CLAIMS

1. A drill bit, comprising:

a bit body having a cutting section, a shank attached to the cutting section and a neck section;

a sensing element in contact with a surface of the shank;

a variable length mechanism including at least one mounting block in contact with the sensing element to secure the sensing element to the surface of the shank; and

at least one sensor on the sensing element, wherein the at least one sensor provides a signal in response to one of a bending moment of the sensing element and weight on the sensing element.

2. The drill bit of claim 1, wherein ends of the sensing element are secured to the surface of the shank with a section between the ends being capable of bending due to a force applied to the sensing element.

3. The drill bit of claim 1, wherein the at least one sensor includes a first plurality of sensors mounted along a longitudinal axis of the sensing element that provide a signal corresponding to a torque on the sensing element.

4. The drill bit of claim 3 further comprising a second plurality of sensors mounted on the sensing element to provide a signal relating to temperature of the sensing element, wherein the second plurality of sensors are substantially unaffected by the bending moment of the sensing element and the weight on the sensing element.

5. The drill bit of claim 1, wherein the at least one sensor includes at least a first pair of sensors mounted on the sensing element at a first location and at least one second pair of sensors mounted spaced apart from the at least one first pair of sensors on the sensing element to provide measurement for determining weight-on-bit.

6. The drill bit of claim 1 further comprising a controller for processing signals from the at least one sensor for determining one of weight-on-bit and torque-on-bit.

7. The drill bit of claim 1, wherein the sensing element and the at least one sensor are securely placed in a cavity formed on an outer surface of the shank.

8. The drill bit claim 7 further comprising a seal member placed on the cavity to seal the at least one sensor from outside environment.

9. The drill bit of claim 8 further comprising at least one of a pressure sensor and a temperature sensor inside the seal member.

10. A drill bit comprising:

a cutting section, a shank and a neck section;

a sensor package secured in a cavity on a surface of the shank, wherein the sensor package includes:

a first longitudinal sensing element with its ends secured onto a surface of the shank and having a middle section capable of bending; and

a first plurality of sensors that provide signals corresponding to a bending moment of the sensing element; and

a variable length mechanism including at least one mounting block in contact with the sensing package to secure the sensing package to the surface of the shank;.

11. The drill bit of claim 10 further comprising a second plurality of sensors that provide measurements relating to temperature of the sensing element.

12. The drill bit of claim 10, wherein the sensor package further comprises a second sensing element having a second plurality of sensors for providing signals corresponding to a weight applied on the sensing element.

13. The drill bit of claim 12, wherein the first sensing element and the second sensing element are secured spaced apart in the cavity by variable length mechanism.

14. The drill bit of claim 13 further comprising a controller that determines one of weight, torque and both weight from the signals provided by one of the first plurality of sensors and the second plurality of sensors.

15. A drilling apparatus, comprising:

a drilling assembly;

a drill bit attached to an end of the drilling assembly, wherein the drill bit includes:

a cutting section and a shank attached to the cutting section; and

a sensing element in contact with a surface of the shank;

a variable length mechanism including at least one mounting block in contact with the sensing element to secure the sensing element to the surface of the shank; and

at least one sensor on the sensing element, wherein the at least one sensor provides a signal in response to one of a bending moment of the sensing element and weight on the sensing element.

16. The drilling apparatus of claim 15 further comprising a controller that determines one of weight and torque from the signals provided by the at least one sensor.

17. The apparatus of claim 16, wherein the controller controls a drilling operation in response to the determined weight or torque.

18. The drilling apparatus of claim 16 further comprising a conveying member attached to the drilling assembly that conveys the drilling assembly from a surface location into a wellbore and wherein the controller is placed at one of: in the drill bit; in the drilling assembly; and partially in the drilling assembly and partially at the surface location.

19. A method of providing a drill bit, comprising:

providing a bit body having a cutting section and a shank section connected to the cutting section;

providing a cavity on an outer surface of the shank;

securely placing a sensor package in the cavity, wherein the sensor package includes a first sensing element and at least one load sensor mounted on the first sensing element that provides signals corresponding to one of a bending moment of the sensing element and weight on the sensing element; and

securing the sensor package to the surface of the shank via a variable length mechanism including at least one mounting block in contact with the sensor package.

20. The method of claim 19, wherein the sensor package further includes a second sensing element having a second sensor attached thereto, wherein the method further comprises:

placing ends of the first sensing element against the surface of the shank, placing the second sensing element against the surface of the shank and separating the first sensing element and the second sensing element by the variable length mechanism.