polyurethane lining
  - Aluminium profile frame – for easy adaption of additional devices
  - Speed regulation via frequency inverter
  - SPS-Touch-Screen with digital display of process time, speed, rinsing cycles, dosing and other important process parameters. More than 1000 individual programs can be stored.


Video

# DISC FINISHING MACHINES

## Series CF-T (Bench type machine)

- High-performance bench type version
- Cost-efficient alternative to the CF stand-alone series
- Ideal for deburring and grinding of industrial work pieces but also very efficient in processing of jewellery work pieces.

- Basic equipment :
  - High-grade gap system for use of fine polishing granules
  - Speed regulation via frequency inverter
  - Touch-screen-operated with digital display of process time, speed, errors, compound and other important process parameters.

- Options:
  - Dosing pump with float switch (no dosing unit)
  - Sieves for separation of work pieces and media

# DISC FINISHING MACHINES

## Series CF Oil

- Especially designed for processing with
  - Special grinding and polishing media
  - Oli as a replacement for water-compound mixture
- Especially for work pieces with a fine burr e.g. secondary burr after cylindrical grinding. No more cleaning or applying of oil as corrosion prevention necessary

- Basic equipment :
  - Process container with hot cast inner polyurethane lining
  - Aluminium profile frame – for easy adaption of additional devices
  - Speed regulation via frequency inverter
  - Touch-screen-operated with digital display of process time, speed, rinsing cycles, dosing and other important process parameters. More than 1000 individual programs can be stored

# DISC FINISHING MACHINES

## Series CF Oil

- Constantly rising demands of the mechanically stressed surfaces
- Gentle removal of the secondary burr after grinding or honing process
- Observing the permitted dimensional tolerances
- Tribologically favourable smoothing of surfaces
- Abrasion-proof media and oil instead of water-compound mixture
- No damage of the work pieces

- Advantages of this system
  - Costs and space for waste water treatment unit can be eliminated
  - No degreasing of the work pieces before processing
  - No more corrosion during processing
  - No more drying of work pieces – they will be delivered to the next process in oily condition
  - Perfectly applicable as a flexible finishing unit in the line of production

# DISC FINISHING MACHINES

## Series CF SP

- Especially for grinding and polishing in the same process. Time, speed, compound ratio and amount of water can be programmed individually for each step

- Application:
  - Step 1: Use of special polishing chips in combination with wet-grinding paste increases the grinding effect
  - Step 2: After automated flushing out of the paste, the grinding effect turns into a polishing process

- Advantage:
  - Possibility to grind AND polish work pieces in the same process.

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## Custom made machine CF 50 MR

- Adapted separation unit via unbalance motors and automatic media return unit
  - Automated sieving of work pieces
  - By tilting the process container back to loading position, the media will be returned automatically into the process container.
  - Easy changing of media due to media collector
  - Fast and easy changing of sieves without tools

- Basic equipment:
  - Sieving via unbalance motors
  - Fast change system for the sieves
  - Siemens S7/200

# DISC FINISHING MACHINES

## Custom made machine semi automatic CF 1x18

- Including automatic separation of media and work pieces.
  Handling system to return media into the process container

# DISC FINISHING MACHINES

## Custom made machine: Automatic CF 50

- CF 50 with zero gap system and integration possibility into a fully automatic processing chain
- Incl. separation and media return

- Basic equipment:
  - Integration into existing place
  - Integration into existing controls
  - No dragging of work pieces into the next process
  - Automated media return
  - No mixing of media

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## Complex CF units with separation and water treatment system