



Intelligent simulation of passenger bus transmissions

Voith Turbo GmbH & Co. KG

Steinbeis Transfer Center New Technologies in Traffic Engineering/Ulm



Passenger buses have totally unique driving patterns: the average kilometer takes in three stops, each time setting off, accelerating, and braking again; one moment on open throttle, the next coasting in neutral – a challenge for any motor and transmission. To tailor transmission units to future requirements, automotive companies use expensive simulation programs.

The makers of automatic gearboxes fine-tune their gear-shift programs to keep gasoline consumption to a minimum. Operators also expect low maintenance costs and extended durability. To meet these expectations and do justice to individual requirements, manufacturers carry out pre-production simulations on each and every component. On-screen displays map out the expected level of load on switch mechanisms enabling engineers to optimize transmission and estimate stress.

Back in the 1980s, together with its Voith AG division (sales: 3.3 billion euros; workforce: 24,000), Voith Turbo GmbH & Co. KG, a leading producer of drive technology, decided to join forces with the Ulm-based Steinbeis Transfer Center New Technologies in Traffic Engineering to work on the development of a sophisticated simulation program specially tailored to the needs of automatic passenger bus transmission units. Subsequent projects led to ongoing program upgrades and adaptations. At the click of the mouse, Voith's VASOP system (a power train optimizati-

on program) identifies which couplings, gear wheels and shafts are subjected to the most load. It also identifies the best weight, wheel, axle and engine ratios for each type of passenger bus. Long-term simulations can be carried out on overall life-times, fuel savings, replacement materials, optimum gear selection, gear change timings and drive coupling set-ups, all of which can then be optimized for long-term use.

The software used with VASOP has proved so successful it has now been integrated into the whole Voith Turbo development process. For Voith, 'tweaking' one of its drives with an upgraded or totally new transmission program is now inconceivable without the simulation program. The output and data provided by VASOP is also put to use in other company departments. For instance, Voith collects and evaluates gear data worldwide – a key stage in the development of future automatic transmission units.