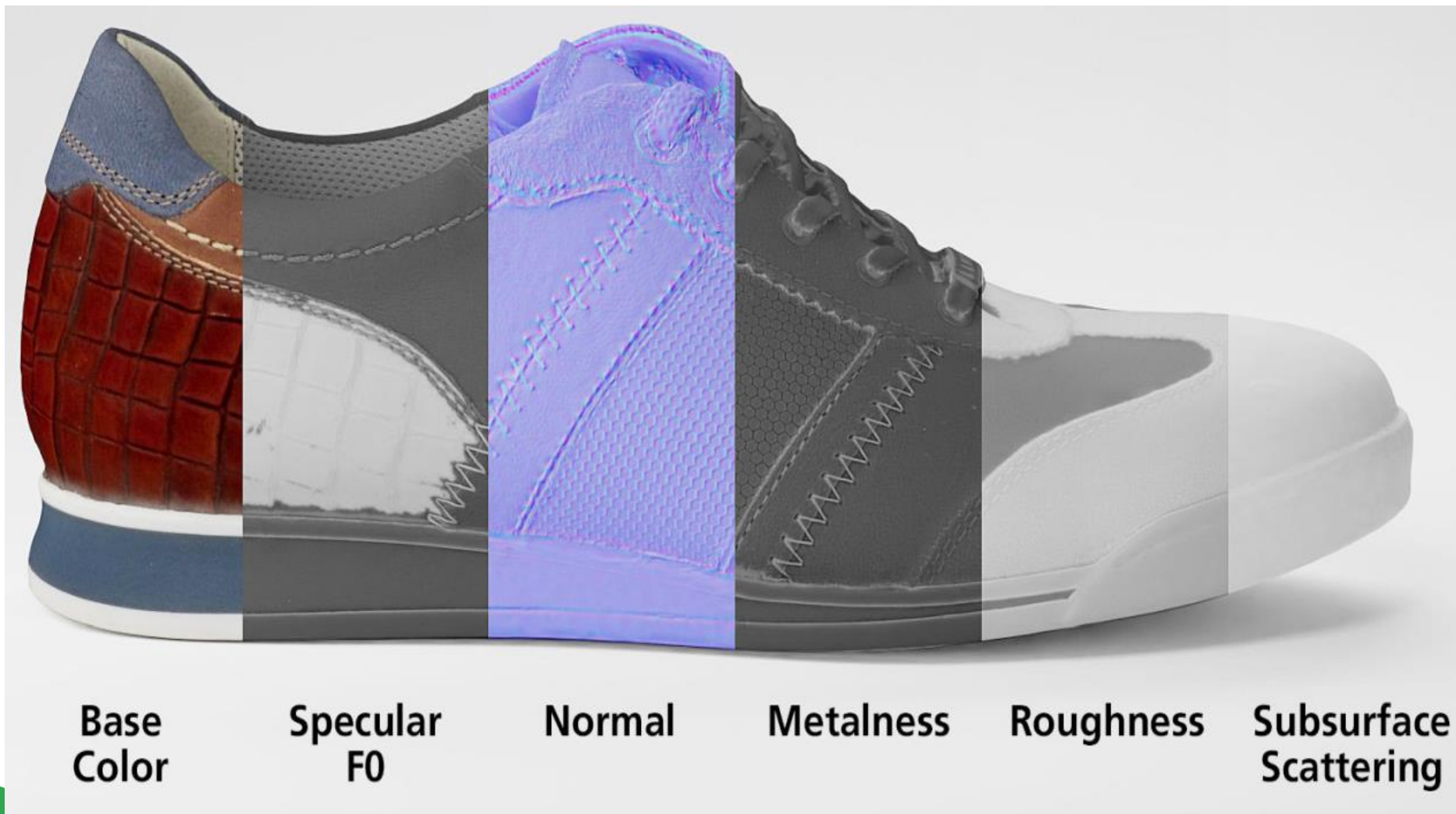# Automating the 3D Processing Pipeline:
From 3D Scan to Efficient Online & AR Presentation

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Khronos glTF BOF
Los Angeles, July 31st, 2019

A 3D-Scanned Example Asset for E-Commerce (ZEISS RealScan)

Base Color   **Specular F0**   **Normal**   **Metalness**   **Roughness**   **Subsurface Scattering**

Making 3D Accessible.

