

where force normal to the surface is  $dL$ :  $dL = \rho C_L [V_a^2(1+a)^2 + 4\pi^2 r^2(1-a')^2] b dr$

$$\frac{1}{2} \rho C_L [V_a^2(1+a)^2 + 4\pi^2 r^2(1-a')^2] b dr$$

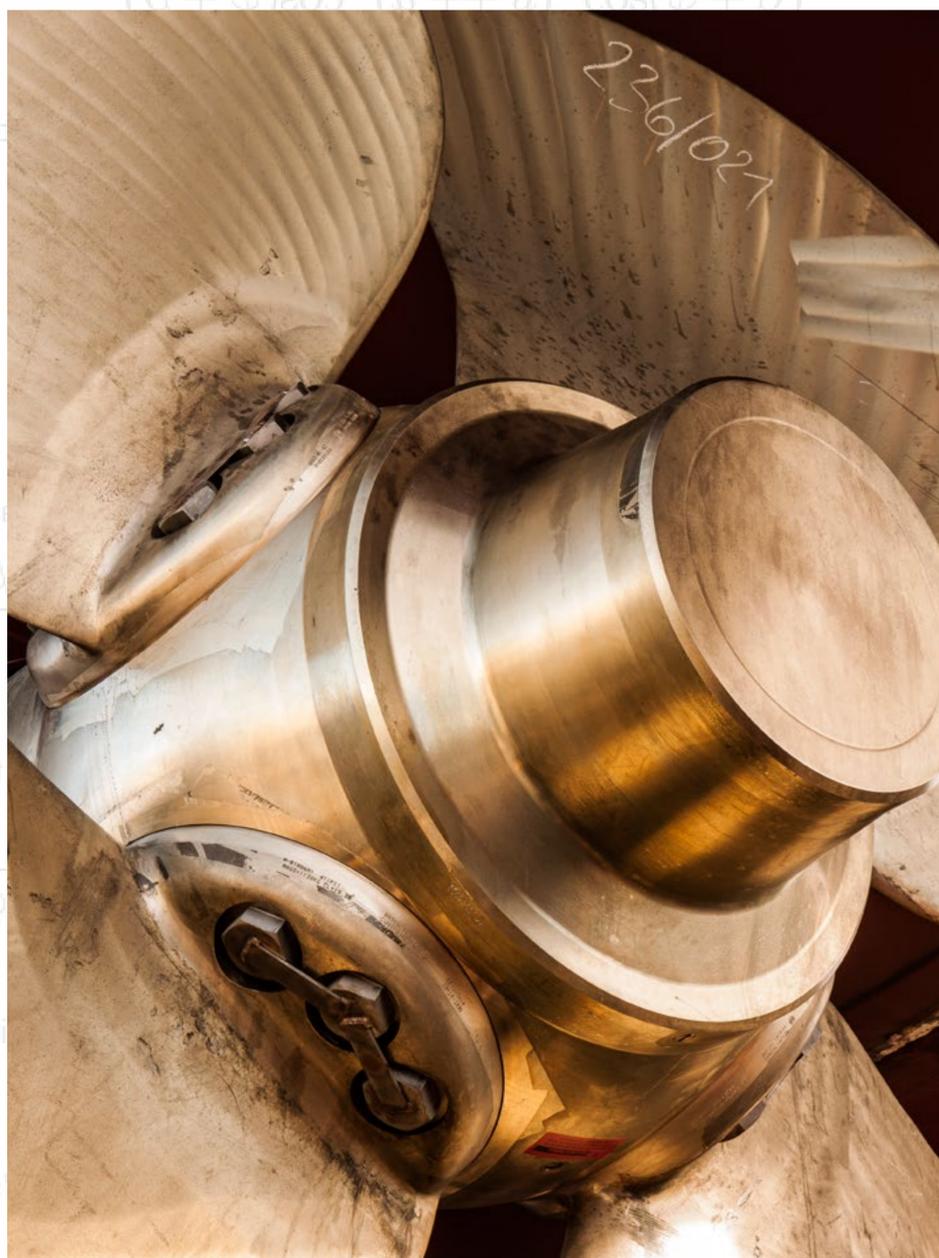
# PETALS OF POWER

on the blade,  $T$ , thrust,  $T$ , on the blade:

