Experiments and inventions using a slightly large (100mm circumference) single-layer conical roller bearing.

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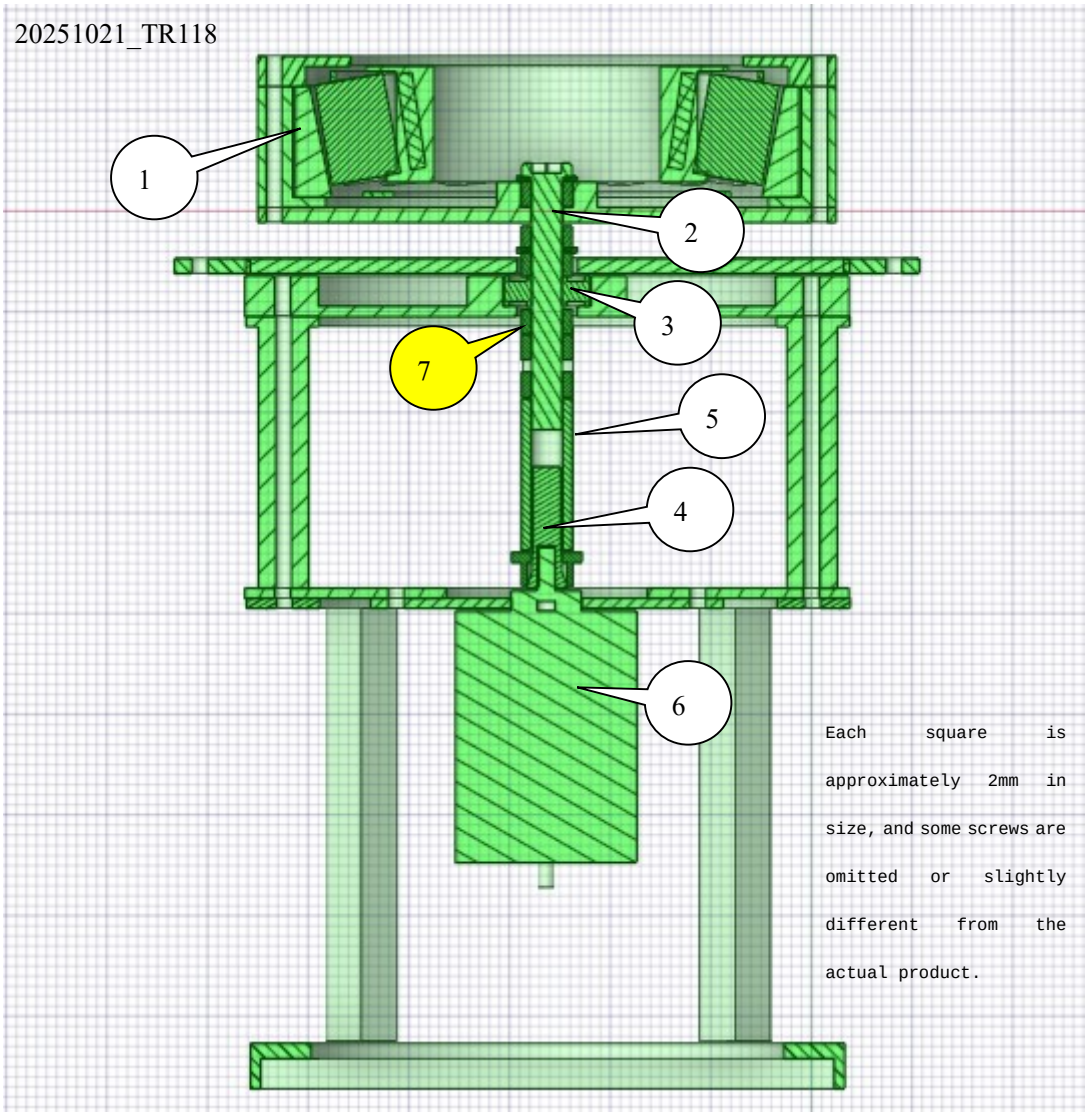
Last time, I had an NTN_30307 conical roller bearing with an 80mm outer ring on hand, so I used it as a single layer to amplify energy. This time, however, I decided to go a bit larger and experiment with a newly acquired NTN_30309 conical roller bearing with a 100mm diameter outer ring.

