Oxford Cambridge and RSA

Wednesday 12 June 2024 – Morning

A Level in Design and Technology: Product Design

H406/02 Problem Solving in Product Design

Resource Booklet

Time allowed: 1 hour 45 minutes

1338426959

INSTRUCTIONS

- Use this Resource Booklet to answer **all** the questions.
- You should spend **35 minutes** reading this Resource Booklet.
- Do **not** send this Resource Booklet for marking. Keep it in the centre or recycle it.

INFORMATION

- This document has **8** pages.

ADVICE

- Read this Resource Booklet carefully **before** you start your answers.

The stimulus in this booklet relates to issues and opportunities that may be encountered by designers and manufacturers of home video making equipment and accessories.

Home Video Making

The number of digital video viewers worldwide grew from 3 billion people in 2020 to 3.5 billion people in 2023 with people watching an average of 17 hours of online videos per week.

This growth in demand, as well as the rise of social media, has led to a boom in home video making. 52% of people are more likely to share video content than any other types of content.

Modern mobile phones feature 4 K high resolution video recording capability with high frame rates. Along with improvements in both audio recording quality and low light performance, mobile phones have become the most popular solution for many home video makers.

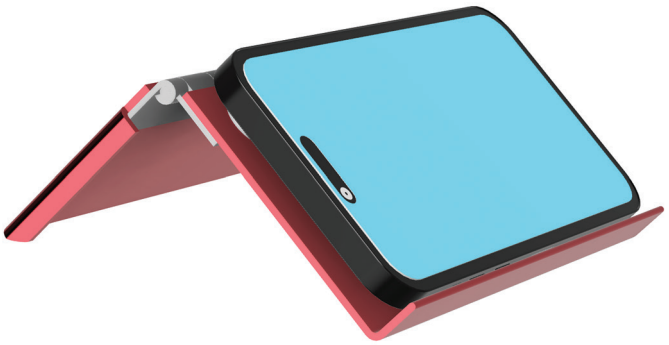
Fig. 1

Examples of home video makers:

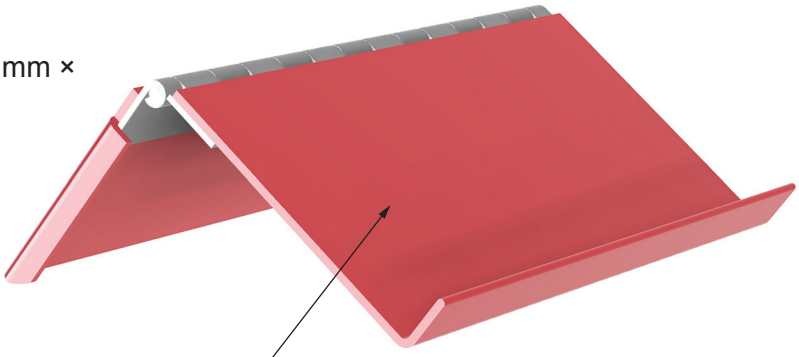
Fig. 2

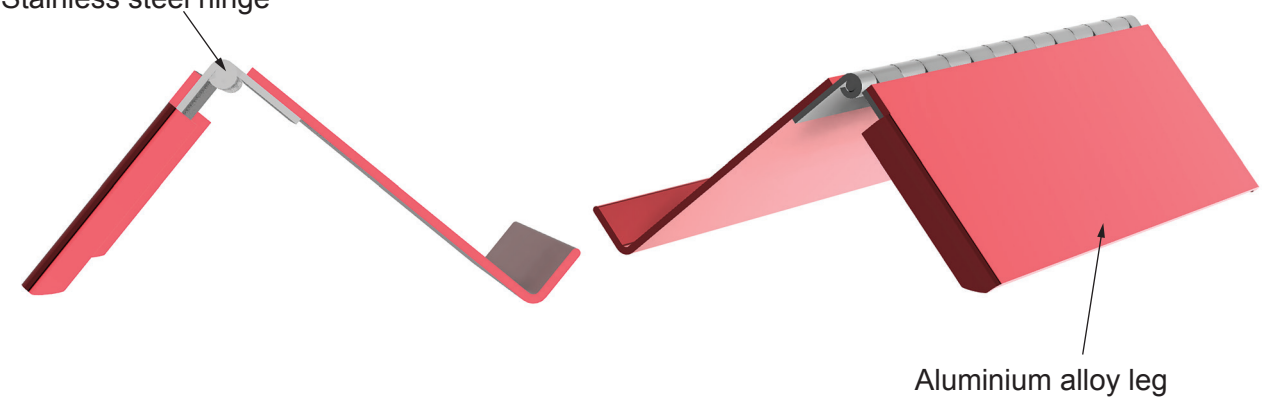
Videotech iStand concept design:

The product designers of a startup company called Videotech have a concept design for an entry level compact lightweight mobile phone stand. The design supports the mobile phone for video making. The design concept is called iStand.

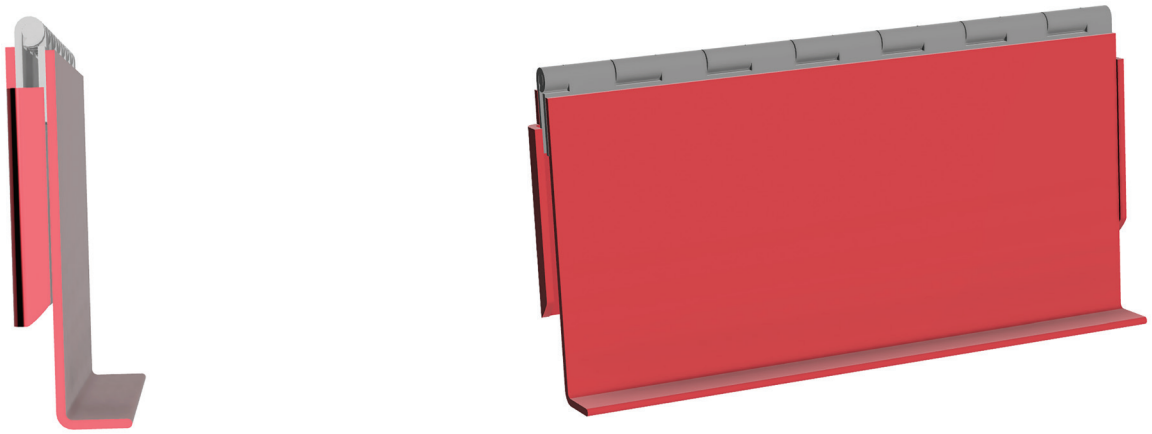


- Supports mobile phones up to 150 mm × 80 mm × 15 mm
- Weight: 150 g
- Anodised surface finish





Leg closed for storage and transportation:



Influencers and Vlogging

Vlogging is what influencers do when they log short videos on a personal website or social media account.

Accessories

A large number of products are available to influencers when using mobile phones for vlogging in order to improve the quality of recordings. Typical products are shown in **Fig. 3**.

Fig. 3

Typical products used for vlogging:

LED light source:
- Adjustable light intensity to illuminate the face or the subject in a range of ambient lighting conditions

Mobile phone

Mount and bracket:
- Attaches mobile phone to tripod
- Provides position adjustment of mobile phone

Camera tripod:
- Provides height adjustment
- Legs fold to reduce size for storage
- Lightweight materials used for portability
- Dark colour and matte texture reduce light reflections

Typical cost: £65
Typical weight: 3 kg

Vlogging Stands

There is consumer demand for compact products that integrate all of the features of these video products into a single solution. These solutions are known as vlogging stands.

Videotech product designers are particularly interested in responding to market pull for compact integrated solutions that also support two mobile phones. One phone would record the face of the vlogger and one phone would record the activity they are doing with their hands.

Two compact integrated solutions are made by a rival competitor. They are shown in **Fig. 4** and **Fig. 5**. Both solutions will be analysed as part of a feasibility study.

