Technology: Risk Assessment Title: **Rapid Prototyping (3D Printing) Machines** SEPTEMBER2015

**This is a generic Risk Assessment that must be modified to suit your place of work**. The Risk Assessment modifications should take into consideration the activity, age/stage/pupil ability, department/working environment and the experience of the teacher in charge. If Control Measures Required as described are implemented the risk is reduced to an acceptable level for mainstream students.

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| **Identify the Hazards** | **Who is at Risk?** | **What is the Harm?** | **Activity Taking Place** | **Control Measures Required** | **Additional Information** |
| Employees and learners should be made aware of the following hazards.  1. Electric Shock  2. Cable Trip Hazard  3. Inhalation of Fumes  4. Exposure to Toxic Materials  5. Ultraviolet Light  6. Unauthorised Use  7. Closing Movements Trapping Fingers  8. Skin Burns | Technology teachers, technicians and students  Technology teachers, technicians and students  Technology teachers, technicians and students  Technology teachers, technicians and students  Technology teachers, technicians and students  User  Technology teachers, technicians and students  Technology teachers, technicians and students | **Damaged cables can lead to the risk of electrocution.**  **Mains cable and USB cables present a trip hazard around the machine.**  **Toxic fumes can affect respiratory sensitization.**  **Toxic materials can affect sensitive skin and allergies.**  **Excessive short term exposure to ultraviolet light can lead to both skin and eye damage.**  **Unauthorised use.**  **Fingers can be trapped between door and machine casing.**  **Heated plastics can lead to skin burns on finger tips and hands when touching.** | Rapid prototyping  Rapid prototyping  Rapid prototyping  Rapid prototyping  Rapid prototyping  Rapid prototyping  Rapid prototyping  Rapid prototyping | Power cables should be regularly checked to ensure that they are undamaged. The machine should be included in a planned maintenance programme that should include electrical safety inspections and tests.  Cables should be routed behind the machine or away from used walkways.  If fumes are produced that cannot be removed with general classroom ventilation, LEV should be provided. It is not anticipated that school 3D printers will produce damaging toxic fumes. Time must be given after manufacture for the product to cool down and fumes to disperse.  Toxic materials which present an unacceptable risk should not be used in then department. A safer alternative should be selected instead.  Rapid prototyping printing machines should be light tight boxes that suitably shield the user. The user must be instructed not to look directly into the laser light. No modifications to shielding doors or guards may be made.  The 3D printer should be switched off when not in use. If the machine is being left on over break or lunchtime, clear signage should be present for the machine not to be touched or interfered with, especially if the model type has no outer guarding.  The prototyping machine should have interlocked doors and access areas – machine power is stopped when any door is opened.  The operator’s fingers cannot be trapped by moving parts. If the machine has no outer guarding clear signage should be present to highlight the risk of finger trapping.  When completed some 3D models can still have heat in them depending on the material used and the manufacture time. Allow to cool. If the model blobs together and requires removal, turn the power off and again allow cooling before removal. | Reference BS 4163:2014  Manufacturer’s instruction guide should be followed and kept within the department for future reference.  The risk of electric shock is reduced by good maintenance.  Best practice is to use a ceiling mounted drop down socket which also removes the mains cable tripping hazard.  Where an effective LEV system is not in place, a dust mask conforming to BS EN 149:2001+A1:2009 class FFP3 should be used.  3D prototypes should not be used with young children or pupils who are likely to put models in their mouths.  Ultraviolet light has a potential for harm at wavelengths greater than 180 nm.  If the 3D printer has no enclosure on the printing mechanism, students must be informed to keep fingers and hands away from moving parts whilst the machine is operational. |
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