

- Increased power and increased torque with less full consumption due to optimized combustion
- Significant reduced emissions, typical two-stroke blue exhaust minimized
- Mixture ratio < 1:100 (Oil : petrol) possible
- better stability, problems of piston jamming minimized
- Less costs due to reduced fuel consumption
- More driving fun



1. Problems / Starting Point

While the main attention of the engineering departments of the automotive-, motorbike- & engine-industry is focussed, how to get by more expensive technology & electronics the engine as it is more powerful, more fuel economical & more ecological, the Mozzi development has been concentrated since more than 15 years now to the "heart" of the engine: The piston.

The piston has important functions:

- Transmission of the combustion forces to the crank mechanism
- Heat derivation via the piston ring to the cylinder & to the lubrication oil
- Limiting & Forming of the combustion chamber
- Sealing of the combustion chamber together with the piston rings
- Guiding of the connecting rod

Target for the layout or rather for the functionality of the piston are following essential parameters:

- Endurance limit of the piston itself
- Endurance limit of the complete system
- Little piston mass
- Receptivity of the high combustion temperatures
- Running smoothness
- Security against piston jamming
- Low abrasion
- Guarantee of the engine-functions
- Reduction of the pollutant emissions

Start of the development was the Two-Stroke-Engine. The Two-Stroke-Engine makes due to its construction with each rotation a complete working cycle. The advantages, which are given by this principle (simple layout, good power, easy maintenance a.s.o) ensured the Two-Stroke-Engine since many decades and worldwide a wide market in the automotive industry (e.g. DKW, Wartburg, Trabant), and also in the motor-cycle industrie (e.g. Simson,

MZ, Kreidler, Yamaha, Zündapp a.s.o.), ship engines, aircraft engines, emergency power generators, lawn movers, power saws and so on.

However, the main problem of the Two-Stroke-Engine was and is still, that a lot of oil is accumulated in the crank-case. Because the oil, which is necessary for the greasing of the piston will be blown through the exhaust together with the emissions, this kind of engine was not qualified for low emission values. Only with expensive technical solutions like Catalyser, secondary air-flow or direct injection, the emissions can be improved. By this, the Two-Stroke-Engine is in the industry itself and also in the environmental federations on a "red" list. The Two-Stroke-Engine passes only with difficulties the actual regulations and will not meet the future limits.

The other essential problem of the Two-Stroke-Engine is located in the constructive layout. Many reasons like

- Nonobservance of the running in instructions
- Overheating of the piston
- Destroying of the oil-film between piston and cylinder wall
- Too small mounting clearance
- Oil shortage
- Foreign object
- Deformation of the cylinder barrel
- Deformation of the piston
- Inaccurate treatment of the cylinder barrel
- Low quality of the piston

lead to piston jamming. A sudden piston jamming blocks the engine and leads to a very quick stop. Accidents are pre-programmed.

Due to the shown problems and due to the emission limits the Two-Stroke-Engine was very off short before being stopped completely. But it is possible until today, to purchase new two-stroke-applications.

In Germany is - according the figures of the "Kraftfahrt-Bundesamt" - still a big quantity of existing automobiles & Motor Cycles registered, with the significant blue exhausts. In 2013 there have been app. 7.000 Wartburg and app. 32.000 Trabant registered. In the motor cycle segment there are - just to show a figure - more than 80.000 MZ / MUZ or more than 300.000 Piaggio registered, which are - especially as older models - predominant as Two-Stroke-Engines.

By the potential of the Mozzi-Piston a Two-Stroke-Engine can, referring to mixture, cooling, compression, combustion temperature and

especially referring the emissions, lead to a new future of the Two-Stroke-Engine. This means, existing engines can be changed easily by exchanging the old piston with the Mozzi-Piston. A good working catalyser can be implemented also. In the "new-engines" segment the engine can be designed in advance to the Mozzi-Piston-requirements. Cheap & low emission Two-Stroke-Engines can be sold on the market. It is also possible, to rework existing pistons into the Mozzi-System.

For the retrofit of existing engines it has to be considered, that the general conditions (e.g. reduced mounting clearance, mixture settings) will be taken care of to use all advantages.

2. Advantages / Benefits

- Mixture (Oil : Petrol) up to 1:300 instead 1:50 or 1:25 possible, dependent of the revolutions per minute and dependent of the direct lubrication of the bearings
- Substantial improvement of the emission situation / special catalyser possible
- Reduced fuel consumption / reduced oil consumption according to the mixture ratio
- Thereby less cost in oil and petrol
- Better endurance / stability

3. Application

Application are the retrofitting of existing engines (working pistons can be used for the rework) and also new engines.

Two-Stroke-Engines in the automotive segment, in the Two-Wheeler-Segment (Scooter, Motor Cycles, Mopeds - nearly all brands), also ship engines, aircraft engines, emergency power generators, lawn movers, power saws, karts.

4. Outlook / Future

The application of the Mozzi-Piston is also given with Four-Stroke-Engines, series development is currently in work.

For more Information please contact us

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