

ROTOPLEX GRANULATORS MODEL RANGE 40/63 - 63/100



HOSOKAWA

ALPINE Aktiengesellschaft & Co. OHG

Rotoplex® Granulators

...The Standard For Quality

Models: 40/63; 50/63; 50/80; 63/80; 63/100

**Every Rotoplex®:
Perfect in technical detail**

The Rotoplex® model range 40/63–63/100 is characterised by the especially sturdy and robust overall design. Cleaning and maintenance of every machine is quick and easy to perform.

**Reliability is decisive.
It determines the
efficiency of a machine.**

The robust machine design permits application for any kind of cuttable material, especially for those materials which require high cutting power, or for when high feed-piece weights or high throughput rates are to be mastered. The machine housing with large, expanded intake, and the many equipment variations such as the Alpine feed control bar and retaining wedge, etc., ensure that optimum material intake and performance are achieved for every size reduction task and material.

**Cross-scissor-cut rotor
...a powerful cutting
tool from Alpine**

The newly developed, patented Alpine cross-scissor-cut rotor surpasses conventional standards. This completely novel cutting system permits up to 20% more throughput (or 20% less energy consumption), ensures smooth running, even under extremely severe operating conditions, and yields a virtually dust-free granulate.

**Cash in on
Alpine's quality maxim**

An all-important factor at Alpine is quality. Economy measures – at the expense of quality or technology – which could later prove costly for the customer, are not to be found in Alpine's design of the Rotoplex® granulators.

**Rotoplex® granulators
can stand the pace:
continuously and reliably**

Supplying top quality products – only fault-free products leave the Alpine works after exhaustive quality control tests – is Alpine's way of guaranteeing lasting economical and technical advantages with every Rotoplex®. Rotoplex® granulators can stand the pace: continuously and reliably!

A wise choice

You can rely totally on the advantages provided by Alpine's technology, quality, and after-sales service. Which is why you couldn't make a better choice than the Rotoplex® granulators.

Technical Data	Model	40/63 Ro	50/63 Ro	50/80 Ro	63/80 Ro	63/100 Ro
Drive power, standard*	kW	30	45	55	75	90
Scale-up factor ¹⁾	F = approx.	2.2	3.2	4.0	5.0	6.0
Feed opening on housing	mm	377x630	520x560	520x840	680x840	680x1050
Cross-scissor-cut rotor, open*		*	*	*	*	*
Speed	r.p.m.	650	650	550	525	465
Knife rows*	number	4	5	5	6	6
Stator knife rows	number	3	4	4	4	5
Knife usability	rotor knives	on 1 side	on 1 side	on 1 side	on 1 side	on 1 side
	stator knives	on 4 side	on 4 side	on 4 side	on 4 side	on 4 side
Standard knives	rotor knives	●	●	●	●	●
(same symbol = interchangeability)	stator knives	○	○	○	○	○
Weight (without motor and feed chute) approx. kg		1800	2200	2600	3800	4500

* = Standard equipment ¹⁾ Scale-up factor: refer to Rotoplex model range table on back page.

Rotoplex® Application Areas

- ☐ Plastic waste of any type and shape:
lumps * hollow items * film * profiled items
- ☐ Natural and synthetic caoutchouc blocks * vulcanised rubber waste
- ☐ Cable waste:
Precious metal recycling as per Alpine's system.
- ☐ Cuttable materials: Non-ferrous waste * paper * textiles * leather * glass-fibre waste * fresh and dried plants, etc.



Rotoplex® 40/63 Ro

- ☐ Throughput up to 600 kg/hr
with sieve 6 mm Ø
material PE
- ☐ Standard rotor:
Open cross-scissor-cut rotor
- ☐ Rotor variants:
 - Enclosed rotor
Number of knife rows: 5
 - Open cage rotor
Number of knife rows: 2

Design: Model 40/63 Ro

- ☐ Materials of construction
Housing, rotor: spherulite cast iron
GGG 40
- Cutting knives: special knife steel
- Feed chute: sheet metal
- ☐ Easy-action crank gear for opening and closing the machine.
- ☐ Knife adjusting fixture for rotor knives with the cross-scissor-cut rotor.
- ☐ Safety device; designed as an arresting lever with lock at the hinge joint.
- ☐ Feed control bar - prevents the mill from stalling and blocking.



Rotoplex® 50/63 Ro; 50/80 Ro

- ☐ Throughput:

50/63 Ro	up to	800 kg/hr
50/80 Ro	up to	1050 kg/hr

 with sieve 6 mm Ø
material PE
- ☐ Standard rotor:
Open cross-scissor-cut rotor
- ☐ Rotor variants:
 - Enclosed rotor
Number of knife rows: 5
 - Open cage rotor
Number of knife rows: 2

Design: Models 50/63; 50/80 Ro

- ☐ Materials of construction
Housing, rotor: cast iron GGG 40
- Cutting knives: special knife steel
- Feed chute: sheet metal
- ☐ Elektrohydraulic device for opening and closing the machine.
- Hydraulic unit complete with control system; mounted ready for operation in the case of table-mounted granulators.
- ☐ Knife adjusting fixture for rotor knives with the cross-scissor-cut rotor.
- ☐ Feed control bar - prevents the mill from stalling and blocking.