A 20mm increase in size brings the mass to about 1kg, making it a size that would be difficult to even rotate. (Some commercially available models in this category are as large as 340mm in diameter and weigh around 29900g. It would probably be possible to make them any size larger if custom-made.) Even if existing physical laws like the law of conservation of energy are wrong, it would be difficult to accept in a world where most people believe that conventional physical laws are correct. Therefore, through experimentation, I've come to think that inventions should also be explained as having meaningful functions that conform to conventional physical laws. For example, in the early stages of a transitional period, such as when obtaining type certification for an aircraft, a clear and rational explanation would be necessary.

First, I will describe the enlarged structure and experimental results, and then I will explain that it also has a significant function that conforms to conventional laws of physics (an invention as significant as energy amplification).

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■Structure



① A disc-like component of a conical roller bearing (NTN_30309) (outer diameter 100mm, inner diameter 45mm) is inside. ② A stainless steel, non-magnetic bolt with a diameter of 6mm and a length of 50mm + 3mm. ③ A bearing with an outer diameter of 17mm, an inner diameter of 6mm, and a thickness of 6mm. It is made of iron-based ferromagnetic material. ④ A collet-type fitting for direct connection of the motor. It is made of aluminum (non-magnetic material). ⑤ A tall nut with a height of 30mm. (Ferromagnetic material, material unknown). ⑥ A 540 class, TAMIYA SPORT TUNED motor (a motor capable of relatively high-speed rotation). ⑦ The presence of this nut allows the bearing to absorb the force attempting to levitate, avoiding braking caused by the rotation shaft inside the motor being pulled. Ball bearings have the resistance to being rotated while being pressed relatively strongly. (This part was important to avoid deceleration when attempting to levitate. The previous experiment did not have this nut.)

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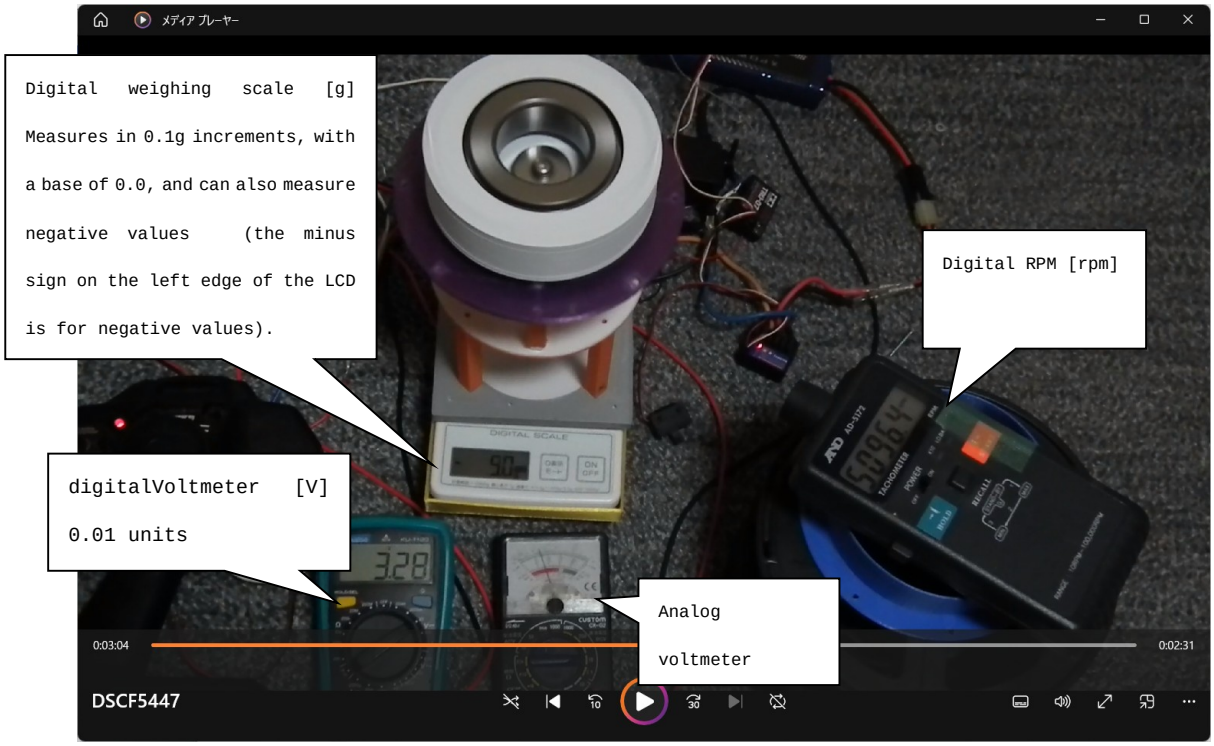






