DESIGNED TO DECEIVE

First used in World War II, when it was codenamed “window”, chaff is still a cheap and effective means to deceive and defeat radars, reports Martin Streetly.

Chaff is produced in hanks, then cut to the half target wavelength size. Here a hank is shown fluffed up for display.

Chaff, often overlooked by virtue of its familiarity, is a potent countermeasure against radars and could be in for a renaissance if proponents of “scalpel” over “brute force” electronic warfare (EW) have their way.

Today, the majority of chaff takes the form of aluminium-coated glass dipoles “tuned” to particular threat emitters, dispensed in bulk or from cartridges tailored to be effective against a range of radars rather than a single type. Such flexibility allows chaff to tackle a range of threats in a variety of ways.

Chaff can be used as a track breaker against air-intercept radars and as a false-target generator for active missile seeker heads. Similar “seduction” and radar break-lock techniques can be used to defeat surface-to-air missile systems.

Operational flexibility, coupled with low production cost, makes chaff an attractive countermeasures option. Further cost benefits accrue because chaff does not require the high-quality intelligence data needed to make active jammers effective. Equally, chaff makes the radar designer’s job more difficult, proofing a system against chaff degradation requiring more complex signal processing with an almost inevitable reduction in detection range.

While many modern combat aircraft are equipped to dispense chaff, the passive countermeasure’s capability has yet to be fully exploited — a situation which leading UK chaff manufacturer Chemring believes is about to be rectified.

Crucial to developments is a radar warning system which can identify the threat in real time with sufficient fidelity to optimise chaff response in terms of emitter type, quantity and direction-of-arrival. Equally important is the “smart” dispenser which informs the EW system what it is carrying (chaff, flares or active decoys), how many rounds are available and where they are located on the airframe.

Chemring believes that the concept of a “total” EW system is vital to chaff’s future success, allowing real-time decisions as to which countermeasure (active, passive or evasive manoeuvring), or combination of countermeasures, is the best response to the threat of the moment.