We Claim:

1. A method for producing a polyethylene polymer in a polymerization reactor, the polymerization reactor receiving a feed of ethylene, a feed of a chromium based catalyst and a feed of oxygen, wherein the polyethylene polymer produced in the polymerization reactor has a predetermined residence time in the polymerization reactor and a predetermined desired range of a melt flow index (MFI), the method comprising:

(a) measuring the MFI of the polyethylene polymer being produced in the polymerization reactor at the predetermined residence time to give a measured MFI value of the polyethylene polymer;

(b) comparing the measured value of the MFI of the polyethylene polymer to the predetermined desired range of the MFI to give a comparison;

(c) changing a catalyst feed rate of the feed of the chromium based catalyst to the polymerization reactor when, based on the comparison, the measured value of the MFI is outside the predetermined desired range of the MFI, wherein the change in the catalyst feed rate of the feed of the chromium based catalyst is calibrated to preemptively compensate for an anticipated subsequent change in the oxygen flow rate of the feed of oxygen to the polymerization reactor, wherein the anticipated subsequent change in oxygen flow rate of the feed of oxygen to the polymerization reactor is an adjustment for maintaining the predetermined residence time and for bringing the MFI of the polyethylene polymer being produced in the polymerization reactor into the predetermined desired range for the MFI of the polyethylene polymer;

(d) at a predetermined time after starting (c), changing the oxygen flow rate of the feed of oxygen to the polymerization reactor thereby both maintaining the predetermined residence time and bringing the MFI of the polyethylene polymer being produced in the polymerization reactor with the chromium based catalyst into the predetermined desired range of the MFI of the polyethylene polymer; and

(e) repeating (a) and (b) after (d) to determine that the measured value of the MFI is within the predetermined desired range of the MFI at the predetermined residence time wherein the oxygen flow rate of the feed of oxygen to the polymerization reactor is from 1 ppb to 500 ppb by volume of the feed of ethylene to the polymerization reactor;

wherein the changing of the catalyst feed rate of the feed of the chromium based catalyst to the polymerization reactor includes increasing the catalyst feed rate to the polymerization reactor; and

wherein changing the oxygen flow rate of the feed of oxygen to the polymerization reactor includes increasing the oxygen flow rate to the polymerization reactor at the predetermined time selected from 15 minutes to 2 hours after starting step (c); or

wherein the changing of the catalyst feed rate of the feed of the chromium based catalyst to the polymerization reactor includes decreasing the catalyst feed rate to the polymerization reactor; and

wherein changing the oxygen flow rate of the feed of oxygen to the polymerization reactor includes decreasing the oxygen flow rate to the polymerization reactor at the predetermined time selected from 15 minutes to 2 hours after starting step (c).

2. The method of claim 1, wherein changing the oxygen flow rate of the feed of oxygen to the polymerization reactor brings the MFI of the polyethylene polymer being produced in the polymerization reactor to a median value of the predetermined desired range for the MFI of the polyethylene polymer.

3. The method of any one of claims 1 or 2, wherein changing the oxygen flow rate of the feed of oxygen to the polymerization reactor maintains the predetermined residence time at a constant value.

4. The method of claim 3, wherein changing the catalyst feed rate of the feed of a chromium based catalyst to the polymerization reactor maintains both a constant production rate of the polyethylene polymer being produced in the polymerization reactor and the constant value of the predetermined residence time of the polyethylene polymer being produced in the polymerization reactor.

5. The method of any one of claims 1-4, wherein the polyethylene polymer is produced at a constant production rate.

6. The method of any one of claims 1-5, wherein the method is a gas phase polymerization method and the polymerization reactor is a gas phase polymerization reactor.

7. The method of any one of claims 1-5, wherein the method is a liquid slurry phase polymerization method and the polymerization reactor is a liquid slurry phase polymerization reactor.