



## CIRP UNIFIED KEYWORD LIST

*Updated September 2021*

The use of keywords in the abstract of papers is fundamental for the documentation of papers and articles in the international scientific world. The CIRP community has always been aware of this requirement and, to this aim, the working group on UNIFICATION has prepared and continuously updated the CIRP UNIFIED KEYWORD LIST, which **must** be used by all the authors of papers in the CIRP Annals and in any other publication under the CIRP heading. While preparing the abstract of your paper, you have to identify your paper with **three** keywords from the list in the following order:

- The first keyword identifying the general subject of the paper
- Two following keywords to detail particular aspects of the paper.

The keywords should be used in singular form, with the first letter in upper case, as they appear in the list. Authors may use the third keyword free, taking into account new emerging areas. The free keyword should always be **the last** one. The keywords should be separated by a **comma**.

The Technical Secretary

### **3**D-Image processing

### **A**brasion

Accuracy  
Acoustic emission  
Active damping  
Actuator  
Adaptive control  
Adaptive manufacturing  
Additive manufacturing  
Algorithm  
Alignment  
Alloy  
Aluminium  
Analysis  
Anisotropy  
Artificial intelligence  
Assembly(ing)  
Atomic force microscopy (AFM)  
Augmented reality  
Automation

### **B**all

Ball screw  
Bearing  
Bending  
Biologically inspired design  
Biomedical  
Blanking  
Bonding  
Boring  
Brittleness  
Burr

### **C**alibration

Carbide

Casting  
Ceramic  
Chatter  
Chemical vapor deposition (CVD)  
Chip  
CO<sub>2</sub> emission  
Coating  
Cognitive robotics  
Cold forming  
Cold spray  
Compensation  
Complaint management  
Complexity  
Composite  
Computer aided design (CAD)  
Computer aided manufacturing (CAM)  
Computer automated process planning (CAPP)  
Computer numerical control (CNC)  
Conceptual design  
Concurrent engineering  
Condition monitoring  
Control  
Cooling  
Coordinate measuring machine (CMM)  
Coordination  
Cost  
Cryogenic machining  
Cubic boron nitride (CBN)  
Customisation  
Cutting  
Cutting edge

### Cutting tool

### **D**amage

Damping  
Deburring  
Decision making  
Deep drawing  
Deep hole drilling  
Defect  
Deformation  
Delamination  
Design  
Design method  
Design optimization  
Development  
Diamond  
Diamond coating  
Diamond tool  
Die  
Digital manufacturing system  
Digital twin  
Direct printing  
Disassembly  
Discrete element method  
Distortion correction  
Distributed control  
Distributed design  
Distributed manufacturing  
Dressing  
Drilling  
Drive  
Dynamics  
**E**co-design methodology  
Economics  
Electric vehicle

