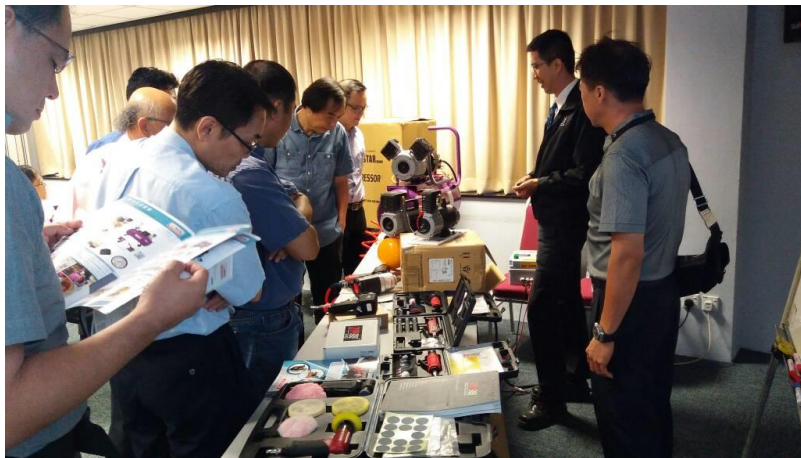




Effective & Versatile Compressed Air Delivery – Portable DC Air Compressor Technology

by Ir. Loo Chee Kin

Ir. Loo Chee Kin is currently the Chairman in Mechanical Engineering Technical Division (METD).



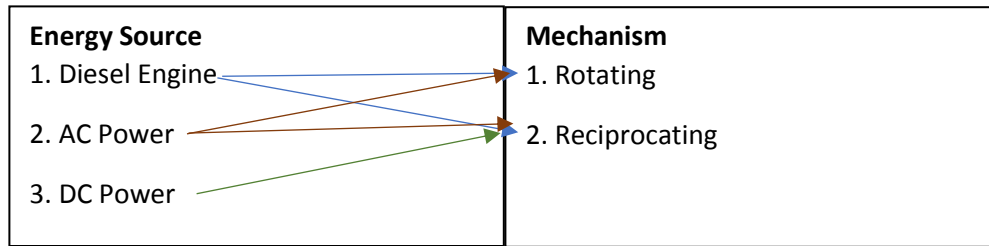
Hands-on session and demonstration of the DC air compressor

This evening talk on portable DC air compressor technology was held in Wisma IEM on 20 September 2017. This talk was presented by Ir Kim Kek Seong. Compressed air is an important source of energy since the industrial revolution.

The energy contained in the compressed air can be used for variety of applications, such as; high pressure clean air for medical purpose; driving building pneumatic HVAC control system; heavy duty or cyclical industrial processes, process & instrumental control, and pneumatic power tool applications.

The pneumatic tools and machines utilises the kinetic energy of the air as it is released and the tank is depressurized. Air compressor is a device that convert air into a potential energy, as it is stored in a pressurized vessel.

There are two basic mechanisms to generate compressed air, namely reciprocating (e.g. piston compressor) and rotating (e.g. screw compressor). This is then matched with a driver.



