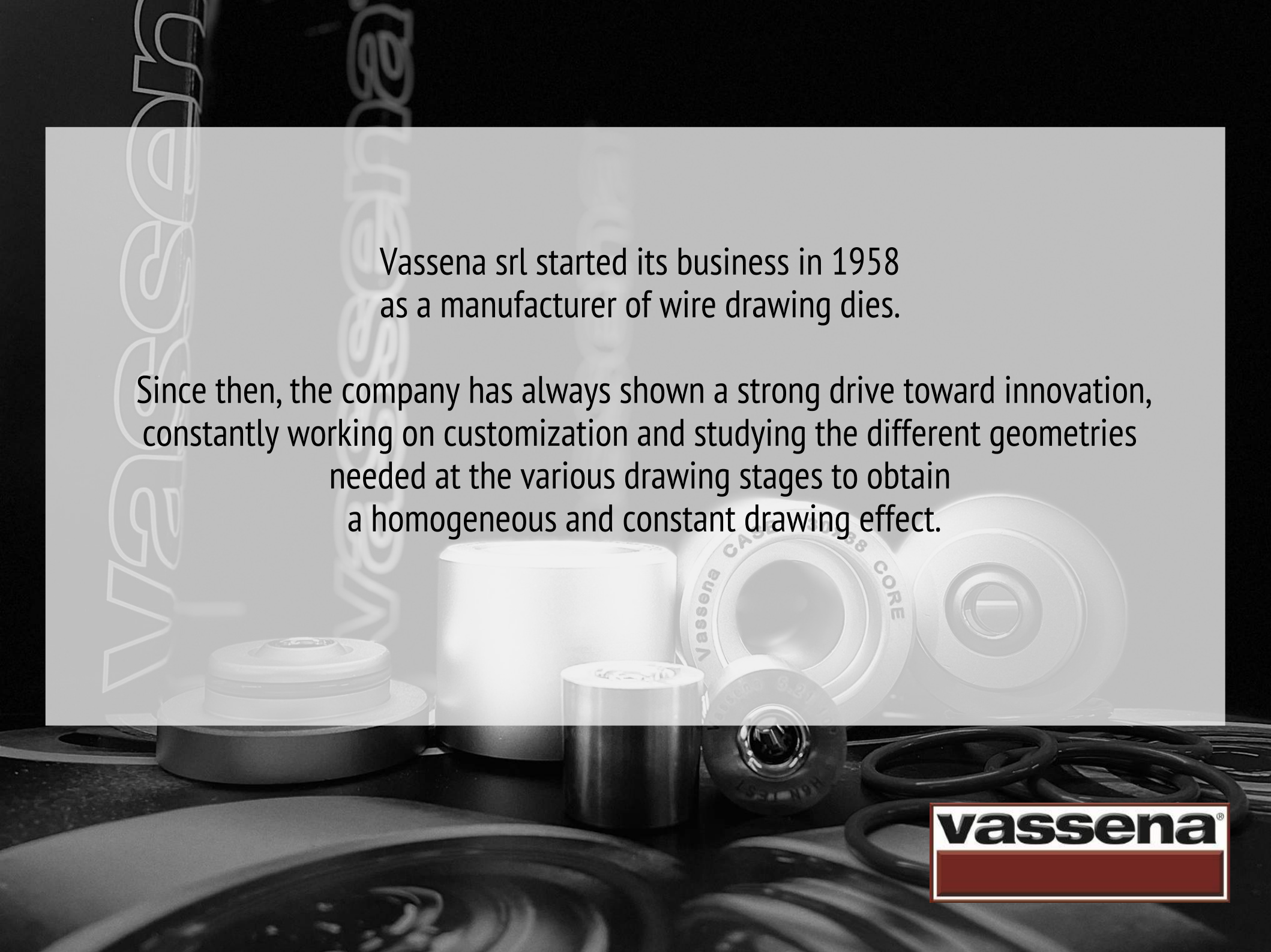
Drawing dies as key factors for energy saving:

Vassena's recommendations.

Vassena srl started its business in 1958
as a manufacturer of wire drawing dies.

Since then, the company has always shown a strong drive toward innovation,
constantly working on customization and studying the different geometries
needed at the various drawing stages to obtain
a homogeneous and constant drawing effect.



