

# **Debunking the Debunker Part II**

**Ph.D. Mechanical Engineer John Feiereisen  
and Side Kick Don Lancaster Fall Silent**

Don Lancaster again thinks deeply and writes to sci.energy.hydrogen, 08/24/99:

“Thermodynamic reversibility is a very subtle and very profound phenonoma (sic). It is often badly misunderstood or grossly under appreciated.

“As a previous ferinstance, a Tesla turbine is irreversible regardless of whether it is being used as a pump or a turbine. The reason being that friction is ~demanded~ for the necessary viscosity in either direction.”

### **~Demanded~ Not**

Go to TEBA’s main page index and select “[Related Links](#)” then click on “[Tesla Turbine Myths](#)” to find TEBA’s previous response to Don.. Also found in TEBA News #15.

If friction were the main component then Don would indeed be correct. This is not, however, the case. Tesla himself admitted that, at first, he too, believed it was a primarily frictional phenomena, not worth pursuing. So don’t feel too bad Don, you are in good company.

It all started when Tesla built what he thought would be an inefficient frictional pump consisting of a single disk to move mercury to and from components of his high power switching devices.

### **The Real Beginning**

Observation of the mercury’s action on the disk gave him pause. Tesla explains that he “thought it out,” and came to the understanding that the main effect could not be friction. This understanding he called the “Real Beginning.”

It is now the considered opinion of those who have studied this carefully, including of course Tesla, that spiral flow disk runners can achieve efficiencies in excess of 95%. Tesla claimed a 98% upper limit.

If Tesla had not proven this to himself experimentally he would have no doubt continued to agree with Don.

### **The Definition of Efficiency**

What is important to take note of is that the Tesla turbine has been documented to operate with a lower steam consumption than other bladed type turbines operating in the same class.

*This is the definition of efficiency.*

The design of the Tesla turbine is also such that saturated steam does not appear to damage the turbine or reduce its operating life. It has been found that saturated steam will drastically reduce efficiency, however, unless a hole is drilled into the bottom of the case ring to let the water out. The casing of the Tesla turbine builds insignificant pressure. Water appears to primarily condense at the nozzle and does not enter the runner. If this water is not allowed escape it becomes a very parasitic load.

### **Finest Pump Available At Any Price**

The Tesla device has also been proven the best pump commercially available for difficult applications.

Beginning in the 1980’s those in the know began replacing their pumps with Tesla types in applications where conventional bladed type pumps are quickly damaged or destroyed. This trend is continuing as awareness is increasing regards the ability of the Tesla type pumps.

When pumping Newtonian fluids the efficiency of a properly built Tesla pump is comparable to that of the highest efficiency centrifugal types. However, efficiency of conventional bladed type pumps is very poor for many Non-Newtonian fluids. The worse the pumping conditions and materials the more obvious the superiority of the Tesla type pump becomes. It can pump solids to boiling liquids, all at once. Only a Tesla survives high vapor pressures, cavitation free.

*This is the definition of efficiency.*

Of course the runner must be built properly to its application for efficiency, just as it is critical that conventional bladed turbines be applied correctly to achieve acceptable result.

Tests employing direct combustion have been very encouraging as reported in TEBA News #16.

### **First Properly Built Since Tesla**

The 11 inch turbine was the first built since Tesla, to our knowledge, to actually be close to the Tesla specifications. This has been the main R&D workhorse to date after having its “coming out,” on stage, at the International Tesla Symposium in the summer of ’95. It was in all its glory lighting a bank of light bulbs as it purred in its scratch free casing.

Virginal no more, this 11 inch turbine has been exposed to temperatures that completely distorted the disks at the outer  $\frac{1}{2}$  inch of the runner, past the tie pins. Amazingly, no loss of efficiency could be determined after disk tip geometry was randomized. Try that with a bladed device.

### **Thermal Shocking No Problem**

Those familiar with bladed gas turbines wanted to know if the Tesla turbine could be quickly cycled: On - Off - On - Off - On - quickly or for that matter, not so quickly.

Apparently bladed turbines don't like this one bit and can go bye bye under the stress. Not so with a real Tesla as the 11 inch has been cycled for prolonged periods and at different intervals without any hint of damage. "It Don't Matter to Me...."

On another occasion damage did occur when temperature regulation failed due to loss of water injection source. The temperature became so extreme after water was lost that the nozzle dislodged and was sent crashing into the runner, operating at high rpm. Tesla's variable nozzle specification was not followed to the letter, making this type of failure physically possible.

Surprisingly the runner was not destroyed. A bladed turbine runner would have experienced a catastrophic failure under these conditions.

A high speed cutting tool was used to reopen the spaces between the flattened disk perimeter. The 11 inch gas turbine, featured under test in TEBA News #16, is shown in operation after these simple repairs, albeit again with water injection.

