

Scrap Recycling Options

By
Dana Darley
Extrusion Auxiliary Services
(678) 714-5218
www.extrusionauxiliary.com

Scrap Reclaim Technology

- In-line edge trim pelletizing
- Direct ground scrap re-feed/reclaim
- Ground scrap densification
- Traditional re-pelletizing extrusion line
- Combination shedder/compactor extrusion line

Edge Trim Pelletizing

- Normally edge trim only...limited loose scrap
- With or without filtration
- Die face pelletizing, air cooled
- Produces pellets for traditional blending

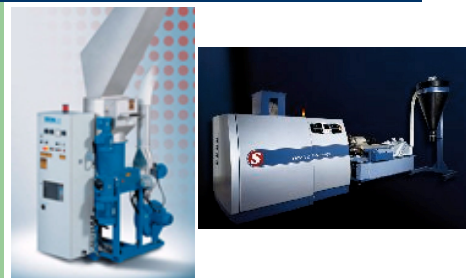
Process Description

- Trims pulled or induced into extruder screw
- Optional nip feeder for roll stock
- Very short, non vented extruder
- Pellets cut and air conveyed to cyclonic discharge
- Typical rates up to 250 PPH

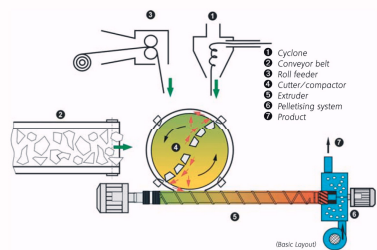
Pros and Cons

- Direct re-pelletizing of edge trim and some roll scrap
- Minimal floor space and operator attention
- Clean, pelletized scrap for ease of re-processing
- Higher cost and maintenance intensive
- Lower rate capacities
- Adds second heat history to material

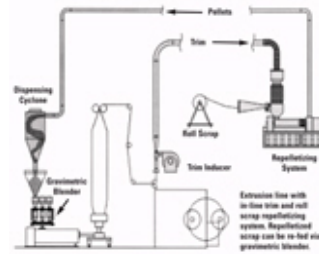
Edge Trim Extruders



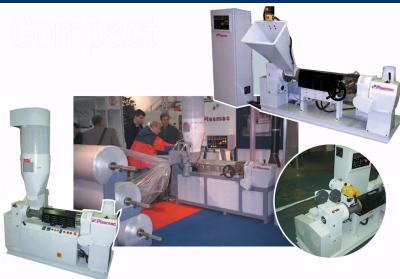
Light Duty Scrap Reclaim Extruder



Repelletizing System Schematic



Various Feeding Techniques



Fluff/Regrind Direct Reclaim

- Edge trim and roll stock grinding
- Very fine screens for increased bulk density
- Dual compartment, scrap reclaim hoppers
- Up to 25% reclaim rates – extruder dependent

Process Description

- Trims are inducer conveyed to grinder
- Optional roll feeder
- Specialty film grinder – down to 3/32" screen
- Intermediate surge bin or direct to extruder
- Vertical auger metered separate from virgin

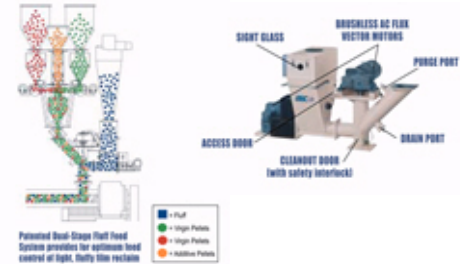
Pros and Cons

- Lower cost and potentially higher total capacity
- Easy to maintain, with low operator intervention
- No additional material heat history
- Housekeeping issues with fluff/dust carryover
- Limited re-feed % back to the extruder

