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SUET Saat- und Erntetechnik GmbH  
Geschäftsleitung

***RTF - a new technology of precise fungicide and insecticide application as a part of a quality assurance concept in sugarbeet incrusting (filmcoating)***

SUET is a servicing company, providing seed treatments for breeders and growers. Annual capacities, in advanced technologies for chemicals application to the seeds, reach 0.7-1 Mio hectares with beetseed and several 100 tons of vegetable seeds. Seed treatments with fungicides, insecticides and further ingredients increasingly replace the traditional area spraying or granules. Directly on the seeds, less than 5 % of the former area concentrations of chemicals can protect seeds and seedlings.

***“Good Seed Treatments“***

- provide full seed and seedling protection against fungal and insects diseases, with
- higher a.i. concentrations exactly dosed in most uniform seed-to-seed distribution,
- reduce a.i. acreage concentrations to 5 or less % of area spraying and granules, respectively costs and environmental impact of chemicals on farm land,
- allow different a.i. combinations under specific binder formulation - release effects, in multi-layer application at same seed moisture content before/after application,
- prevent a.i. abrasion losses and risks of operators/users contamination,
- improve storability - shelf-life conditioning, sowability and germination of seeds

*Traditional dressing techniques*, seeds revolved in mixers and drums, do not meet these requirements as a high-quality film-coating. *Powder applications* lead to a poor a.i. seed-to-seed distribution and great losses of ingredients through abrasion.

In *Liquid and Slurry applications*, the additional moisture hinders the homogeneous seed mixing and constitutes, even in smaller a.i. and binder quantities, a shelf-life risk for the products, especially for their storage in seal-packs and warmer climates.

*Seed Incrusting or Filmcoating* processes achieve homogeneous and non-abrasive applications of Binders, Active Ingredients and Color dyes, preferably suspended in water. Seed shape, temperature and moisture is not changed significantly.

### **“Good Seed Treatment Technology“**

as modern film-coating technology masters high technological demands as :

- increased number and concentrations of active ingredients per seed units,
- specifically formulated a.i. combinations, applicable in separate multiple layers,
- greater quantities of binders and therefore suspensions required,
- most homogeneous intermixing of the seeds during the total application,
- exactly controlled dosage and most uniform seed-to-seed a.i. distribution,
- instant re-drying of the atomized formulations on the seed surfaces,
- avoidance of dust abrasions or lump formation and subsequent cleaning, and
- final conditioning of temperature-humidity for safe storage and shelf-life.

These parameters assure reliable germination, even after prolonged storage, and an optimum efficacy of seed and seedling protection.

In addition, modern film-coating technologies must ensure operational hygiene and high standards of fabrication which meet today's environmental requirements.

### **Fluidized Bed processes**

In Fluidbed or Spoutbed units the seeds are suspended in injected warm air, gently moved and applied at instant redrying. Ingredients are sprayed from top or bottom onto the seeds. The treatment time is significantly reduced, compared to drums with over-wetting risk. However, permanent particle contacts in Fluidbeds can also build agglutinations. With bad seed flow properties of species as carrot, onion or parsnip, the coating homogeneity can also be disturbed. Counterflow spraying originates losses.

### **SHR Fountain process (Spraying - Homogenization - Re-drying System)**

The SHR process is based on a regulated jet of upstreaming warm air, the seeds are uniformly whirled-up in a slim conical container without physical contact. Premixed suspensions are steadily atomized from below and simultaneously re-dried on the seed surfaces. Seed temperature and humidity are electronically controlled and automatically maintained at a constant low level during the coating process.

For more than 15 years, the SHR System has guaranteed superior dosage and distribution quality of Inkrusaat® and Basiscoat® (SUETs Treated Seed Trademarks). With high amounts of diversely formulated active ingredients and coating materials also in multiple layers, the SHR system fully meets all quality demands.

The seeds movement effected by warm air elevates construction and energy costs, limiting the SHR applications preferably to so-called "high-value/low-volume" seed. The performance of the system (patented DE 29 40 269, EU 0 047 794, USA, CDN) has been officially tested and approved by the BBA (Federal Biologic Institute,

Braunschweig, German Regulatory Authority) for the period from 1994 to 1999 (Registration No. G 1429).