$$dT = \rho C_L [V_a^2(1+a)^2 + 4\pi^2 r^2(1-a')^2] b dr \sin \phi$$



## Tug Boat Propellers of Dakota Creek Shipyards



*J Brooks Jensen*

A Brooks Jensen Arts Publication

$$\frac{D_1^2}{D_2^2}$$

where force normal to the surface is  $dL$ :  $dL = \frac{1}{2} \rho C_L [V_a^2 (1+a)^2 + 4\pi^2 r^2 (1-a')^2] b dr$

$$\frac{1}{2} \rho C_L [V_a^2 (1+a)^2 + 4\pi^2 r^2 (1-a')^2] b dr$$



So with the propellers the expression for both will be the same.

$$\frac{D_1^2}{D_2^2}$$

...where force normal to the surface is dL:

$$\frac{1}{2} \rho C_T [V_\infty^2 (1+a)^2 + 4\pi^2 r^2 (1-a')^2] b dr$$

**For ten** years, my office was directly across the street from Dakota Creek Shipyards. From the window next to my desk, I could watch each project while it morphed from piles of sheet metal to a massive, fully-functioning ship. One of the most exciting days of my photographic life was when the owner of the shipyard gave me my own hardhat and permanent visitor's pass so I could wander the shipyard with my camera whenever the action and the light moved me.



$$\left( \frac{D}{V} \frac{ND}{V_a} \right)$$

...So with the propellers

$$\frac{D_1^2}{D_2^2} \frac{D_1^2}{D_2^2}$$

... on the blade, dA, where force normal to the surface is dL:

$$\tau b d \left[ \frac{1}{2} \rho C_L [V_a^2 (1+a)^2 + 4\pi^2 r^2 (1-a')^2] b dr \right]$$

Mechanics, materials, and math are the foundations of a ship. The angles and twist of the propeller blades can push even the most massive and laden ship through the roughest seas. The forward thrust of a ship's spinning propeller is a matter of engineering, calculable by some fairly high-level math which I have no hope of understanding. For me, the magic is in the simple beauty of exquisite and graceful *form*, particularly in those giant petals of power, designed for a powerful purpose, sculpted out of solid brass, taller than I am, golden in the evening sun.

