~~WE CLAIM:~~

1. A method for improving the prediction of polymer properties comprising the steps of:

providing a polymer;

providing a prediction model;

utilizing said prediction model to define an average polymer property prediction value,

determining a feasible range;

measuring one or more properties of said polymer;

determining whether said one or more measured polymer properties are within said feasible range;

validating said one or more measured polymer properties if said one or more measured polymer properties fall within the feasible range or invalidating said one or more measured polymer properties if said one or more measured polymer properties fall outside of the feasible range;

optionally updating said prediction model;

repeating said previous steps at least one or more times; and

thereby improving the prediction of polymer properties.

2. The method for improving the prediction of polymer properties according to Claim 1, wherein said average polymer property prediction value is x_p.

3. The method for improving the prediction of polymer properties according to Claim 2, wherein said feasible range is determined via

$$x_{Low} = x_p\left(1-\frac{\sigma}{x_p}\sqrt{-2\ln(1-f)}\right)-\frac{dx_p}{dt}T_u\text{; and}$$

$$x_{High} = x_p\left(1+\frac{\sigma}{x_p}\sqrt{-2\ln(1-f)}\right)+\frac{dx_p}{dt}T_u\text{;}$$

wherein said polymer property prediction value is logarithmic, and wherein

x_{Low} is the lowest value expected for the lab value;

x_{High} is the highest value expected for the lab value;

f is the probability that the sample is part of the collection of samples;

σ is the standard deviation of the lab measurement method;

x_p is the model predicted bed average value;

T_u is the amount of time uncertainty in the exact sample time; and

$\frac{dx_p}{dt}$ is the derivate of x_p with respect to time.

4. The method for improving the prediction of polymer properties according to Claim 2, wherein said feasible range is determined via

$$x_{Low} = x_p-\sigma\sqrt{-2\ln(1-f)}-\frac{dx_p}{dt}T_u\text{; and}$$

$$x_{High} = x_p+\sigma\sqrt{-2\ln(1-f)}+\frac{dx_p}{dt}T_u\text{;}$$

wherein said polymer property prediction value is non-logarithmic, and wherein

x_{Low} is the lowest value expected for the lab value;

x_{High} is the highest value expected for the lab value;

f is the probability that the sample is part of the collection of samples;

σ is the standard deviation of the lab measurement method;

x_p is the model predicted bed average value;

T_u is the amount of time uncertainty in the exact sample time; and

$\frac{dx_p}{dt}$ is the derivative of x_p with respect to time.

5. The method for improving the prediction of polymer properties according either to Claim 3 or Claim 4, wherein said $\frac{dx_p}{dt}$ is determined via $\frac{x_p^k - x_p^{k-1}}{t^k - t^{k-1}}$; wherein

k represents the current time; and

k-1 represents the time one calculation interval previously.

6. The method for improving the prediction of polymer properties according to Claim 2, wherein said feasible range is determined via $x_{Low} = x_P(1-delta)_u$; and $x_{High} = x_P(1+delta)$; wherein x_p is the model predicted bed average value.

7. A polymerization system having improved polymer property prediction capabilities comprising:

at least one polymerization reactor;

an automated prediction model;

means for measuring one or more polymer properties;

means for detecting one or more erroneous measured polymer properties; and

means for updating said automated predication model.

8. The polymerization system having improved polymer property prediction capabilities according to Claim 7, wherein said means for measuring one or more polymer properties is an automated device.

9. The polymerization system having improved polymer property prediction capabilities according to Claim 7, wherein said means for detecting one or more erroneous measured polymer properties is an automated device.

10. The polymerization system having improved polymer property prediction capabilities according to Claim 7, wherein said means for updating said automated predication model is an automated device.

11. The polymerization system having improved polymer property prediction capabilities according to Claim 7, wherein said automated predication model is a computer model.

