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Professor Sunberg

MCEN 4151 – Flow Visualization

05 October 2026

Resin – A Flow Visualization

This project was created for an assignment called “Team First” which was meant to be a continuation of “Get Wet”—this time, with the help of a group. My group and I chose to create three separate images from a similar setup using resin and unique lighting. My group mate, Shae Roozing, came up with the idea for the project while my other teammate, Brody Rosch, and I contributed with lighting additions. Originally, we wanted to capture light refraction from a piece of cured resin placed inside a jar of uncured resin, but as we experimented with the curing process, our flow visualization changed course. Instead, we ended up with a piece of cured resin with uncured resin flowing inside and captured the effects of shining UV and LED light on the piece. This report will outline the methodology, setup, aesthetics, and science of the Team First assignment.

Without a proper silicone mold, our team researched how to create a mold to pour the UV-curable resin (Form Labs Clear V5) into. We ended up with a ~2.5”x2.5” tape box (figure 2) which was an effective mold but left an oblong shape that offered many imperfections. Those imperfections turned out to be beneficial for photographing the flow as the LED and UV lights used refracted off the resin piece’s convex portions uniquely. The only other fluid used during the process was pink/mauve lip gloss with glitter that was swirled into the resin during curing. The UV light was held over the resin for ~2 minutes or until the surface and sides of the piece were fully cured. Upon releasing the piece from its mold, we found that the inside compartment was full of viscous, uncured resin. Thinking this would make a visually distinct flow, we kept the piece as is and set it down against an upside-down mason jar. The object was rotated between shots to keep the liquid inner-core moving. We noticed the fluid moved more slowly over time and covered less of an area than when it was immediately taken out of the mold. The resin was continuing to cure over time, and thus the final image truly captures the resin frozen in place with white-highlighted swirls and purple encapsulated glitter.

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Taking a step to consider mathematics, we can estimate the Reynolds Number's (Re) of the present fluids:

$Re = \frac{Ul}{\nu} = \rho UL/\mu$, where U is the velocity, l is the plume width, ν is the kinematic viscosity, μ is the dynamic viscosity, and ρ is the density.

Fluid	Density (kg/m ³)	l, Liquid Width (inside shell) (m)	U (m/s)	ν (μ/ρ) (m ² /s)	Re
Uncured Resin	1.1 E3	0.0254	1.0 E-3	9.09 E-4	.02794
Lip Gloss	405	0.0127	8 E-4	7.41 E-4	.013716

Table 1

**Lip-gloss density estimated using common ingredients Hydrogenated Polyisobutene and Ethylene*

These low Re's point to high viscosity and low inertial force within the fluids. This points to laminar flow with low turbulence (Smartflow, para 1.) In terms of the curing process, UV-curable resin was used, which, "...is composed of monomers, oligomers, photopolymerization initiators" (CirTech, para. 3). The photoinitiator in resin is what absorbs the UV light. It bonds oligomers and monomers into chains called polymers which defines the solid state of resin (CirTech).

Surrounding the flow was a color-changing LED camping light and the UV light which changed positions frequently to allow for the best shot. The UV light's final position was right above the camera lens and the camp light right above the mason jar. This lighting was not only effective at lighting up the resin piece and its inner flow, but also at highlighting the magenta glow of the lip gloss encased within the resin. The camera used was a Canon EOS Rebel t2i. The raw image (figure 4) was taken with a shutter speed of 1/80, an aperture of 5.6, ISO 1600, image size of 5184x3456 pixels, and a focal length of 58 mm. While it was effective on its own, post processing truly brought the image to life. For the final image (figure 3), the purpose of editing was to bring attention to the resin piece and highlight the magenta glare and white highlights without making the image look too fantastical (than it already was). The background exposure was also brought down as to smooth over any distracting elements. The biggest struggle for this

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image was the crop. The right side of the raw image was all black while the left side displayed the glass jar with resin dripping on it. Overall, the edits served their purpose by providing a subtle emphasis on the neon colors and glow of the piece.

This image reveals the moments before a liquid-inner core of resin was fully cured alongside its outer shell. The glitter-induced glare adds visual appeal and shows how glitter scatters and reflects light into the camera. With feedback from peers, it was noted that the mason jar in the background was a confusing element. The final image may have benefited from a different crop. Along with that, while there is a clear explanation for the physics flow, there is little to no contrast within fluid properties. Upon re-doing this piece, one might consider dropping the cured resin piece inside a jar of uncured resin or adding another fluid in for distinction. Although its scientific explanation is simple, this flow visualization is effective and dramatic. It was received well with its intended audience and was a successful completion of the Team First project.

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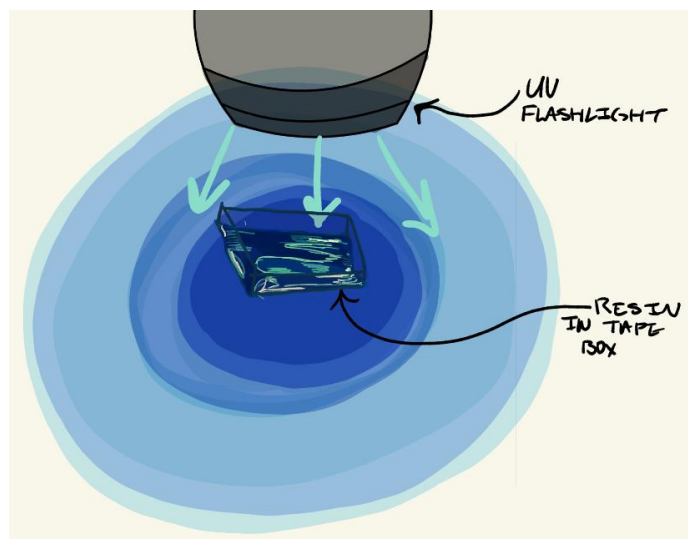


Figure 1

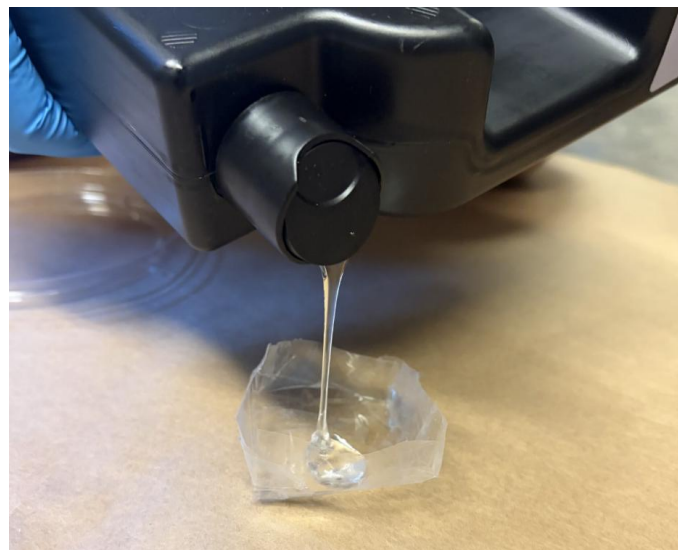


Figure 2



Figure 3 (final)



Figure 4 (raw)

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