Rotoplex® 63/80; 63/100 Ro

- ☐ Throughput:

63/80 Ro	up to	1300 kg/hr
63/100 Ro	up to	1550 kg/hr

 with sieve 6 mm Ø
material PE
- ☐ Standard rotor:
Open cross-scissor-cut rotor
- ☐ Rotor variants:
 - Open cage rotor
Number of knife rows: 3

Design: Model 63/80 Ro

- ☐ Materials of construction
Housing, rotor: cast iron GGG 40
- Cutting knives: special knife steel
- Feed chute: sheet metal
- ☐ Elektrohydraulic device for opening and closing the machine.
- Hydraulic unit complete with control system; mounted ready for operation in the case of table-mounted granulators.
- ☐ Knife adjusting fixture for rotor knives with the cross-scissor-cut rotor.
- ☐ Feed control bar - prevents the mill from stalling and blocking.



Design: Model 63/100 Ro

- ☐ Materials of construction
Housing, rotor: cast iron GGG 40
- Cutting knives: special knife steel
- Feed chute: sheet metal
- ☐ Elektrohydraulic device for opening and closing the machine.
- Hydraulic unit complete with control system; mounted ready for operation in the case of table-mounted granulators.
- ☐ Knife adjusting fixture for rotor knives with the cross-scissor-cut rotor.
- ☐ Feed control bar - prevents the mill from stalling and blocking.



Spherulite cast iron GGG 40: The material with solid advantages for high demands.

Alpine uses only the best materials for its Rotoplex® granulator housings and cutting rotors, and has chosen spherulite cast iron in GGG 40 quality to meet these high demands.

The advantages are:

- Higher mechanical strength factor.
- No distortion even when heated, meaning that the cutting gap always remains constant and precise, even in continuous operation.
- Better vibration and structure-borne sound absorption than with comparable thickness sheet-metal housings.

Rotor Systems

- Open Cross-Scissor Cut Rotor
- Open Cage Rotor
- Enclosed Rotor (without illustration)

A word on cutting technology..

At the same degree of cutting efficiency, the peak forces of the cross-scissor-cut rotor (red) are considerably lower than those of the parallel cut rotor (yellow).

For Rotoplex® granulators, this means less stress on the knives, the knife fastening screws, the rotor bearings, and on the machine housing.

Cutting force/path diagram



Patented

cross-scissor-cut rotor

The open cross-scissor-cut rotor is the standard rotor employed in the Rotoplex® models 40/63 to 63/100 Ro. It is a new piece of Alpine technology which carries a great deal of cutting power.

And at the same time, it is proof that top technology need not be inconsistent with an economical price.



Features of the Cross-Scissor-Cut Rotor

Application Advantages for Practical Operation

Operating principle

Processing Technical Superiority

In practical operation, the processing technical superiority of the novel cross-scissor-cut rotor developed by Alpine compared with the conventional scissor-cut systems is immediately apparent.

Optical feature of the new rotor: The knife rows are not only one-sided, but they are also inclined – at the same angle – alternately in opposite directions.

This brings the following advantages:

□ Reduction of stress on the grinding chamber side walls, because no one-sided material distribution can occur. This improves the service life of both the machine and the knives.

□ Optimum utilization of the granulator: the increase in throughput or the reduction of specific energy consumption can be up to 20%.

□ Low-vibration, smooth machine running with reduced noise level.

□ Uniform, controlled intake: when processing film, the film web is grasped smoothly by the cross-scissor-cut rotor, preventing any lateral distortion of the film web.

□ Low temperature of the material being processing – even during continuous operation at maximum load. Additional water cooling of the rotor – e.g. when processing film – is not necessary.

□ When exchanging knives which have become damaged by tramp material, only the damaged knife segment needs to be exchanged. Exchange of a long, unsegmented knife is considerably more expensive. The stator, or fixed knives, are therefore also segmented in Rotoplex® granulators.

□ The cutting gap can be adjusted over the entire cutting width with more precision compared to granulators with long, one-piece knives.

Advantage 1 longer life time

Advantage 2 output 20% higher

Advantage 3 reduced noise

Advantage 4 improved material acceptance

Advantage 5 cooler grinding

Rotor knives split into short, standard segments

Open cage rotor

Dependent upon the machine size, open cage rotors are equipped with either 2 or 3 rows of sharp slicing knives.

