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Processing and Handling of Verton[®] Composites

An Overview



Injection Molding Machine Considerations

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- **Screw & Barrel**
 - **Recommend 50mm minimum barrel diameter**
 - **Allows deeper metering section depth (.125” minimum)**
 - **Allows more clearance between the seat and ring and ring and retainer in the free flow non-return valve**
 - **Long pellets feed easier in the deeper feed section flights**
 - **Compression ratio should be between 2:1 and 2:5:1**
 - **Screw length – 20D**
 - **No mixing sections, no barrier flights**
 - **Machine sized to use 30-40% of shot capacity per part**



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Injection Molding Machine Considerations

- **Nozzle**
 - **Short as possible**
 - **Orifice $5/16"$ (.313") minimum**
 - **One piece design preferred over two piece with removable tips**
- **Sprue**
 - **Sprue orifice diameter should be $1/32"$ over nozzle orifice diameter**



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Injection Molding Machine Considerations

- **Runners and Gates**
 - **Size runners as large as possible until the amount of regrind becomes a problem**
 - **Minimize the number of 90 degree bends in the runners. Use large generous radii**
 - **Use large gates. Note: Recommend pneumatic, double-stage, heavy duty gate cutters for operators**



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Processing Guidelines

- **Run slow screw speeds, use as long as possible recovery times. Complete recovery seconds before cooling cycle times out**
- **By utilizing large flow paths, pressure drop from screw tip to end of flow in part should be minimal allowing the use of low injection pressure**
- **Utilize slow injection speeds**
- **Higher melt temperatures are recommended**
- **Rely on barrel conductive heating rather than shear heating.**
- **Use less than 50 psi back pressure**



Property Comparisons Case Study: Optimized Press vs. Small/Standard Press

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- **Optimized Press - Van Dorn 150 ton**
 - **Increased injection unit from 40 mm to 50 mm**
 - **Nozzle is only 5" long, one piece with 5/16" orifice**
 - **Runners are large trapezoidal and gate directly into part**



Property Comparisons Case Study: Optimized Press vs. Small/Standard Press

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MFX-700-10	Optimized	Small/Standard	% Change
Tensile Strength (psi)	24,870	17,108	45
Flexural Strength (psi)	35,910	27,025	33
Notched Izod	10.5	3.5	196



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Material Handling: Pellet Drying

- **Recommend drying Verton[®] MFX for 2-3 hours at 180°F**
- **Verton RF for 4-5 hours at 180-190°F**
- **Desiccant type dryer recommended**

- **1/2" Pellets → 2" lines minimum. 2-1/2" + optimum in and out**
- **> 1/2" pellets → 3" Lines Minimum in and out.**
- **Conical bottom with 45° minimum discharge angle - 60° preferred**
- **6" minimum discharge to take-off box - bigger is better...**
- **Best take off boxes style is minimum 12"x12"x12" cube with air bleeds. Takeoffs 4" off bottom and 2" minimum clearance to side walls.**
- **Discourage use of flat bottom dryer hoppers as bridging and degradation at base will occur**

- **Use large diameter pick-up wands**
 - **2" dia. or larger, single tube, with air-bleed holes**
 - **3" dia. Or larger for pellets >1/2"**



- **Outer telescoping tubes over inner tube not recommended (long pellets will block air flow - difficult to push into pellets)**



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Verton Material Handling: Air Conveying

- **2" lines minimum, 2-1/2" + optimum**
- **Minimize conveying distance and bends**
- **Discourage screens in vacuum loaders, or paper filters on top of loaders.**
- **Conveying airspeed ==> slow as possible**
- **Use wear resistant bends - i.e. Ceramic Flat Back Elbows**
- **Use Long radius sweeps for bends, elbows.**
- **Use wear resistant conveying equipment - SS Construction, Wear plates, etc.**
- **No Flexible tubing/hose for bends or directional changes**
- **Minimize truck fill pressures/velocities**



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Recommended Vacuum Components

