







# **Hard drive Teardown**

**flying heads, voice coil  
motors, amazingly smooth  
surfaces & signal processing**

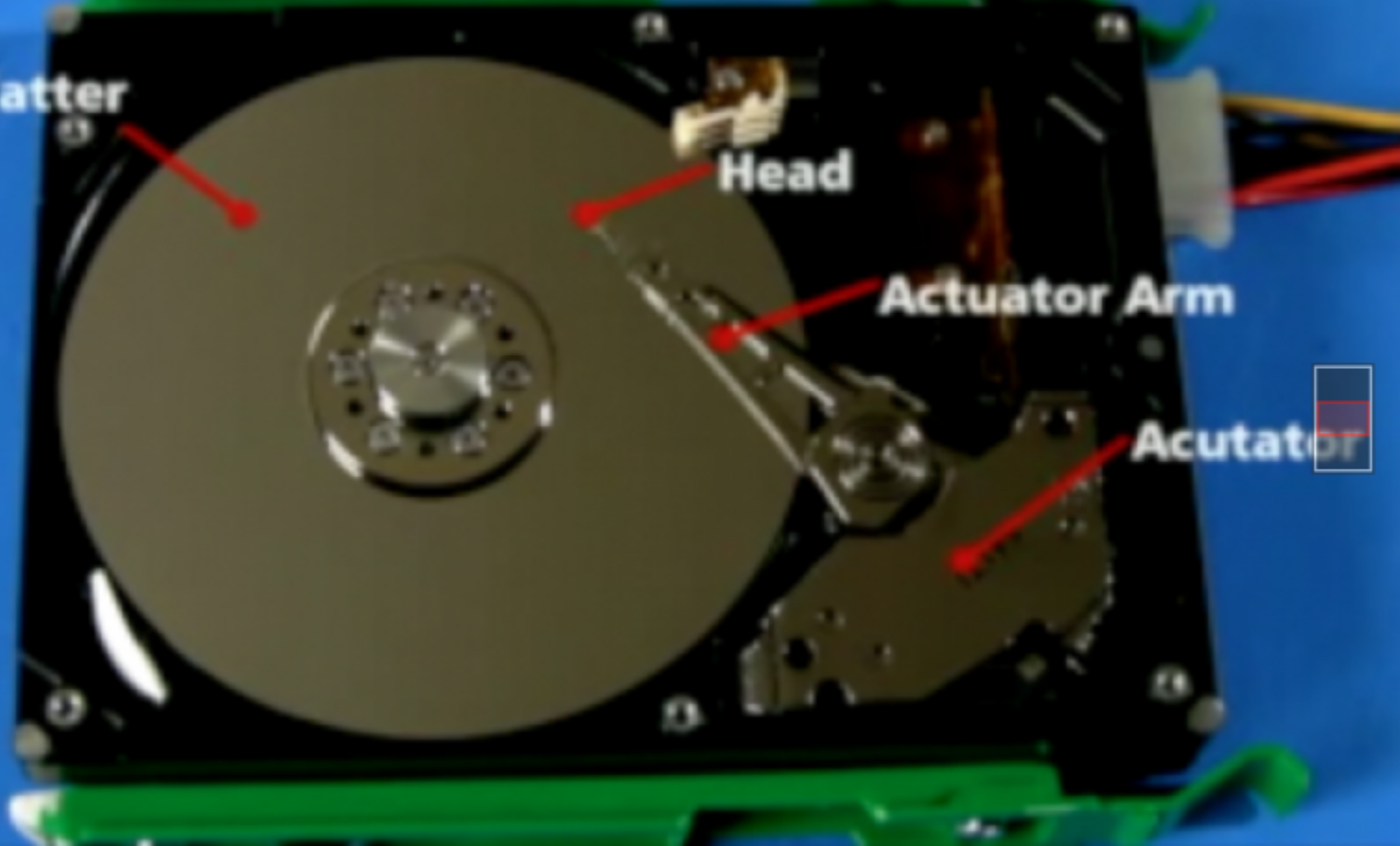
**series 3 | engineerguy videos**

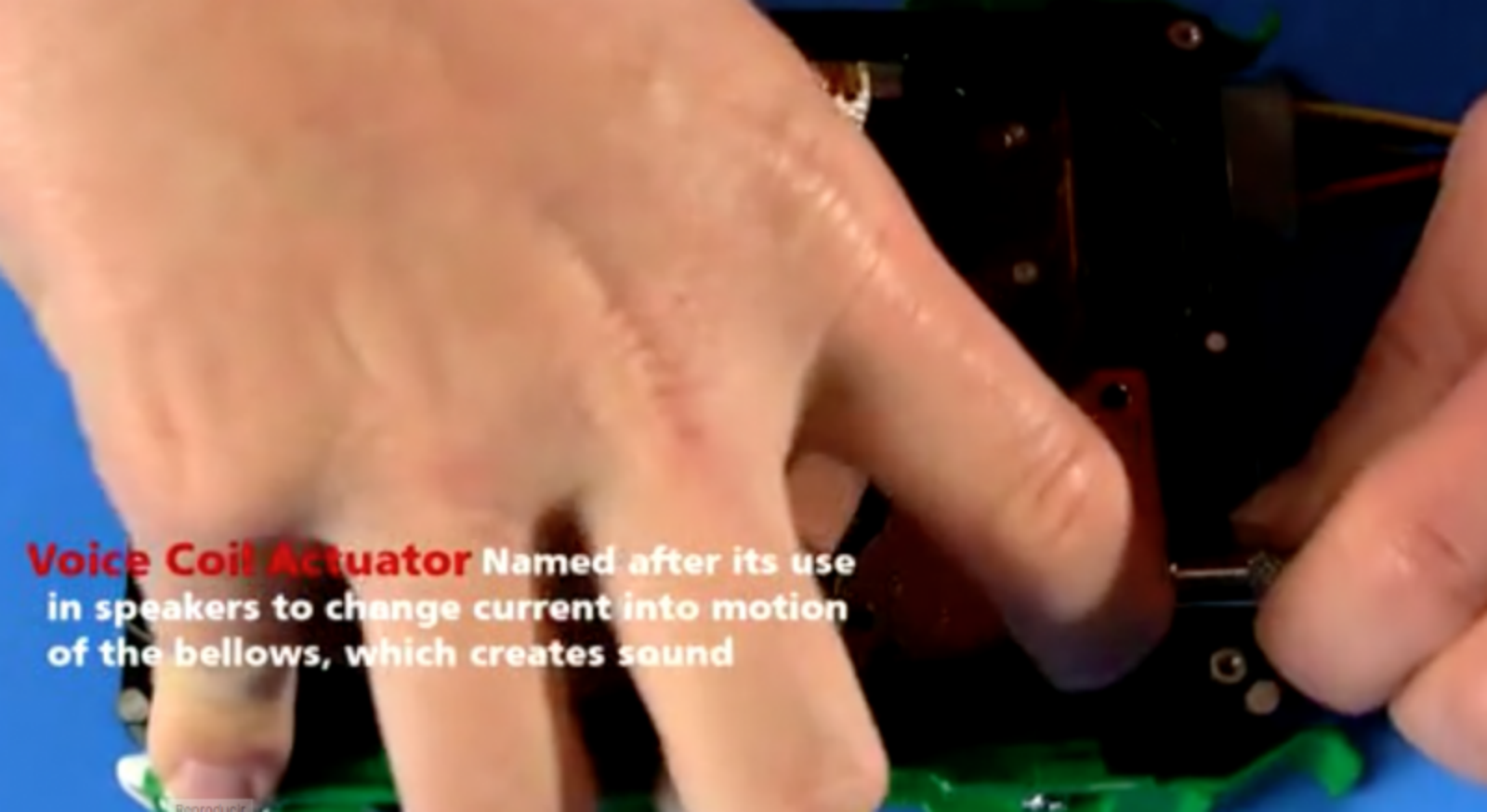