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■ Energy amplification experiment using a slightly larger conical roller bearing (30309) with one layer and one rotor.



Measured values(numerical values obtained from the recorded video [TR118/DSCF5447.mp4])				
No.	Voltage[v]①	Rotational speed[rpm]②	(Duration of video)	Weight[g]③
1	0.00	0	0:00	0
2	2.75	989.1	0:16	0.0
3	2.75	1346.8	0:20	0.0
4	2.75	2021.7	0:33	0.0
5	2.85	3115.2	0:50	0.0
6	3.05	4093.5	1:07	-2.4
7	3.26	5003.2	2:10	-4.7
8	3.28	5096.4	3:04	-5.0
9	0.00	0	4:48	1.2

No. 1: Experiment begins.

No. 2: Speed controller accelerator is fixed and operation begins. Without energy amplification, neither voltage nor rotational speed should increase. From this time onwards, a cylinder was used instead of a pen to keep the accelerator opening constant and make comparison possible.

No. 3: It was observed that the disc on top of the conical roller bearing

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lifted slightly.
No. 4: It was observed that the entire main body lifted slightly.
No. 5: The voltage increased by 0.1[V], indicating energy amplification.
No. 6: shows increased voltage and rotation speed, and the upward thrust has also increased, resulting in a weight of -2.4 [g].
No. 7: reached almost the highest voltage and rotation speed in this experiment.
No. 8: voltage and rotation speed increase stops because it becomes impossible to rotate the roller due to levitation. Levitation can be avoided by using a leaf spring to hold it down.
No. 9: weight does not become zero even when the rotation speed is zero because the weight may change slightly depending on the position of the wires, etc.