### **Rotor-Stator process (RTN, W.Niklas, D-41066 Mönchengladbach)**

The RTN technology has been acquired for applications of lower a.i. concentrations, therefore well suited for exceptional capacities at lower construction and energy consumption with large seed batches. RTN machinery consist of a horizontally rotating vaulted bowl within the interior of a perpendicular apparatus. The seed builds-up great momentum by being spirally accelerated aloft, to be tossed back to the centre by the aid of circular deflectors. This effects, until a limited extent of more intensive atomizing, a gentle, uniform and lump-free seed treatment.

SUET's special suspensions with active ingredients pre-mixed and homogenized are automatically dosed and precisely applied by means of a newly developed atomizing disk. For redrying the increased moisture after coating, the coated seeds are conveyed to separate shelf dryers. Especially for this purpose, and also suitable for the conditioning of other (even more sensitive) seed pre-treatments, SUET has developed special Spouted FluidBed driers with programmable electronic controls.

But also existing drying facilities can be employed, thereby ensuring economical film-coatings. As the SHR system, the RTN rotation technology permits the multi-layered application of different combinations of diverse fungicidal and insecticidal active ingredients in aqueous suspensions. The machinery is officially registrated and supervised by the BBA (Registration No G 1468, Fa.Niklas WN 5/0).

### **RTF Process (Rotary - Treatment - FluidBed)**

The RTF process is, in addition to RTN, equipped with an integrated drying facility. It's principles are based on a Rotor-Stator-apparatus of special design. Along the perpendicular wall, warm air is conducted into the cycling seeds bed from an encircling canal through a perforated belt, integrated in the wall. By simultaneous regulation of air pressure and temperature the seeds are fluidized, and by their sensing the atomizing and drying is automatically controlled.

Through the constantly low surface humidity and the additional fluidization, an homogeneous, gentle seed treatment and instantly meticulous moisture conditioning of the seed is assured. This technology is patented for SUET (DE 41 28 258).

The RTF process allows an exceptionally high seed treatment capacity and quality at relatively low costs of construction and energy. The dimensioning of the units, including perforated belt, heating capacity, atomizing system and temperature control, is determined by seed species, granulometry and batch volumes.

SUET supplies units of varying charges, ranging from less than 250 g up to 25 kg, which can subsequently be automatized. These systems are officially approved by the BBA, Braunschweig, under the Registration No. G 1512 (1995-2000).

The SUET FilmCoating Systems are especially employed for the greater application quantities in Inkrusaat<sup>®</sup> and Basiscoat<sup>®</sup>. For the multi-layer MICROMULTIPROTECT processing (incl. entire SUET services) system, formulations in the "natural medium" water are exclusively used. They are weighed-in on the basis of either seed weight or seed number and then homogeneously suspended with special stirrers. With the aid of electronic scales, suspensions are precisely dosed for each seed batch. Diverse specific formulations of active ingredients can be separately applied, layer by layer, and protected through covering materials with colour pigments. Automatic atomizing and drying are safeguarding the seeds at low temperature and humidity. To avoid moisture condensation in packages, SUET recommends seeds cooling after the coating processes, using a special flow-thru fluidbed unit.