New challenges and trade-offs have emerged in recent years for wire producers:

- **Energy saving**
- Higher drawing speeds
- Better wire surface quality needed
- Weaker lubricants due to more stringent environmental regulations
- Challenging materials

How can energy consumption be reduced through drawing dies?

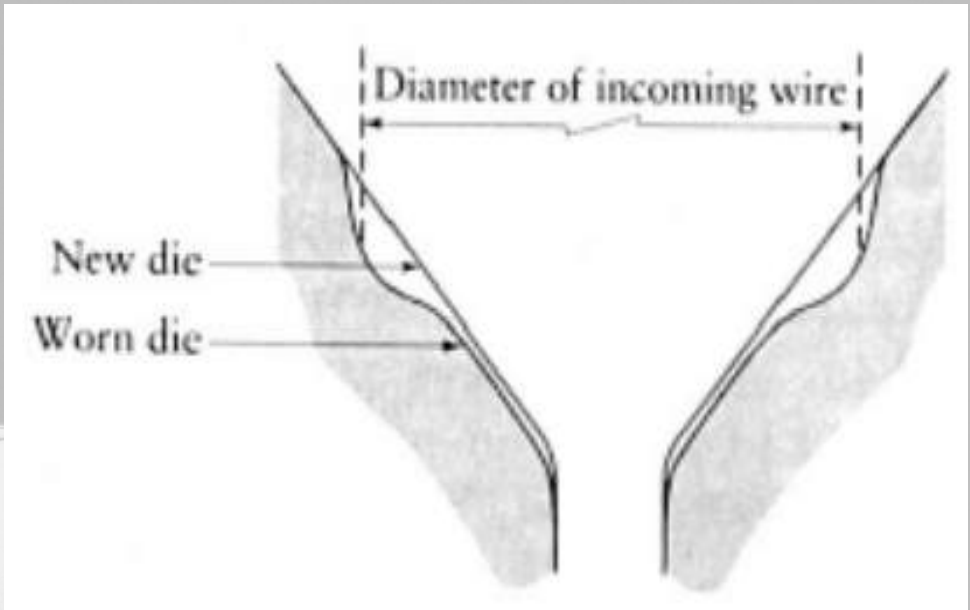
Minimizing the coefficient of friction.

Vassena's recommendations for energy saving:

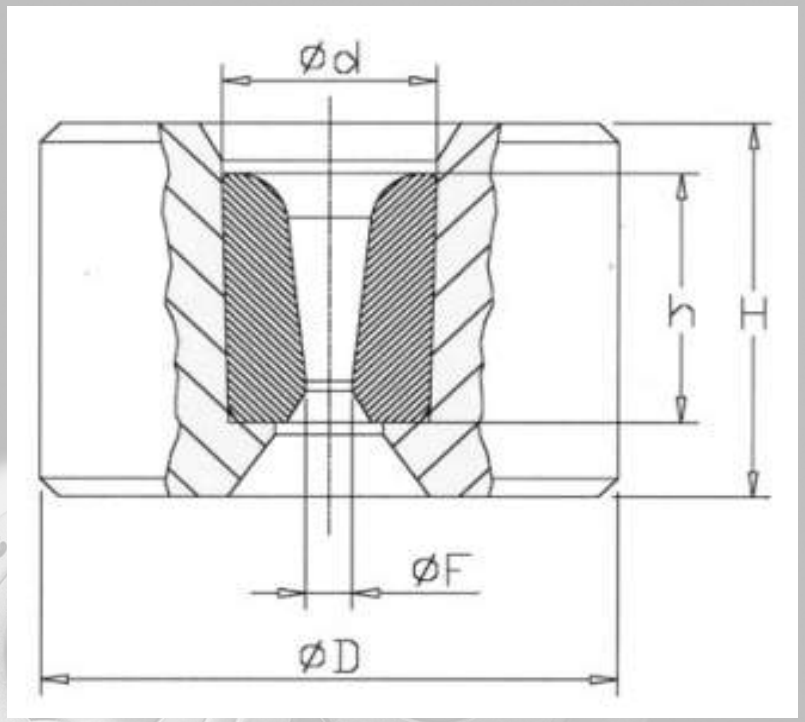
1. Dies with a longer reduction cone

Die wear occurs primarily in the reduction zone where the incoming wire comes into contact with the die.

Is there any chance to reduce friction acting on the **geometry** of the drawing die?



Yes! Dies with **longer reduction cones**
having minor inclination
are less exposed to friction
and die wear.