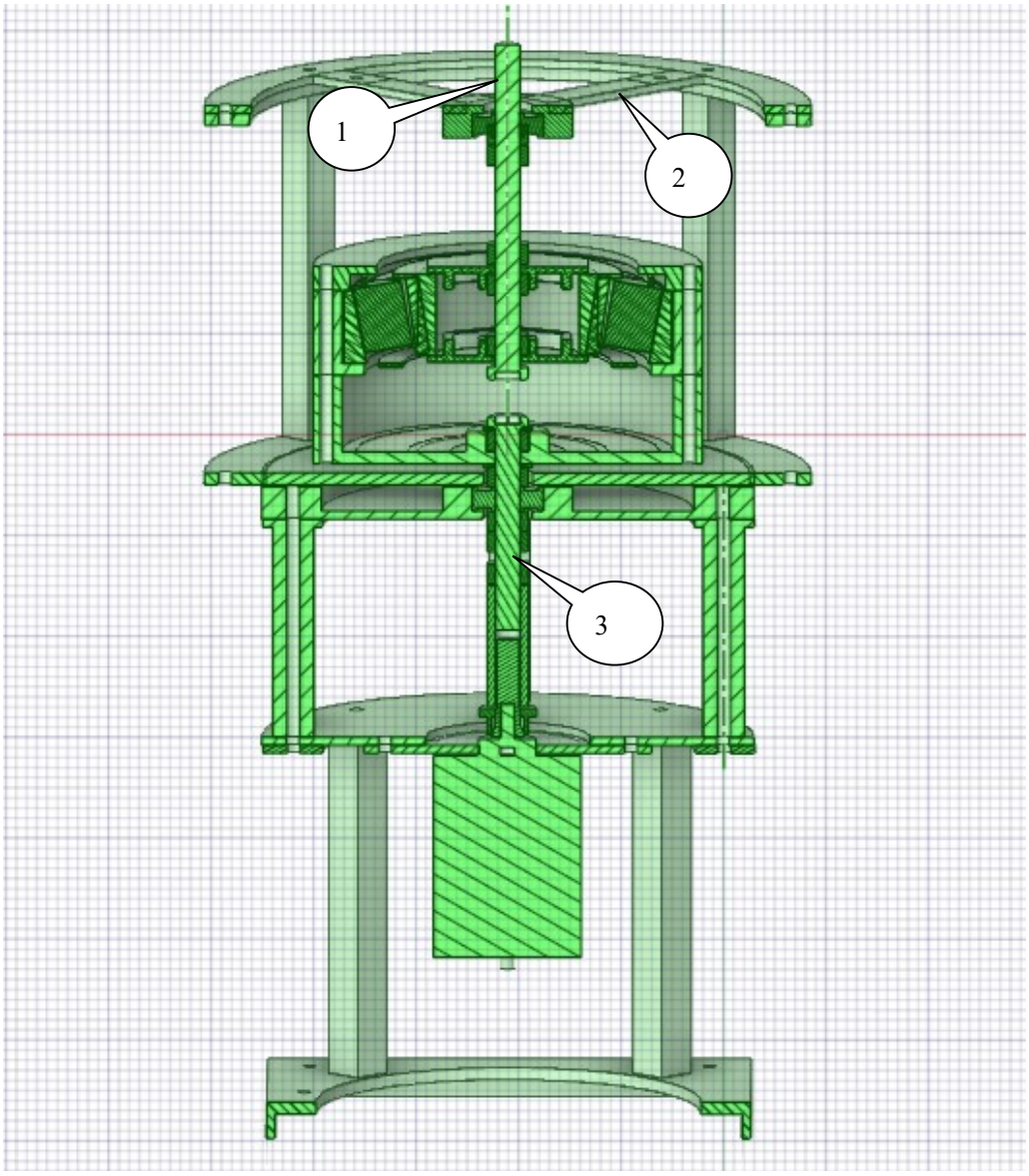
In this experiment, even with a slightly larger (30309) cone roller bearing than in the previous experiment (30307), a significant energy amplification was observed. It also functioned as a generator with an output greater than its input. It is expected that even stronger energy amplification can be observed by further increasing the size of the cone roller bearing.

The energy amplification is thought to be caused by bending centrifugal force, and it is believed that not only increasing the size but also increasing the rotational speed will increase the centrifugal force, leading to a greater energy amplification. (However, it would not be that simple, as air resistance and other factors would increase at higher rotational speeds.)

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■ What constitutes a meaningful invention that conforms to conventional laws of physics?

To avoid levitation, a 6mm x 80mm bolt is passed through the leaf spring (②) on the inside of the structure of the previous (NTN_30307), which is smaller than the current (NTN_30309), resulting in the following. This type of structure has appeared many times before.

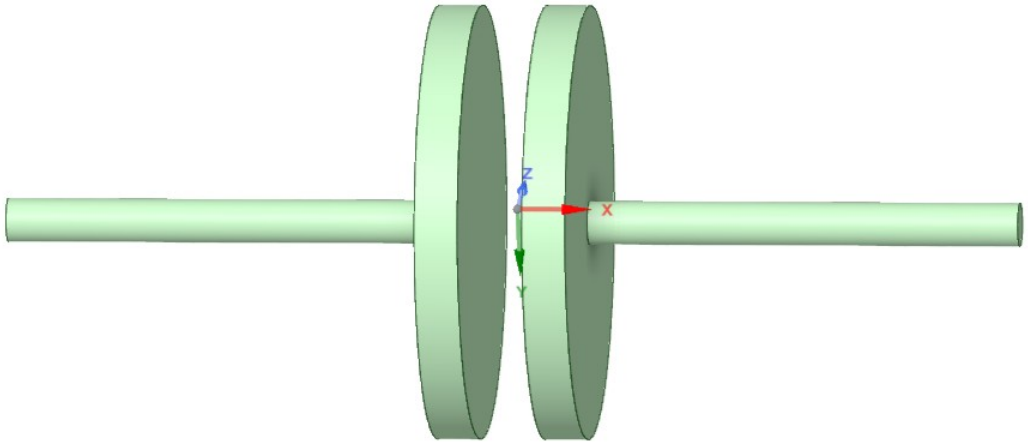


By mounting the propeller on the upper rotating shaft and rotating the motor-side rotating shaft (③), the propeller-side rotating shaft (①) will also rotate in the same direction as the motor (it is not impossible to rotate it in the opposite direction manually). Even if the propeller's