WE CLAIM:

1. A method for improving the prediction of polymer properties comprising the steps of:

providing a polymer;

providing a prediction model based on material balance and polymer properties;

utilizing said prediction model to define an average polymer property prediction value, wherein said average polymer property prediction value is x_p;

determining a feasible range;

measuring one or more properties of said polymer;

determining whether said one or more measured polymer properties are within said feasible range;

validating said one or more measured polymer properties if said one or more measured polymer properties fall within the feasible range or invalidating said one or more measured polymer properties if said one or more measured polymer properties fall outside of the feasible range;

updating said prediction model;

repeating said previous steps at least one or more times until updating said prediction model at least one more time; and thereby

improving the prediction of polymer properties; wherein said feasible range is determined via

$$x_{Low} = x_P\left(1 - \frac{\sigma}{x_p}\sqrt{-2\ln(1-f)}\right) - \frac{dx_p}{dt}T_u;$$

and

$$x_{High} = x_P\left(1 + \frac{\sigma}{x_p}\sqrt{-2\ln(1-f)}\right) + \frac{dx_p}{dt}T_u;$$

wherein said polymer property prediction value is logarithmic, and wherein

x_{Low} is the lowest value expected for the lab value;

x_{High} is the highest value expected for the lab value;

f is the probability that the sample is part of the collection of samples;

σ is the standard deviation of the lab measurement method;

x_p is the model predicted bed average value;

T_u is the amount of time uncertainty in the exact sample time; and

$$\frac{dx_p}{dt}$$

is the derivate of x_p with respect to time.

2. The method for improving the prediction of polymer properties according to claim 1, wherein said

$$\frac{dx_p}{dt}$$

is determined via

$$\frac{x_p^k - x_p^{k-1}}{t^k - t^{k-1}};$$

wherein

k represents the current time; and

k−1 represents the time one calculation interval previously.

3. A method for improving the prediction of polymer properties comprising the steps of:

providing a polymer;

providing a prediction model based on material balance and polymer properties;

utilizing said prediction model to define an average polymer property prediction value, wherein said average polymer property prediction value is x_p;

determining a feasible range;

measuring one or more properties of said polymer;

determining whether said one or more measured polymer properties are within said feasible range;

validating said one or more measured polymer properties if said one or more measured polymer properties fall within the feasible range or invalidating said one or more measured polymer properties if said one or more measured polymer properties fall outside of the feasible range;

updating said prediction model;

repeating said previous steps at least one or more times until updating said prediction model at least one more time; and

thereby improving the prediction of polymer properties; wherein said feasible range is determined via

$$x_{Low} = x_P\left(1 - \frac{\sigma}{x_p}\sqrt{-2\ln(1-f)}\right) - \frac{dx_p}{dt}T_u;$$

and

$$x_{High} = x_P\left(1 + \frac{\sigma}{x_p}\sqrt{-2\ln(1-f)}\right) + \frac{dx_p}{dt}T_u;$$

wherein said polymer property prediction value is non-logarithmic, and wherein

x_{Low} is the lowest value expected for the lab value;

x_{High} is the highest value expected for the lab value;

f is the probability that the sample is part of the collection of samples;

σ is the standard deviation of the lab measurement method;

x_p is the model predicted bed average value;

T_u is the amount of time uncertainty in the exact sample time; and

$$\frac{dx_p}{dt}$$

is the derivative of x_p with respect to time.

4. A method for improving the prediction of polymer properties comprising the steps of:

providing a polymer;

providing a prediction model based on material balance and polymer properties;

utilizing said prediction model to define an average polymer property prediction value, wherein said average polymer property prediction value is x_p;

determining a feasible range;

measuring one or more properties of said polymer;

determining whether said one or more measured polymer properties are within said feasible range; validating said one or more measured polymer properties if said one or more measured polymer properties fall within the feasible range or invalidating said one or more measured polymer properties if said one or more measured polymer properties fall outside of the feasible range;

updating said prediction model;

repeating said previous steps at least one or more times until updating said prediction model at least one more time; and thereby improving the prediction of polymer properties;

wherein said feasible range is determined via $x_{Low}=x_p(1-\text{delta})_u$; and $x_{High}=x_p(1+\text{delta})$; wherein x_p is the model predicted bed average value.