### **Torque Limited Only By Shaft Strength**

Another previous telling accident happened while operating this turbine. The original bearing frame was built from scratch (not recommended by TEBA) and was not proper. The shaft shifted in this bearing frame, during high speed operation, causing the runner to contact the turbine housing.

It was reported that this caused the turbine to become airborne and return to concrete against its face. No runner damage resulted. However, the chromolly shaft was twisted and required replacement.

A standard bearing frame is now installed on the 11 inch turbine, as pictured in TEBA News #15, and is now in tune to original TEBA suggestions.

To view the original 11 inch bearing frame see TEBA News #3. Can also be found at:

<http://www.execpc.com/~teba/images/tesla3.jpg>

See also:

<http://www.execpc.com/~teba/images/tesla11.jpg> for the latest Tesla turbine (21" runner) that many

could actually build and try out if serious (details in this issue.)

*One rugged machine.*

### **# Dr. John Feiereisen Responds**

#### **:) TEBA Answers.**

# More like a non-response that ignores most of what has been known about viscous fluid flow for some 80 years now. (referring to TEBA's original response to Don.) Besides the references to the 1991 Rice paper, all agree with the 1999 understanding of viscous fluid flow and bladeless disk-type turbomachinery.

:) Besides the 1991 paper references?!! Don't you think it logical that the final 1991 conclusions and summations would be the most important?

# And like the other quack science we read about here, the TEBA 'response' says:

# :) Prof. Rice was only able to offer his opinion in this regard, however, as he did not do testing of a pump built in strict accordance to the Tesla design."

#### **Quack Science?**

:) Is it Quack science that Prof. Rice states that the inherent efficiency of the Tesla turbine runner is very high and can even exceed 95% if properly applied; And that it is his opinion that even without benefit of Tesla's inlet geometry, disk pump efficiencies will be into the 65% range. Are you really calling Prof. Rice a Quack?

# Once again, no matter how solidly based in physics, it's only 'opinion' unless you build it and test it yourself. Sad. Doubly sad is that most of the people who do design and build these things don't understand how to properly measure their performance, yet they'll regale us with all sorts of amazing figures.

:) We agree with Prof. Rice's final opinions! His work is very much appreciated. He did build. He did see. He did record.

:) Yes we are regaling in his final conclusions as well as those recorded by Professor C.D. Richards, Professor Emeritus of the Engineering Faculty of Yale University.

# Heck, the guys at Discflo ([www.discflo.com](http://www.discflo.com)) who build bladeless pumps know very well that adding partial 'blades' greatly increases their performance.

:) You would seriously present this argument in an attempt to discredit the entire concept? Shame on you.

:) This is true ONLY of their pumps which have disk spacings taken to an almost ridiculous extreme.

:) Discflo patented a whole range of disk appendage geometry they thought might improve performance and make it truly theirs. They found that straight ribs were the best appendage by experimentation. But guess what? They are still doing it Tesla's way in all their pumps except the aforementioned. Why? They discovered that lifting surfaces DECREASE performance. Imagine that?

# Interesting note found at the Discflo web site:

# "The disc pump concept dates back to 1850. A pump was invented in the US by Sargent, who took a series of 29 parallel discs spaced a few thousandths of an inch apart, enclosed them with a metal band, and made a number of holes in the band to allow fluid to pass in and out. It was the first example of a pump operating solely on the boundary layer/viscous drag principle. As far as pumping goes, though, it was not a great success.

:) The primary prior art mentioned during Tesla's time was Thrupp. For an analysis of the workings of the Thrupp concept see TEBA News #15.

:) Quoting Tesla: "It was perfectly well known that a fluid would be dragged by rotating surfaces, but somehow nobody realized the conditions for economic working, nor has any one properly grasped the principles which could be applied to propulsion. So it happens again that it is my good fortune to come to the rescue, and I have produced a highly economic way of compressing or pumping fluids."

# : "The idea was taken further by the Serbian-American inventor Nikola Tesla. He removed the metal band from around the discs, which improved the pump's performance, although he too insisted on keeping the spacing between the discs very small, believing that at a certain point the pump would stop pumping if the discs were spaced too far apart. This insistence on very narrow disc spacing greatly limited the pump's capabilities to pumping non-viscous fluids and then very inefficiently, so the idea was all but forgotten."

### **Tesla's Patents Public Domain**

:) This is pure bunk from the Discflo camp in an attempt to claim it as their patented invention. All one must do is look at Tesla's patent drawings to see these statements are false. Also published articles from Tesla's time describe the solids carrying potential of these new pumps which had the potential to "Revolutionize Mining Practice."

:) See "Tesla's Engine - A New Dimension For Power" page 161 for more details on the patent controversy. The original Discflo (Gurth) solids pumping patent is over 17 years old, so its now moot.

# By everybody but the Tesla worshippers.

:) Again, to hold up an argument like this, in an attempt to discredit the entire concept, and the people involved, is very shameful indeed.