Nice… are we ready to render then?

Base Color | Specular F0 | Normal | Metalness | Roughness | Subsurface Scattering

- 3D scan output: Detailed OBJ or glTF, high-res textures, 100K polygons

- **Too heavy** for many cases

- Best target rate depends on the final application!

  ➔ Comparable 2D Example:
  "From RAW image to JPEG in desired target resolution"

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3D Mesh Processing, Compression

Part I: 3D Mesh Reduction

- Simplify mesh
- Unwrap & create UV atlas
- Bake maps (color, normals, RMA, …)

Part II: 3D Mesh Compression
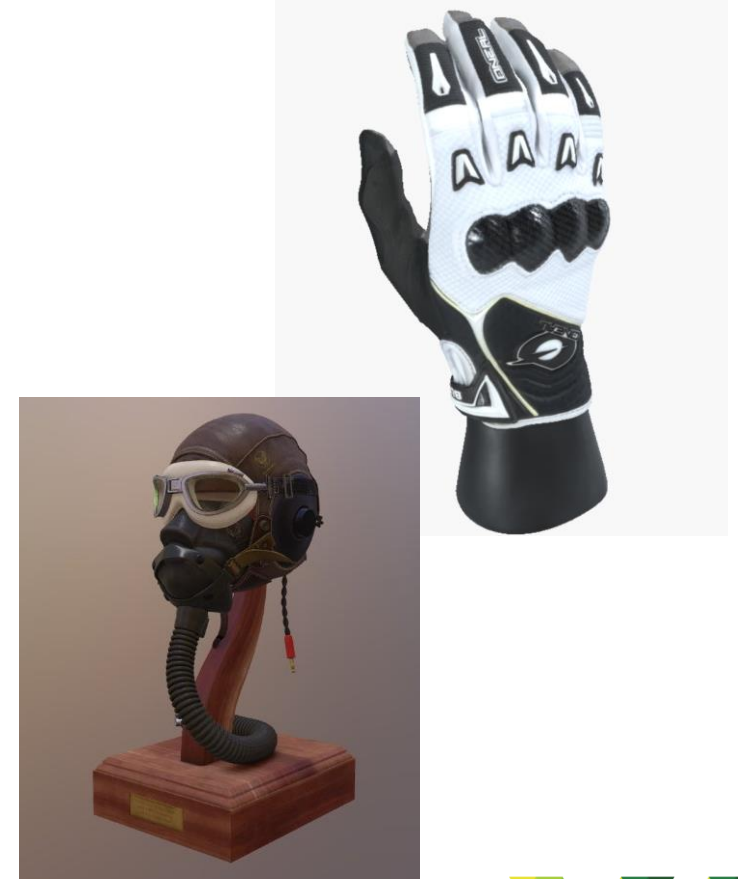
- Draco for geometry
- KTX2/Basis for textures

Case Study:
glTF with Draco + Basis via KTX2

- Goals:
  - Evaluate texture / geometry footprints
  - Encoding / decoding performance
  - Visual quality