Fig. 4

Vizion live stand:

£74.99
Weight: 5 kg

Features:

- Telescopic pole and arms
- High power light output
- Mains electrical connection 240V ac
- 3 colour temperatures: cold, natural, warm
- Iron base
- Aluminium alloy pole and arms

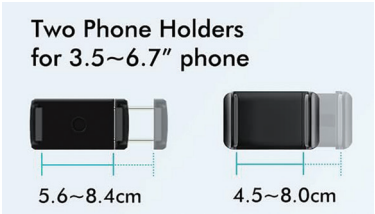


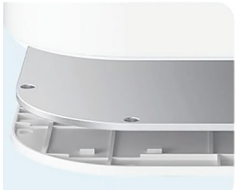
Fig. 5

Vizion selfie stand:

£59.99
Weight: 3 kg

Features:

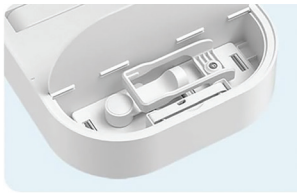
- All-in-one foldable design
- Suitable for indoor and outdoor use
- Up to 12-hour charge
- Uses USB charging cable
- 3 colour temperatures: cold, natural, warm
- 5 brightness levels
- 270° rotatable phone holders



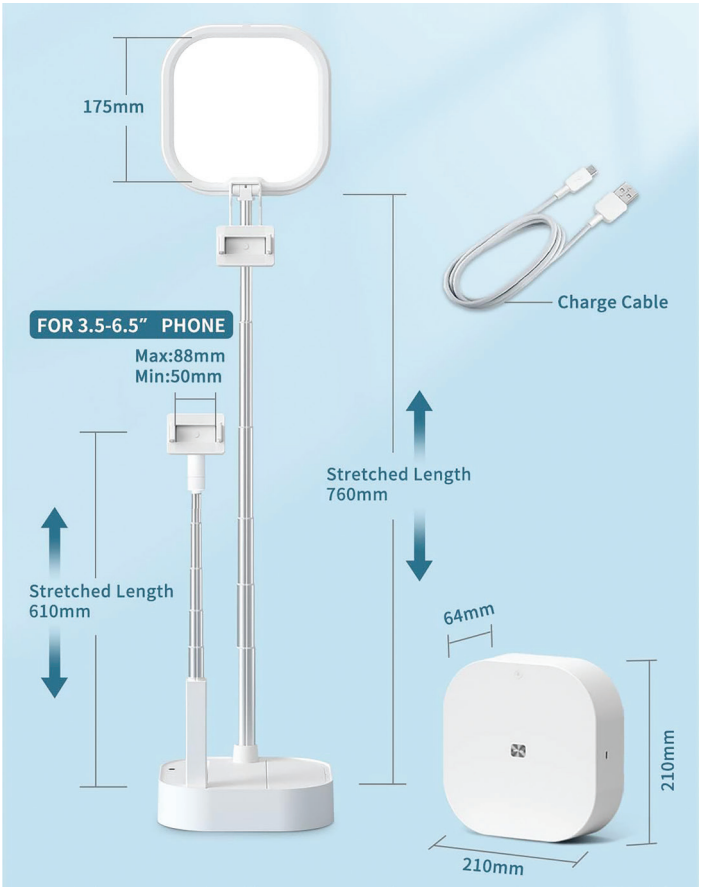
Alloy counterweight base

Zinc alloy telescopic rod

Pivoting shaft



Side box storage



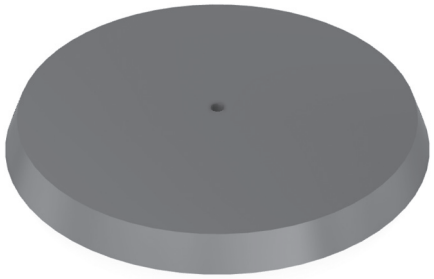
Design Feasibility

When tested, the Vizion live stand can tip over when fully extended with heavy mobile phones.

