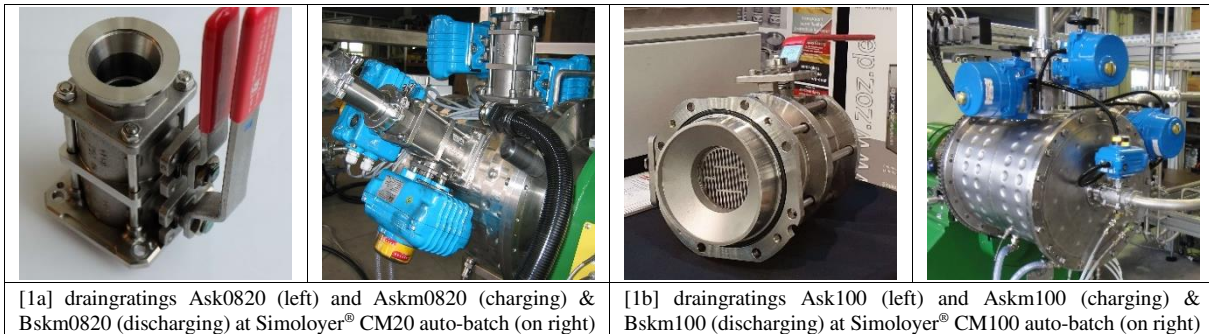


## HKP in the Simoloyer® Media Reload Processing (MRP)

High Kinetic Processing (HKP) in the Simoloyer® represents the most advanced technique for Mechanical Alloying (MA), High Energy (HEM) and Reactive Milling (RM) for making Nanostructures. Three general processing modes are addressed, namely the common batch-process (01), auto-batch (02) with automatic loading and unloading as well as the semi-continuous processing route (03) for insitu separation/classification by the adapted carrier-gas/multiphase flow circuit.



In all three modes, starting-powder material is charged into the Simoloyer® processing chamber that is loaded with grinding media (GM). The processed powder is subsequently discharged while GM remains in the chamber. Separation is provided by advanced draingrating systems with respect to atmosphere and/or handling mode from manual to fully automatic.

### Temp. Recovery & Product Flow

Except Reactive/HighTemp processing, grinding media stores processing heat that needs to be dissipated via cooling systems at vessel, flanges and sometimes rotor-blades and/or main-port circuits. In mode (3), additionally the carrier-gas can be utilized for temperature recovery.

Separation GM / product at discharging can represent a bottleneck in the product flow chart, particularly if product unloading shall be performed under vacuum or severely controlled atmosphere utilizing Ask-type draingrating [1a/b], Zoz-patent, as the only known solution (without dead zone).

### Media Reload Processing (MRP)

HKP at industrial manufacturing (repeated and fast processing) may require complete discharging/charging of product including GM in order to increase discharging efficiency (time and yield, economic) and to extract all heat that is stored by GM (heat-break, process technical) from the flow chart.

Complete discharging may also improve product access for CMB materials, such as highly ductile metals and composites.

Media Reload Processing (MRP), as a variant to batch- or auto-batch mode, also allows to discharge through a fixed main-port at 6 o'clock position [2-10b] without turning the grinding unit from charging- to discharging position. Thus auto-batch without carrier-gas becomes possible and carrier-gas assisted discharging can be replaced to some extent.

### MRP - loading/unloading at vessel

Charging/discharging of starting/processed powder + GM right at the processing chamber is done via two chargegratings Bskm [1b] [2-10a/b] at 6 o'clock and 12 o'clock position respectively. Type Bsk, on the contrary to type Ask, is appropriate for twin-direction, all transfer run by the Maltoz® control software.

### Separation GM/product, here MPS10b

The MediaProductSeparator MPS10b [3a-d] is made to collect the full multi-phase flow from the Simoloyer® CM20 processing chamber. GM will pass over a vibrating pan while powder product is passing through the same. GM is collected in the container (2-6b), powder product in the container (2-6a). Separation res. remaining time is controlled by the converter driven vibration intension as well as the adjustable pan-shift-angel. Classification can be observed through a complete transparent cover of MPS, the entire process can be operated under vacuum or inert gas.