# (And actually the "non-viscous" should probably actually be "low viscosity".)

# :) If friction were the main component then Don would indeed be correct. This is not, however, the case.

# Then what is it? If your response (if there is one at all) is something like "We're still studying that...", then please forgive me if I chuckle.

### **The Undeniable Fact**

:) Again quoting Tesla:

:) "The undeniable fact is that the machine does operate, both expansively and impulsively." This is what matters, despite your chuckles; remember, he who laughs last.... :)

# If it's not viscous coupling, what is it? If you say "friction and adhesion", please tell us how this is different from the 1999 understanding of viscous fluid flow.

:) Tesla said; Adhesion and Viscosity.

### **Back to Kindergarten**

:) Tell us; is it frictional when Viscous fluid Adheres to a disk? There is no movement between the fluid and disk to cause friction, it is simply clinging. What if the disk, to which the fluid is clinging or sticking, is then accelerated to the point of causing the fluid's release? Has there been frictional slippage between the fluid body and disk? Not hardly, yet the mass of fluid can still have large amounts of energy imparted to it.

:) Tesla pointed out, in detail, for the patent office, just how frictional sheer forces, as you describe, made all prior disk turbine attempts destined to failure, just as you claim. Too bad you discount this as Quackery.

:) Cling and release or "Carried Along" as Tesla would say. Yes friction is there, but Prof. Rice has determined that if the Reynolds number is matched to the disk spacing, efficiencies can be very high, even above 95%.

### **Experimentation and Demonstration**

:) Tesla proved this through experimentation and demonstration.

:) Scientific American wrote: "Pumps of this character show efficiency favorably comparing with that of centrifugal pumps and they have the advantage that great heads are obtainable economically in a single stage."

:) You can NOT achieve this operating by friction.

:) We know, We know; Quacks; All of them.

# :) Observation of the mercury's action on the disk gave him pause. Tesla explains that he "thought it out," and came to the understanding that the main effect could not be friction. This understanding he called the "Real Beginning."

# And sadly, that's where it seems to have stopped as well. Luckily, people came long later and discovered things like boundary layers, etc.

### **\*Modern\* Fluid Dynamicist?**

# Most \*modern\* fluid dynamicists would say that the fluid-rotor coupling in a bladeless, disk-type turbomachine is solely through viscous effects. There are no surfaces on the bladeless rotor that will permit pressure forces to exert any torque on the shaft, thus viscous forces are all you have to work with. If you can explain to us how the fluid and rotor are coupled in a bladeless disk-type turbine without requiring viscosity, we're all ears.

# To apply viscous forces to a bladeless disk-type rotor, you need viscous fluid and velocity gradients at the surface of the rotor (Look up "viscosity" and its relation to shear stresses and velocity gradients in the fluid.) Any time you have a velocity gradient in a viscous fluid, you're going to have dissipation. Dissipation converts fluid kinetic energy into heat. Irreversible.

### **When Operated in Comparable Class**

:) Yes and ALL turbines have Irreversible losses. It's just that the Tesla turbine has been documented to have less loss than does its competition when both operate in comparable class.

# It's interesting to note that in the TEBA response to Don Lancaster, they say:

# :) Prof. Rice was also not aware of, and did not use, the numerous disk support bolts and spacers employed by Tesla. This hardware is power producing and is absolutely essential for starting torque and vital for disk stability, without which adhesion can be broken, allowing friction to manifest.

# Apparently they never considered the fact that these bolts and spacers provide surfaces through which pressure forces can exert torque on the shaft. Again, another example of how the TEBA guys make observations without a shred of understanding.

:) Wrongo, oh rude one.

:) See TEBA News #16; "Physics of the Tesla Turbine" for a discussion of the torque producing effect of this geometry, examined in light of what is known about other flying spheroids.

# Remainder of 1910 technology snipped>

# So, TEBA, what couples the fluid and rotor in a Tesla turbine?

### **Just As Tesla Said**

:) Molecular Adhesion and Viscosity just as Tesla documented.

:) Have fun ranting but don't you have to work sometime?

# John

:) Tesla Engine Builders Association Inc. (TEBA)

**There were no further responses from Dr. John and company, which is unheard of :)**



*The Following is Excerpted from page 67 of:*

## **Boundary Layer Breakthrough — The Bladeless Tesla Turbine**

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### **THIS IS NOT A FANTASY - EMPIRICAL EVIDENCE**

For years men of science have brought forth the theory and equations proving beyond a shadow of a doubt that a bumblebee can not fly. Then after learning this, from these so called learned men, you get stung by a large yellow and black flying bumblebee. Ouch! Now you have better information than these deluded men. You have empirical evidence!

Quoting Tesla:

**"Today's scientists have substituted mathematics for experiments, and they wander off through equation after equation, and eventually build a structure which has no relation to reality."**

This information is offered so that you don't get stung!

