

## Vortex E Series All-in-one Coolant Pump Nippon Oil Pump Co., Ltd.

### 1. Development Motive

Machine tools use coolant fluid to remove the friction heat and the cutting chips. The coolant is circulated in the machining chamber by a pressurizing pump. Generally speaking, displacement pumps, generating high pressure, are susceptible to chips and sludge. Chips and sludge in the coolant are likely to cause problems. They should affect productivity or even damage the machine.

To protect pumps against chips and sludge, a suction filter at the intake side has been used for many years. The filtration system, however, occupies large space and incurs high initial cost. Regular maintenance of the filter, periodic cleaning or replacement, is crucial to ensure the performance of the coolant system. The proper maintenance is costly and sometimes requires interruption of machine operations.

We tried to develop a new type of coolant pump, robust against chips and sludge, easy-maintenance and cost/space efficient, which could replace a conventional coolant filtration unit. We deemed that this development would contribute to recent manufacturing industry which is increasingly expected to operate for longer hours without interruption.

To this goal, we invented Vortex E series, which is shown in (Figure 1).

### 2. Features of the Vortex E series

The product consists of a high pressure pump and a filter in one package. The most remarkable feature is the Turbulence® design which peels off chips and fine sludge (about 20 µm) adhering to the filter during operation of the pump. The turbulence is created by fixed vanes and moving vanes that rotate near the surface of the filter. The combined action of the turbulence and centrifugal force separates the sludge from the filter and discharge through the outlet (Figure 2). This proprietary "Self-cleaning Turbulence® Filter" brings a number of significant advantages, as described below;

- ① Maintenance-free operation boosts efficiency and productivity.
  - Minimum need for cumbersome filter maintenance, resulting in reduced workload of operators. Operation time can be maximized, and thus maximum productivity can be expected.
- ② The compact design of the unit, about 1/20th the size of a conventional coolant system, enables significant space savings (Figure 3).
  - Standard coolant systems comprise a number of discrete components, including the filters, the supply pump, and the tank for containing the

coolant after filtering. Incorporating all of these functions in a single package, Vortex can reduce the required space.

- ③ Fewer pumps are required, leading to reduced power consumption.
- ④ Reduced industrial waste helps to conserve resources.
  - No need for filter replacement leads to reduced industrial waste. Chips and sludge are discharged via a separate port and can be collected for recycling.
- ⑤ Clean coolant ensures higher precision.
  - Eliminating fine sludge from the coolant prevents the work piece from denting caused by small particles during cutting.

### 3. Summary

We believe that this new product has strong potential to change the conventional wisdom of coolant systems for machine tools. Although the coolant system in the rear of a machine tool doesn't have a flashy presence, it leaves much to be desired. We hope that this product will provide the machine tool users with better work environment, performance and productivity.

Figure 1 Vortex E Series



Figure 2 The structure of the Turbulence® filter

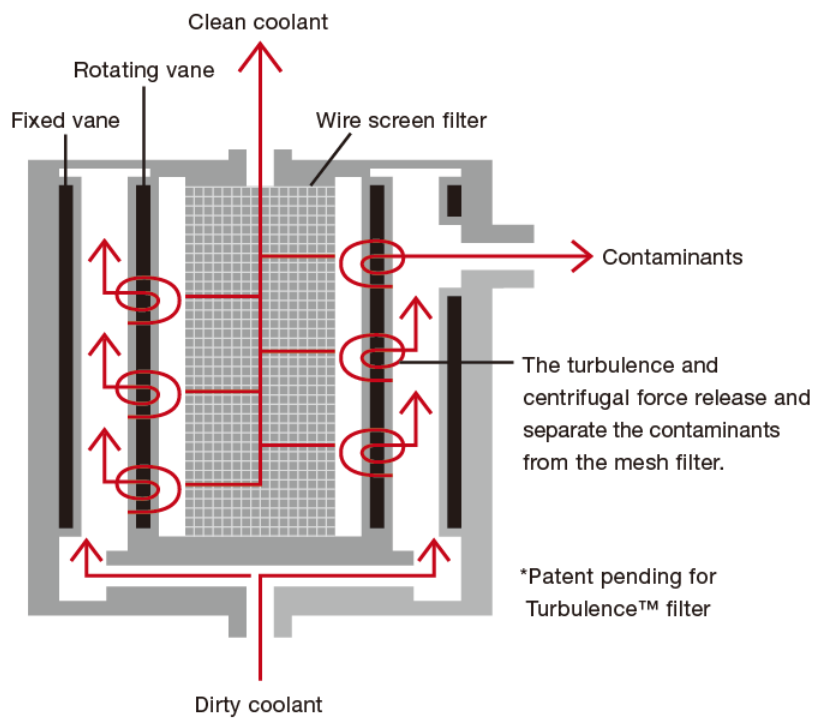


Figure 3 Compact design: about 1/20th the size of a conventional coolant unit