$$\psi = \arcsin(\cos \beta)$$

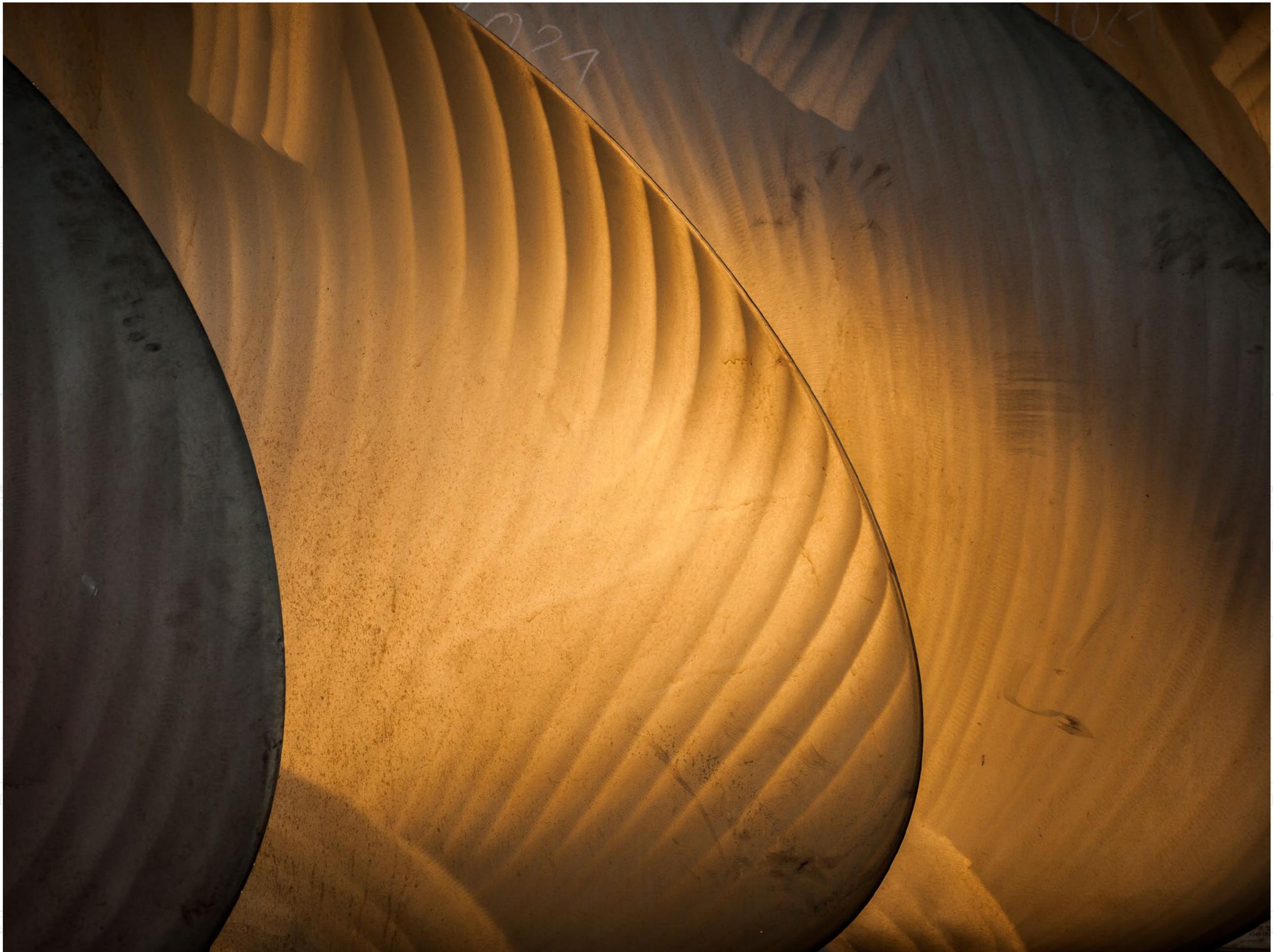


$$V_a$$

... So with the propellers the expression for both will be the same.

$$\frac{D_1^2}{D_2^2}$$





where  $dA$ , the area of the blade, where  $dL$  is the lift force normal to the surface is  $dL$ :

where  $dA$ , the area of the blade, where  $dL$  is the lift force normal to the surface is  $dL$ :

$V_a^2(1+a)^2$

$-a)^2$

$V_a^2(1+a)^2$

the blade:

