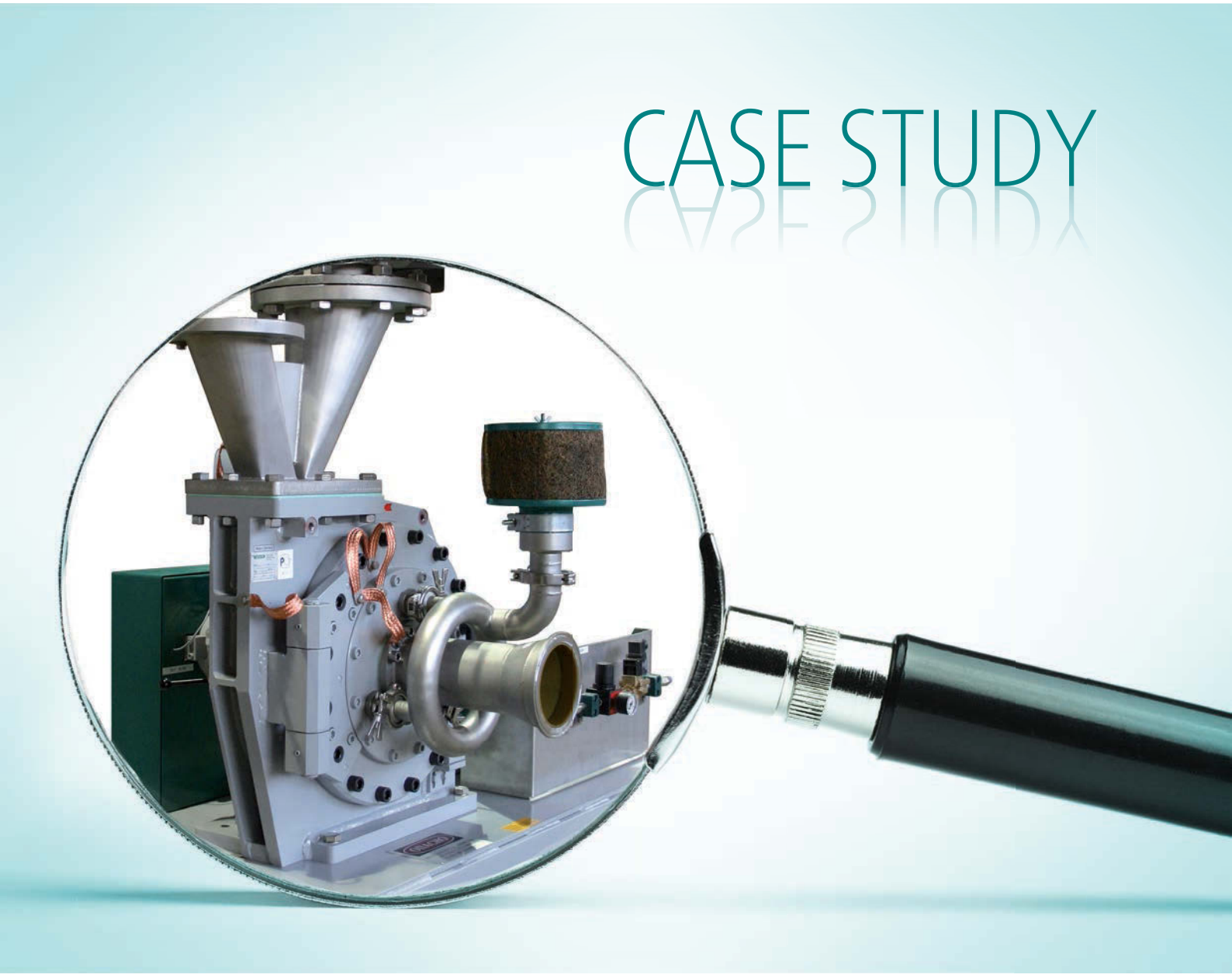
NETZSCH

CASE STUDY



Dedusting of Metal Powder for Additive Manufacturing (3D-printing)

CHEMICAL INDUSTRY | a Business Field of NETZSCH Grinding & Dispersing

Dedusting of Metal Powder for Additive Manufacturing (3D-printing)

State of the art

In particular the 3D-printing market is currently experiencing a period of very rapid growth. An ever-increasing number of applications in the area of the automobile industry, aircraft construction, tool manufacture and prototype construction are based on the AM process. 3D-printing has made it possible to manufacture complex shapes with defined characteristics. Previously it was impossible to manufacture such parts or they could only be manufactured by joining together several parts. The advantages are obvious:

- Components are lighter (weight saving of up to 80%)
- Components are smaller
- Quality can be controlled and therefore fewer rejects are produced
- Components have improved characteristics as cavities are single and complex shapes can be manufactured
- Development times are considerably shorter as prototypes can be manufactured immediately after the design phase

During the currently used printing process a 20-100 µm thick coating of metal powder is applied. Then, a laser melts the metal powder at the points at which the part is to be produced, so that the metal particles fuse. Afterwards another coating of powder is applied and the process repeated. This procedure is then repeated until the part is finished. Production times range from 2 - 24 hours, which means that the use of this method in serial production is still limited.

