PRESS RELEASE - For Immediate Distribution

Introducing the Improved MAS DRD "Waterless" Cleaning System for Plastic Film, Flakes and Fibers

September 28, 2015 - **The Upper Austrian plastics machinery manufacturer "MAS Maschinen-und Anlagenbau Schulz GmbH" has recently technologically upgraded its DRD (Double Rotor Disc) "waterless" drying and cleaning systems for plastic film, flakes and fibers. These improvements offer significantly higher throughput-rates without affecting, nor increasing, their already extremely low energy consumption rates. As always the standard DRD Single-stage system can be used as a dryer for already washed film waste, as well as the cleaning of contaminated dry waste. Our revolutionary Two-stage DRD-DS systems are specifically designed to handle the combined cleaning and drying of wet and dirty waste in two steps for superior contamination removal. Both of our DRD styles, the single and double systems, can easily handle the most difficult waste around, agricultural films, flakes and fibers.**

The DRD started 10 years ago as a simple idea based on a vacuum cleaner principle, which was developed by MAS-Maschinen-und Anlagenbau Schulz GmbH with the affiliated company EKUMA; and as such, has quickly blossomed into a revolutionary product that has been proven in the market on a worldwide industrial scale. The DRD is a dry-cleaner type process for film, flakes, and fibers, which works completely without water. Many customers have been looking for a solution for their costly water treatment and the associated regulatory requirements and have quickly found our DRD to be the solution to that burdensome issue. As an added advantage, the DRD system also has a clear advantage over its 'wet cleaner' counterparts in not only energy consumption, but also in lower operating costs.

After all of the DRD's successful field-use, the next logical step was to improve the concept. This next evolution of the DRD-system was launched this year. The most noticeable change in the next generation of the DRD is the significant increase in throughput utilizing a similar unit size, air consumption, and only a moderately higher drive power. MAS has also focused on a more user friendly DRD by including changes to improved serviceability, by making the screens, rotors and drive elements more accessible.

Through all of the DRD's changes and upgrades, MAS has been careful to insure that the field of application has always stayed constant. The DRD is still a superior intermediate stage within recycling processes to dry plastic waste after a washing process (which is necessary if it is contaminated with

tacky or sticky organic residues), or for its main focus, the cleaning and drying of mainly mineral-contaminated plastic waste, which is mostly found in agricultural products as well as post-industrial and some post-consumer products (MRF). The DRD's principle is simple but effective. The central component of the MAS dry cleaning unit is a double rotor system in a centrifuge housing (Fig.1). The rotor consists of a top and a bottom rotor (= patented Double Rotor Disc system). The lower rotor sucks the material batches supplied by a shredder and spreads it uniformly. During the cleaning process all larger and heavier impurities such as metal parts, stones, and debris are separated by gravity and discharged periodically from the bottom of the centrifuge chamber via a pneumatic flap. Simultaneously, the upper rotor creates vortex airflow and forces the pre-purified material into a turbulent cycle (Fig.2). To absorb the moisture during the cleaning process, hot air is generated by a central heater register (Fig.3). The particle separation occurs in the vortex using the friction between the plastic flakes, film or fibers in combination with a declining moisture content to assist the separation of adhering residual dirt particles and deliberating them into the air. At which time particles are continuously removed by the centrifugal force on the lateral screens by dust collectors (Fig. 4). After the purifying process, the plastic flakes are discharged and fed into a material-silo at the plant.

When combined in a recycling process that utilizes a pelletizing unit, the DRD system can be operated in a further energy-saving way by utilizing the waste heat from the pelletizer and introducing that residual heat back into the heating process air of the DRD unit.

Excellent recycling quality

As a result of our air-assisted DRD cleaning process we are able to produce flake-qualities with a residual contamination level of less than 0.5 percent, as well as a residual moisture content of approximately 2 percent (Fig. 5).

As a final benefit to the bottom line, this entire process is fully automatic via a PLC. Power consumption and residence time of the plastic in the dryer/cleaner can be individually adjusted to the moisture content and the rate of contamination. The DRD's sensors were expertly developed to stabilize the entire process with the expectation of fluctuating moisture levels which are commonly found within the input material.

