Energy saving transformation of extruder

2018-01

Advantages of Liansu permanent magnet synchronous servo motor in energy saving transformation of extrusion

◆Dedicated for extruder and easily replace the original DC motor；

◆The energy efficiency reaches the super high grade, 20% energy saving than the DC motor；

◆Good characteristics at low speed (constant torque at full speed range)；

◆High dynamic response and high speed precision；

◆Maintenance free(The bearing refueling without stop)；

◆Unique internal and external air cooling channel, acheived IP54 protection grade；

◆High Power Factor, reduced the factor compensation in the factory

Common types of main motor in extruder

- DC motor with carbon brush
- AC asynchronous motor（general efficiency/highly efficient）
- Permanent magnet synchronous super high efficiency motor（servo）

Advantages & disadvantages of DC motor with carbon brush

Low speed and large torque

Small size

Low protection level IP21,is easy to get dust in.

It needs to frequently replace and clean the carbon brush which leads high maintenance cost.

Commutator,external excitation and speed measurement feedback,more faults.

High energy consumption

Advantages and disadvantages of AC asynchronous motor

Low energency consumption compared with DC motor

Maintenance free

Low speed and poor performance

Low speed and high energy consumption

Large size, take more space

Advantages and disadvantages of permanent magnet synchronous high efficiency motor (extrusion special)

Large torque at low speed of motor（Torque constant in full speed range）

Small size

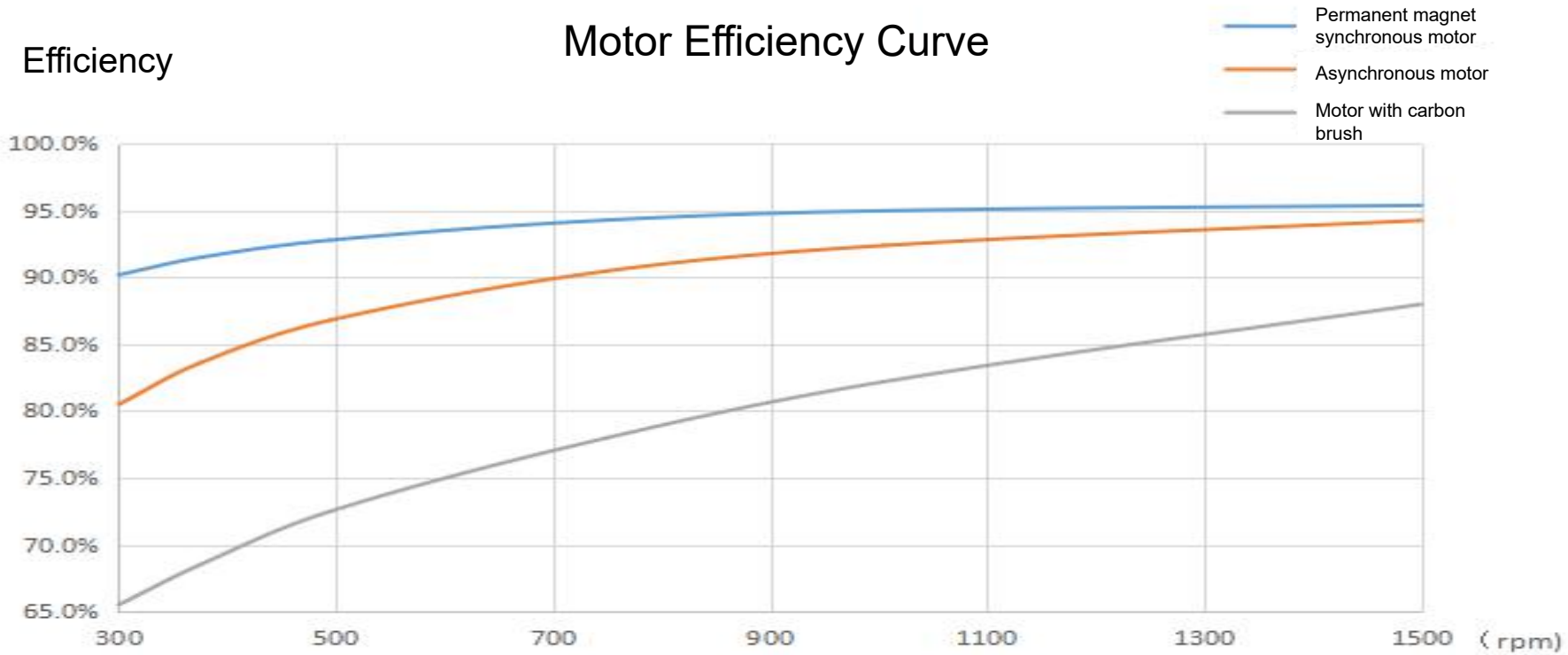
Lower energy consumption compared to asynchronous high efficiency motor

