Assignment 1 – Alex Bartella - 400308868

1.

a) Design for assembly is the principle of designing a part for ease of assembly. Key factors include reducing the number of components, standardization of components, reducing number of fasteners, reducing tangling of components, correct orientation of part being obvious or omnidirectional, reducing the need for re-orientation of part during assembly/manufacturing.

b) Gears – omnidirectional & single-component.

Tupperware – designed to snap on & off using built-in fasteners rather than screwing the top on and off like a jar.

Sony Walkman – designed for top-down assembly, no re-orientation needed.

NW-WM1AM2

2.

a) Ease of use/setup, portability, durability, safety, cost, maintenance

b)

	Ease of use	Portability	Durability	Safety	Cost	Maintenance	Total
Weight (5)	4	3	4	5	2	2	/
Design #1	1	2	3	4	5	1	54

3.

Interference fit for steel shaft: use "s" column.

Basic Size = 44 mm

Interference – medium drive fit: H7/s6.

Shaft:

$$d_{max} = d + \delta + \Delta d; \quad d_{min} = d + \delta$$
$$\delta = +0.043 \quad \text{from table A-12}$$
$$\Delta d = 0.016 \quad \text{from table A-11}$$
$$d_{max} = 44 + 0.043 + 0.016 \qquad d_{min} = 44 + 0.043$$
$$d_{max} = 44.059\ mm \qquad d_{min} = 44.043\ mm$$

Hole:

$$D_{max} = D + \Delta D; \quad D_{min} = D$$
$$\Delta D = 0.025$$
$$D_{max} = 44 + 0.025 = 44.025\ mm$$
$$D_{min} = 44\ mm$$

4.

Drill press

Description: a drill press is a large machine composed of a base, table, column, spindle, and drill head. Its function is to drill and bore holes into a material at a precise angle. Common features of a drill press include adjustable table for drilling at various angles, depth stop for drilling to an exact depth, drill head speed control which is adjusted depending on various factors for achieving the cleanest hole, and sometimes a laser guide.

Primary Function

- Making holes at a precise angle (angle can be adjusted).

Secondary Function

- Countersinking holes.

Tertiary Function

- Tapping and cutting material using specialized bits.

Hazard analysis:

- Mechanical: clothing and hair can get caught in the many rotating parts of the drill press.
- Mechanical: rotation of drill bit can case shards of material or shavings to be thrown into the air, potential hazard for eyes and exposed skin.
- Vibration of the machine can occur during operation.
- Heat: parts of the machine may be become hot during operation, can cause burns if touched.
- Heat: material which is/was being drilled and shavings can be hot.

Labeling Analysis

- Wear eye protection (due to flyaway shavings and debris)

- Do not wear gloves, rings, bracelets, or loose clothing (due to spinning parts)

- Hair must be protected or tied back (due to spinning parts)

- Caution: hot surface (due to parts like the drill bit heating up)