Not Recommended

Loose Fibers will Exhaust like Darts through Paper



Recommended

Multiple Loaders Off Central Line Possible

No Screen
No Filter



Pump
Filter



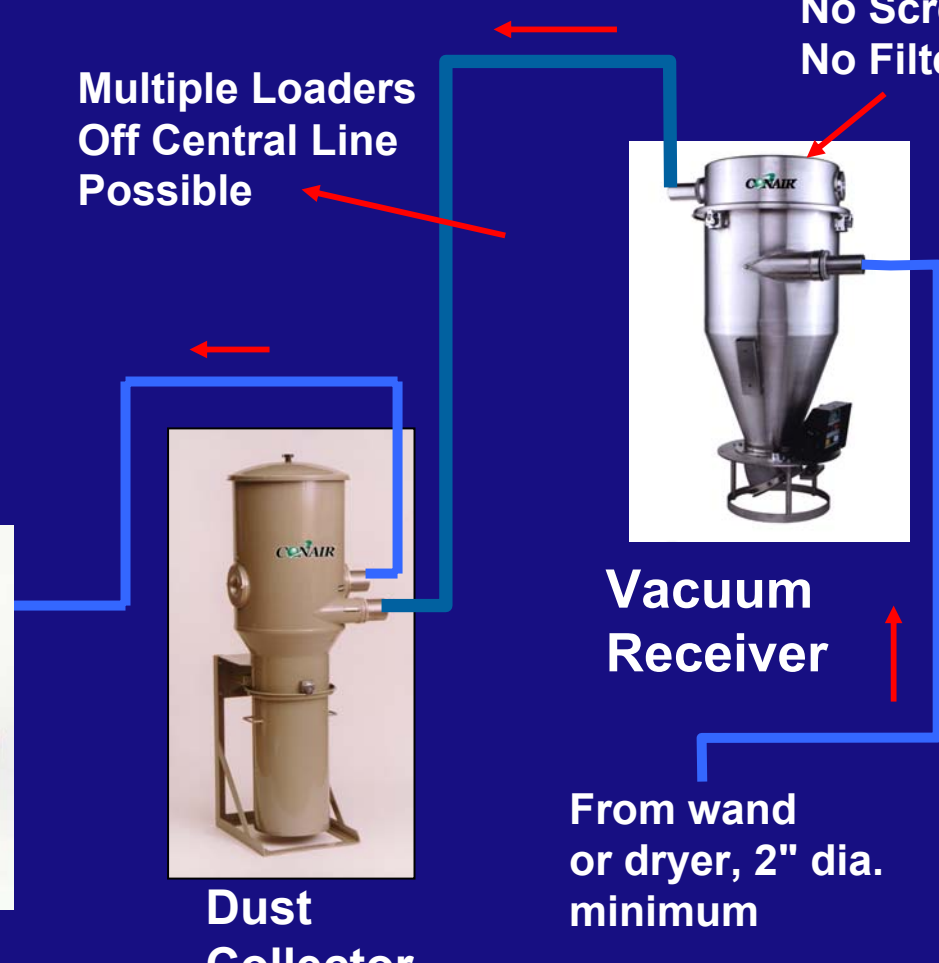
Pump



Dust
Collector

Vacuum
Receiver

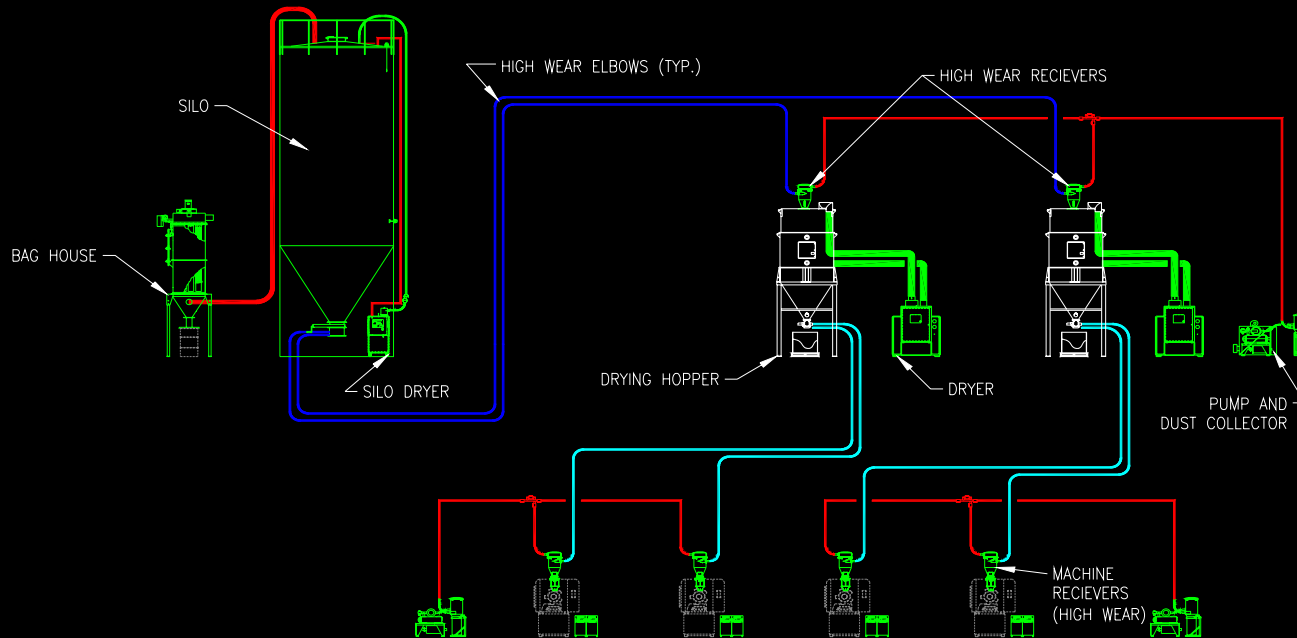
From wand
or dryer, 2" dia.
minimum





Recommended System Design

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		FLOW-DIAGRAM LONG_FIBER_PELLETS		
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Material Handling: Hopper Magnets

- **Typical hopper Magnets are designed for use of 1/8" pellets and smaller. Need some design modifications for use with Verdon pellets:**
 - **3/4" distance minimum edge-to-edge between any two magnets, or between magnets and wall**
 - **45° minimum angled discharge, 60° preferred**
 - **3"(+) discharge diameter to feedthroat preferred. If machine is smaller, start larger at magnet base and cone down, 60° angle minimum recommended**

The logo consists of the letters "LNP" in a bold, dark blue, sans-serif font, centered within a white rectangular box.

LNP

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