High power factor and reduced reactive loss

Maintenance free

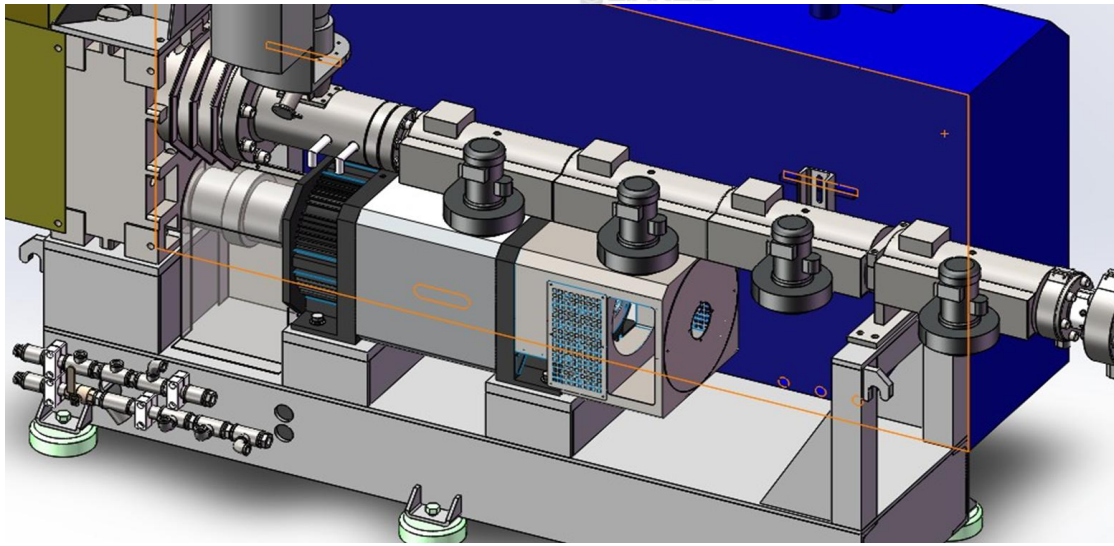
High manufacturing cost of permanent magnets and high insulated enamelled wire

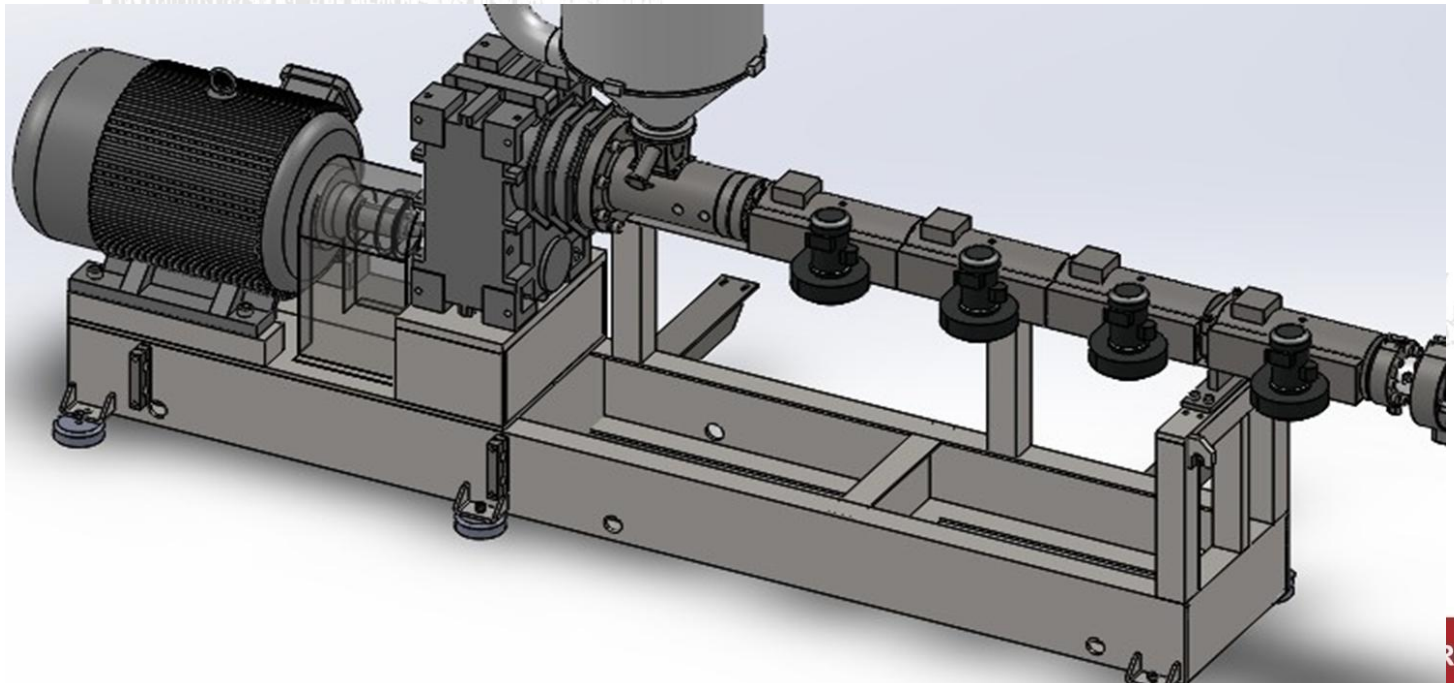
Efficiency comparison of DC, AC asynchronous & permanent magnet servo motor