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rotating shaft is stopped, the motor can continue to rotate without placing a large load on it. This is similar to how an automatic car's engine continues to idle even when the brakes are applied at a traffic light, and this structure acts as a torque converter.

Torque converters in automobiles and other vehicles use two rotating discs with their axes aligned in a straight line, and transmit torque using resistance forces such as the viscosity of oil. Clutches basically use the same principle.



The structure of this type of conventional torque converter is more complex and results in greater energy loss due to fluid movement compared to torque converters using conical roller bearings. In manual transmission vehicles, the so-called half-clutch state uses mechanical friction, and direct engagement reduces energy loss, but stopping the car also stops the engine. Therefore, complex operation is required.

Torque converters using tapered roller bearings have minimal energy loss because they don't slip (they essentially roll). This is because they are like ball bearings but with cylindrical (or conical) balls, allowing them to rotate smoothly. The original purpose of tapered roller bearings is to fix the outer part while allowing the inner part to rotate at high speed, so there is no structural stress. In an automatic car, pressing the brake hard, simultaneously pressing the accelerator, and then releasing the brake for a sudden acceleration puts considerable stress on the car and may cause it to break, but a torque converter using tapered roller bearings is hardly a factor in terms of load.

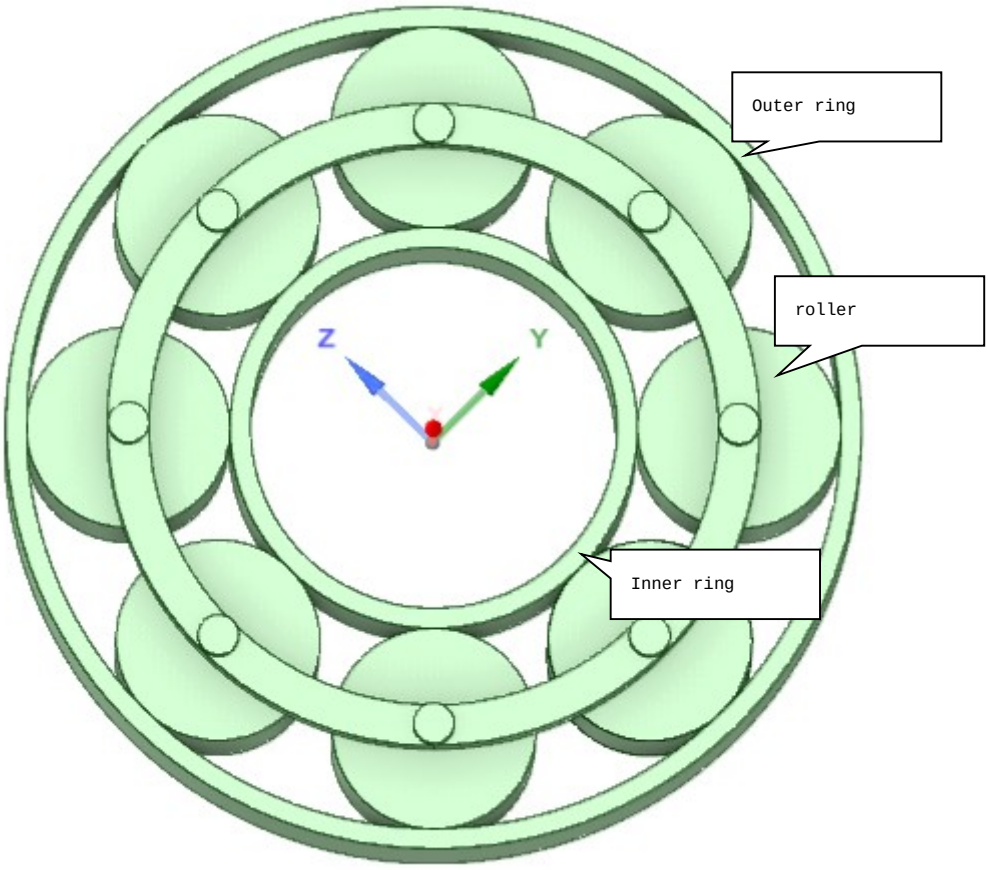
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The load on the propeller side is so heavy that even with the motor speed set to 1000 rpm, the propeller's rotating shaft may not turn. In such a case, if a normal motor were directly connected, the motor would be damaged by overcurrent due to the overload. However, with a torque converter using tapered roller bearings, there is no problem at all, and when the speed is increased to 2000 rpm, it overcomes the load on the propeller side and starts to rotate. If the propeller side is at 10 rpm, the reduction ratio becomes 2000:10, or 200.0, and if the motor side remains at 2000 rpm and the propeller side is at 1000 rpm, the reduction ratio becomes 2.0. In other words, this also indicates that it functions as a continuously variable gear that can automatically change speed according to the required torque.