- Offline Optimizer: **DGG RapidCompact**

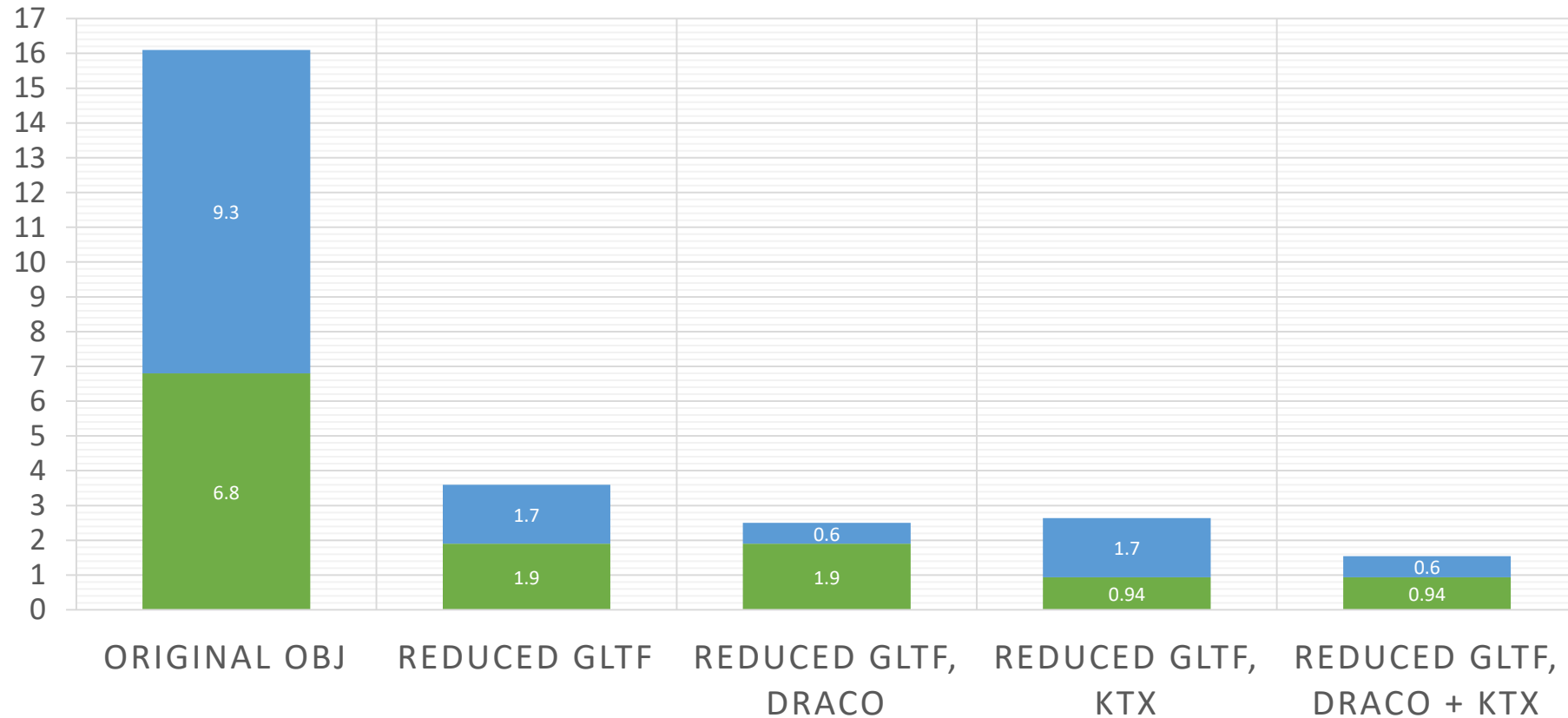- Online Engine & Renderer: **Babylon.js**

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Case Study: Glove

Uncompressed Texture

KTX2 (Basis)

Case Study: Glove

ASSET SIZE (MB)

■ Textures   ■ Geometry

Category	Textures	Geometry
ORIGINAL OBJ	6.8	9.3
REDUCED GLTF	1.9	1.7
REDUCED GLTF, DRACO	1.9	0.6
REDUCED GLTF, KTX	0.94	1.7
REDUCED GLTF, DRACO + KTX	0.94	0.6

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Case Study: Flight Helmet

Asset Size (MB)

Chart showing asset sizes for three encoding methods: glTF + PNG Images (~50 MB total), glTF + JPG Images (~13 MB total), and glTF + KTX2 Images (~5.5 MB total). Each bar is stacked with Geometry (Draco), Base Color Tex, Normal Tex, and RMA Tex.