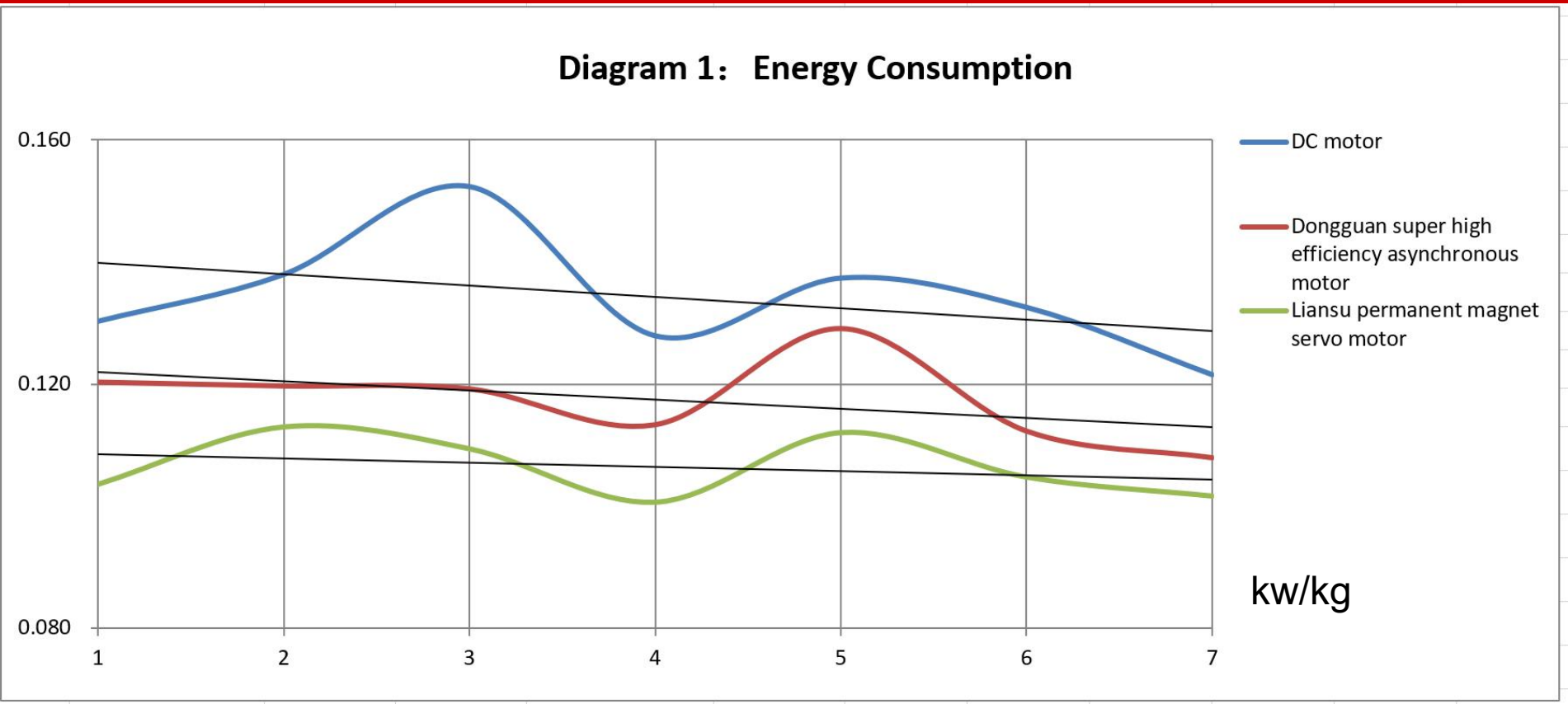
Advantage I：Dedicated for extruder and easily replace the original DC motor