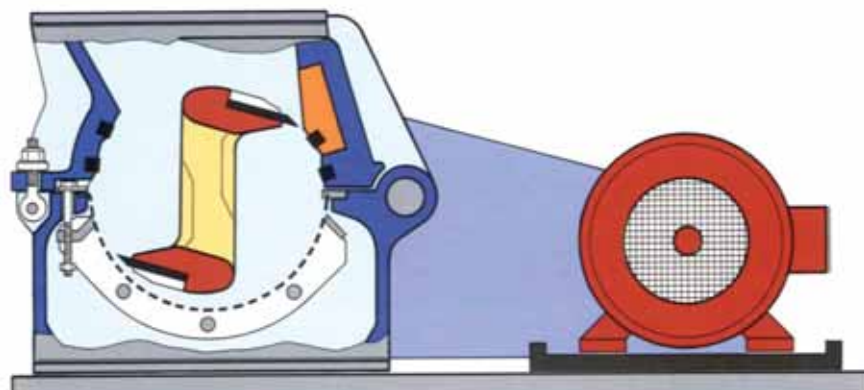
The large clearance between the knife rows permits optimum material intake when processing bulky hollow items.

Typical application areas are:

□ Hollow items such as barrels and canisters, etc.

□ Large, soft lumps of synthetic or natural caoutchouc.

□ Vulcanised engineering rubber pieces such as strippings and hoses, etc.



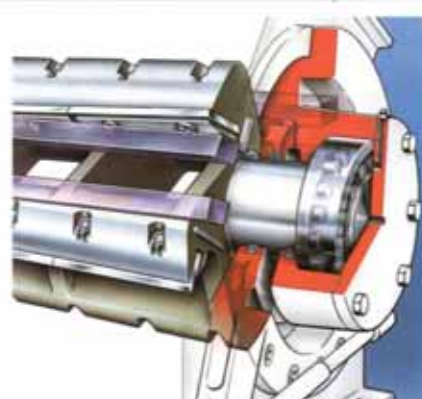
Specific Rotoplex® Features And Equipment Variations

Quality increases customer benefits

Regardless of whether the granulator is to be in standard or special design, Alpine's engineers are specialists.

Problem-specific designs are available to order such as:

- gas-sealed bearings/granulators
- waterproof designs, etc.



Rotor bearings (Illustrations)

A weak point of many granulators is the excessively simple design of the rotor bearings and bearing sealing.

Rotoplex® granulators are characterised by elaborately designed special bearings with double sealing.

The high technical standard of the Alpine bearings guarantees maximum operating reliability and a high utilization factor.

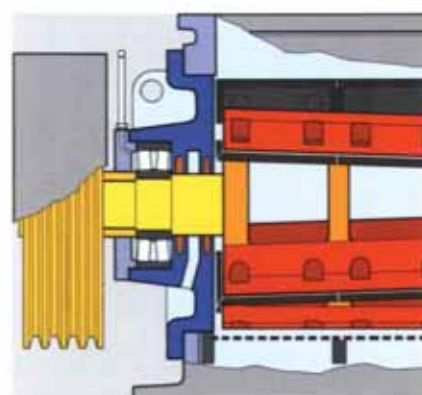
Economy measures made at the expense of quality or high technology do not figure in Alpine's calculations.

The difference: the bearing unit

The rotor bearing (figure) is located outside the grinding chamber. The bearing sealing is technically perfect and totally reliable. Two sealing rings separated by a safety channel guarantee:

- no grease enters the product
- no ground material can penetrate into the bearings.

This still holds true even if one of the sealing rings is defective; without causing any damage, lubricant or material exits the machine through the safety channel.



Knife adjustment

- ☐ Stator or fixed knives.

Before leaving the factory, the knives undergo a one-off precision adjustment to 50 microns accuracy within the machine housing.

Alpine's technology ensures that new or re-sharpened knives require no additional adjustment during mounting.

The knives can be used on four sides before they need to be re-sharpened.

- ☐ Rotor knives

Use of a knife adjusting fixture permits extremely short knife exchange times.

Knife adjusting fixture

A standard accessory supplied as a maintenance aid is the knife adjusting fixture for the rotor knives.

With the aid of this device, new or re-sharpened rotor knives are adjusted to the exact cutting gap outside the machine. The pre-set knives are then ready to be installed, and are simply pushed into the rotor until the arresting surface halts them, and then only need to be fastened securely in position.

The cutting gap does not need to be subsequently checked.



Patented Feed Control Bar (FGP)

With the exchangeable feed control bar (Figures 0-III), the intake zone of the Rotoplex® granulators can be adjusted to suit every size of feed material.

Material intake is optimised, the throughput rate is increased, and blocking or stalling of the machine - caused by large, tough blocks - is prevented.

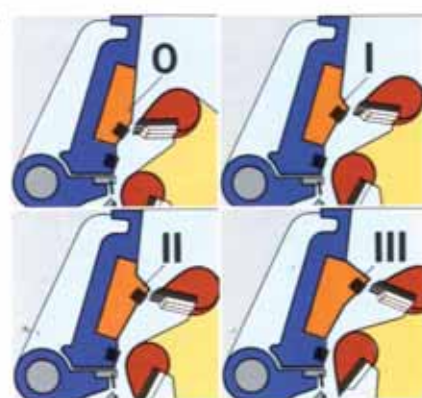
Feed Control Bar Designs

The Figures 0-III show the four feed control bar variants.