- Geometry (Draco)
- Base Color Tex
- Normal Tex
- RMA Tex

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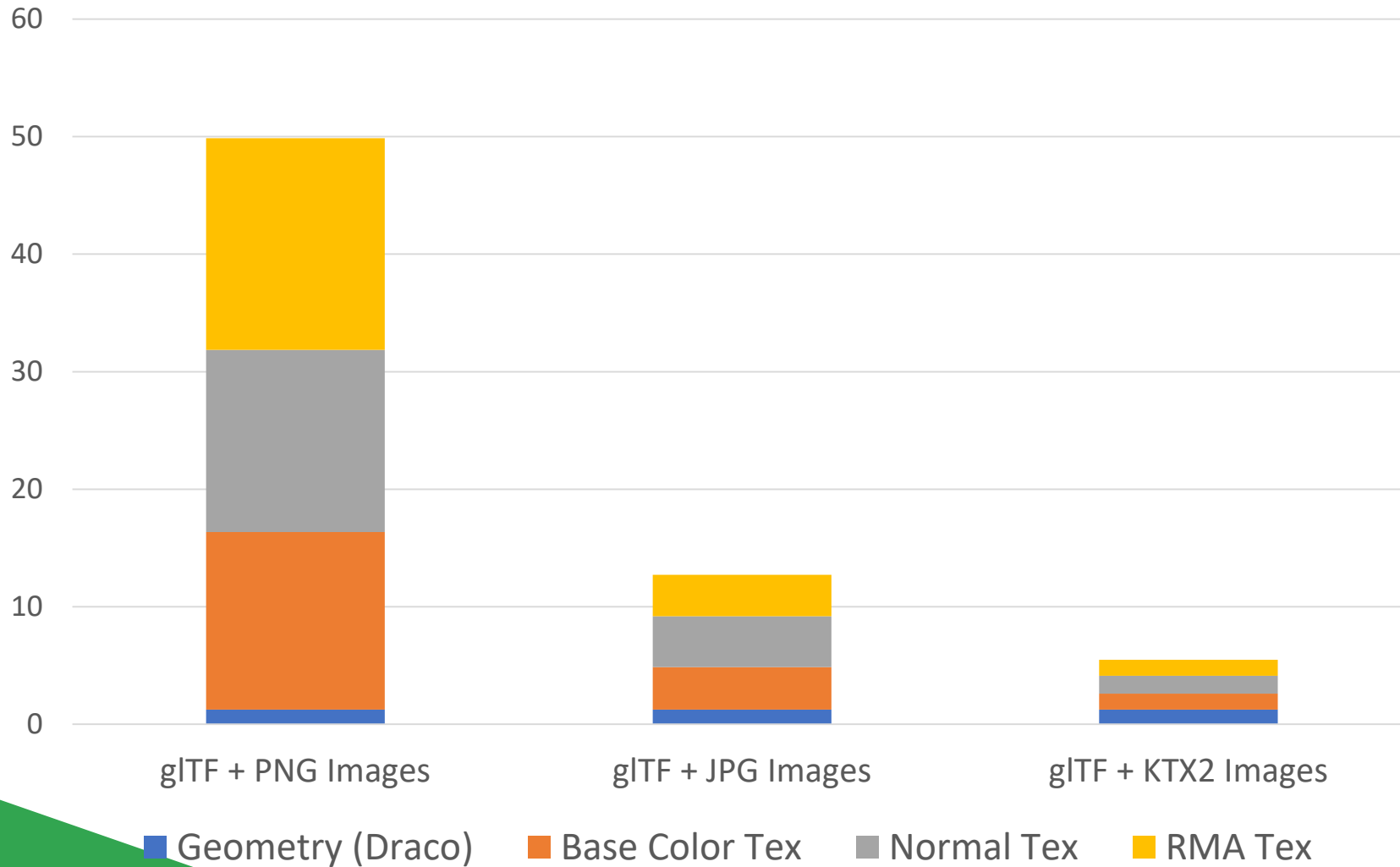
Case Study: Flight Helmet

- From ~50MB PNG to ~12MB JPG / ~6MB KTX2

- Encode time (compression + storage):

    JPG (jpge):   1.052 sec

    KTX*   : 73.101 sec

    System: AMD Ryzen 7 2700X / 8 Cores @ 3.7 Ghz
            32 GB RAM, Windows 10 (64 bit)

- Decode time: Neglectable

*: we performed a slight modification to the KTX SDK to allow us to enable multithreaded Basis compression. The number above reflects that change and would be considerably worse without it.

