

UNDERSTANDING FAN TEST STANDARDS AND VENTILATION SYSTEM PERFORMANCE



K.J. Lownie

B.E.(Hons1).,M.Eng.Sc

HOWDEN AUSTRALIA LIMITED

9 June 2008

VELOCITY RE-DISTRIBUTIONS AND STATIC PRESSURE RECOVERY

- 1. VELOCITY RE-DISTRIBUTION FOLLOWING A DISTURBANCE RESULTS IN SOME RECOVERY OF VELOCITY PRESSURE (STATIC PRESSURE).**
- 2. VELOCITY RE-DISTRIBUTION DOES NOT TAKE PLACE INSTANTANEOUSLY.**
- 3. DIFFERENT MEASUREMENTS PLANES WILL GIVE DIFFERENT RESULTS.**

FAN PERFORMANCE DEPENDS ON HOW IT IS MEASURED

FAN TEST STANDARDS PROVIDE A BASIS FOR:

- ESTABLISHING “STANDARDISED” FAN PERFORMANCE CHARACTERISTICS.
- COMPARING PERFORMANCE OF DIFFERENT FANS.
- INDEPENDENT VERIFICATION OF FAN AND SYSTEM ELEMENT TEST DATA.

FAN TESTING STANDARDS

HIGHLY PRESCRIPTIVE STANDARDS ARE REQUIRED BECAUSE THE PERFORMANCE OF ANY FLUID MACHINE, OR ANY ELEMENTS WITHIN AN INTERNAL FLOW SYSTEM, WILL BE DEPENDANT ON:

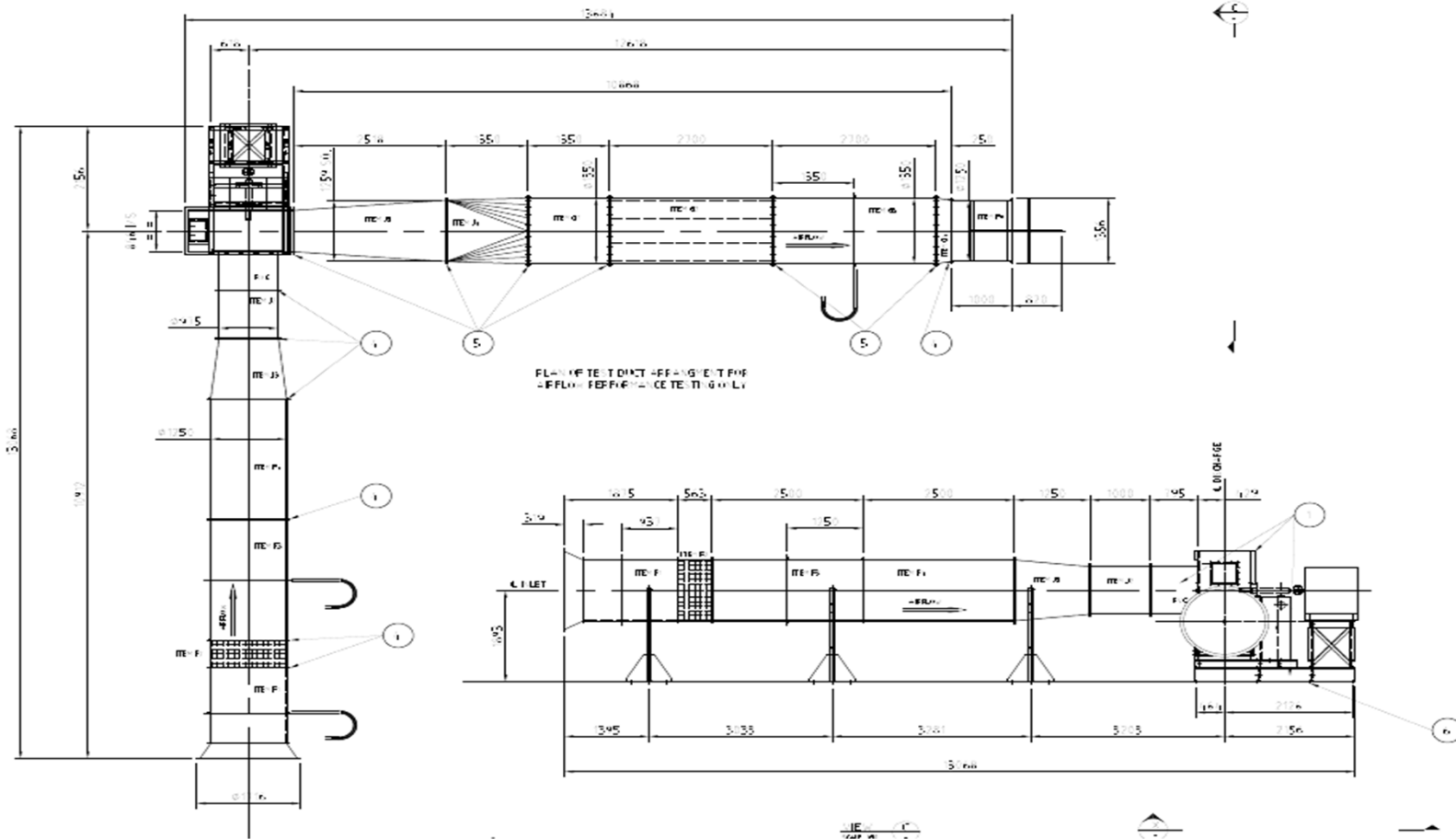
- **THE PHYSICAL INSTALLATION.**
- **THE PROCESS OF MEASUREMENT.**
- **METHODS AND ASSUMPTIONS USED TO CALCULATE THE RESULTS.**

INTERNATIONALLY RECOGNISED STANDARDS



1. **ISO 5801:1997/BS848 PART 1:1997 –
PERFORMANCE TESTING USING STANDARDISED
AIRWAYS**
2. **ISO 5802:2001 – PERFORMANCE TESTING *in situ*.**
3. **AMCA 210**

TYPICAL LABORATORY INSTALLATION FOR BS848:1997/ISO5801:1997



FAN PERFORMANCE INFLUENCED BY THE SYSTEM

PROVIDED A FAN HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE GEOMETRY SPECIFIED BY THE DESIGNERS, IT WILL PERFORM WITHIN THE TOLERANCES OF THE STANDARD USED TO ESTABLISH THE FAN PERFORMANCE.