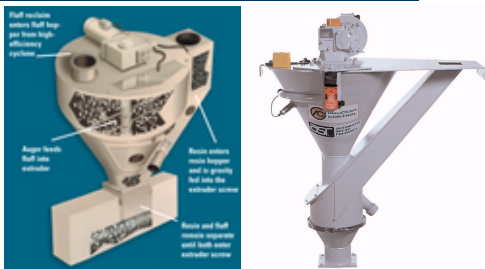
Film Grinders



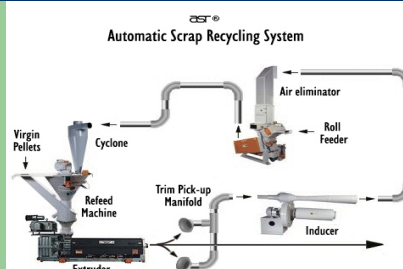
Fluff Refeed Machines



Additional Refeed Machines



Inline Fluff Reclaim System



Fluff Densityfication

- Densified/agglomerated ground film scrap
- Frictional heat, almost to the melting point
- Popcorn like particles, without a second heat history
- Traditionally blended through reground hoppers

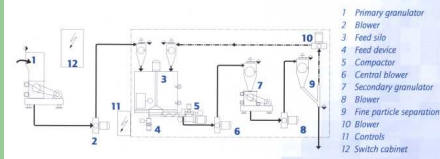
Process Description

- Trim, rolls and loose scrap must be ground
- Blown to surge bin and metered to compactor
- Agglomerated between a fixed and rotating plate
- Dried and densified to 20 – 25 PCF
- Air cooled, with secondary granulation/separation step

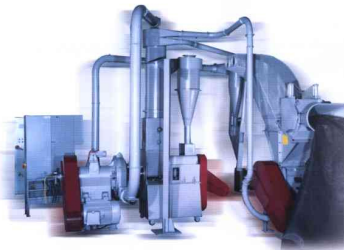
Pros and Cons

- Produces high bulk density material for easier bulk handling
- Minimal additional heat history
- Can dry and/or crystallize materials
- Hazardous to operate, high energy cost
- Very expensive and maintenance intensive
- Process dependent and high energy usage
- Older technology, with limited suppliers

Scrap Densification System



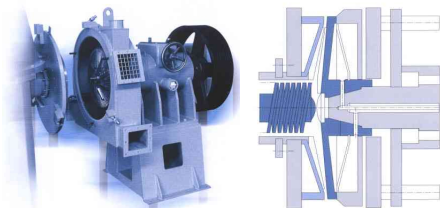
System Layout



Pellet Mill Densification



Densifying Disc



Traditional Repelletizing Systems

- Film waste pre-shredded/size reduced
- Force fed into single screw, twin screw, or dual diameter extruders
- Vended barrels, high open area screen changers
- Die face pelletizing, water ring or underwater
- Filtered pellet for traditional blending

Process Description

- Film scrap must be size reduced through a shredder
- Can be combined with other post industrial film scrap
- Single screw extruder, with "RAM Feed" inlet
- Twin screw extruder with "Auger Crammer/Densifier" inlet...scrap must be further size reduced
- Dual diameter, single screw extruder
- Melt filtered and pelletized

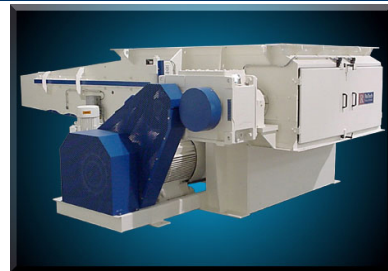
Pros and Cons

- Highest in versatility and suited for post industrial or post consumer
- Numerous suppliers of each sub-system...mix and match
- Lowest cost, and easiest to operate and maintain
- Provides and filtered pellet, but with an additional heat history
- Higher energy cost, with added floor space and complexity

