CLAIMS

1. A method of deriving parameters for a desired emulsifier for producing specific water-in-fuel emulsions consistent with emulsions produced by a reference emulsifier, the desired emulsifier and reference emulsifier including a desired mixing chamber and reference mixing chamber respectively for mixing fuel and water, the method comprising

(i) deriving a dimension of the desired mixing chamber for the desired emulsifier based on dimension of the reference mixing chamber of the reference emulsifier, the derived dimension of the desired mixing chamber being one which creates a turbulent type flow at the desired mixing chamber;

(ii) calculating dimensionless water particle size from the derived dimension; and

(iii) deriving nozzle dimension of the desired emulsifier for one or more water nozzles for injecting the water into the fuel at the desired mixing chamber from the calculated dimensionless water particle size.

2. A method according to claim 1, wherein step (i) further comprises

(iv) calculating an initial dimension of the desired mixing chamber for the desired emulsifier based on dimension of the reference mixing chamber of the reference emulsifier, and

(v) verifying if the initial dimension of the desired mixing chamber would create the turbulent-type flow at the desired mixing chamber.

3. A method according to claim 2, wherein if the initial dimension would create the turbulent-type flow, the method includes using the initial dimension as the derived dimension.

4. A method according to claim 2 or 3, wherein if the dimension would not create a turbulent-type flow, the method further comprises:

(vi) revising the initial dimension and performing step (v) until a revised dimension is obtained which would create a turbulent-type flow at the desired mixing chamber; and

using the revised dimension as the derived dimension.

5. A method according to claim 2 to 4, wherein step (v) includes calculating respective Reynold number of fuel flow of the reference emulsifier and the desired emulsifier.

6. A method according to claim 5, further comprising the step of checking the calculated Reynold numbers against a Moody Diagram to verify if the derived dimension would create a turbulent-type flow.

7. A method according to any preceding claim, wherein step (iii) includes determining nozzle dimension ratio from an empirical dimension model of the reference emulsifier based on the calculated dimensionless water particle size.

8. A method according to claim 7, further comprising deriving the nozzle dimension from the determined nozzle dimension ratio and the derived dimension.

9. A method according to claim 7 or 8, wherein the empirical dimensional model includes a chart of varying nozzle dimension ratios versus varying dimensionless mean water particle sizes derived from the reference emulsifier.

10. A method according to any preceding claim, wherein the reference dimension of the reference emulsifier includes diameter of the reference mixing chamber and fuel flow rate of the reference mixing chamber.

11. A method according to any preceding claim, wherein the derive dimension includes diameter of the desired mixing chamber of the desired emulsifier.

12. A method according to any preceding claim, wherein water content and water particle size of the emulsion to be produced by the desired emulsifier is consistent with those produced by the reference emulsifier.

13. A method according to claim 12, wherein the water content is between 6% and 40% as percentage of water volume to fuel volume and water particle sizes of substantially between 2 and 6 microns.

14. A method according to any preceding claim, further comprising deriving a number of water nozzles for the desired emulsifier.