The basic parameters of the evolutionary stage II

With the most recent upgrade to the DRD process the previous DRD systems 18 and 24 containing a centrifugal diameter of 1800 or 2400 mm have been replaced by the types DRD 21 and 26 with 2100 and 2600 mm in diameter respectfully. By doubling the number of rotor blades, increasing the rotor speeds and drive power, the material throughput per batch could be doubled with almost the

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same volume of process air. In practice, the batch volume could be increased with the smaller type from 12 to 25 kg, and the larger DRD 26 system from 20-25 kg to 40-50 kg. A batch time for "normal" contaminated feedstock with 15 percent moisture content is about 2 minutes. Accordingly, the hourly output has increased from 750 - 900 kg to 1200 - 1500 kg, and we were able to make this increased change with very little increase in the initial investment costs. Even with the significantly higher throughput, moderately increased drive, and heating-power, the specific process energy consumption could be reduced to approximately 0.15 kWh / kg with dry material, and 0.6 kWh / kg for material with 15 percent initial moisture.

Material which is >25% moisture may need a pre-dewatering process in a centrifuge to keep the throughput and operation of the DRD more economical.

Lower investment and operating costs

When comparing the DRD waterless cleaning methods to that of a standard wet wash system we find the following benefits:

1. Significantly lower initial investment needed.
2. Drastically lower space requirement for instillation.
3. Water treatment and the related investments are not required.
4. The high costs of sludge and wastewater removal do not apply.
5. Related operating costs for the accompanying monitoring and maintenance of a wet wash system are no needed.
6. DRD can be operated by 1 employee.
7. A comparative calculation based on a depreciation period of 6 years is clearly in favor of the dry-cleaning process.
8. The operating cost per ton of material throughput amounts to only about 20 to 25 percent of a conventional water-based cleaning process.

Universally applicable

The MAS dry cleaning plants are available both as a 2-stage stand-alone-system (Fig.7), as well as a single-stage-system in combination with a “wet system“. When used prior to a wet cleaning process, heavily soiled sheets can be cleaned more efficiently, since a majority of the solids can be separated beforehand thus avoiding an over-consumption of process water. When applied after wet cleaning of purified material, a DRD-unit is an efficient dryer and additional cleaner resulting in a full decontamination of all impurities that could not be separated during the initial wet-wash process. After this process the plastic flakes are then suitable for the in-line-processing on a MAS extruder with attached pelletizing.

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DRD-cleaning and drying systems are modular and also suitable for combining with recycling systems from other manufacturers (Fig.8).

■■■

MAS and their innovative processing and plastic recycling equipment is brought to you in North America by **eFACTOR3, LLC**.

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About eFACTOR3, LLC

Headquartered right outside the Greater Charlotte area, in Pineville, North Carolina, eFACTOR3, LLC brings together a keen understanding of environmental, engineering and equipment issues. The company offers a variety of pre-shredding, shredding and granulating equipment, along with conveying and separation equipment, systems integration and installation.

eFACTOR3 also represents MAS and their innovative plastic processing and plastic recycling equipment. Their product portfolio focuses on high product quality and very low energy consumption. It is comprised of 3 main components: Extruders, Continuous Disc Filtration and Dry Cleaning Systems.

Whatever is intended to be recycled or turned into an alternative fuel, eFACTOR3 can provide a custom solution.

For more information, contact Hartmut Bendfeldt at 1.877.801.3232, hbendfeldt@efactor3.com, and visit www.efactor3.com.

Images:

Photo: Reinhard Bauer – TECHNOKOMM

Fig.1: Two DRD-26 units in progress. In the foreground a buffer tank for material feeding, in the background the centrifuge chambers in combination with the electrical and control cabinets.

Photo: Reinhard Bauer – TECHNOKOMM

Fig.2: Central component of the DRD system is the 'dual' rotor. On the underside, not visible here, is the suction side for the feedstock.