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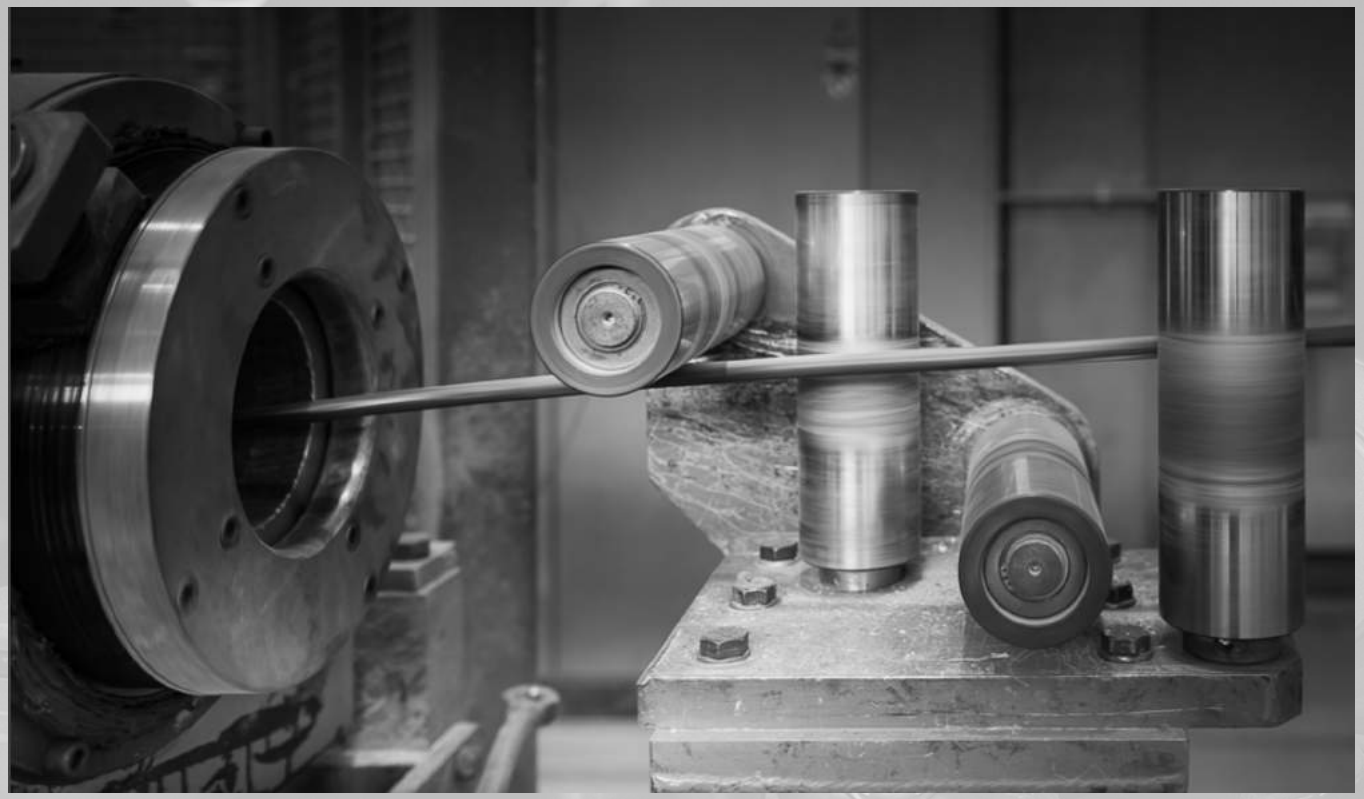
Vassena's recommendations for energy saving:

2. Using an appropriate geometry for each single drawing step



Vassena's recommendations for energy saving:

3. Pressure dies

With the materials prevalent nowadays, it is advisable to employ drawing dies with a pressure core.

Despite the higher initial cost, they have a service life of up to three - four years.