**Platter**

**Head**

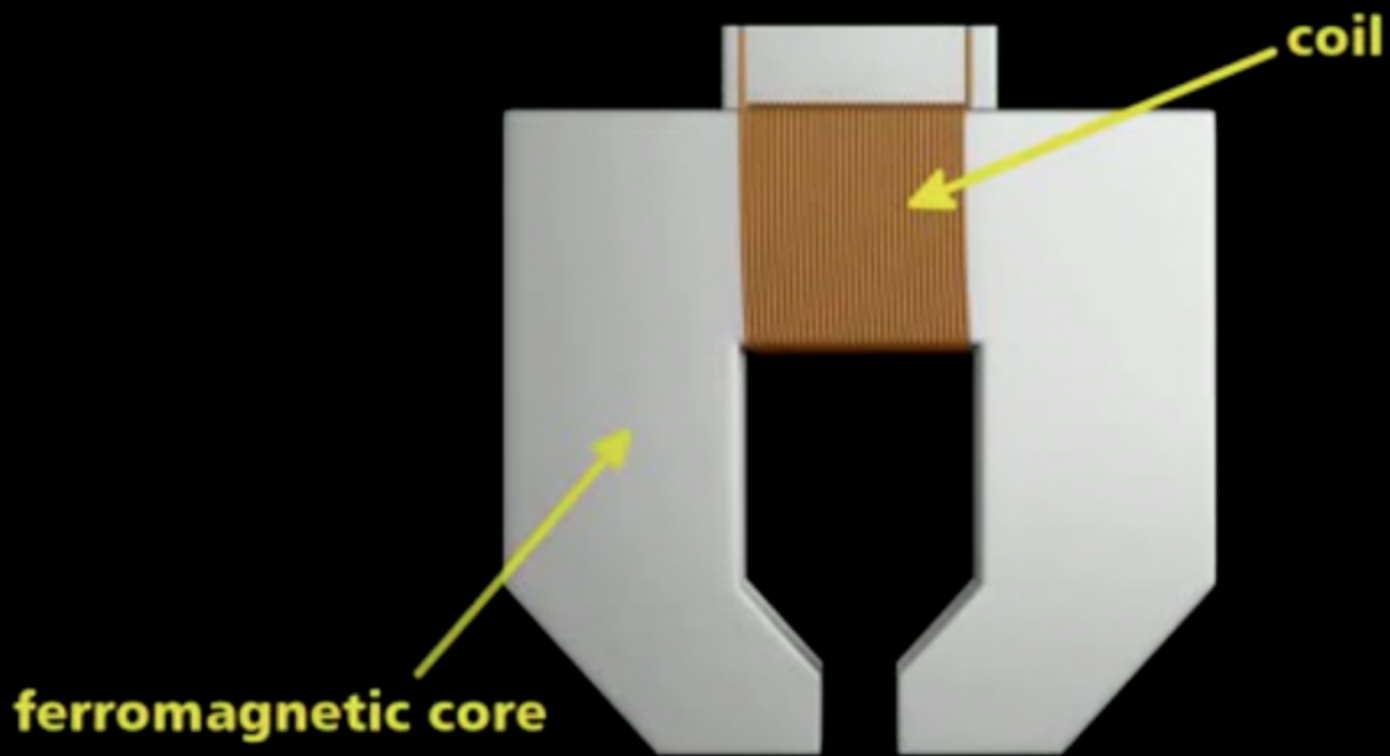
**Actuator Arm**

**Actuator**



A close-up photograph of a person's hand holding a small, dark-colored mechanical component. The component has a cylindrical shape with a central shaft and some internal wiring or structure visible. The background is a solid blue color. The text is overlaid on the lower-left portion of the image.