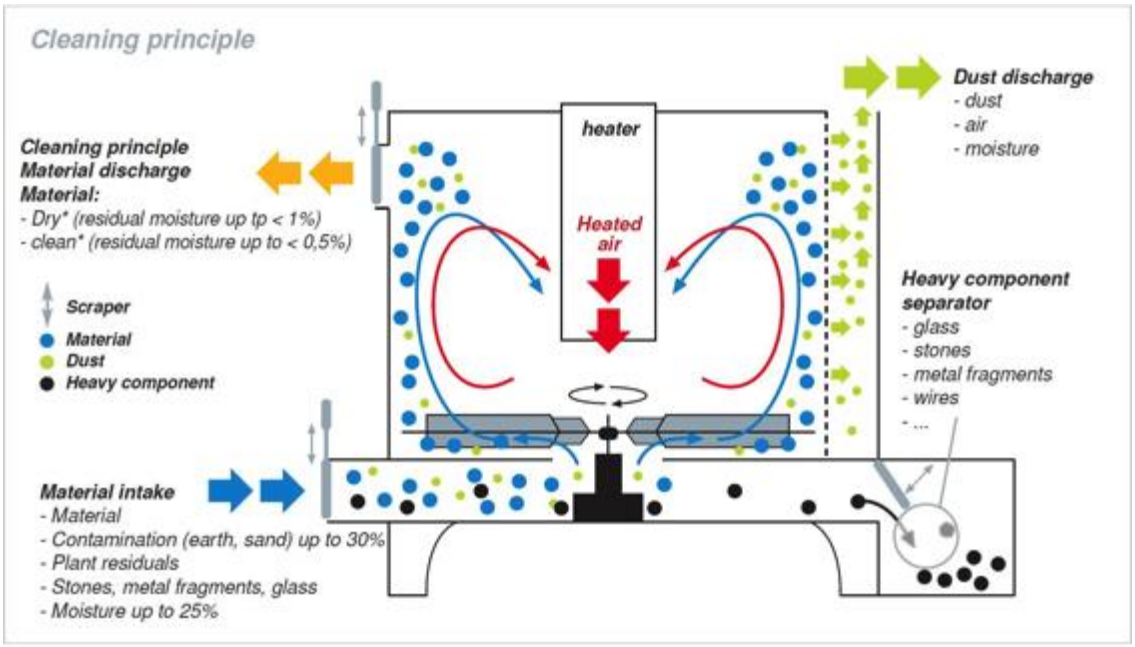

Photo: MAS – Maschinen- und Anlagenbau Schulz GmbH / Pucking

Fig. 3: The principle of operation of the MAS dry cleaning system: film flakes are dried in a floating area of hot air. With the decreasing moisture levels, in combination with mutual friction, granular and powdered materials are separated from the flakes and by centrifugal force and discharged tangentially through the screens.

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Fig.4: View through a tangential sieve into the centrifuge chamber of the DRD 26 system, below the double-rotor system with 12 rotor blades, above the heater housing.

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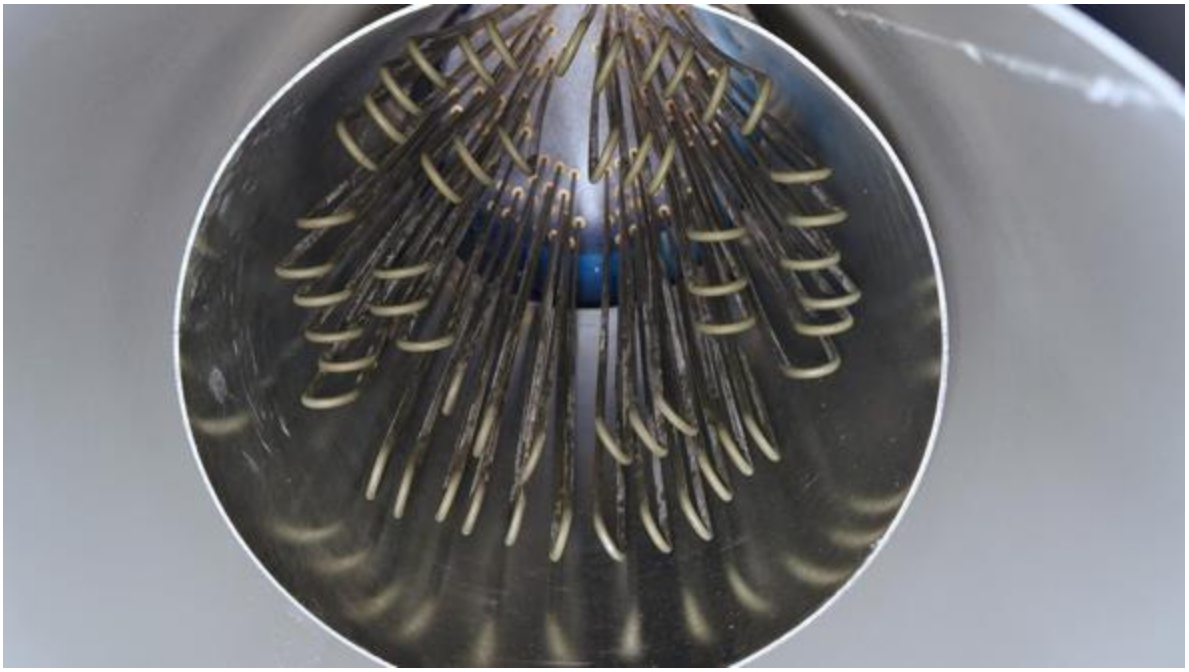