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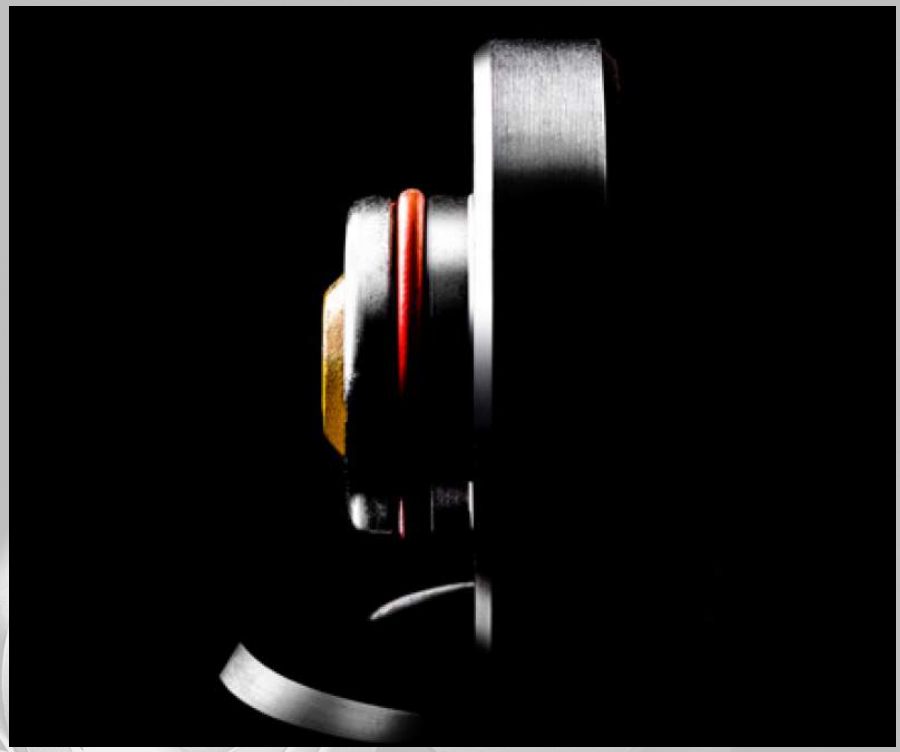
Using dies with a pressure system increases lubricant pressure and drawing speed.

The particular geometry guarantees efficiency and constancy of lubrication, allowing to eliminate the solidification of the lubricant in the cone.



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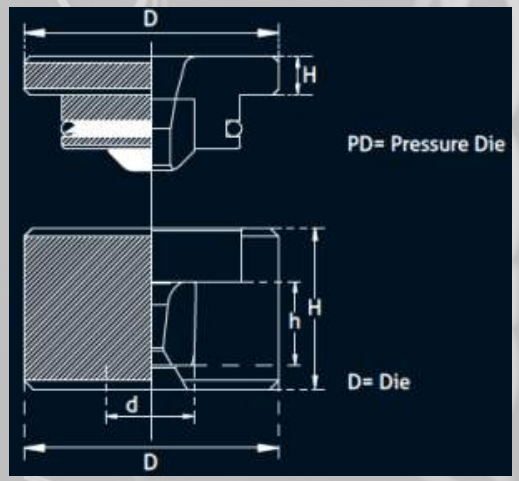
Pressure die + long reduction cone = the optimum solution!



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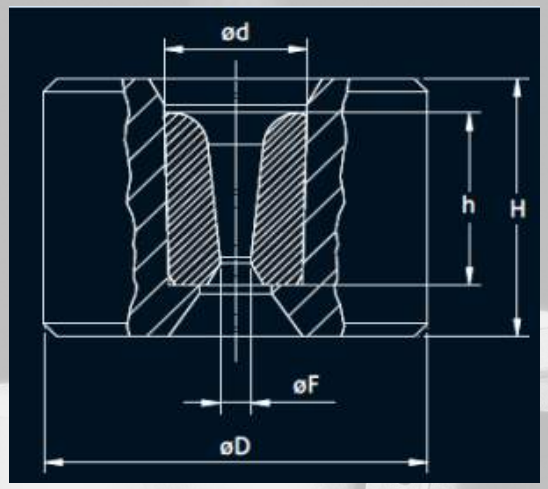