As an application example:

- Design 0 for film and leather, etc.
- Design III for large, tough lumps.

At Alpine, it is the technical details that count, details which prevent unnecessary operating costs or expensive downtime. Specific quality features are not always easy to express in the form of brochure data, which is why a personal consultation with Alpine's experts is always a good idea.



The Retaining Wedge (Figs. A + B)

The Alpine retaining wedge optimises the operating behaviour.

In practical operation, this means:

- ☐ Granule pulsation or circulation within the grinding chamber is prevented.

- ☐ Low-vibration, smooth machine running, leading to a considerable reduction of the total noise level.

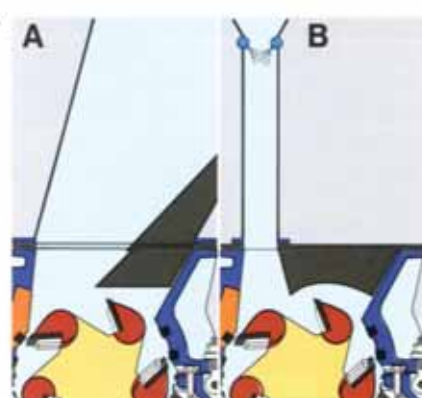
- ☐ Higher throughput, or lower energy consumption, due to the more uniform loading of the machine.

Retaining Wedge Designs

Figures A and B show design examples of the retaining wedge developed by Alpine.

- ☐ The standard retaining wedge (Fig. A) is used chiefly for film, paper, rubber, cable scrap, and tough plastic, etc.

☐ Figure B shows a special design retaining wedge, developed for the size reduction of 200°C-hot, thin plastic strands. The feed material supply system has a water injection device which cools the product. Rotoplex® granulator in waterproof stainless steel design.



Processing And Engineering Examples

The advantages for Rotoplex® granulators embraces ...
 ...flexibility of application for Granulation of materials.
 ...trouble-free performance, even in round-the-clock operation.
 ...a long-term supply of reasonably priced spare parts.
 ...a customer-orientated, world-wide service network.
 ...exemplary quality and precision in detail which surpasses conventional standards.

Plastic Blocks

Even heavy blocks can be finely reduced without difficulty. Both the cross-scissor-cut rotor and the Alpine feed control bar (FGP) serve to prevent the machine from blocking and stalling. Guide values for PE blocks:

Rotoplex®	kW	Screen	Piece Weight ¹⁾
40/63 Ro	30	6 mm	up to 5 kg
50/63 Ro	45	6 mm	up to 8 kg
50/80 Ro	55	6 mm	up to 15 kg
63/80 Ro	75	6 mm	up to 20 kg
63/100 Ro	90	6 mm	up to 25 kg

¹⁾ dependent on type of plastic and screen Ø, etc.

Hollow Plastic Items

Thin-walled, bulky hollow items place extreme demands regarding material feeding on granulators. Operation at full capacity is often not possible, because items such as barrels and buckets, etc. are not siezed rapidly enough. This naturally reduces the overall performance of the machine. The Rotoplex® granulators achieve optimum conditions through: ☐ enlarged grinding chambers ☐ open cutting rotors with widely distanced knife rows ☐ use of a feed control bar (FGP).

Plastic Films

Rotoplex® granulators reliably reduce film of any type and thickness. Alpine supplies complete systems for every requirement: from film feeding systems to film flake silos.

Throughput guide values:

Rotoplex®		Polyester Film		PP Film
Model		10 µm	300 µm	30 µm
40/63	Ro	500	620	500
50/63	Ro	730	900	730
50/80	Ro	900	1120	900
63/80	Ro	1150	1400	1150
63/100	Ro	1350	1700	1350

Other Types of Plastic Waste

With Rotoplex® granulators, size reduction of a vast assortment of plastic materials (rejects or waste) can be performed efficiently and economically. Multiple application possibilities are the result of all-round know-how. Take advantage of Alpine's expertise in this field.
☐ Car bumpers • television and refrigerator housings • tubes and profile bars • panels • window and door frames • fibres and filaments • millings and turnings • rubber, etc.



Technik, die mehr möglich macht

Scrap Cable Recycling

For the recovery of copper or aluminium from scrap cable, Alpine supplies favourably-priced recycling systems ranging from a 100 kg-batch-operation system to a large-scale system for approx. 5 t/hr. Rotoplex® granulators are used to cut the cable scrap, thus exposing the precious metal. 50/80 Ro: guide values with 50% Cu

Cable type	Screen	app. kg/hr
Solid cable	4-8 mm	800-1500
Mixed cable	3-4 mm	600-1000
Strand cable	2.5 mm	350- 500

Metallic Products

When it comes to the size reduction of metallic products, the objective here is usually to recycle the metal. Here too, Alpine can offer complete processing systems. Typical product examples are:
☐ Aluminium or brass turnings, e.g. from memory plate production in the computer industry.
☐ Electronic scrap.
☐ Aluminium sheets and edge trims.
☐ Non-ferrous scrap such as: Aluminium, tin plate and tin pots, and other nonferrous metallic scrap.