The center hight (smaller than AC asynchronous for 2~3 base number), the installation dimension are exactly the same as DC motor.



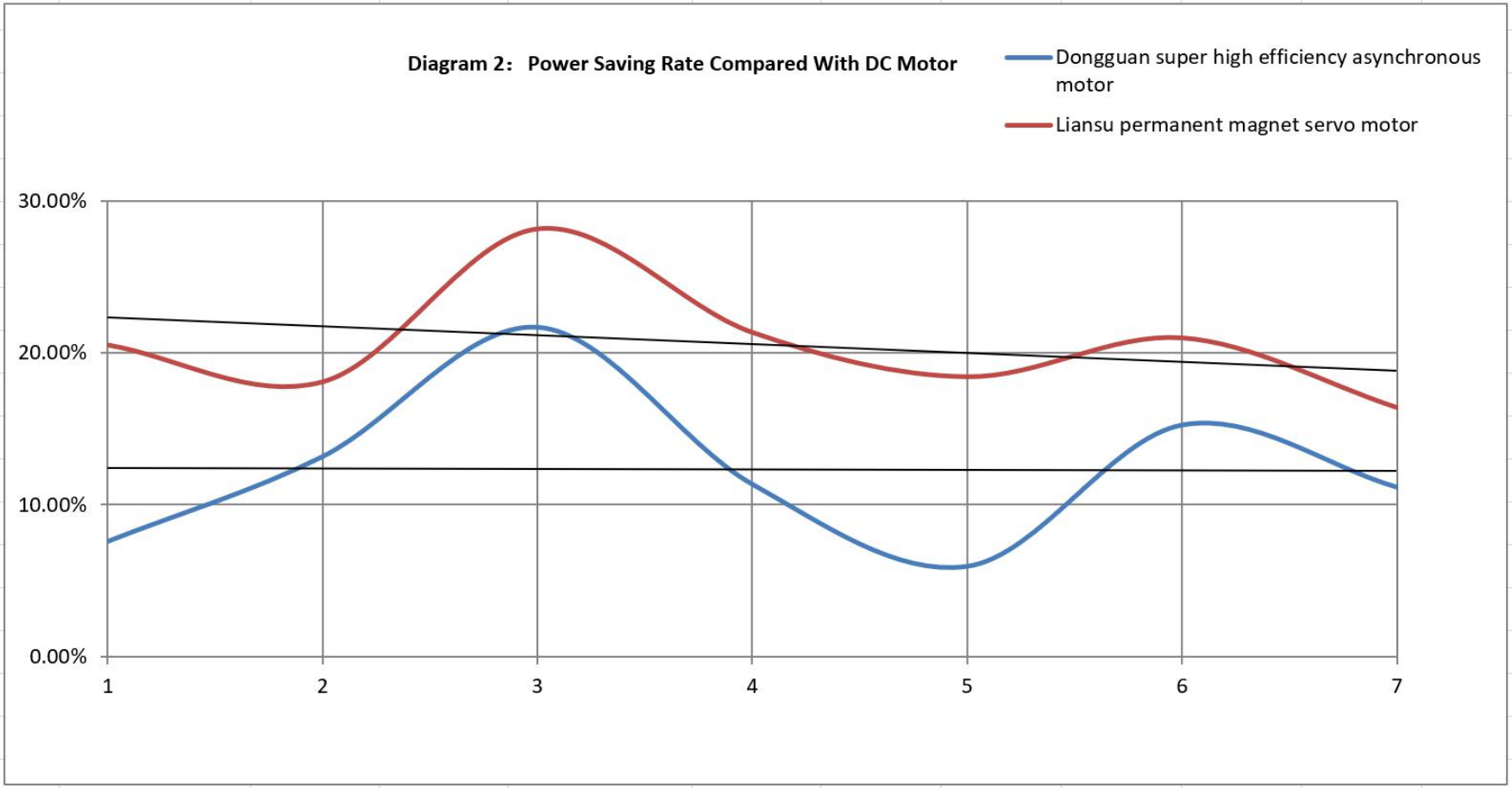


Advantage 2：Energy efficiency reaches the super high grade,and energy consumption pratically test the data



`	1	2	3	4	5	6	7	max	min	AVG
DC motor	0. 130	0. 138	0. 152	0. 128	0. 137	0. 133	0. 122	0. 152	0. 122	0. 134
Dongguan super high efficiency asynchronous motor	0. 120	0. 120	0. 119	0. 113	0. 129	0. 112	0. 108	0. 129	0. 108	0. 117
Liansu permanent magnet servo motor	0. 104	0. 113	0. 109	0. 101	0. 112	0. 105	0. 102	0. 113	0. 101	0. 106