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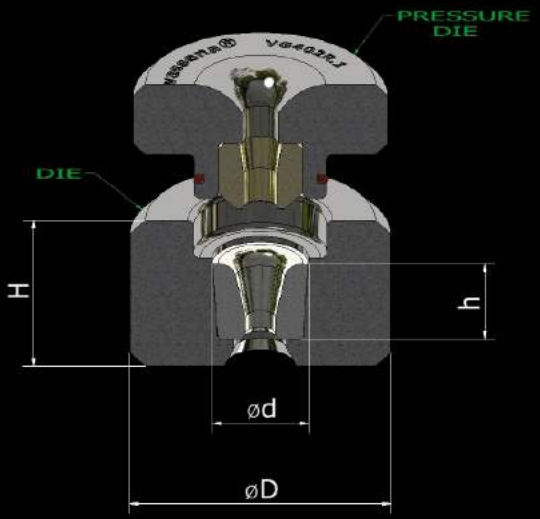
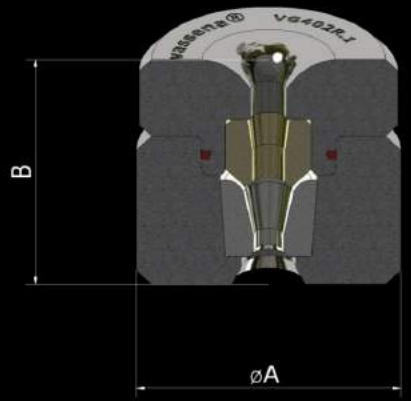
Die VG402R and Pressure Die VG402R.1

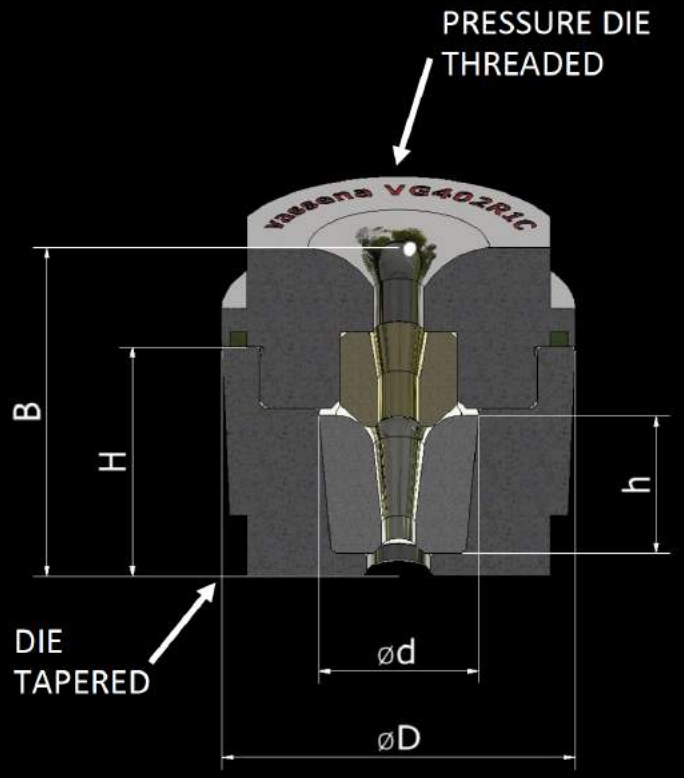
Code DIE	ød x h	øD x H	Code PRESSURE DIE	øA x B
VG402R-15	ø15 x 14	ø43 x 30	VG402R1-15	ø43 x 40 or 44
VG402R-16	ø16 x 20	ø43 x 30	VG402R1-16	ø43 x 40 or 44
VG402R-20	ø20 x 18	ø43 x 30	VG402R1-20	ø43 x 40 or 44
VG402R-25	ø25 x 20	ø53 x 40	VG402R1-25	ø53 x 53
VG402R-30	ø30 x 24	ø63 x 40	VG402R1-30	ø63 x 60
VG402R-35	ø35x 24	ø80 x 50	VG402R1-35	Ø80 x 70
VG402R-40	ø40 x 24	ø80 x 50	VG402R1-40	ø80 x 70
VG402R-21	ø20 x 30	ø53 x 45	VG402R1-21	ø53 x 60
VG402R-22	ø20 x 30	ø43 x 45	VG402R1-22	ø43 x 55 or 59
VG402R-26	ø25 x 30	ø63 x 45	VG402R1-26	ø63 x 63
VG402R-31	ø30 x 28	ø63 x 45	VG402R1-31	ø63 x 63
VG402R-36	ø35 x 40	ø75 x 56	VG402R1-36	ø75 x 71
VG402R-41	ø40 x 40	ø80 x 56	VG402R1-41	ø80 x 71