Other Cuttable Materials

☐ Foodstuffs industry
 Rotoplex® granulators, to order in stainless steel design, for preliminary size reduction and low-dust fine cutting of:
 - Dried vegetables
 - Spices
 - Fresh and dried plants, etc.
☐ Systems for tea and drugs Rotoplex® granulators are employed in tea plants for the production of:
 - Fine-cut tea for tea bags
 - Coarse-cut tea
 Examples of tea plants supplied to date:
 - Apples, oranges, rose hips, peppermint, rosemary, camomile, etc.
☐ Utilization of animal products
 - Horns, hooves, claws, bones, etc.
 - Animal hair and bristles
 - Raw, slaughterhouse-fresh animal skins
 - Leather waste of any type
☐ Other products:
 Cellulose, textile scraps, insulating material, gypsum-cardboard panels, cork, glass fibre scrap, glass wool, bark, peat, sewage sludge, sorted household waste, etc.



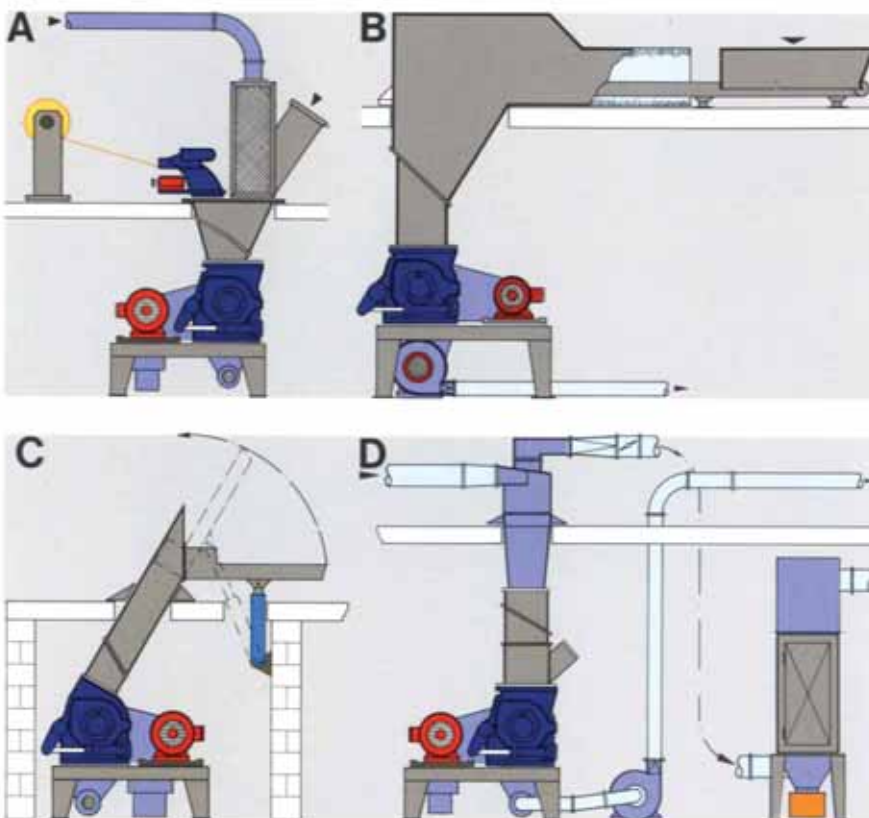
High Technology Adds More Value • Une technique qui permet plus • Técnica que aún más per

Engineering of Complete Systems

Alpine plans, constructs, and delivers complete granulator systems along with all necessary system components. Even system projects which call for intensive planning and coordination to the customer's requirements are dealt with quickly and efficiently. The solution that Alpine offers is always the ideal one, and not just the first best one, then for Alpine, engineering means more than just a collection of individual system components: Alpine system engineering is tailor-made.

Problem-Specific Solutions

- ☐ Application trials to determine the processing data.
- ☐ Establishment of the processing steps needed to achieve optimum operating conditions.
- ☐ Design of component parts.
- ☐ Switch cabinet/panel design.
- ☐ Instrumentation and control system technology.
- ☐ Manufacture; assembly; commissioning, etc. ...everything tailored to the requirements on hand – and yet still available at standard prices.



