MULTI-PROCESSING SYSTEMS

The task of laboratory development centres is usually to produce small amounts of product samples for tests with the aim of defining an industrial manufacturing process.

The laboratory-scale systems used must offer process reproducibility and the possibility of scaling up at a later date to production-scale equipment. Because new products whose grinding properties cannot always be predicted in advance are constantly being developed, maximum flexibility is a prerequisite. This is where so-called multi-processing systems have established themselves as veritable all-rounders: it takes only a few minutes to exchange the following modules:

- Opposed jet mill
- Ultrafine classifier
- Classifier mill
- Spiral jet mill
- Fine impact mill

MULTI-PROCESSING SYSTEMS FOR A HOST OF COMBINATIONS

This concept revolves around the fact that the installation frame, the feed metering unit, the valves for bearing rinsing air and grinding air, the drive, the product collection filter, the fan, the electrics and the control unit are common to all processes. The latest development of Hosokawa Alpine is the extension of this combi-system by a fine impact mill which can be equipped with the customary variety of grinding elements (pin discs, plate beater units, grinding tracks, sieve grates, etc.). A newly developed drive, controlled by a frequency converter with different sets of parameters, permits (in spite of the very different design, power and speed) installation of both the grinding rotor of the fine impact mill and also of the deflector classifying wheel.

ALPINE MULTI-PROCESSING SYSTEM FOR FIVE PROCESSES, ALSO SUITABLE FOR CIP/SIP PROCEDURES

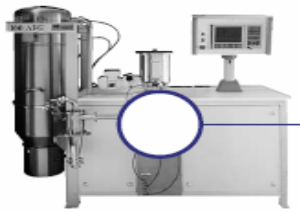
A) Opposed jet milling with the 100 AFG for materials with a Mohs' hardness up to 10 and end-product fineness values of between 2 and 40 µm,
B) Ultrafine classifying with the 50 ATP, separation range from 2 to 120 µm
C) Fine grinding with integrated 50 ZPS classifier for materials with a Mohs' hardness up to 3,5
D) Ultrafine grinding with spiral jet mill 100 AS for fineness values between 5 µm and 30 µm
E) Fine impact milling with 100 UPZ

Combination possibilities

	AFG	ATP	ZPS	AS	UPZ
1)	100	50	50	100	100
2)	140	70	70	140	–
3)	200	100	100	200	160

CLASSIFICATION: ALPINE TURBOPLEX® ULTRAFINE CLASSIFIER ATP

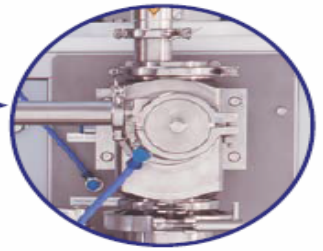
- For materials with a Mohs' hardness up to 10.
- Separation/fineness range steplessly adjustable from d_{97} = 2 to 80 µm.
- Extremely high precision of cut.
- End products with steep particle size distributions and free from oversize particles.
- Ideal for materials of high density.
- Good dispersion of cohesive products.
- Throughput approx. 3 to 50 kg/h.



JET MILLING WITH INTEGRATED AIR CLASSIFIER: ALPINE FLUIDISED BED OPPOSED JET MILL AFG

- For materials with a Mohs' hardness up to 10.
- Fineness values of d_{97} = 2 to 40 µm.
- End products with steep particle size distributions and free from oversize particles.
- Throughput approx. 1 to 25 kg/h.

Option: PU lining and a ceramic classifying wheel results in end products with no iron contamination.



FINE GRINDING WITH INTEGRATED CLASSIFIER: ALPINE ZIRKOPLEX® CLASSIFIER MILL ZPS

- For soft materials with a Mohs' hardness up to 3.5.
- Fineness values of d_{97} = 8 to 80 µm.
- End products with steep particle size distributions and exact topsize limitation free from oversize particles.

ULTRAFINE COMMINUTION: ALPINE AEROPLEX® SPIRAL JET MILL AS

- For fineness values of d_{97} = 5 to 30 µm
- For product batches between 3 g and 100 g (50 AS).
- Because there are no electric components, this laboratory mill is suitable for sterilisation in an autoclave.

FINE GRINDING: ALPINE FINE IMPACT MILL

For the fine grinding, disintegration and cutting of materials with a Mohs' hardness up to 3 and end-product fineness values dependent on the installed equipment of approx. 50 to 1500 µm.

MULTI-PROCESSING SYSTEMS MACHINE VARIANTS

STANDARD

To ensure the highest degree of resistance to chemical attack and against corrosion, all product-contact surfaces of Alpine's multi-processing systems are made of rust- and acid-proof stainless steel.

ENHANCED WEAR PROTECTION (NO IRON CONTAMINATION)

The use of oxide ceramics and PU as wear-protection elements for the product-contact surfaces makes it possible to produce extremely pure and high-quality powders with no iron contamination. With this arrangement, Fe contamination levels of less than 3 ppm are possible.

WEAR PROTECTION AL_2O_3

SiC CLASSIFYING WHEEL

PHARMA EEx

EEx design for installation in Zone 1/21 as per ATEX 95.

EXPLOSION-PRESSURE-SHOCK-PROOF TO 10 BAR (OVERPRESSURE)

Dependent on the job, i.e. whether the system will be used in batch operation or continuous mode, it is available in explosion-pressure-shock-proof design to 10 bar overpressure.

PHARMA / GMP DESIGN

The overall design with smooth surfaces and no dead spaces simplifies thorough emptying, cleaning and sterilisation. The system can be dismantled and all product-contact components can be sterilised in an autoclave. As an alternative, an SIP design is also available.

FEATURES

- Construction materials: product-contact parts 316 L, surface quality Ra = 0.4 to 0.8 µm
- System components completely in stainless steel 304, surface quality Ra = 0.8 to 1.2 µm
- Control cabinet in a special stainless design suitable for wet cleaning
- Motors cased with polished stainless steel plate
- Seals made of silicone, EPDM, Chemraz
- Operation in sterile rooms with absolute filter for filter exit air plus sterile filter with polished stainless steel housing for intake air

FOR CIRCUIT-GAS MODE WITH INERT GAS

This kind of system design calls for the system supplier to have complete command of the inerting process, an optimal gas-tight system design and a wealth of specialised know-how and experience, e.g. in the design of the circuit-gas control unit, the use of special vessels to fill the product into under inert conditions without having to switch off the machine and last but not least in selecting the type of compressor.

INTEGRATED INTO AN ISOLATOR

The most exciting new development is the integration of grinding systems into isolators. This development was motivated on the one hand by the risk to the operating personnel posed by toxic substances, and on the other hand by the desire to protect sensitive products, e.g. sterile materials, from operator contamination.
Conventional mill designs with glove ports in the isolator housing proved to be unsuitable due to the restricted access. This led to redesign of the entire mill and isolator. 3D CAD systems were used to simulate all the operations necessary for powder processing and maintenance. Even with this modern design tool, it is usually still necessary to build a wooden mock-up of the isolator and the mill to test and verify the actual system handling.

INTEGRATED INTO AN ISOLATOR

UPZ

AS