Just as a balance scale can measure the weight of an object whose weight is unknown without using complex electronic control mechanisms, a continuously variable speed gear using conical roller bearings automatically adjusts the gear ratio according to the required torque. Increasing the rotational speed of the motor is equivalent to increasing the weights on the balance scale. A balance scale measures weight by gradually increasing the amount of weights, causing the pan to tilt. Similarly, by gradually increasing the motor's rotation speed, when the propeller starts to rotate, that indicates the required torque.

If the outer and inner rings of a conical roller bearing rotate independently, it will function like a gear with a reduction ratio, similar to a planetary gear.

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If the rollers do not rotate and the outer and inner rings rotate in sync, the rotation speed of the outer ring n : the rotation speed of the inner ring n = n : n, and the reduction ratio becomes 1.0.

When the outer ring rotates, the rollers rotate, and if the outer ring rotation speed is 1000 and the inner ring rotation speed is 1, then the ratio of outer ring rotation speed 1000:inner ring rotation speed 1 = 1000:1, resulting in a reduction ratio of 1000.0.

When the outer ring rotates and the rollers rotate, if the outer ring rotation speed is 1000 and the inner ring rotation speed is 0, then the ratio of outer ring rotation speed 1000 to inner ring rotation speed ≈ 0 = 1000:0, and the reduction ratio becomes infinite.

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The faster the rollers rotate, the larger the reduction ratio.

While the gear ratios of automobile gearboxes are typically between 2 and 6, this continuously variable speed gear using a conical roller bearing has a reduction ratio of 1 to infinity regardless of its size. Moreover, it automatically adjusts the gear ratio to optimize it according to the required torque, making it functionally superior to complex and expensive gearboxes.

Whether it's a truck or a ship, the greatest torque is required when starting to move, but a motor's torque doesn't increase significantly until the rotational speed is high enough. This means that the motor is under heavy load when the torque is low at low rotational speeds, which is hard on it. However, with the continuously variable speed gear of the present invention, the motor is not overloaded (the maximum load occurs when the inner ring does not rotate, but in that case, the outer ring rotating is the normal state).

It was difficult to know if a motor could handle the load without actually trying it, and adjusting the gear ratio was a challenging task until now. However, with this invention, there's no problem even if you suddenly put a heavy load on it (it would be great if there were people who could do that). If the load is too large, even if you increase the motor to its maximum allowable rotation speed, the propeller's rotating shaft simply won't turn. If the motor is integrated, it can also become a simple, compact motor that doesn't break even under overload, with a built-in gearbox and torque converter.

Until now, moving heavy objects required motors or engines capable of generating a certain amount of torque. However, with this invention, even small, high-speed, low-power motors can move heavy objects. It's like how even a weak person can lift a bus using a jack.

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■Conclusion for the next step

The efficiency of all rotating objects, such as ships, aircraft, trucks, cars, motorcycles, trains, and air conditioner fans, will improve dramatically.

Next time, we'll return to a two-rotor setup to aim for liftoff.

That's all.

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