**Voice Coil Actuator** Named after its use in speakers to change current into motion of the bellows, which creates sound





**Faraday's Law** The EMF (electromotive force) generated is proportional to the rate of change of the magnetic flux

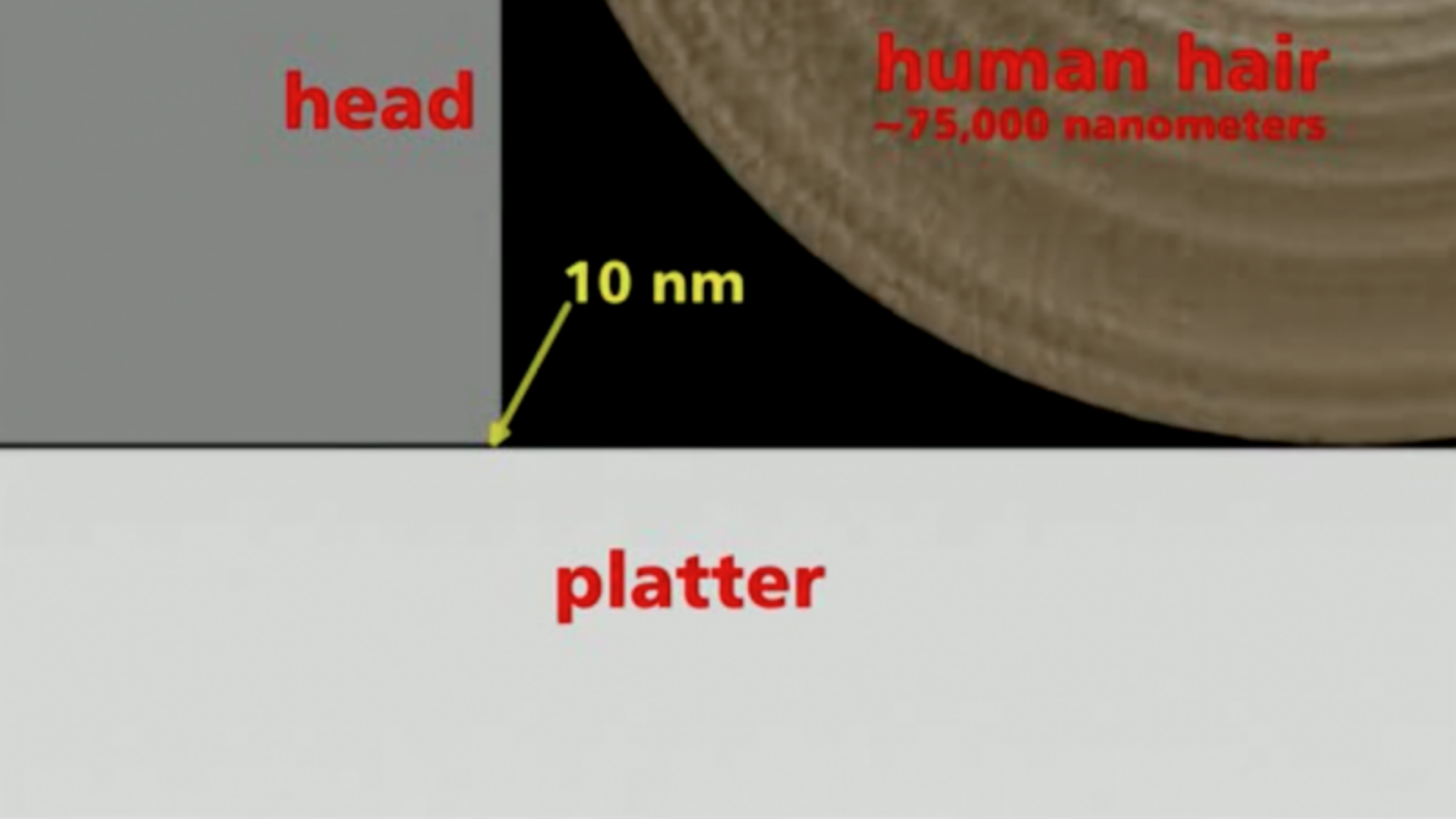


**head**

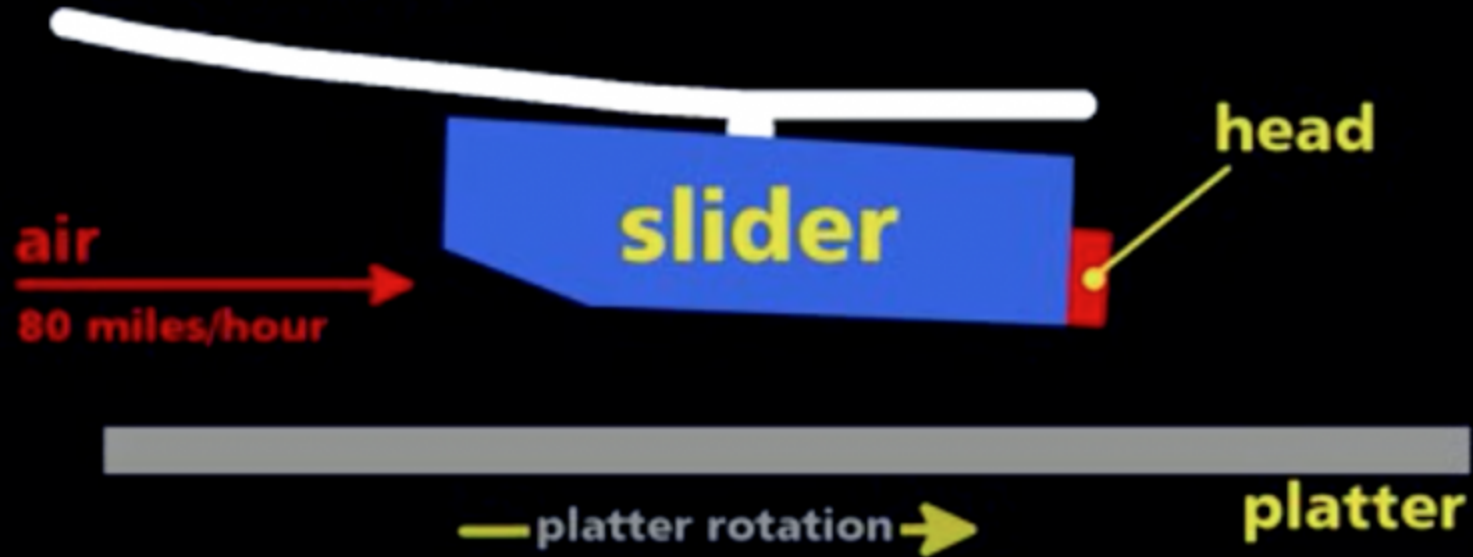
**human hair**  
~75,000 nanometers

**10 nm**

**platter**



**Suspension**



**head**

**slider**

**air**  
80 miles/hour

**platter rotation**

**platter**

## Carbon Overcoat

tough layer with lubricant  
to reduce wear

## Magnetic Layer

## Chromium

## Aluminium

low density, rigid,  
& low cost

## Cobalt with platinum & nickel

Sputtered onto chromium, which provides  
grained surface that is replicated in magnetic  
layer, which helps reduce signal noise

# Platter

The diagram illustrates the layered structure of a hard drive platter. It consists of five concentric layers, each represented by a colored disk with a central hole. From the bottom-most layer to the top-most, the layers are: Aluminium (light blue), Chromium (purple), Cobalt with platinum & nickel (teal), Magnetic Layer (teal), and Carbon Overcoat (olive green). The layers are shown overlapping to show their relative positions. A red arrow points from the text 'Cobalt with platinum & nickel' to the corresponding layer.

# Partial Response Maximum Likelihood

**010111**

**001111**

