

Save your parts from travelling to the spa Be sure that your parts return your care.

Are you still belonging to the company owners allowing their parts several travels within the production, with baths and all comfort?

You know the situation well. One work step has been terminated, the part must be cleaned. It is put into a case, passing along other tool machinery towards the centralised cleaning unit. The part needs to wait in front of this unit. Other parts arrived earlier, the bath needs to be changed at first. There are many reasons for jams in front of washing plants. The substances used for cleaning have been adapted to the best cleaning result. For intermediate cleaning in particular the quality which is achieved this way is not necessary.

After cleaning a drying procedure is still required for the parts. To make sure that the preceding and the following continuous production processes are not troubled a sufficient quantity of buffers must be available. When the cleaning process has been concluded the parts are put into a case which has also been cleaned and moved back to the next work station. This “travel” may be repeated several times.

At first glance there may be good reasons for a round travel for bathing. Investments will be lower for centralised cleaning stations than for decentralised ones. Systems of this kind are most flexible, and people always did it this way. So the chief of production may be ready to accept the additional stress caused by noise and heat, and also the costs due for logistic and the disposal of cleaning agents. However an attractive alternative with decentralised options is missing. We need to say: This alternative was missing.



Since the year 2002 the Coli-Cleaner has been available, a future-oriented, profitable and ecologically friendly cleaning technology. When the patent had been registered this revolutionary idea had been fitted with Fraunhofer Technologie Entwicklungsgruppe (TEG) of Stuttgart for the industrial use. As soon as a good reliability of the process could be assumed the North-Bavarian machine constructor Ossberger GmbH + Co could be gained as industrial partner. A further business branch was therefore set up at their works with the Coli-Cleaner.

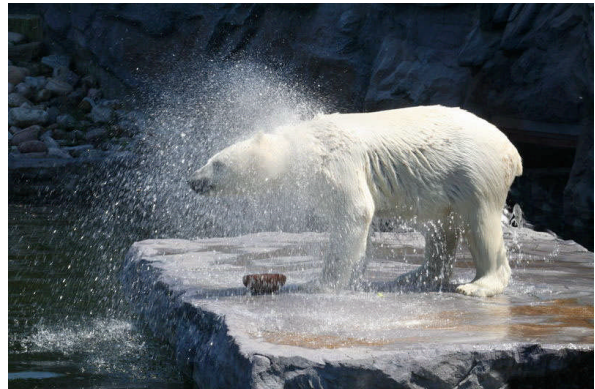
Recently an article dealing with this company was published by the magazine RegioPress of North-Bavaria, which was entitled “SMALL FRANCONIAN REVOLUTIONS SINCE MORE THAN 130 YEARS”. Ossberger has been producing machinery indeed since 131 years. In the course of the years further business activities were added to the traditional field of agricultural techniques. So a good success is also secured in the era of globalisation.

Nowadays Ossberger is the leading manufacturer in the World Market for hydro power stations of small capacities (up to 2.000 kW). PRESSBLOWER Injection-Blow Moulders, which are also manufactured by Ossberger, are widely spread within the plastic industry. Presently more than 9,000 Ossberger™ Turbines are producing energy reliably and in an environmentally friendly way in 100 countries. PRESSBLOWER injection-blow moulders are producing tubes, bottles, axial boots and fold bellows for the plastic industry. The Coli-Cleaner, a system destined for the decentralised cleaning of work pieces, gives a new proof of the company's innovating force.

Following the statements made by Mr. Matthias Böning, a qualified engineer (FH) of TEG, the advantages of integrating the cleaning into the production process (decentralised cleaning) are evident:

- No unnecessary buffers
- No unnecessary ways of transport
- No unnecessary handling
- Reduction of logistic requirements, personnel and monetary funds
- Improved safety of process for the permanent material flow
- The cleaning requirements are optimally adapted to the demands raised by the follow-up processes, i.e. "as much cleaning as necessary".

If you are intending to do without any luxurious "travel to the bath" you should provide a Coli-Cleaner for your parts instead. With the Coli-Cleaner you will have a decentralised, compact cleaning system. The fascination about dogs and polar bears, shaking themselves after swimming to get rid of moisture, gave birth to the ingenious idea that work piece cleaning could be based on the same principle.



Picture 1: polar bear

Following the example given by nature the Coli-Cleaner overcomes the adhesion forces of solid and liquid pollutions that stick to the work piece by vibrating. Solely by vibrating pollutions are thrown off and can then be extracted with only little energy. Here the example given by nature is left: Pollutions are not spread in the room, the workplace remains clean.

The first tests were quite promising, so a patent was granted for this procedure. Additionally remarkable investments were made into the development up to its industrial maturity. The procedure was awarded the 2nd environmental protection price of the trade sector of North-Rhine Westphalia, and the Price of the Bavarian State.

Whereas creatures have a complicated muscle system, throwing off the water in a controlled way, it is necessary to overcome mass inertia in the case of work pieces. It is essential to have a good control of the phases acceleration, stop and new acceleration.