Photo: Reinhard Bauer – TECHNOKOMM

Fig. 5: Detailed view of the process air heating system with 6 x 36 kW heating power.

Photo: Reinhard Bauer – TECHNOKOMM

Fig.6: Two containers with polluted (left) and purified film flakes (for illustration purposes, the flakes are dispersed with water).

Photo: MAS – Maschinen- und Anlagenbau Schulz GmbH / Pucking

Fig.7: Two-stage DRD 21 DS System. On the left is the first cleaning stage, including heater; on the right, the second purification stage, which has no air heating.

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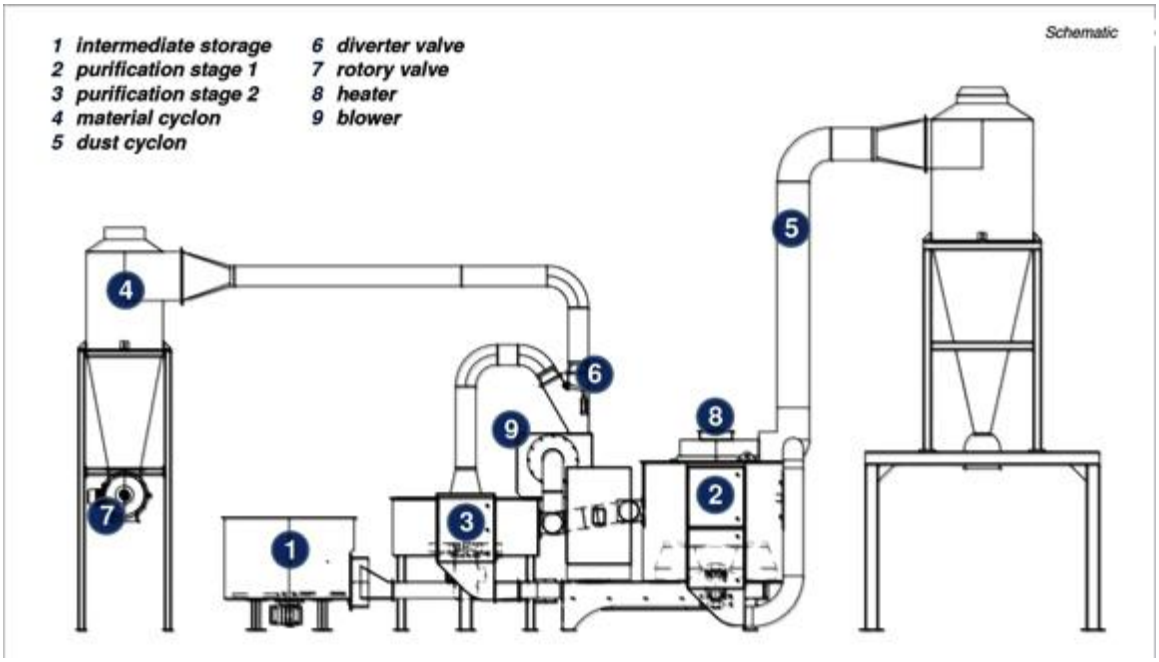

Photo: MAS – Maschinen- und Anlagenbau Schulz GmbH / Pucking

Fig. 8: The MAS system scheme is characterized by a modular design that can be easily adapted to specific material grades and throughput quantities.

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