CLAIMS

1. An integrated drilling and injection device, comprising:

a longitudinal shank having an internal passage extending from an open first end of the shank along an axis of the shank toward a second end of the shank;

a drill bit located at a second end of the shank opposite the first end;

at least one outlet in fluid communication between the internal passage and an exterior surface of the shank;

a valve within the internal passage, the valve configured to control passage of material within the internal passage; and

a seal disposed on the shank, located at the first end of the shank, the seal configured to form a barrier around the shank, between the shank and a channel bored out by the drill bit.

2. An integrated drilling and injection device according to Claim 1, in which the valve comprises an enlarged portion of the internal passage, a constriction and a valve component free to move axially within the enlarged portion, the valve component comprising a central core with a narrow, pointed end for engaging in the constriction and sealing it against fluid flow therethrough and three longitudinal ribs configured to prevent the central core from engaging with the inner surface of the internal passage and permit fluid flow past, the longitudinal ribs terminating in respective feet that are configured to sit on a distal end of the enlarged portion of the internal passage, whilst allowing fluid to flow past.

3. An integrated drilling and injection device according to Claim 1 or 2, in which the drill bit comprises:

a blade that is configured to cut in a first rotational direction; and

a helical flute extending away from the blade along a portion of the shank, the flute configured to draw swarf away from the blade by twisting in a second rotational direction opposite the first rotational direction.

4. An integrated drilling and injection device according to Claim 1, 2 or 3, in which the seal is frangibly connected to the shank.

5. An integrated drilling and injection device according to any preceding claim, in which the shank comprises a plurality of shank sections.

6. An integrated drilling and injection device according to any preceding claim, further comprising embedded tools/technology therein.

7. A system for injection of material into a substrate, the system comprising:

a device according to any preceding claim;

an access surface through which the device is to be deployed; and

a device deployment apparatus for driving the device through the access surface into a substrate and injecting material into the internal passage.

8. A method of injecting material into a substrate, the method comprising the steps of:

providing a device according to any of Claims 1 to 6;

driving the device into a substrate; and

injecting material into the internal passage.