Poemetry In Mesh

As we at Addendum have long known, within every gear man (and woman) lies the soul of a poet.

To prove it, we present the following piece by David B. Dooner.

Gear Technology's bimonthly aberration — gear trivia, humor, weirdness and oddments for the edification and amusement of our readers. Contributions are welcome.

History has pegged wheels in mesh circa 2600 BC
as ancient Chinese traversed the Gobi desert to see.
In motion was the South Pointing Chariot to lead
with epicycloidal movement at face and in feed
as the ubiquitous use of gear pairs were cast to be.

Experience or none consultants are available for a fee;
to contract out the specs an expert will want to see.
List of concerns needed prior to angle of approach
so success will be a measure of market share encroach
as all claim to cut cost and none are for free!

Traces of gears were put in print with work of Aristotle,
not as science but as machine drives for a future throttle.
For fifteen centuries advancements had little to show
where materials matters were mute and speeds were slow
as increased revolutions spurred designers to model.

The design of a gear set requires ratings and an initial guess;
to evaluate inertial, bending, contact, and thermal is *shear* stress.
Splined, keyed, webbed, or rimmed: a choice one must make
prior to determining if fatigue is critical and at stake
as the decision to FEA the calculations can make a mess.

In 1694 Philip de la Hire sired the tooth type involute;
years 150 later Euler fathered details with circular evolute.
Abandoned is the widespread cycloidal profile;
notwithstanding timepieces, tooth types anew are rendered futile
as details are often dimensioned as mathematically convolute.

First, to fabricate a gear set requires a machine at last;
CNC or not, options are to press, mill, forge or cast.
EDM and RP are not mass production like generating hardware
where the number of teeth in mesh can occur anywhere,
so hunt a ratio and shave, hone, or burnish the finish fast.

Nomenclature needed to number the tooth parts with pitch:
diametral, circular, axial, and transverse; *normally* known is which.
EAP, HPSTC, and tip relief are all aspects of addendum;
TIF, SAP, LPSTC, fillet, root, and base define dedendum
as clearance, backlash and contact ratio are added to enrich.

TiN, TiAlN, and XYZ to be can wear a better rate
as tooth films or tool coatings when cutting its mate.
To gage the amount necessary is to measure when
the film thickness is distributed evenly thin
as choices PVD, CVD, or NEW can create a heated debate.

Different gear types make many classes too:
rack & pinion, non-circular, and worm identify a few.
Matters not whether cylindrical, conical, or hyperboloidal
for all degenerate cases are ordered cylindroidal
as spiral, spur, and straight are species sighted at a gear zoo.

Caution, post processing produces profile modification
with fluctuations in I/O relation as well as noise and vibration.
Be it at a tooth mesh frequency or sideband,
a runout of envelope calculations are easy and off-hand,
so consider carefully as resonance can cease utilization.

To EGT or PGT is differential only in name
for the motions made vary the same.
So be it central, intermediate, annulus, carrier, and case;
otherwise call it sun, planet, ring, arm, and base
as other families of motions are made via a simple gear train.

To optimize is to search for numbers in vain;
gear paramaters are balanced with a gradient to constrain.
Material may be plastic, bronze, aluminum, iron "ore" steel;
as all must be considered to generate the best deal,
for a favorite is found with increasing power to weight gain.

Differential geometry is a topological tool with a goal;
the objective is to minimize the amount of slide-to-roll.
Euler-Savory defines surfaces of conjugate curvature
and laws of gearing guarantee fundamentals of nature
as freedom from efficiency is the price of the toll.

ISO—a metric that is independent of ips and cgs,
along with a gear doctor that can cure mis-alignment for fps or mks.
Be it hard to know when to Bhn, Rc, HSc, or mho;
for it's time to trade schools when masters do not know
enough to tell when to DIN, AGMA, or BS.

Tribology of contact can be studied to a point
where friction at contact gets graphite, grease or oil to anoint.
Be it centipoise, stokes, micro-reyns, saybolts, or else
temperature rise at mesh must maintain before gear set melts;
as EHD lubrication is an item of aim at each joint.

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Gear photo courtesy of GEARTECH Gear Research, Analysis and Design.