$dL(\cos \varphi)$

$\frac{(\varphi + \beta)}{\beta} bdr$

by integrat

$dr$

gives torqu

$a)^2 \sin(\varphi)$

$^2 \varphi \cos \beta$

is proportio

$V_a$

$2\pi Nr$

is determined by

$V_a^2(1+a)^2$

$-a)^2$

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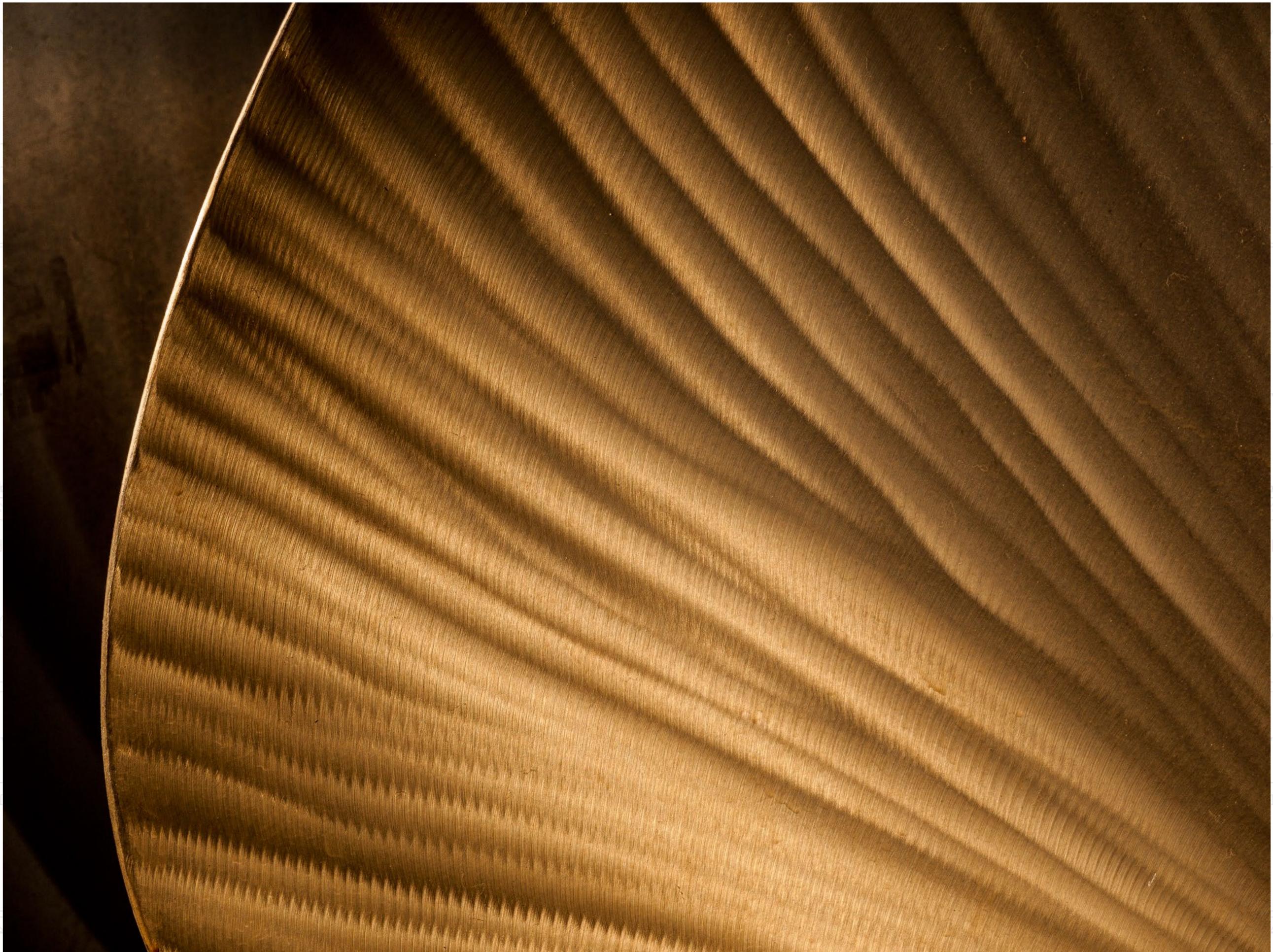
$^2 \varphi \cos \beta$

