



CIRP UNIFIED KEYWORD LIST

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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 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

3D-Image processing

Abrasion

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
Axiomatic

Ball

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

Calibration

Carbide
Casting
Centerless
Ceramic
Chatter
Chemical vapor deposition (CVD)
Chip
CO₂ emission
Coating
Cognitive Robotics
Cold forming
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

Damage

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
Direct printing
Disassembly
Distortion correction
Distributed control
Distributed design
Distributed manufacturing
Dressing
Drilling
Drive
Dynamics

Eco-design methodology

Economics
Electric vehicle
Electrical discharge machining (EDM)

Electro chemical machining (ECM)
 Electrode
 Electroforming
 Electrolyte jet
 Electron beam machining (EBM)
 Emergent synthesis
 Encoder
 End milling
 Energy
 Energy efficiency
 Environment(al)
 Ergonomics
 Error
 Etching
 Evaluation
 Extrusion
Factory
 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
Gear
 Genetic
 Geometric modelling
 Geometry
 Glass
 Grinding
 Grinding Wheel
 Grooving
Handling
 Haptic device
 Hard machining
 Hardening
 Hardness
 Health care
 Heat treatment
 High strength steel
 Honing
 Hot deformation
 Hot stamping
 Human aspect
 Hybrid assembly system
 Hybrid machining
 Hydroforming
Identification
 Incremental sheet forming
 Information
 Injection
 Innovation management
 In-process measurement
 Inspection
 Integration
 Interferometry
 Ion beam machining (IBM)
Joining
Kinematic
 Knowledge based system
 Knowledge management
Lapping
 Laser
 Laser beam machining (LBM)
 Laser micro machining
 Laser welding
 Learning
 Lifecycle
 Linear motor
 Logistics
 Lubrication
Machinability
 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)
 Molecular dynamics
 Monitoring
 Motion
 Multi-level modelling
Nano indentation
 Nano manufacturing
 Nano structure
 Nano technology
 Nano tube
 Network
 Neural network
 Nickel alloy
Object recognition
 Observer
 Open architecture
 Operations management
 Optical
 Optimization
Parallel kinematics
 Part
 Pattern recognition
 Performance
 Phase transformation
 Photochemical machining
 Physical vapour deposition (PVD)
 Piezoelectric
 Planning
 Plastic
 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
Quality
 Quality assurance
 Quality control
 Quenching
Rapid prototyping
 Rapid tooling
 Reconfiguration
 Recycling
 Reliability
 Removal rate
 Replication
 Residual stress
 Reuse
 Reverse engineering
 Robot
 Rolling
 Roughness
 Roundness
Safety
 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
Tapping
 Temperature
 Tensile strength
 Texture
 Thermal effects
 Thermal error
 Titanium
 Tolerancing
 Tool
 Tool geometry
 Tool path
 Topography
 Tribology
 Turning
Ultra precision
 Ultra-high strength steel
 Ultrasonic
 Uncertainty
Vibration
 Virtual reality
 Visual inspection
Wafer
 Waterjet machining
 Wear
 Welding
 White layer
 Wind energy
 Wire EDM
 Workpiece
X-ray
Y
Z