Electrical discharge machining (EDM)  
 Electro chemical machining (ECM)  
 Electrode  
 Electrolyte jet  
 Electron beam machining (EBM)  
 Emergent synthesis  
 Encoder  
 End milling  
 Energy  
 Energy efficiency  
 Environment(al)  
 Ergonomics  
 Error  
 Etching  
 Evaluation  
 Extrusion  
**F**actory  
 Failure  
 Fatigue  
 Feed  
 Feed drive  
 Feedback  
 Fiber reinforced plastic  
 Finishing  
 Finite element method (FEM)  
 Flatness  
 Flexibility  
 Flexible manufacturing system (FMS)  
 Flow  
 Fluid  
 Force  
 Forging  
 Forming  
 Fracture analysis  
 Free forming  
 Friction  
 Friction stir welding  
 Fuel cell  
 Fused deposition  
 Fuzzy logic  
**G**ear  
 Genetic  
 Geometric modelling  
 Geometry  
 Glass  
 Grinding  
 Grinding wheel  
 Grooving  
**H**andling  
 Haptic device  
 Hard machining  
 Hardening  
 Hardness  
 Heat treatment  
 High strength steel  
 Honing  
 Hot deformation  
 Hot stamping  
 Human aspect  
 Human robot collaboration  
 Hybrid machining  
 Hybrid manufacturing  
 Hydroforming  
**I**dentification  
 Incremental sheet forming  
 Information  
 Injection  
 Innovation management  
 In-process measurement  
 Inspection  
 Integration  
 Interferometry  
 Ion beam machining (IBM)  
**J**oining  
**K**inematic  
 Knowledge based system  
 Knowledge management  
**L**apping  
 Laser  
 Laser beam machining (LBM)  
 Laser micro machining  
 Laser welding  
 Learning  
 Lifecycle  
 Linear motor  
 Logistics  
 Lubrication  
**M**achinability  
 Machine  
 Machine tool  
 Machining  
 Machine learning  
 Magnesium  
 Magnetic bearing  
 Maintenance  
 Management  
 Manipulator  
 Man-machine system  
 Manufacturing  
 Manufacturing network  
 Manufacturing process  
 Manufacturing system  
 Mass customization  
 Material  
 Material removal  
 Measurement  
 Measuring instrument  
 Mechanism  
 Mechatronic  
 MEMS  
 Metal forming  
 Metal matrix composite  
 Methodology  
 Metrology  
 Micro forming  
 Micro machining  
 Micro structure  
 Micro tool  
 Milling  
 Miniaturization  
 Model  
 Modelling  
 Modular design  
 Module  
 Mold (or Mould)  
 Molding (or Moulding)  
 Monitoring  
 Motion  
 Multi-level modelling  
**N**ano indentation  
 Nano manufacturing  
 Nano structure  
 Nano technology  
 Network  
 Neural network  
 Nickel alloy  
**O**bject recognition  
 Observer  
 Open architecture  
 Operations management  
 Optical  
 Optimization  
**P**arallel kinematics  
 Part  
 Pattern recognition  
 Performance  
 Phase transformation  
 Photochemical machining  
 Physical vapour deposition (PVD)  
 Piezoelectric  
 Planning  
 Plate forging  
 Ploughing  
 Polishing  
 Polymer  
 Positioning  
 Powder  
 Precision  
 Predictive model  
 Press  
 Probe  
 Process  
 Process control  
 Processing  
 Product  
 Product development

Production  
 Production planning  
 Productivity  
 Profile  
 Programming  
 Prototyping  
 Punching  
 PVD-coating  
**Q**uality  
 Quality assurance  
 Quality control  
 Quenching  
**R**apid prototyping  
 Rapid tooling  
 Reconfiguration  
 Recycling  
 Reliability  
 Replication  
 Residual stress  
 Reuse  
 Reverse engineering  
 Robot  
 Rolling  
 Roughness  
 Roundness  
**S**afety  
 Scanning electron microscope (SEM)  
 Scanning tunnelling microscopy (STM)  
 Scheduling  
 Selective laser melting (SLM)  
 Selective laser sintering (SLS)  
 Semiconductor  
 Sensor  
 Sequencing  
 Service  
 Servo system  
 Shape memory alloy  
 Sheet metal  
 Silicon  
 Silicon carbide  
 Simulation  
 Single crystal  
 Sintering  
 Soldering  
 Spindle  
 Spline  
 Springback  
 Stability  
 Stainless steel  
 Stamping  
 Standardization  
 Statistical process control (SPC)  
 Steel  
 Stereo lithography  
 Stiffness  
 Straightness  
 Strain  
 Stress  
 Structural analysis  
 Structure  
 Super abrasive  
 Surface  
 Surface analysis  
 Surface integrity  
 Surface modification  
 Sustainable development  
 Sustainable machining  
 Synthesis  
 System  
 System architecture  
**T**apping  
 Temperature  
 Tensile strength  
 Texture  
 Thermal effect  
 Thermal error  
 Titanium  
 Tolerancing  
 Tool  
 Tool geometry  
 Tool path  
 Topography  
 Tribology  
 Turning  
**U**ltra precision  
 Ultra-high strength steel  
 Ultrasonic  
 Uncertainty  
**V**ibration  
 Virtual reality  
 Visual inspection  
**W**afer  
 Waterjet machining  
 Wear  
 Welding  
 White layer  
 Wind energy  
 Wire EDM  
 Workpiece  
**X**-ray  
**Y**  
**Z**