### **Application Quality - Process Safety**

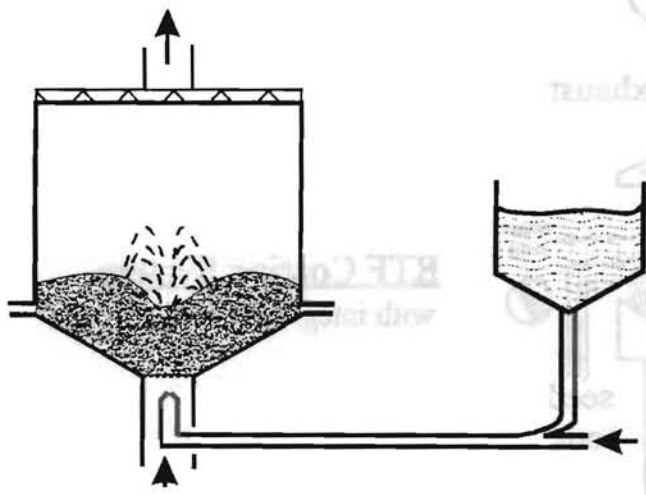
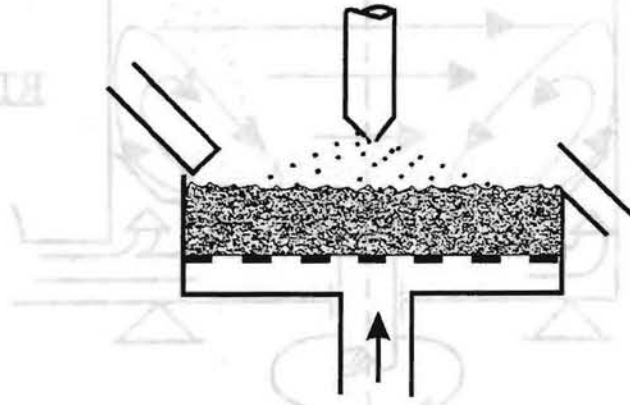
As a practical example enlightening the quality achieved by RTF, naked Beetseed was coated with Thiram at 12 grams a.i. per Unit (1 U = 100,000 grains). Analyzed by Thin Layer Chromatography, average dosages were found at 11.8 g in all samples. With 50 grains analyzed individually, the variation of the results was only 7.9 %. Further, Onion seeds were treated with the insecticide Benfuracarb 13.6 g a.i./U. Representative samples showed av. dosages analyzed at 13.4 g a.i./100,000 seeds. The variation coefficient from analyses of 50 individual grains was 10.40 %.

With loading concentrations close to the target values, the correct dosages without any a.i. losses or abrasions is proven. The distribution values analyzed by individual seeds are far closer, and thus their concentrations much more homogeneous than from any traditional process technology.

Process quality comprises all aspects of safe construction, know-how transfer, personnel training and quality/environmental management. Application procedures comprise methodic regulations for the safe and hygienic preparation and handling, extensive recycling of minor dust, suspension and rinsing water, and duly disposal of unavoidable residues complying with GMP and German Working Safety standards.