Traditional Scrap Recycling Line



Film Scrap Shredder



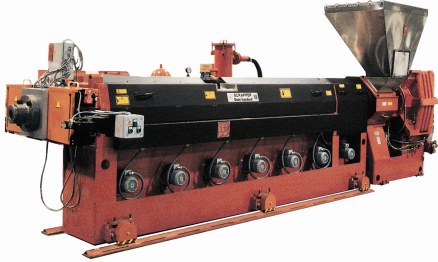
Film/Fiber Rotor Design



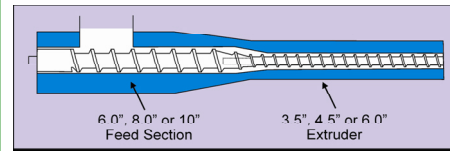
Recycling Extruder – Ram Feed



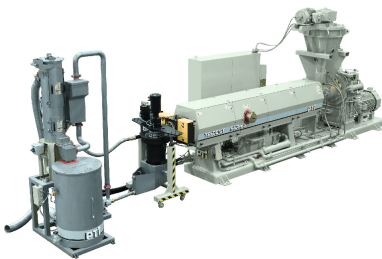
Recycling Extruder – Dual Diameter



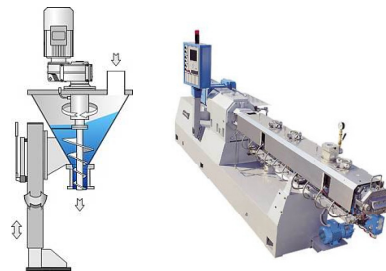
Dual Diameter Extruder Screw



Reclaim Extruder/Crammer Feeder



Twin Screw Recycling



Application

- Force Fed, Single Screw
 - Best for four PCF and above
- Dual Diameter
 - Low bulk density films and foam < four PCF
- Twin Screw
 - Scrap materials must be finely ground
 - Better for compounding and de-volatilization

Combination Repelletizing Systems

- Specialty extruder, with integral shredder/compactor
- Direct feed of un-ground film scrap...trim, rolls or loose
- Skid mounted system, with die face pelletizer
- Vended barrels and high open area screen changers
- Filtered pellet for traditional blending

Process Description

- Film fed un-ground to pre-shredder/compactor
- Material is size reduced, heated and densified prior to extrusion
- Vented or non-vented, single screw extruder – short L/D
- Melt filtered and pelletized

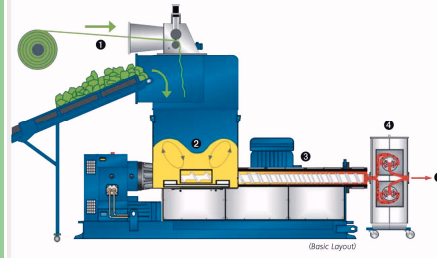
Pros and Cons

- All in one, specialized systems for mostly post industrial scrap
- Lower energy and installation cost, with high automation
- Offered by a limited number of European suppliers
- Limited versatility with changes in process or products
- Rate limited and requires knowledgeable operators

Combination Compactor/Extruder



Schematic



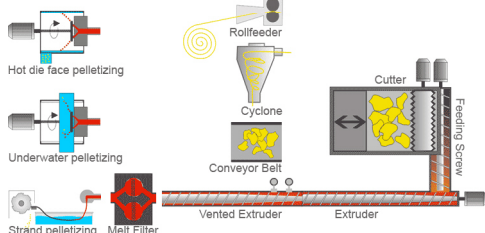
Erema TVE Reclaim Line



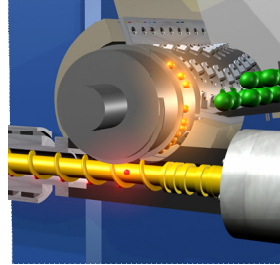
Combination Shredder/Extruder



Schematic



Shredder Feed



Summary

- Fluff reclaim systems for trim and limited loose scrap
- Trim pelletizing systems for extruders unable to accept fluff
- Densification systems are on the way out
- Combination repelletizing systems for dedicated, inplant scrap
- Traditional systems for post industrial and post consumer reclaim

Results



Suppliers

- Erema North America
- Starlinger
- The ACS Group - AEC
- Osprey
- Process Control Corporation
- Herbold
- California Pellet Mill
- David-Standard/Merritt Extruders
- PTI/Process Technologies, Inc.
- NGR/Next Generation Recycling
- AET/Advanced Extruder Technologies