CLAIMS

1. A method of conveying a material under an electron beam, the method comprising:

exposing a biomass material to an electron beam while conveying the biomass material on a vibratory conveyor, wherein the vibratory conveyor comprises a vibratory conveyor trough having a first surface conveying the biomass, and

oscillating the vibratory conveyor in a direction parallel to the direction of conveying and perpendicular to the scan horn of the electron beam .

2. The method of claim 1, wherein the vibratory conveyor trough comprises a first surface of the vibratory conveyor trough conveying the biomass, and the method further comprises cooling a second surface of the vibratory conveyor trough, wherein the first and second surfaces of the vibratory conveyor trough are in thermal communication.

3. The method of claim 1, wherein the total electron beam power has at least 50 kW of power.

4. The method of claim 1, wherein the vibratory conveyor comprises a metal, alloys of metals or coated metals and alloys of metals.

5. The method of claim 2, wherein the distance between the first and second surface of the vibratory conveyor trough is between about 1/64 and 2 inches.

6. The method of claim 2, further comprising cooling the second surface by contacting the second surface with a cooling enclosure containing a cooling fluid.

7. The method of claim 6, wherein the second surface of the vibratory conveyor trough forms a part of the cooling enclosure.

8. The method of claim 6, further comprising flowing fluid through the cooling enclosure by flowing the cooling fluid into the cooling enclosure through an inlet to the

enclosure and flowing the fluid out of the cooling enclosure through an outlet from the cooling enclosure.

9. The method of claim 8, wherein the cooling enclosure comprises channels configured to allow the flow of the cooling agent from the inlet to the outlet.

10. The method of claim 8, further comprising maintaining a difference in the temperature of the cooling agent at the inlet of the cooling enclosure to the temperature at the outlet of the enclosure of between about 2 to 120 ° C.

11. The method of claim 7, further comprising maintaining a flow rate of cooling fluid through the cooling enclosure of between 0.5 and 150 gallons/minute.