

- (e) Blade or vane rolling machines;
- (f) Blade or vane aerofoil shaping machines *except* metal removing types;
- (g) Blade or vane root grinding machines;
- (h) Blade or vane aerofoil scribing equipment.

#### Technical Note:

Manufacture (making) includes refurbishing.

#### NOTE:

This definition also covers machinery and equipment for the manufacture of blades or vanes in the compressor section of aircraft or aircraft derived gas turbine engines where the technology is the same as for the manufacture of blades or vanes in the turbine section.

## 1081

**Specially designed or modified equipment, tools, dies, moulds and fixtures for the manufacture or inspection of aircraft, airframe structures or aircraft fasteners, as follows, and specially designed components and accessories and "specially designed software" for the equipment, components and accessories:**

- (a) Equipment, tools, dies, moulds or fixtures for:
  - (1) Hydraulic stretch forming:
    - (i) Whose machine motions or forces are digitally controlled or controlled by electrical analogue devices; *or*
    - (ii) Which are capable of thermal conditioning the workpiece;
  - (2) The milling of aircraft skins or spars *except* if they do not present an improvement on machinery in production ten years preceding the year of export;
- (b) Tools, dies, moulds or fixtures for:
  - (1) "Diffusion bonding";
  - (2) "Superplastic forming";
  - (3) "Hot die forging";
  - (4) Metal powder compaction by vacuum hot pressing, high pressure extrusion or isostatic pressing;
  - (5) Direct-acting hydraulic pressing of aluminium alloys and titanium alloys;
  - (6) The manufacture, inspection, inserting or securing of specially designed high-strength aircraft fasteners.

#### NOTE:

For the definition of the processes and control of the metal working manufacturing technologies mentioned above, see Item 1001.

## 1086

**Specially designed or modified equipment, tools, dies, moulds, fixtures and gauges for the manufacture or inspection of aircraft and aircraft derived gas turbine engines, as follows, and specially designed components and accessories and "specially designed software" for the equipment, components and accessories:**

- (a) Equipment, tools, dies, moulds, fixtures and gauges:
  - (1) For automated production inspection;
  - (2) For automated welding;
- (b) Tools, dies, fixtures and gauges:
  - (1) For solid state joining by inertial welding or thermal bonding;
  - (2) For manufacture and inspection of high-performance gas turbine bearings;
  - (3) For rolling specially configured rings such as nacelle rings;
  - (4) For forming and finishing turbine discs;
- (c) Compressor or turbine disc broaching machines.

#### NOTE:

This sub-item embargoes only broaching machines specially designed for the manufacture of aircraft or aircraft derived gas turbine engines, and not general purpose broaching machines specially adapted for that purpose.

## 1088

**Gear making or finishing machinery, as follows:**

- (a) Bevel gear making machinery:
  - (1) Gear grinding machinery (non-generating type);
  - (2) Other machinery capable of the production of bevel gears of module finer than 0.5 mm (diametrical pitch finer than 48) and meeting a quality standard better than DIN 58405 Class 6;

#### NOTE:

If rated in AGMA or Admiralty standards and not rated in DIN 58405, AGMA 11 or Admiralty Class I shall be considered to be the equivalent of DIN 58405 Class 6.

- (b) Machinery capable of producing gears in excess of AGMA quality level 13 or equivalent.

#### NOTE:

If not rated in AGMA standards, DIN 3963 Class 4 shall be considered equivalent to AGMA quality level 13.

## 1091

**Numerical control units, numerically controlled machine-tools, dimensional inspection machines, direct numerical control systems, specially designed sub-assemblies, and specially designed "software", as follows:**

- (a) Units for numerically controlling simultaneously coordinated (contouring and continuous path) movements of machine-tools and dimensional inspection machines in two or more axes, *except* those having all of the following characteristics:
  - (i) No more than three contouring interpolating (any mathematical function including linear and circular) axes can be simultaneously coordinated. Units may have:
    - (1) One or more additional axes for which rate of movement is not coordinated, varied or modulated with that of another axis;
    - (2) One additional set of up to three contouring axes provided a separate feed rate number, standard or optional, does not control more than any three contouring axes; *or*
    - (3) Up to three contouring axes switchable out of any number of axes;
  - (ii) Minimum programmable increment equal to or greater than 0.001 mm;
  - (iii) Interfaces limited as follows:
    - (1) No integral interface designed to meet ANSI/IEEE standard 488-1978, IEC publication 625-1, or any equivalent standard; *and*
    - (2) No more than two interfaces meeting EIA standard RS-232-C or any equivalent standard;
  - (iv) On-line (real-time) modification of the tool path, feed rate and spindle data limited to the following:
    - (1) Cutter diameter compensation normal to the centreline path;
    - (2) Automatic acceleration and deceleration for starting, cornering and stopping;
    - (3) Axis transducer compensation including lead screw pitch compensation (measurements on one axis may not compensate another axis);
    - (4) Constant surface speed with or without limits;
    - (5) Spindle growth compensation;
    - (6) Manual feed rate and spindle speed override;
    - (7) Fixed and repetitive cycles (does not include automatic cut vector generation);
    - (8) Tool and fixture offset;
    - (9) Part programme tape editing, excluding source programme language and centre-line location data (CLDATA);
    - (10) Tool length compensation;
    - (11) Part programme storage;
    - (12) Variable pitch threading;
    - (13) Inch/metric conversion;