Feed chutes for every requirement

With the supply of feed chutes which are individually synchronised to specific applications, Alpine offers a unique scope of service. Four examples:

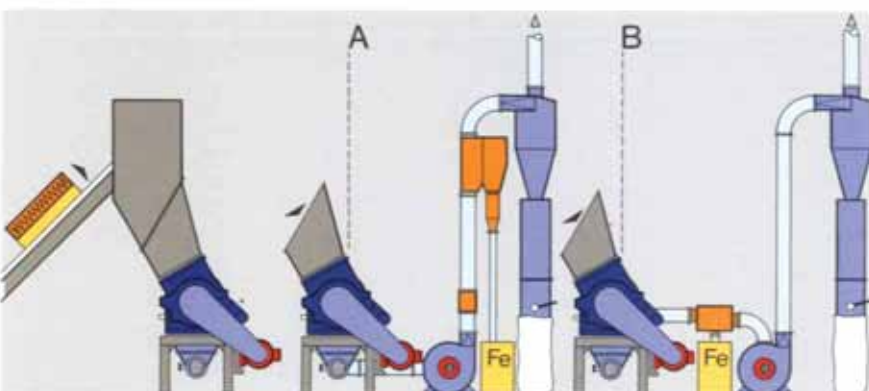
Fig. A Feeding station for combined recycling of:

- Film reject reels. Horizontal film intake via a steplessly adjustable film intake unit.
- Pneumatically conveyed film edge strips. In this case, the feed chute is designed as an air relief box.
- Film piles and bales, compact material. Manual feeding via an auxiliary chute.

Fig. B: Sound-dampened special feed chute for feeding via a conveying belt.

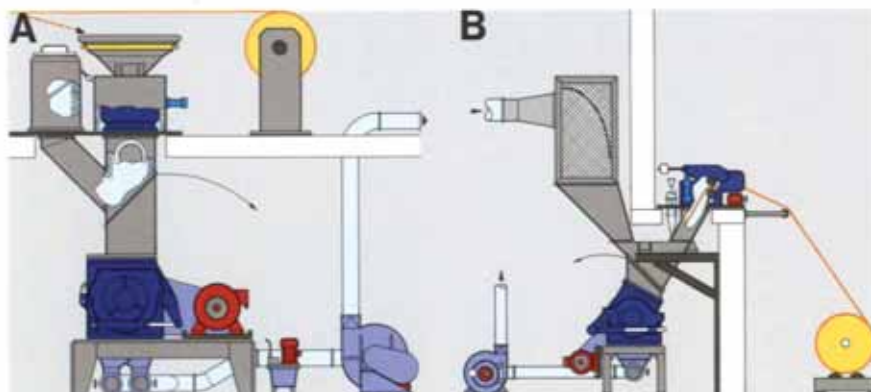
Fig. C: Feed chute with lifting cylinder on the material storage bin. The time-tested solution when sprues and reject parts are to be processed in a central grinding system.

Fig. D: Feed chute with cyclone for pneumatically conveyed millings and chips which result from the processing of plastic panels.



Extraction of Metals

- ☐ Upstream from the mill by means of: magnetic separator arranged on top of belt conveyor (schematic) as a crossover separator or as an overhead magnet in conveying direction • magnet roller • magnet drum • magnet grille • magnet cascade, etc.
- ☐ Downstream from the mill by means of: bridge-type metal detector • metal search coil • metal separation devices for installation in either the pressureless zone, or in the pressure (A) or suction (B) zones.

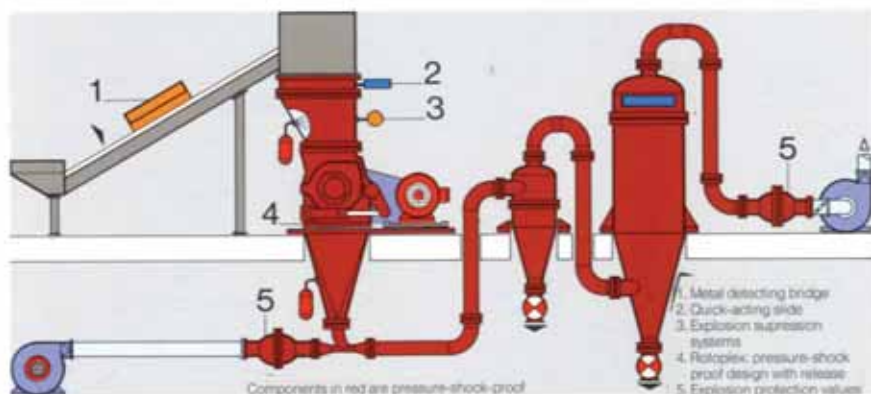


Film Recycling Processes

Various processes for edge trims, film webs, rolls, and piles, etc. are described in detail in Alpine's special brochure: "Film Recycling Processes". This brochure is available on request.

Fig. A: In this process, rejects from start-up and change-over procedures are processed directly at the exit point.

Fig. B: Film roll recycling: In addition to the reels and rolls, pneumatically conveyed edge trims are simultaneously reduced in size. The feed chute here is designed as an air relief box.



Systems for Caoutchouc Bales

Complete Rotoplex granulating systems are employed to granulate synthetic and natural caoutchouc of every type in the form of bales or strips, as well as for vulcanised and non-vulcanised rubber waste.

Fig. 1: Caoutchouc bales (synthetic), weight 700 kg; 800 x 700 x 1200 mm. 1 = caoutchouc bale cleaver, which produces caoutchouc sheets of approx. 20-30 mm thickness.