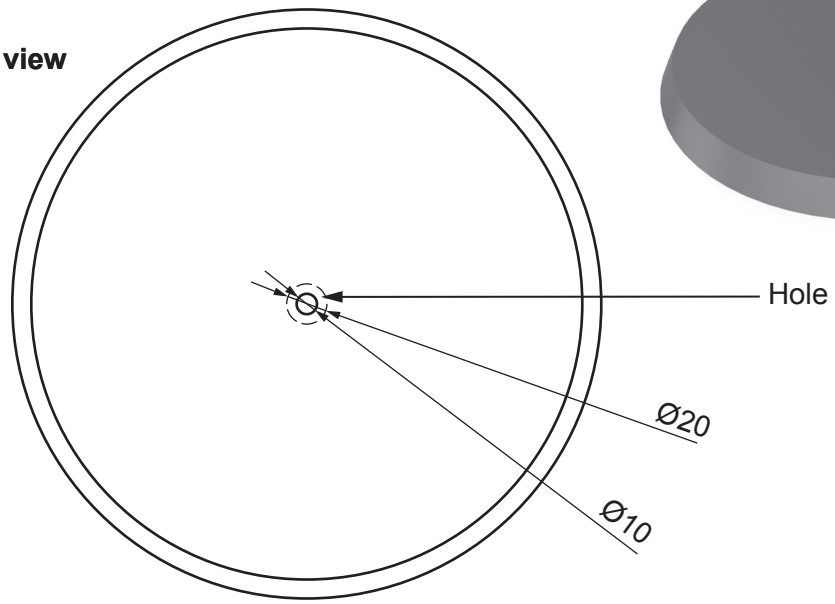
A designer has developed the following cast iron base to increase stability.

Fig. 6

Cast iron base for Vizion Live Stand:

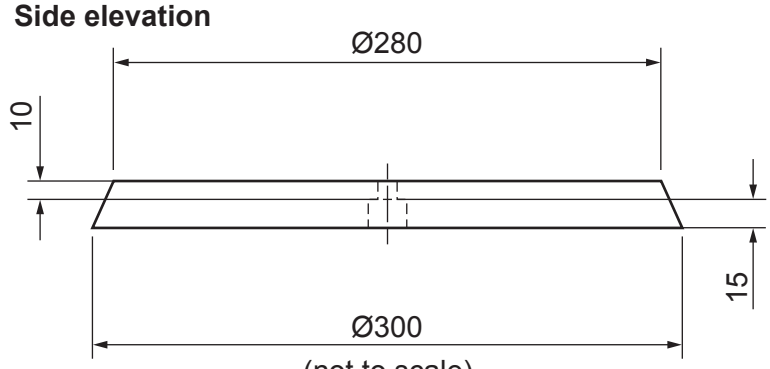


Plan view



(not to scale)

Side elevation



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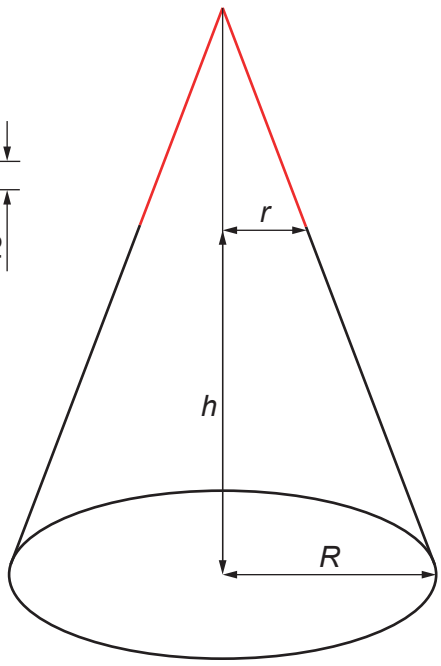
All dimensions mms



Volume of a truncated cone:

$$\textit{Volume of a truncated cone} = \frac{1}{3}\pi h(Rr + R^2 + r^2)$$

Where: r is the smallest radius
R is the largest radius
h is the height

Artificial Intelligence (AI)

Videotech designers have identified a need for a vlogging stand to be used by dancers for social media videos.

One designer used AI to generate an initial concept shown in **Fig. 7**. Unfortunately, the design generated is not complete leaving the designer with some problems to overcome.

Fig. 7