List of individual projects ACFD (KAP), 2D and 3D denote two- or three dimensional cases

1. (2D) Find the best shape (minimum drag) for a building in an area with dominant west and north west wind and mean air velocity 10 m/s. Prepare a written report containing pictures and discussion.
2. (2D) Find the best shape (maximum ventilation) for a building in an area with dominant east and north west wind and mean air velocity 8 m/s. Prepare a written report containing pictures and discussion.
3. (2D) There is a set of buildings with different heights 5, 10, 15, 20, 30 and 50 meters. All buildings have the same width – 10 m. Locate these buildings that way to obtain arrangement with minimum drag (total drag for all buildings should be taken into account). You should use at least one building of certain height. Wind velocity is 24 m/s. Prepare a written report containing pictures and discussion.
4. (2D) There is a set of buildings with different heights 5, 10, 15, 20, 30 and 50 meters. All buildings have the same width – 10 m. Locate these buildings that way to obtain arrangement with best ventilation (all buildings should be taken into account). You should use at least one building of certain height. Wind velocity is 5 m/s. Prepare a written report containing pictures and discussion.
5. (2D) There is a set of buildings with different heights 5, 10, 15, 20, 30 and 50 meters. All buildings have the same width – 10 m. Locate these buildings that way to obtain arrangement with minimum drag for the tallest building. You should use at least one building of certain height. Wind velocity is 21 m/s. Prepare a written report containing pictures and discussion.
6. (2D) There is a set of buildings with different heights 5, 10, 15, 20, 30 and 50 meters. All buildings have the same width – 10 m. Locate these buildings that way to obtain arrangement with maximum ventilation for the tallest building. You should use at least one building of certain height. Wind velocity is 11 m/s. Prepare a written report containing pictures and discussion.
7. (2D) Design a simplified ventilation system which inside area is represented be an rectangle 1.7 x 3 m. Ventilation should provide 2 inlets with maximum speed 2 m/s and 2 outlets. Prepare a written report containing pictures and discussion.
8. (2D) Design a simplified ventilation system which inside area is represented be an rectangle 1.9 x 4.2 m. Ventilation should provide 2 inlets with maximum speed 3 m/s and 4 outlets. Prepare a written report containing pictures and discussion.
9. (2D) Examine flow behind a isosceles acute triangle pointed with smallest-angle corner towards the flow. Height of the triangle is 0.1 m, side perpendicular to the flow is 0.05 m. Examine flow with different angles of attack (0, 2, 5, 10, 15 degrees). Velocity of the free stream is 2 m/s. Suggest surface modifications to improve ventilation around the triangle. Prepare a written report containing pictures and discussion.
10. (2D) Examine flow behind a right-angled triangle pointed with smallest-angle corner towards the flow. Height of the triangle is 0.15 m, side perpendicular to the flow is 0.03 m. Examine flow with different angles of attack (0, 2, 5, 10, 15 degrees of inclination of the longest side to the direction of a flow). Velocity of the free stream is 0.2 m/s. Suggest surface modifications to improve ventilation around the triangle. Prepare a written report containing pictures and discussion.

11. (2D) Examine flow behind a diamond pointed with smallest-angle corner towards the flow. Height of the diamond is 0.1 m, dimension perpendicular to the flow is 0.05 m. Examine flow with different angles of attack (0, 2, 5, 10, 15 degrees). Velocity of the free stream is 2 m/s. Suggest surface modifications to improve ventilation around diamond. Prepare a written report containing pictures and discussion.
12. (2D) Examine flow behind a diamond pointed with smallest-angle corner towards the flow. Height of the diamond is 1 m, dimension perpendicular to the flow is 0.2 m. Examine flow with different angles of attack (0, 2, 5, 10, 15 degrees). Velocity of the free stream is 82 m/s. Suggest surface modifications to improve ventilation around diamond. Prepare a written report containing pictures and discussion.
13. (2D) Examine flow over a sinusoidal surface. Length of the domain L is fixed. Surface can be described with an equation A sin(2Пkx), where amplitude A is equal to 5-10% L, k is integer number. Take into account at least 6 full periods for lowest frequency configuration. Free stream velocity is equal to 10 m/s. Study the drag force exerted on the perturbed surface. Prepare a written report containing pictures and discussion.
14. (2D) Examine flow over a sinusoidal surface. Length of the domain L is fixed. Surface can be described with an equation A sin(2Пkx), where amplitude A is equal to 5-10% L, k is integer number. Take into account at least 6 full periods for lowest frequency configuration. Free stream velocity is equal to 1.5 m/s. Study the ventilation around perturbed surface. Prepare a written report containing pictures and discussion.
15. (3D) Propose a shape of a front cabin of a train to satisfy minimum drag and maximum pull-down force. Train velocity 93 m/s. Prepare written a report containing pictures and discussion.
16. (2D) There is an array of 9 squares (15x15 m). Find the minimum total drag arrangement considering two free stream direction 0 and 30 degrees. Prepare a written report containing pictures and discussion.