2 = Rotoplex® 50/80 Ro, equipped with a rubbersplitting rotor;

15 mm Ø screen; throughput up to 500 kg/hr;

Fig. 2: Two-step granulating system for synthetic caoutchouc.

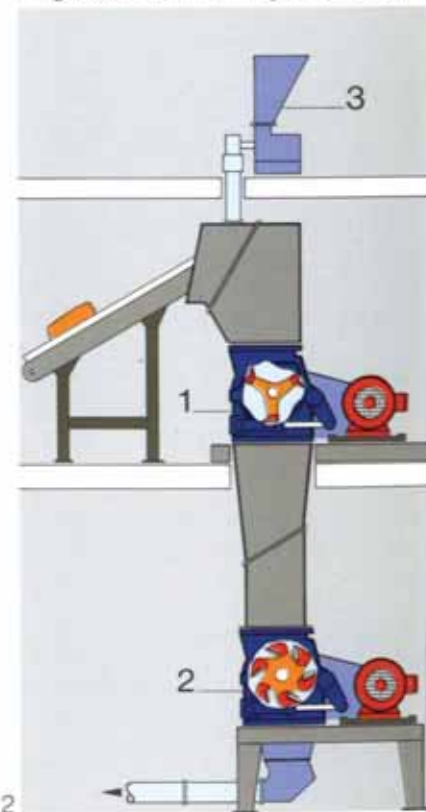
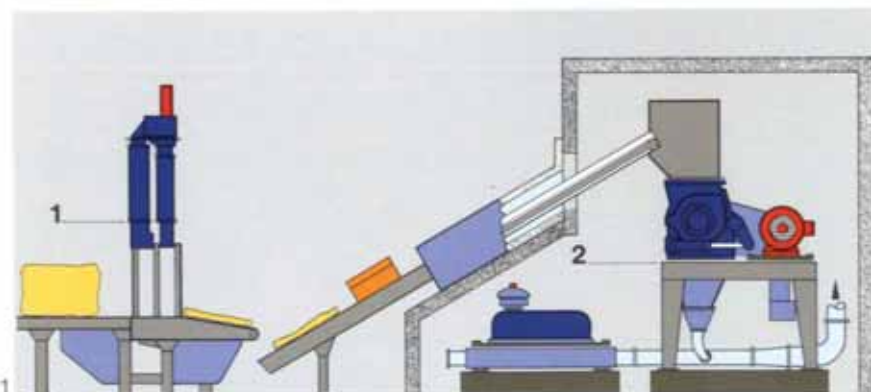
System capacity: up to 1000 kg/hr.

□ Bale weight approx. 35-40 kg.

1 = Rotoplex® 63/100 Ro (90 kW), equipment: rubber-splitting rotor; 50 mm Ø screen

2 = Rotoplex® 63/100 Ro (90 kW), equipment: cross-scissor-cut rotor, 6 mm Ø screen

3 = Feed metering screw for powdery grinding aids (parting compounds).





Cutting knives are machine components which considerably influence the performance and efficiency of a granulator.

The original Alpine cutting knives are characterised by features which increase the service life and optimise the capacity of the machine. Employment of the original Alpine knives reduces costs. And brings advantages. Design features:

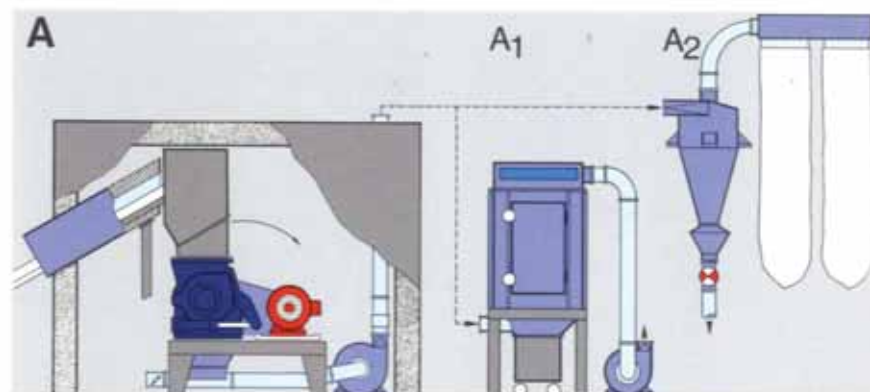
- Use of top-quality chromium tungsten special knife steel. The special thermal treatment ensures optimum hardness coupled with a high degree of toughness – and thus also a long service life.
- Geometrically optimum design of rotor knives for high cutting and throughput capacity.
- Screws of high mechanical strength guarantee secure knife anchorage.

Individual Soundproofing

Within the scope of individual system planning, the noise protection measures offered by Alpine guarantee a maximum noise level of 85 dB(A), or where necessary, considerably lower values. And even with soundproofed size reduction systems, each and every Rotoplex® granulator is still easy to maintain and clean. Some of the components Alpine employs: soundproofing cabinets, sound-absorbing feed chutes, sound-protection tunnel for conveyor-belt feeding, etc.