These factors are, of course, decisive for overcoming the adhesion forces. The lack of wear, small energy requirements and a simple operation are further factors for the industrial use.

Although it was possible to produce and control the vibrations desired by pneumatic vibrators this procedure had to be given up for the excessive need of energy. By the use of hydraulic drives the energy requirements could be reduced remarkably, contrarily too many demands were raised by the voluminous periphery. Today the Coli-Cleaner works with an electromagnetic vibrator, based on two magnets. With this option the optimum has been reached with regard to costs and control. The magnets are free of maintenance and wear.

The excitation is made by a frequency-modulated sinusoidal oscillation. This situation can be mathematically described by an inhomogeneous differential equation of 2nd order and can be resolved numerically. Following the mathematic model an acceleration is obtained at the reversal point of up to 30 g¹, and in reversed condition of up to 25 g.

The Coli-Cleaner is composed of three important subassemblies:

- vibrator
- part accommodation
- extraction

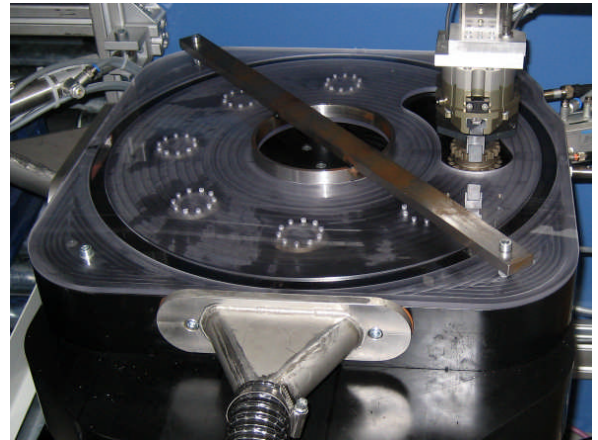


Picture 2: swinging plate

AC voltage is available from the mains at 50 / 60 Hz. The frequency rectifier converts this AC voltage to swinging frequencies of 120 – 600 Hz, transmitting the same to swinging magnets. There the electrical energy is converted into mechanical one. The mechanical energy is transmitted to the swinging plate through special compression springs. Coli-Cleaners of the present generation can handle elements of up to 25 kg.

¹ g= acceleration caused by gravity = 9,80665 m/s²

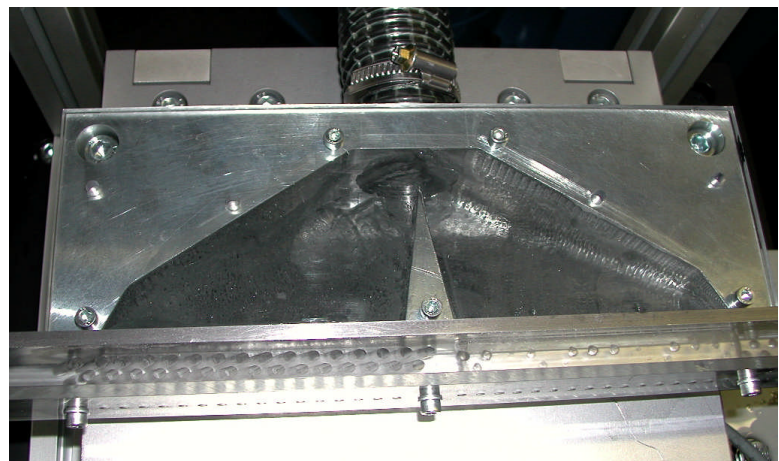
A remarkable range of work pieces can be washed by the Coli-Cleaner. Vibration frequency and amplitude are adjustable within a wide range. The work part accommodation is of great importance, which must conform to the work piece contour to make sure that during the vibration procedure the air current takes off all particles adhered thereto. For this purpose small boreholes are provided at the jigs, producing additional air vortices when air is extracted. The said vortices are also supporting the effect produced by the vibration, removing pollutions at the same time. Particularly in case of rotation-symmetrical parts a well-defined intentional turn of the element can be initiated additionally by a clever arrangement of air intake and extraction bores.



Picture 3: cleaning of rotation symmetrical parts in a revolver as part accommodation.

The core of the extraction is a customary industrial exhauster with filter and separating device. The quality of the cleaned medium, whether oil or emulsion, is not affected by the procedure. So work pieces can immediately be returned to the production process.

The cleaning time conforms to the geometry of the cleaned part, the pollution degree and the cleaning result which is desired. These times may vary between some seconds and half a minute. An unavoidable small oil layer still remains on the work piece which is, however, even desirable in many cases to prevent corrosion. In this regard reference is made to the ongoing discussion on the meaning of the word "clean" for the production sector and the development of clear measuring methods. One further factor for the cleaning time are the cycles of the last and the following machine in the line.