Advantage 3：Energy efficiency reaches super high grade and power saving rate



Power saving rate compared with DC motor	1	2	3	4	5	6	7	max	min	AVG
Dongguan super high efficiency asynchronous	7. 61%	13. 19%	21. 70%	11. 37%	5. 97%	15. 26%	11. 18%	21. 70%	5. 97%	12. 33%
Liansu permanent magnet servo motor	20. 53%	18. 10%	28. 19%	21. 36%	18. 44%	21. 00%	16. 41%	28. 19%	16. 41%	20. 58%
Permanent magnet motor more energy saving than asynchronous motor	12. 92%	4. 91%	6. 49%	9. 99%	12. 47%	5. 74%	5. 23%	12. 92%	4. 91%	8. 25%

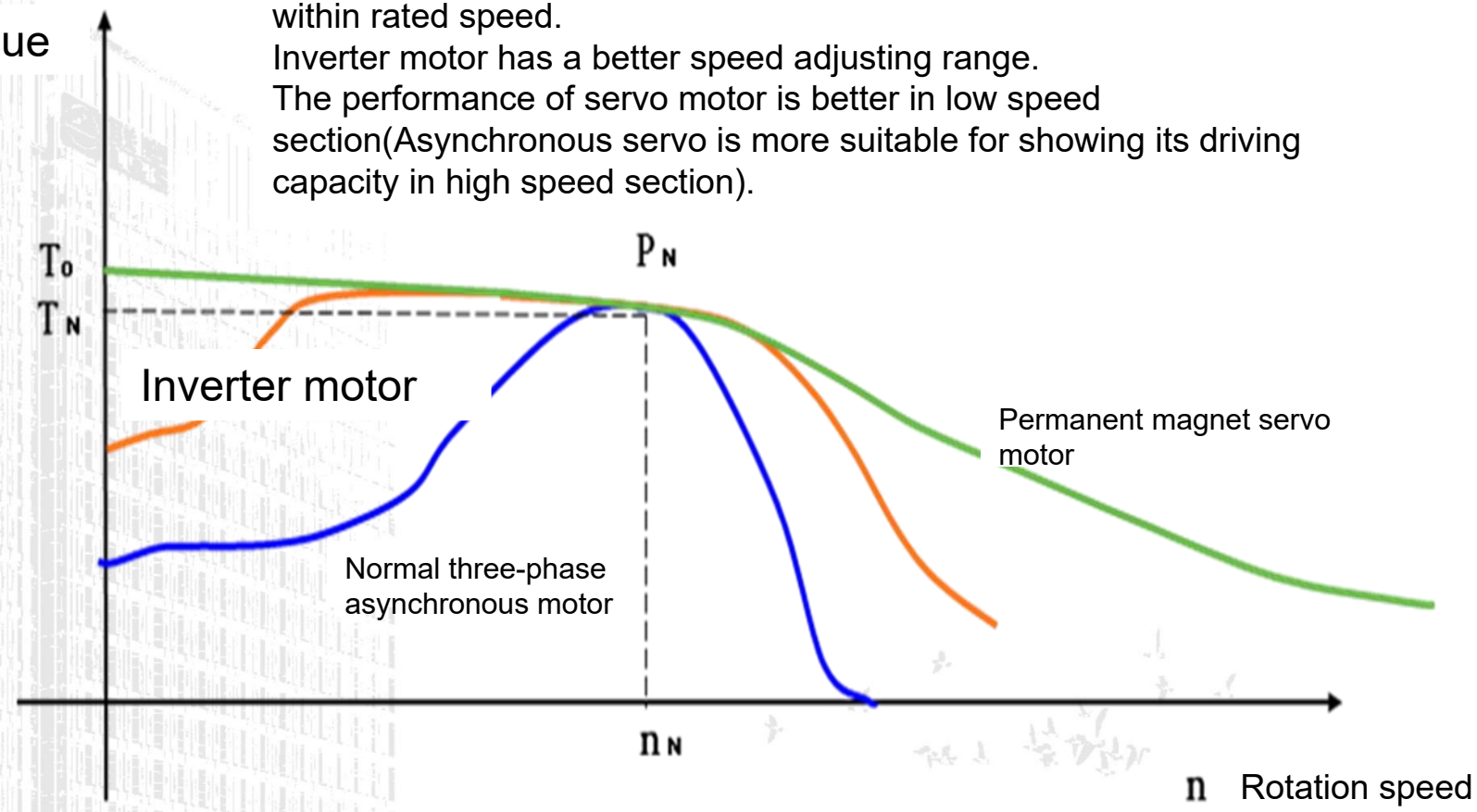
Advantage 4：Energy efficiency reaches the super high grade,conclusion