Die tapered VG402RC and Pressure Die VG402RC.1

Code DIE	ød x h	øD x H	Code PRESSURE DIE	øD x B
VG402RC-15	ø15 x 14	ø43 x __	VG402RC1-15	ø43 x __
VG402RC-16	ø16 x 20	ø43 x __	VG402RC1-16	ø43 x __
VG402RC-20	ø20 x 18	ø43 x __	VG402RC1-20	ø43 x __
VG402RC-25	ø25 x 20	ø53 x __	VG402RC1-25	ø53 x __
VG402RC-30	ø30 x 24	ø63 x __	VG402RC1-30	ø63 x __
VG402RC-35	ø35x 24	ø80 x __	VG402RC1-35	Ø80 x __
VG402RC-40	ø40 x 24	ø80 x __	VG402RC1-40	ø80 x __
VG402RC-21	ø20 x 30	ø53 x __	VG402RC1-21	ø53 x __
VG402RC-22	ø20 x 30	ø43 x __	VG402RC1-22	ø43 x __
VG402RC-26	ø25 x 30	ø63 x __	VG402RC1-26	ø63 x __
VG402RC31	ø30 x 28	ø63 x __	VG402RC1-31	ø63 x __
VG402RC-36	ø35 x 40	ø75 x __	VG402RC1-36	ø75 x __
VG402RC-41	ø40 x 40	ø80 x __	VG402RC1-41	ø80 x __



Vassena's recommendations for energy saving:

4. Diamond coated dies

Carbide tools with a special nano diamond coating.
Despite being slightly more expensive than standard dies, they boast **lower friction coefficients** and **greater wear resistance**.

Diamond properties

- Hybridization of carbon atom orbitals: sp^2 or sp^3
- ➢ Different bonding and crystal structure
- ➢ **Strong differences in properties**

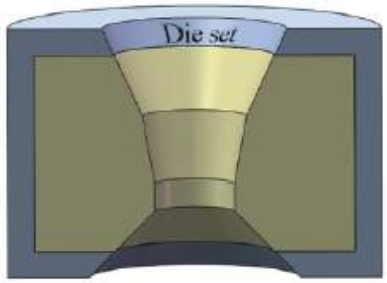
	Graphite	Diamond
Young's modulus E	27.6 GPa	**1210 GPa**
Heat conduction k	114 W/(mK)	**2200 W/(mK)**
Band gap E_g	0 (conductor)	5.45 eV (insulator)

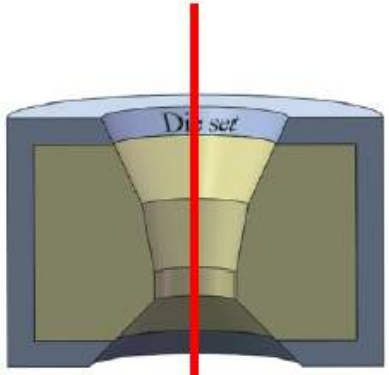
Diamond bulk properties:

- Exceptional hardness: E ~ 5 x steel
- Exceptional heat conduction: k > 2 x copper
- Chemical inertness
- Biocompatibility: **non-toxic (no micro plastic)**

Figure 1: Graphite (sp^2) and diamond (sp^3) structure

Diamond synthesis on drawing dies (HFCVD)





Diamond coated dies can be used on non-ferrous materials
and both medium- and low-carbon wire.

The performance is well above hard metal tools.

Diamond coated dies + Pressure Die = The ultimate energy-saving solution!

Benefits of diamond coated dies

- **Longer die life**
  30 times more with alu wire & MC steel wire than TC dies
- **Improved production efficiency**
- **Raw materials savings**
  Enhanced wire length: +1-2% compared to traditional dies
- **Non-ferrous wire drawing: lubrication with water**
- **Better surface quality**
- **Less electricity needed**
  Smoother working surface > less friction > less machine power consumption

What's new at Vassena:

Dies with interchangeable cores

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In response to numerous customer requests, Vassena has developed dies with interchangeable cores, resulting in substantial **cost savings**, including reduced transport expenses.

The **geometry is tailored** to each client, as with traditional Vassena dies.

The **conicity is variable** at each drawing step to ensure that the wire suffers as little stress as possible.

By providing the option to purchase **worn-out cores** at the end of their life cycle, Vassena actively promotes **environmental sustainability**.

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All in all

Using the right drawing dies with the correct geometry and proper materials can help obtain a stable and high-performance drawing process, avoiding further unnecessary processing and problems (e.g., wire cleaning) while reducing energy consumption.

Customization is the key!

Ask for a personalized counseling.

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Thanks for your kind attention!

More on www.vassena.it