1 Winnowing

Concept Fragments	Jet engine	Fan/propellor	Friction drive
Feasibility	n	n	y
Requirements			
Only use DC motor for driving	n		y
Pass Fragment?	NO	NO	YES
Justification	Must use DC Motor	See calculations ASDFCHANGE	

Table 1: Turn Energy into Mechanical Energy Winnowing

Concept Fragments:	Direct drive	Gearbox	Belt drive	Chain drive	Friction Drive
Feasibility	y	y	y	y	y
Requirements					
Only use DC motor for driving	y	y	y	y	y
No hazardous/ prohibited materials	y	y	y	y	y
Only contact rails	y	y	y	y	y
Must stay the same dimensions	y	y	y	y	y
Battery supply <9.5V	y	y	y	y	y
Drive system must use provided batteries	y	y	y	y	y
Only electrical sources of batteries	y	y	y	y	y
Technical Readiness	y	y	y	n	y
Pass Fragment?	YES	YES	YES	NO	YES
Justification				Couldn't source; too difficult to manufacture in house	

Table 2: Transfer Energy from Motor to Wheels Winnowing

Concept Fragments:	Drum brake	Caliper brakes	Disc brakes	Electrical brakes	Air Brakes
Feasibility	y	y	y	y	y
Requirements					
No hazardous/ prohibited materials	y	y	y	y	y
Only contact rails	y	y	y	y	y
No affixing to track	y	y	y	y	y
No tethered or launched materials	y	y	y	y	y
Must stay the same dimensions	y	y	y	y	n
Battery supply <9.5V	y	y	y	y	
Drive system must use provided batteries	y	y	y	y	
Only electrical sources of batteries	y	y	y	y	
Technical Readiness	y	y	y	y	
Pass Fragment?	YES	YES	YES	YES	NO
Justification					The train must stay the same size

Table 3: Control Speed Winnowing

Concept Fragments:	Potentiometer	Gyroscope & accelerometer	Light sensor	Time based	None
Feasibility	y	y	y	n	y
Requirements					
No hazardous/ prohibited materials	y	y	y		y
Must be autonomous	y	y	y		y
Battery supply <9.5V	y	y	y		y
Only electrical sources of batteries	y	y	y		y
Technical Readiness	y	y	y		y
Pass Fragment?	YES	YES	YES	NO	YES
Justification				This would be an incredibly unreliable way of detecting turns because there is no feedback	

Table 4: Detect Turns Winnowing

Concept Fragments:	Conical wheels	Slip	Slip differential	Heavily segmented locomotive
Feasibility	y	y	y	y
Requirements				
No hazardous/ prohibited materials	y	y	y	y
Only contact rails	y	y	y	y
No affixing to track	y	y	y	y
No tethered or launched materials	y	y	y	y
Must stay the same dimensions	y	y	y	y
Take 24in (radius) corners	y	y	y	y
Technical Readiness	y	y	y	y
Pass Fragment?	YES	YES	YES	YES

Table 5: Turn Relative to Ground Winnowing

Concept Fragments:	High Torque	Sticky arms	Spike	High momentum
Feasibility	y	y	y	y
Requirements				
No hazardous/ prohibited materials	y	y	y	y
Only contact rails	y	n	n	y
No affixing to track	y			y
Must be autonomous	y			y
No tethered or launched materials	y			y
Technical Readiness	y			y
Pass Fragment?	YES	NO	NO	YES
Justification		It would be almost impossible to ensure that the sticky arms only contacted the rails	Spike would be in contact with track ties	

Table 6: Move Up Steep Inclines Winnowing

Concept Fragments	Conical wheels	Wheels with o-ring	Tank treads
Feasibility	y	y	y
Requirements			
Only contact rails	y	y	y
No affixing to track	y	y	y
Take 24in (radius) corners	y	y	n
Technical Readiness	y	y	
Pass Fragment?	YES	YES	NO
Justification			The tank treads would not be able to stay on the tracks and still take the turn

Table 7: Stay Aligned with Rails Winnowing

Concept Fragments:	Box chassis	Drill to plate	Adhere to plate	Potting	Gingerbread
Feasibility	y	y	y	y	y
Requirements					
No hazardous/ prohibited materials	y	y	y	y	y
Technical Readiness	y	y	y	y	
Pass Fragment?	YES	YES	YES	YES	YES

Table 8: Attach Components to Locomotive Winnowing

Concept Fragments:	Screw	Rope	Link	Pin	Glue	Clip
Feasibility	y	y	y	y	y	y
Requirements						
No hazardous/ prohibited materials	y	y	y	y	n	y
Connect to cargo cart	y	y	y	y		y
Technical Readiness	y	y	y		y	y
Pass Fragment?	YES	YES	YES	YES	NO	YES
Justification					The glue would damage the connection, and would not be removable	

Table 9: Connect to Carts Winnowing[1]

[1]None of these concept fragments were implemented as a connection was supplied by the instructors