Conclusion:

It can be seen from the above data and chart that Dongguan super efficient asynchronous motor & Liansu permanent magnet ultra efficient motor saves more energy than DC motor.The power saving rate:Dongguan super efficient asynchronous motor 5.97%--21.7% (average 12.33) Liansu permanent magnet ultra efficient motor 16.41%--28.19% (average 20.58%)

Advantage 5：Good characteristic at low speed（Torque constant in full speed range）

Normal three-phase asynchronous motor is suitable for working within rated speed.
Inverter motor has a better speed adjusting range.
The performance of servo motor is better in low speed section(Asynchronous servo is more suitable for showing its driving capacity in high speed section).

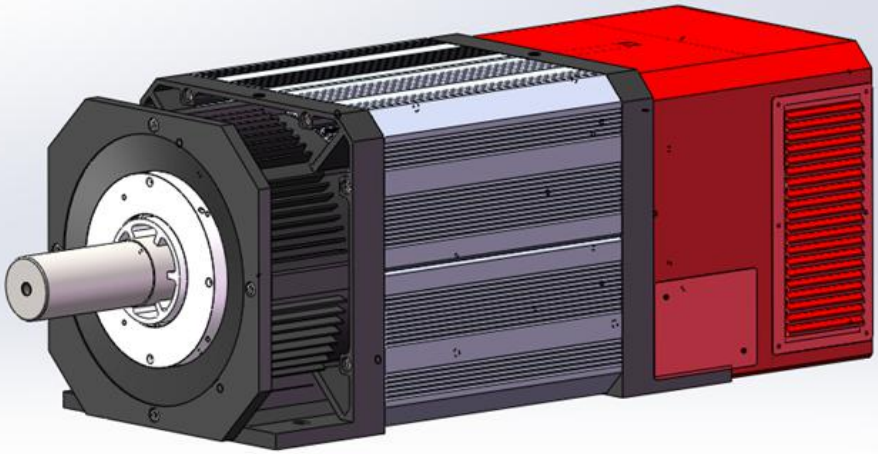


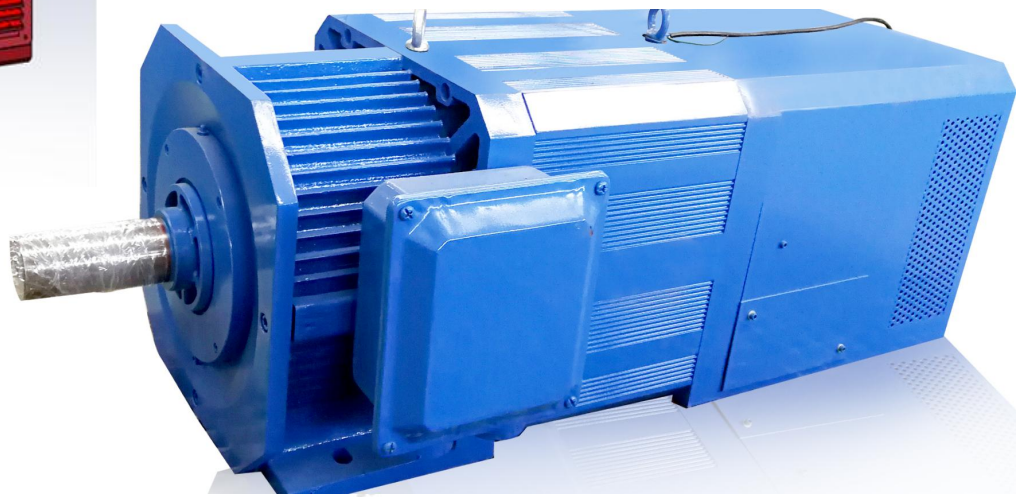
