Our large wind tunnel facility will be used for studies on turbulence development downstream of grids. There is scientific literature describing turbulence decay downstream of grids, but we want to compare this type of turbulence with the turbulence generated by laminator plates as used in the MDS work, and to compare it with the turbulence generated by a dynamic grid.

A dynamic grid is a grid that can be installed in the wind tunnel and the flow can be stirred time dependent. This motorized dynamic grid, which is shown on the right, consists of many flaps that can be rotated and which is installed in the measurement section of the wind tunnel.

So the main flow passes through the cross section of the flaps. Due to the rotating flaps a disturbance is created in the flow leading to specific velocity fluctuations and their decay in the downstream flow field. An example of a recently constructed huge honeycomb laminator system is shown in the other photo on the right, here 70 sandwich panels are stacked to form one huge laminator system.

The fluctuations, and the turbulence that results from it are of interest scientifically, but also for practical applications like in flow fields that occur in biological environments. Measurements will be made with hot wire sensors to measure the local velocity field (point measurement), and the fluctuations of it and investigate the level of turbulence. Furthermore we would like to find out how the merging and dissipation of large isolated vortex patches in this flow field takes place. The final goal of this project is to apply this knowledge to understand the motion of mosquitos in certain biological flow fields.

The starting point of the project will be first validation and comparison of the data of our system with known data from scientific literature with standard grids. From grids the steps will be made towards laminator plates and their fluctuations and finally comparisons of the turbulence will be made with the dynamic grid and the turbulence decay.

This project is intended as a 45-60 ECTS graduation project for a master student.

For more information please contact: Jos Zeegers (J.C.H.Zeegers@tue.nl).