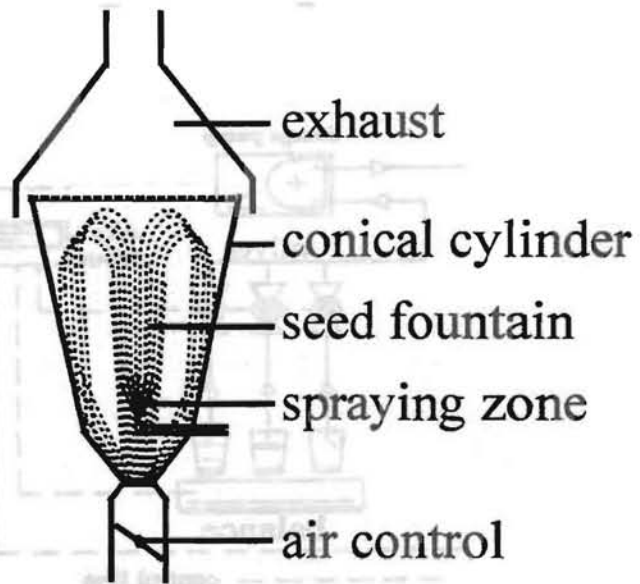
# Coating Installations

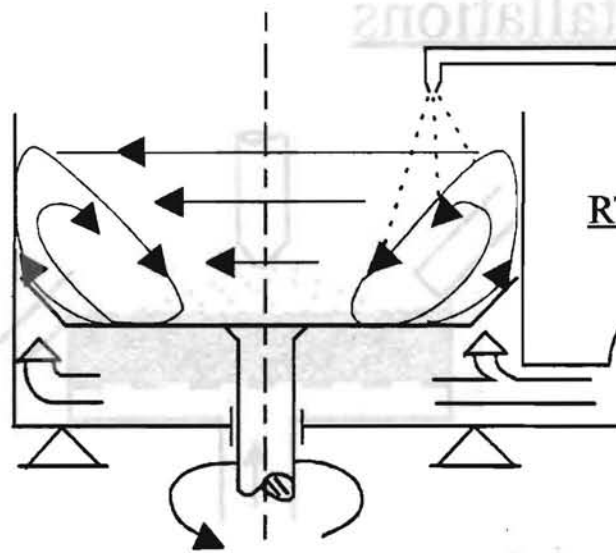
Fluidized Bed



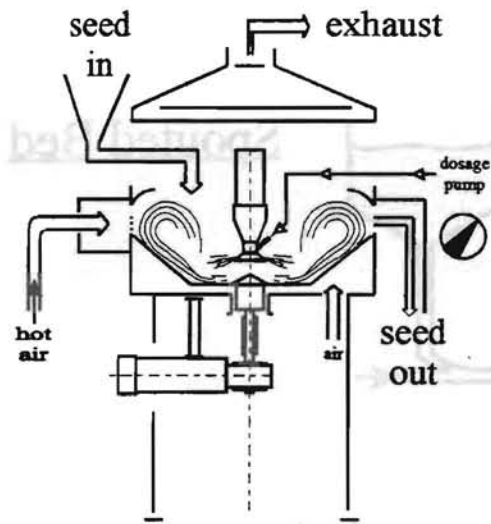
Spouted Bed

SHR Fountain

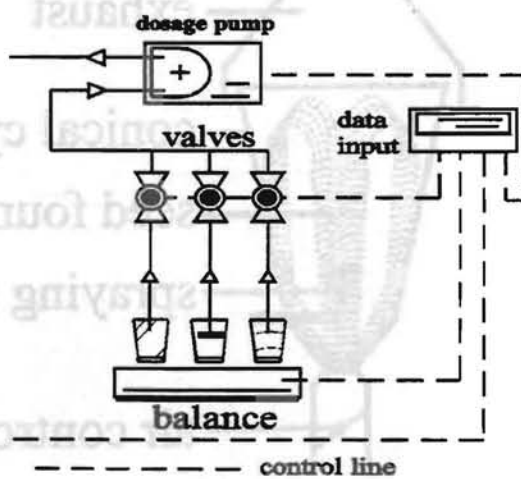




**RTN Rotor-Stator**



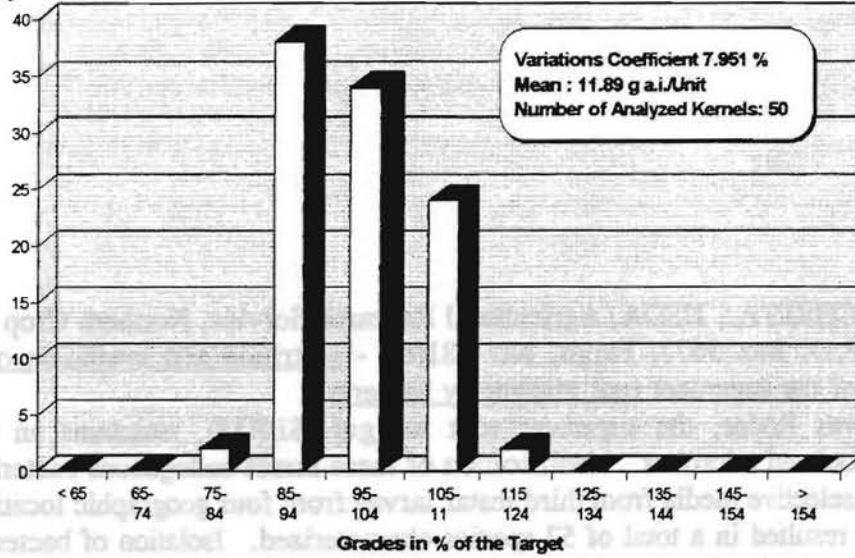
**RTF Coating System**  
with integrated drying



**Automatic Suspension**  
Feeding (Multi-Layer)

**Single Kernel Distribution on Beta-Seed-Incrusting with RTF  
Active Ingredient: Thiram, Target: 12 g a.i./Unit**

% of Analyzed Kernels



**Single Kernel Distribution on Onion-Seed Incrusted with RTF  
Active Ingredient: Benfuracarb, Target: 13.6 g a.i./100,000 Kernels**

% of Analyzed Kernels