Advantage 6：The main screw driver can reduce a power level

- Because Liansu dedicated extruder screw driving motor has characteristics of high torque output at low speed and 20% electricity saving, the main driver can be reduced a power level according to the actual load rate of the extruder:For example, the original motor drive system with 75KW can be replaced by 55KW, and the original 90KW can be changed to 75KW and so on.

- Under the condition of non expanding capacity, the number of the installed machine of the workshop can be properly increased through all the energy saving transformation.

Advantage 7：High dynamic response and high speed precision



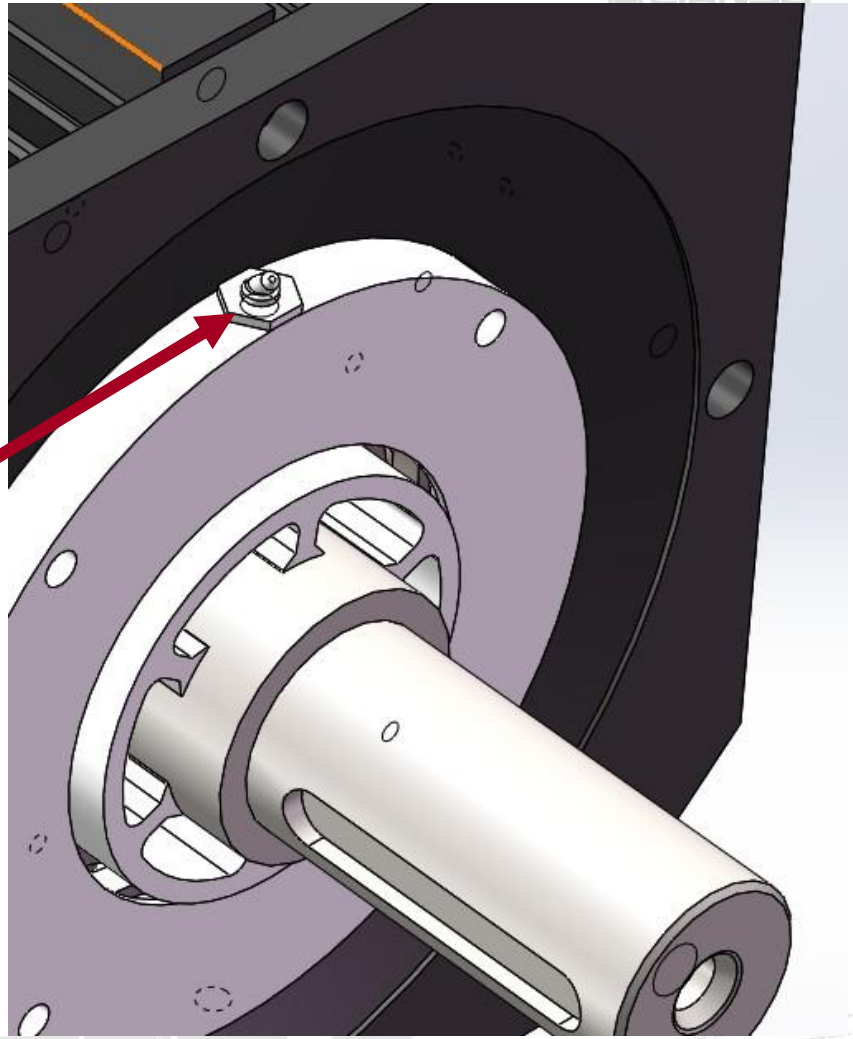


1、The main screw motor and driver of the extruder adopts servo driving, fast dynamic response and high speed precision.