Metal powders used for high-quality applications in the area of „Additive Manufacturing" (AM as well as 3D-printing) are produced in different ways by gas, water or plasma atomization. Unfortunately, an exact and very narrow particle size distribution, which is required for 3D-printing, cannot be obtained using this process method. Therefore, after the atomization process the raw material needs to be classified to ensure a steep particle size distribution to get a product that is tailored to the particular requirements of the end application.

The solution from NETZSCH

In order to ensure that a good quality product is produced, it is important that the powder used has a narrow particle size range, typically from 20 to 60 µm.

In this way separation technology plays a decisive roll and this is where the NETZSCH classifier of the series CFS/HD-S comes into play. With this machine type we can obtain a sharp cut during dedusting. We were also able to demonstrate this to the customer during testing.

In the framework of this project for a company which leads the worldwide market for the manufacturing of metal powders for technically challenging applications, it was also important to be able to quickly change from one product to another as the various stainless steel powders have different compositions. Therefore, the easy accessibility of the classifier was also a further important criterion.

An absolutely new innovative factor of the total design of the classifier plant is the operation of the classifier air in a closed loop system which means that the fine product can be almost completely separated out via a cyclone! This is possible due to the high density of the product. No filter is necessary. Thanks to this, after the product has been changed and a small amount of cleaning carried out, the customer can then collect each type of dust separately so these can then be used for other applications.

As the separation of the fine fraction is significantly quicker and operationally more reliable using the NETZSCH Classifier Plant CFS 170 HD-S, the customer can replace the existing screening technology. At these fineness ranges screening machines are pushed to the limit of their operating capacity. This is illustrated by a low throughput and frequent blocking of the screens. Furthermore, the wish to reliably dedust amounts over 100 kg at the same time ensuring availability can be fulfilled with this design. As a consequence, users can react flexibly to the demands of their customers at all times.

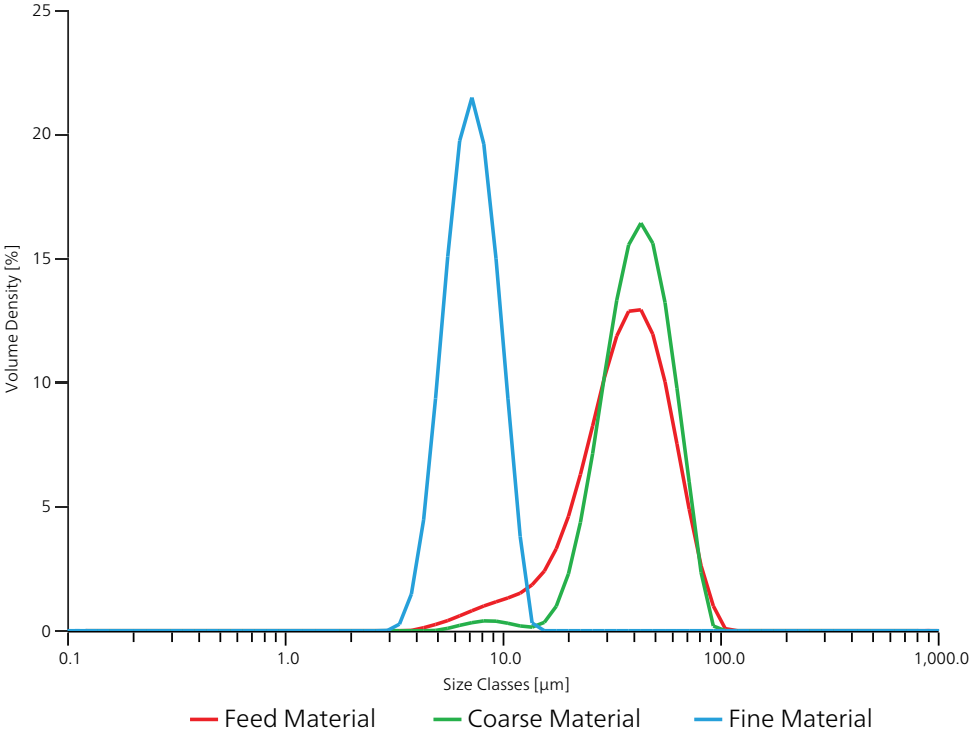
This order is a further step in establishing the name of NETZSCH Trockenmahltechnik as a reliable partner for dedusting applications in this industry.

High-efficiency Fine Classifier CFS/HD-S

The NETZSCH High-efficiency Fine Classifier CFS/HD-S (High Dispersion) works very efficiently due to its closely defined sharpness of cut and its very specific product flow. Mixing of the classified coarse material and feed material inside the classifier cannot occur.

A significant improvement in throughput has been made possible by a specially designed housing: the screw-shaped design of the housing optimizes the product flow within the unit. This allows large quantities of coarse material to be discharged unhindered through the product outlet. Accessibility and easy cleaning of the machine are guaranteed by the hinged housing door and the removable guide vane basket.

- Guide vane ring with adjustable vanes for efficient dispersion of the feed product prior to classification
- Classifier wheel with exchangeable, simultaneously rotating immersion tube to achieve highest finenesses, unlimited adjustment
- Gap between classifier wheel and fines outlet rinsed by gas for highest possible prevention of oversize material in the fine fraction
- Extremely sharp separation for improved fines extraction
- Highest finenesses and maximum throughput achievable with just one classifier wheel
- Very good access for fast, easy cleaning and maintenance
- Reproducible results



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