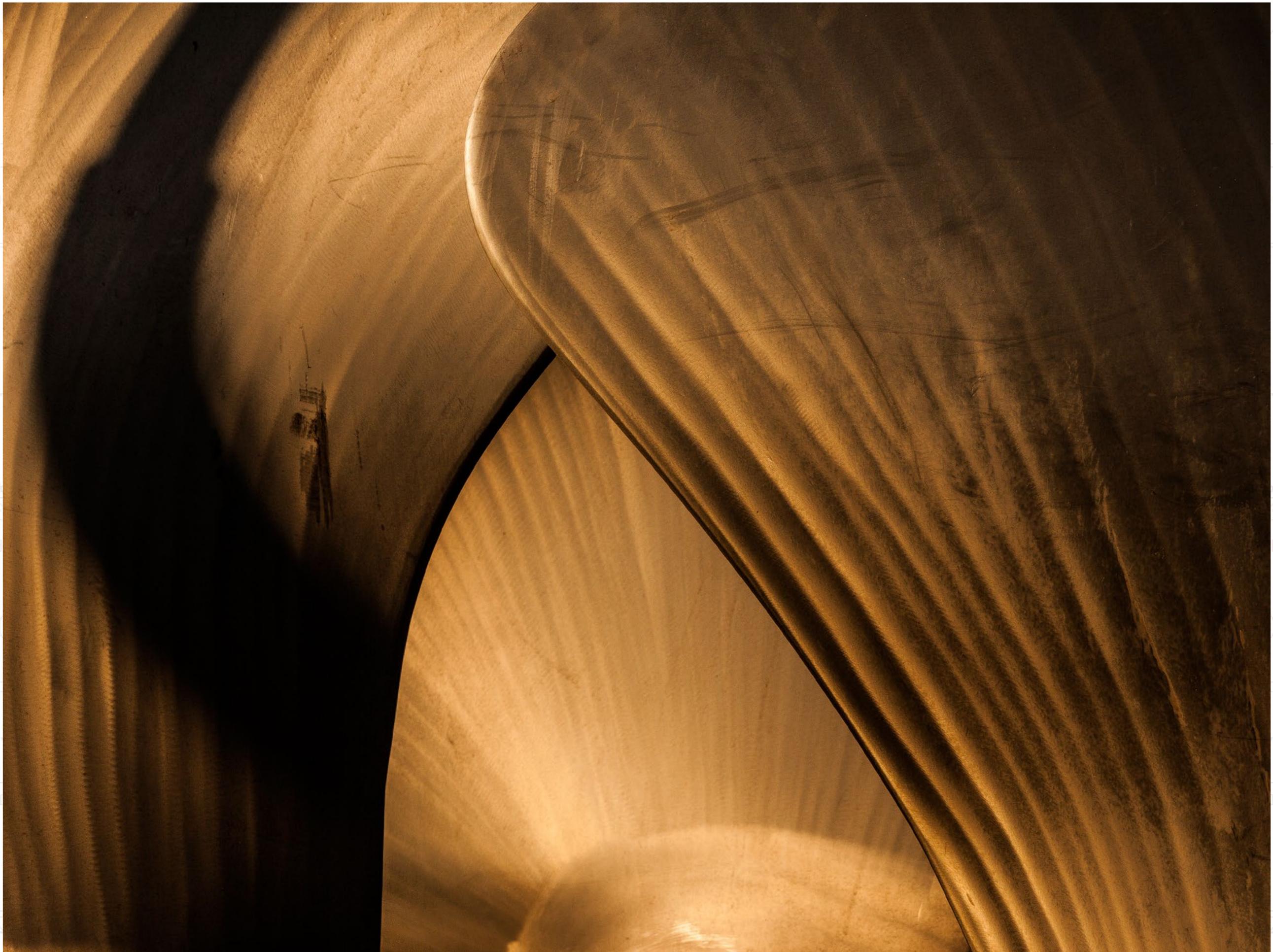
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**Brooks Jensen** is a fine-art photographer, publisher, workshop teacher, and writer. In his personal work he specializes in small prints, hand-made artist's books, and digital media publications.

He and his wife (Maureen Gallagher) are the owners, co-founders, editors, and publishers of the award winning *LensWork*, one of today's most respected and important periodicals in fine art photography. With subscribers in 73 countries, Brooks' impact on fine art photography is truly world-wide. His long-running podcasts on art and photography are heard over the Internet by thousands every day. All 900+ podcasts are available at [LensWork Online](#), the LensWork membership website. LensWork Publishing is also at the leading edge in multimedia and digital media publishing with *LensWork Extended* — a PDF based, media-rich expanded version of the magazine.

Brooks is the author of seven best-selling books about photography and creativity: *Letting Go of the Camera* (2004); *The Creative Life in Photography* (2013); *Single Exposures* (4 books in a series, random observations on art, photography and creativity); and *Looking at Images* (2014); as well as a photography monograph, *Made of Steel* (2012). His next book will be *Those Who Inspire Me (And Why)*. A free monthly compilation of of this image journal, [Kokoro](#), is available for download.

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