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DGG Case Study:
3D Automation in E-Commerce

- Sign up until **August 18, 2019**!

  http://dgg3d.com/ecom

- **What you provide**:
    - 1-3 of your 3D models (3D Scan or CAD)
    - Brief description: How'd you like to see them? (AR, VR, Web)
    - Feedback on the results (1 minute survey)

- **What you will get**:
    - PDF report with before/after comparisons & stats
      (sizes, mesh stats, processing time)
    - Web- and AR-ready versions of your data (glTF, OBJ, USDZ)
    - Embeddable 3D Web demos and AR demos

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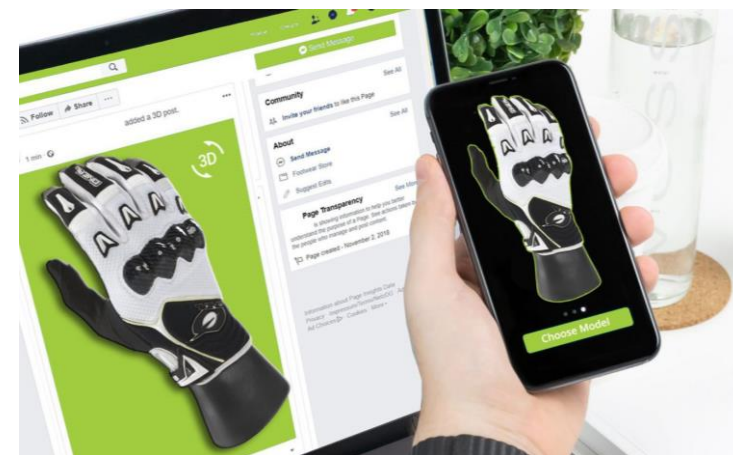
Thanks To …

- Binomial Team (Basis)
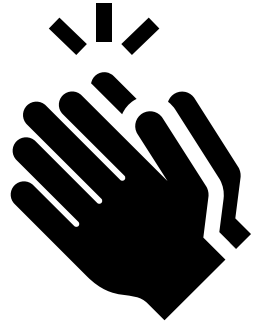
- Marc Callow & KTX Tools Team

- Microsoft Babylon.js Team
  - Gary Hsu
  - Trevor Baron

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Original Model
Courtesy: O'Neal/ZEISS

Base Color | Specular F0 | Normal | Metalness | Roughness | Subsurface Scattering
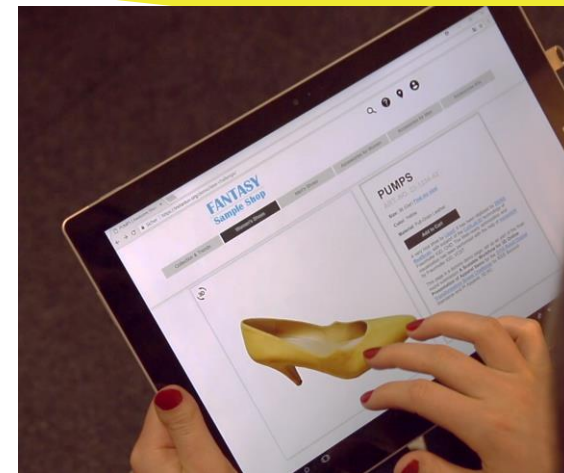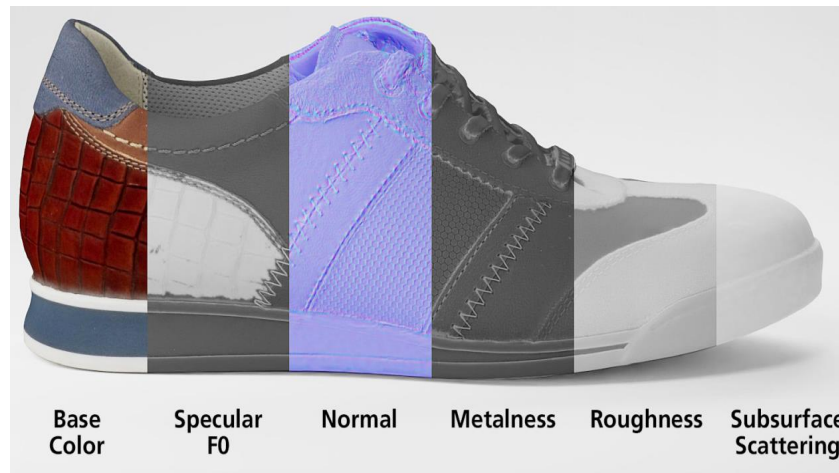
Thanks for Your Attention!

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