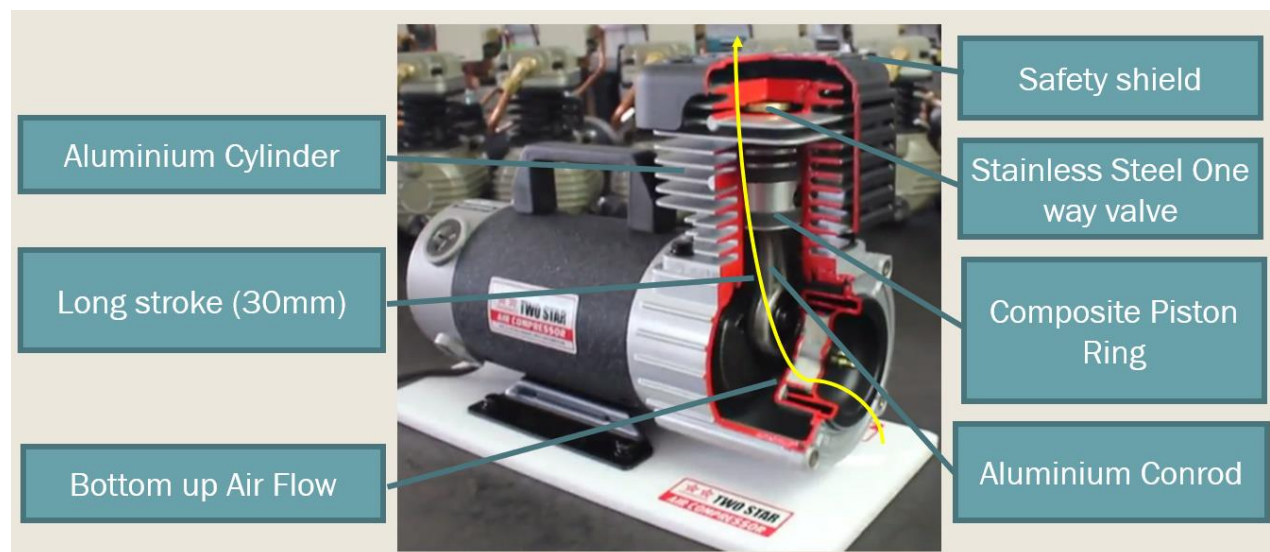
Energy source and compressor mechanism

In the market, there are many combinations of choice for compressors like the chart above. Direct current (DC) compressor is probably the smallest and lowest investment of compressor in the market. The revolutionary design of the modern DC compressor are;

- Ultra-portable,
- High output ratio over power consumption,
- Oil free green technology, and
- Easy low maintenance.

With this new invention of the professional DC air compressor, it opens up a new horizons of air compressor application outdoor. It could drive professional power tools at a fraction of weight of traditional diesel air compressor with a small 12V battery car battery.

Ir. Kim said the ultimate challenge in the design of DC compressor is the heat dissipation issue. His talk and hands on session demonstrated to the participants some of the breakthrough and improvement in both the compressor and motor design.



A cut away model of the compressor, illustrating the latest design features

| | |
|----------------------------------|--|
| 1. Aluminium cylinder | Aluminium heat fin cylinder dissipate heat up to 50+°C |
| 2. Long Stroke | Create higher pressure and higher flowrate. |
| 3. Bottom up air flow | Good heat dissipation |
| 4. Aluminium Conrod | Good heat dissipation |
| 5. Composite piston ring | Self lubricating, environment friendly, less resistant. |
| 6. Stainless steel one way valve | Long usage life |
| 7. Safety shield | Protect human arm. |
| 8. Copper Carbon Brush | High wear resistant, expected 700 hours operation life. Easy changeover. |
| 9. Built-in cooling fan | With pure copper high performance conductor, fast heat dissipation |
| 10. Ventilation vane | 12 facing downwards vane facilitating fast heat ventilation |
| 11. Wrinkle powder coating | Anti-fouling & abrasion resistant. |

| Model | Weight kg | Air Flow lpm @ 0 psi | Max Current Amp | Max Pressure psi | Ratio Air flow to weight | Ratio air flow to current |
|-------------------|-----------|----------------------|-----------------|------------------|--------------------------|---------------------------|
| Brand A | 9.6 | 174 | 50 | 150 | 18.12 | 3.48 |
| Brand V | 5.7 | 85 | 44 | 150 | 14.91 | 1.93 |
| Brand O | 28.0 | 425 | 180 | 200 | 15.18 | 2.36 |
| Two Star FD-D1 | 8.7 | 210 | 40 | 150 | 24.14 | 5.25 |

Comparison chart of compressor air flow against unit weight and power required

Ir. Kim presented a comparison of his demonstration unit against similar global products. His study shows the compressor to have the highest efficiency. It has the highest ratio of air flow against weight and power. This innovation has unlocked the possibilities of carrying out job with professional pneumatic tools with just an ordinary car battery. It gives great convenient for the work to be done on the field or jobsite.