

Virtual Background — Production & Compositing Cheat Sheet

Fora Soft Learn · AI for Video Engineering

1 · The composite formula (the 'over' operator, Porter & Duff 1984)

output = fg × alpha + bg × (1 - alpha) -- mix you and the new bg per pixel.
 alpha = how much of YOU to keep (1 = all you, 0 = all background).
 Example: 200 × 0.6 + 50 × 0.4 = 140 → a smooth blend, not a jagged cut.

Keep fg and bg in the SAME alpha convention or you get an edge halo.

2 · Why replacement looks faker than blur: 3 seams + fixes

Hard cookie-cutter edge	feather the alpha + alpha matte (keeps hair)
Lighting / colour mismatch	colour-match + light wrapping (bg light on edges)
Green spill (green screen)	spill suppression — neutralise green-tinted edges

3 · Green screen? The chroma-key cheat code

- No green screen: ML segmentation guesses your outline — needs a capable CPU/GPU.
- Green screen: chroma key finds you by colour — sharper edges, runs on weak devices.
- Cost: green spill → add a spill-suppression step. Best for fixed studio setups.

4 · Background asset specs (2026 — re-verify per client release)

Zoom image	16:9, ≥1280x720 (1920x1080 recommended)
Zoom video	MP4/MOV, 480x360 to 1920x1080, keep it small
Teams image	16:9, ≥1920x1080; admin upload 100KB-2MB JPG/PNG

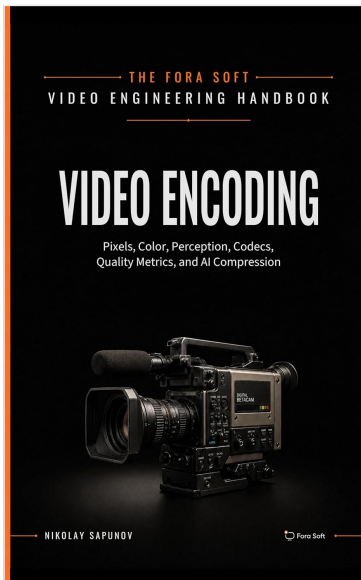
5 · Build it in your product (browser) — checklist

- ☐ Tap the raw-frame point: MediaStreamTrackProcessor in, MediaStreamTrackGenerator out.
- ☐ Segment with MediaPipe; run the composite (over operator) on the GPU (WebGL2 / WebGPU).
- ☐ Upload the background image to the GPU ONCE — never re-send it per frame.
- ☐ Scale-to-cover and centre the image so it does not stretch; handle the self-view mirror.
- ☐ Feather the edge, blend each mask with the previous frame, and close() every VideoFrame.

Companion to: 'Virtual backgrounds — segmentation + composite'

www.forasoft.com/learn/ai-for-video-engineering/articles-ai/virtual-backgrounds-segmentation-composite

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GO DEEPER · VOLUME 1 OF 7

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This cheat sheet covers alpha compositing, the three seams that make replacement look fake, and asset specs per client. Volume 1 covers the pixel side in depth: color spaces and chroma subsampling, how compression treats edges and gradients, and the quality metrics that catch halos.

WHAT YOU WILL FIND INSIDE

- Color spaces and chroma subsampling
- Quality metrics for visual artifacts
- How encoders treat edges and gradients
- Bit depth and banding

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