Primary sound protection is standard: sophisticated design details of the Rotoplex® granulators ensure a considerable noise reduction right at the source. Examples are:

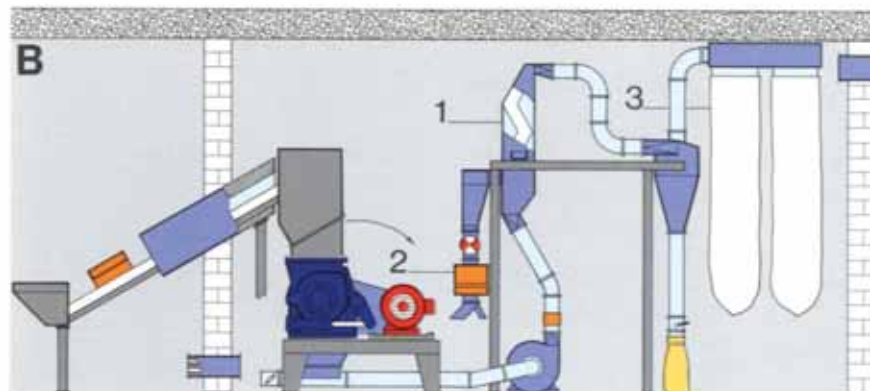
- Use of spherulite cast iron with optimum structure-borne noise damping.
- Open rotor with large diameter for air passage; cross-scissor-cut.
- Arrangement of knives, as well as correct choice of the complete knife cutting geometry such as clearance, wedge, and rake angle.



Soundproofed System (Fig. A)

Design features:

- Soundproofing cabins for Rotoplex® granulator and material conveying fan; cabin with air suction and air exhaust silencer; large double folding door permits access to cabin.
- Soundproofed product feed achieved by enclosing the conveying belt.
- Feed chute with inclined flange facilitates opening the machine.
- Variants of product dedusting:
 - A₁ = automatic filter
 - A₂ = cyclone with ceiling filter



Bricks and Mortar – Ideal "Sound Protection" (Fig. B)

Installing the granulator in a separate – and where possible soundproofed – room is an excellent sound protection measure. Systems set up in this manner offer an extremely effective protection from noise. Furthermore, the system is accessible at all times for maintenance, servicing, and cleaning. A system concept of this type is particularly practical in the case of large-scale granulating systems – and also for new projects.

Granulate Dedusting (Fig. B)

If high demands are placed on the granulate concerning its dust content, Alpine granulate dedusting systems can be employed to clean the granulate exiting the Rotoplex® from dust, splinters, and fibres.

Fig. B shows a state-of-the-art system:

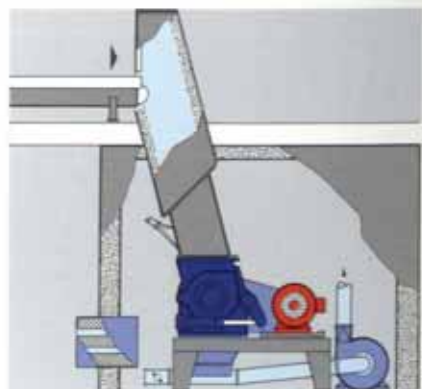
- 1 = Zigzag classifier for dedusting.
- 2 = Electronic metal removal device.
- 3 = Ceiling filter to dedust the cyclone exhaust air.

Installation in the Basement

A frequently-practised soundproofing measure is to install the granulator in the basement (see Figure).

Material feed is either manual or by means of a conveying belt located on the ground floor. The soundproofed feed chute in this case is firmly supported. The inclined flange on the feed chute facilitates opening the granulator.

At Alpine, sound-insulated granulators are standard, as is an expert and cost-favourable solution to your problem.





HOSOKAWA POLYMER SYSTEMS

63 Fuller Way, Berlin, CT 06037 • Tel (860) 828-0541 • Fax (860) 829-1313

Specializing in recycling

www.Polysys.com

GRANULATORS • PULVERIZERS • SYSTEMS

HOSOKAWA

ALPINE Aktiengesellschaft

Recycling & Granulators Division

P.O. Box 10 11 51

D-86001 Augsburg / Germany

Delivery address

Peter-Dörfler-Str. 13 - 25

D-86199 Augsburg / Germany

Tel.: 0049 (0)821 59 06-0

Fax: 0049 (0)821 59 06-630

E-Mail:

recycling@alpine.hosokawa.com

Internet:

www.alpinehosokawa.com

www.hosokawamicron.com



HOSOKAWA

ALPINE Aktiengesellschaft & Co. OHG

Hosokawa Alpine Aktiengesellschaft is a member of the Hosokawa Micron Group, responding to global needs through emphasis on materials science and engineering. The Group is an international provider of equipment and technology for powder and particle processing, product recovery, plastics processing and confectionery products. The Group maintains facilities for research, engineering, manufacturing and service in each of the world's major industrial markets.

All details in this brochure are purely informative and non-binding. Authoritative for actual orders are our quotations.