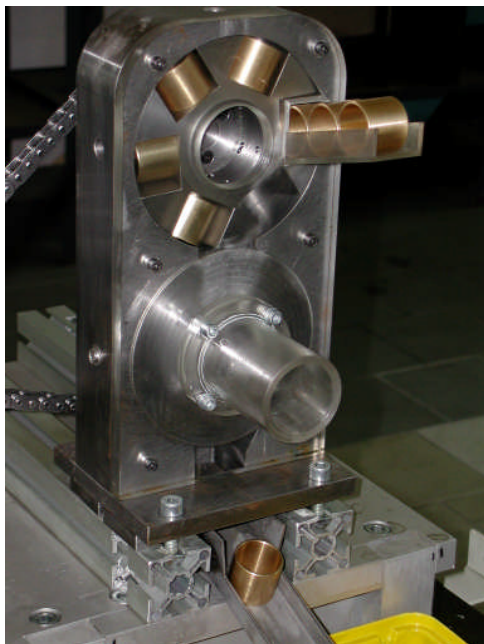


Picture 4: part accommodation for chains cleaned by run-through procedure, air intake and exhaust bores are clearly visible.

In case the Coli-Cleaner cannot cope with the admitted quantity some parallel cleaning could also be envisaged by arranging several jigs on the vibration plate. For the compact dimensions an extension to several Coli-Cleaners working in parallel would be possible without any problems.

After cleaning parts are conveyed to the next work station. A smooth integration into the production process has been provided, so buffer storages are not required at this point. For feeding and discharge individual solutions could be envisaged.

All technical options are advantageous and disadvantageous at the same time. A principal comparison between centralised and decentralised cleaning clearly shows that both options are justified. It is true that the centralised cleaning can normally do with one single universal machine, cleaning several lines in one washing process, for all that the risk of failures may not be underestimated. After cleaning a drying process is still required, it may also be hard to find a reliable estimation of future cleaning requirements. The substances referred to can be adapted to the cleaning problem so that an excellent cleaning result is finally achieved. Just in case of intermediate cleaning the outcome is often better than required. When work pieces are conveyed, pollutions are frequently spread by dripping lubricants. The work safety is enormously affected by slippery hall floors. This problem can only be solved by cleaning the transport ways frequently at the necessary costs.



Picture5: part accommodation for sleeve cleaning

Just in case of automatic production procedures the given order of parts needs to be observed. This demand must be fulfilled with a decentralised cleaning only. It is important to have a higher time of cycle for the decentralised cleaning, compared with the preceding work cycle, so that the parts are not jammed. The decentralised cleaning has been precisely adapted to the production process, so it also needs to be readapted with a re-equipment of the manufacture. Decentralised units are, however, relatively small, the pollution has not dried yet immediately after the handling, and can be dissolved much easier. So chemical detergents can be reduced, possibly there may even be no need for them at all. The unit can be set up for its particular cleaning problem and the cleaning result which is necessary.

A rough comparison between the advantages and disadvantages of the diverse procedures clearly gives proof that each cleaning system is well justified:

	Advantages	Disadvantages
Centralised cleaning	<ul style="list-style-type: none"> • Large quantity of batches • Independence of the work piece geometry • Well-proven procedures 	<ul style="list-style-type: none"> • Material buffers required • Resources bound in the buffers • Transport • Logistic requirements; batch marking • Pollution of transport ways • Reduced process safety, any failure affects the whole production • Additional work steps for separating the parts • Cleaning of transport cases
Decentralised cleaning	<ul style="list-style-type: none"> • No buffers • No transport • High process safety • Separation of parts maintained • Clean work places 	<ul style="list-style-type: none"> • Investment • Small flow • Costs of re-equipment

Finally the basic difference between wet and dry cleaning procedures needs to be considered. One can do without chemical additions in the cleaning bath, an essential argument speaking in favour of dry cleaning. So there are no costs for provision and disposal of additions or monitoring of the cleaning bath.

Similar advantages are faced with blowing air and compressed air procedures, and dry vibration cleaning; here the high energy consumption may not be underestimated. The risk of aerosol formation is above all faced with plants which are not closed. These systems are only suitable for an automatic work piece cleaning in a quite restricted way.

Many users have reported on simple tests at their own works. Extraction as an alternative could just be a good solution in cases where blow-off procedures are referred to. Comparing tests have shown that the cleaning result could be improved decisively by combining vibrations and extraction.

Finally the vibration cleaning plant offers a compact solution for the automatic integration into the production process. Neither the provision nor the disposal of solvents is necessary, a cleaned medium may even be returned into the production process immediately. Besides of a good environmental compatibility and the small energy consumption the argument of a clean work place is essential as no aerosols are existing. This procedure is particularly suitable for rotation-symmetrical parts produced at large quantities. A small oil film remains, whereas cooling lubricants, chips and grinding remainders are washed off completely.

Until now the Coli-Cleaner has been successfully utilized for the cleaning of common rail holders, switching sockets, drills, screws, aluminium wires and for the oiling and degreasing of steering chains. Its use is being envisaged already by well-renowned bearing manufacturers who are planning to reorganise their production.



Picture 6: Coli-Cleaner for cleaning bush



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