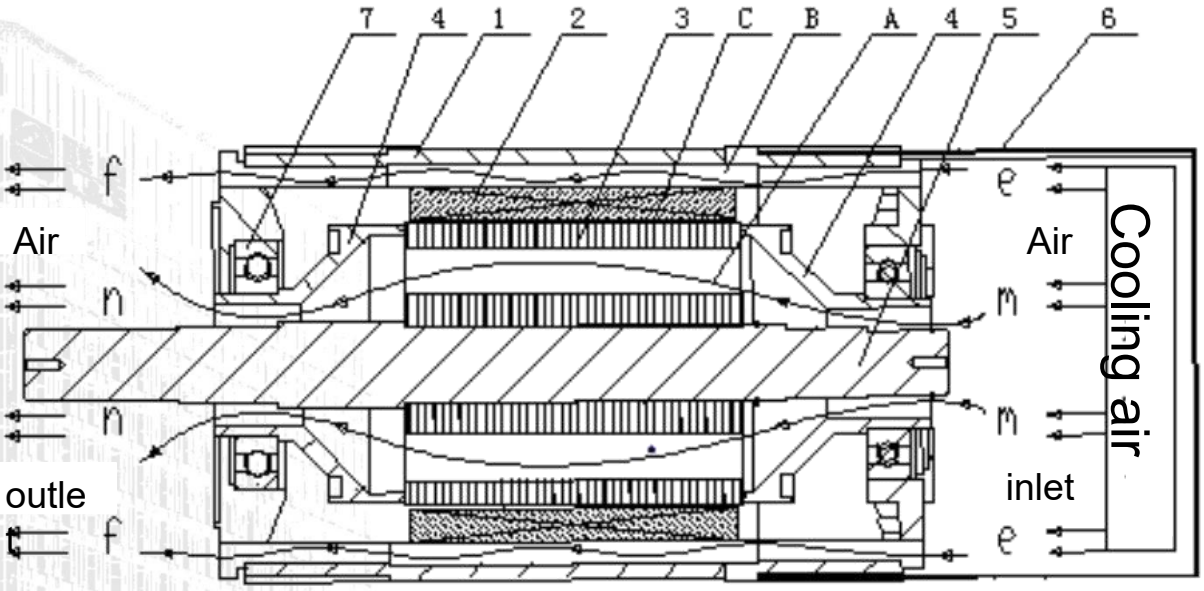
2、It can cooperate with servo drive, set the screw as super torque fast automatically slow down until it stops, effectively protect the screw.

Advantage 8：Maintenance free（The bearing will not stop for refueling）

The front and rear bearings of the motor adopt non stop refueling



Advantage 9：Unique internal and external air cooling channel heat dissipation mechanism,good cooling effect



A. Motor rotor heat dissipating air duct B. Motor stator heat dissipating air duct C. Air gap
1. Machine housing 2. Stator 3. Rotor 4. Air cover of rotor 5. Axis 6. Air cover of motor 7. Bearing

The stator iron core, the rotor iron core and the bearing of motor have independent heat dissipation air duct(initiate double heat dissipating ventilation channels of stator and rotor,one more rotor heat dissipating channel compared with traditional motor).

Advantage 10：High power factor and the required reactive compensation is small

The power factor is high, the load capacity can be reduced properly, and the economic input of reactive compensation can be almost saved.In particular, the greater the distance between the distribution cabinet and the extruder, the more obvious economic benefits of the "wire loss" manifests.

Return on investment

The cost of electricity is compared as follows(take 80 conical twin screw extruder,75KW motor and PVC pipe production line as an example: count according to the actual production load rate of 66.67%), we expect to reclaim the invested cost (compared with DC) in 11 months.

	Rated power (KW）	Actual production load rate	Average electricity saving rate compared to DC motor	Average working hours per month(20hX24 days=480 hours）	Per kilowatt hour price （assume 1 yuan/hour）	Electricity cost per month
DC motor	75	66. 67%	/	480	1	24000
Liansu motor	75	66. 67%	20%	480	1	19200

Same power and same torque contrast picture

Customer site energy saving transformation picture

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