IT CANNOT BE ASSUMED THAT THE FAN PERFORMANCE WILL BE MAINTAINED WHEN THE FAN IS INSTALLED IN A DIFFERENT FLOW SYSTEM

ALLOWANCE FOR ADDITIONAL LOSSES NOT INCLUDED IN SPECIFIED MINE VENT DUTY



MINE VENTILATION DUTY DOES NOT INCLUDE FOR:

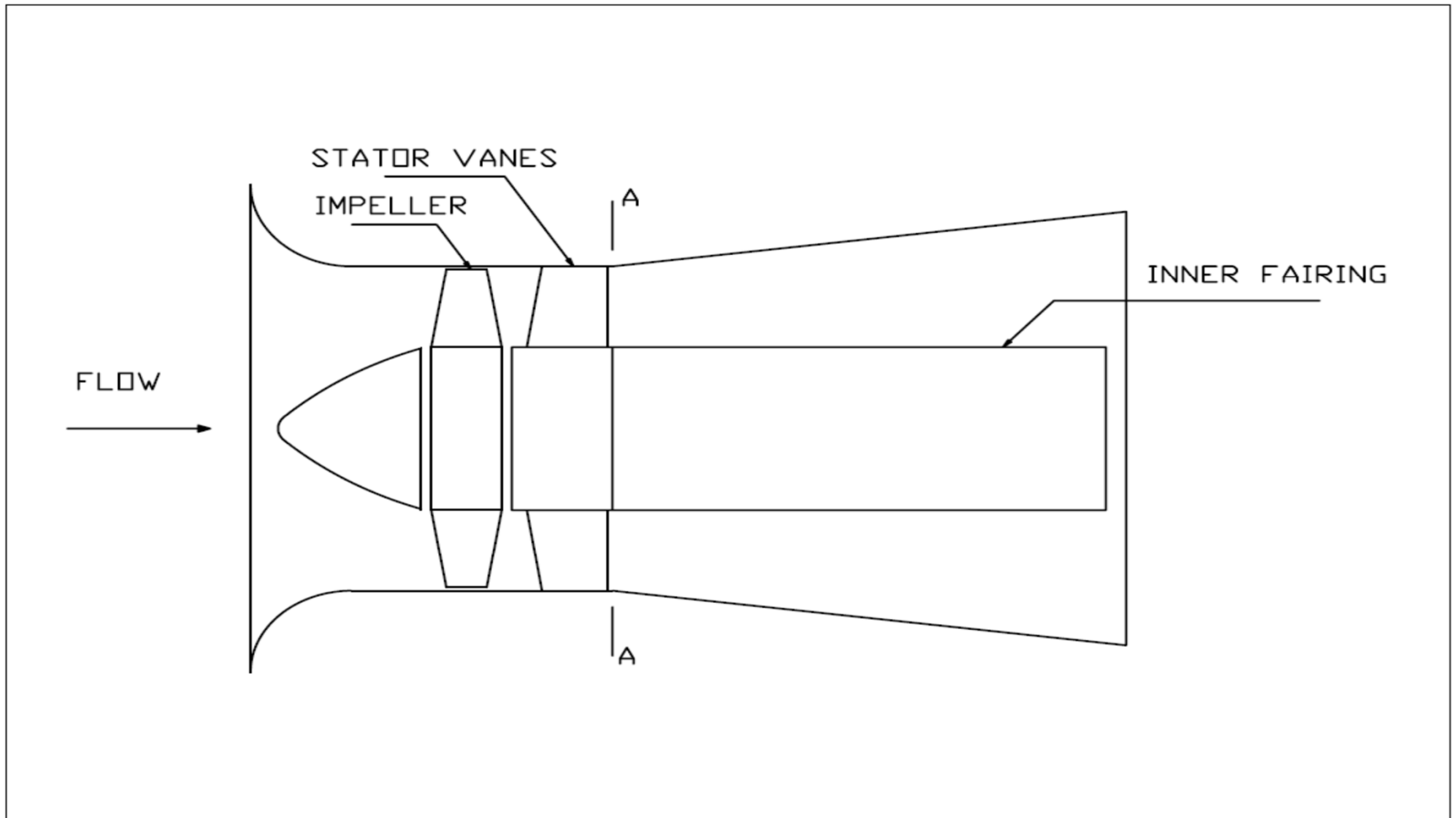
1. PERFORMANCE VARIATIONS DUE TO MANUFACTURING TOLERANCES.
2. FAN INSTALLATION EFFECTS.
3. ADDITIONAL SYSTEM DUCTWORK LOSSES.
4. FAN STABILITY CONSIDERATIONS.

MANUFACTURING TOLERANCES

AXIAL FLOW FANS:

1. **OMMISSION OF INNER FAIRING IN DIFFUSER.**
2. **LOCATING SELF CLOSING DOORS AT THE DIFFUSER INLET.**
3. **INACCURATE BLADE PROFILES AND TIP CLEARANCE.**
4. **LACK OF CONCENTRICITY OF IMPELLERV ROTATION.**

TYPICAL AXIAL FLOW FAN

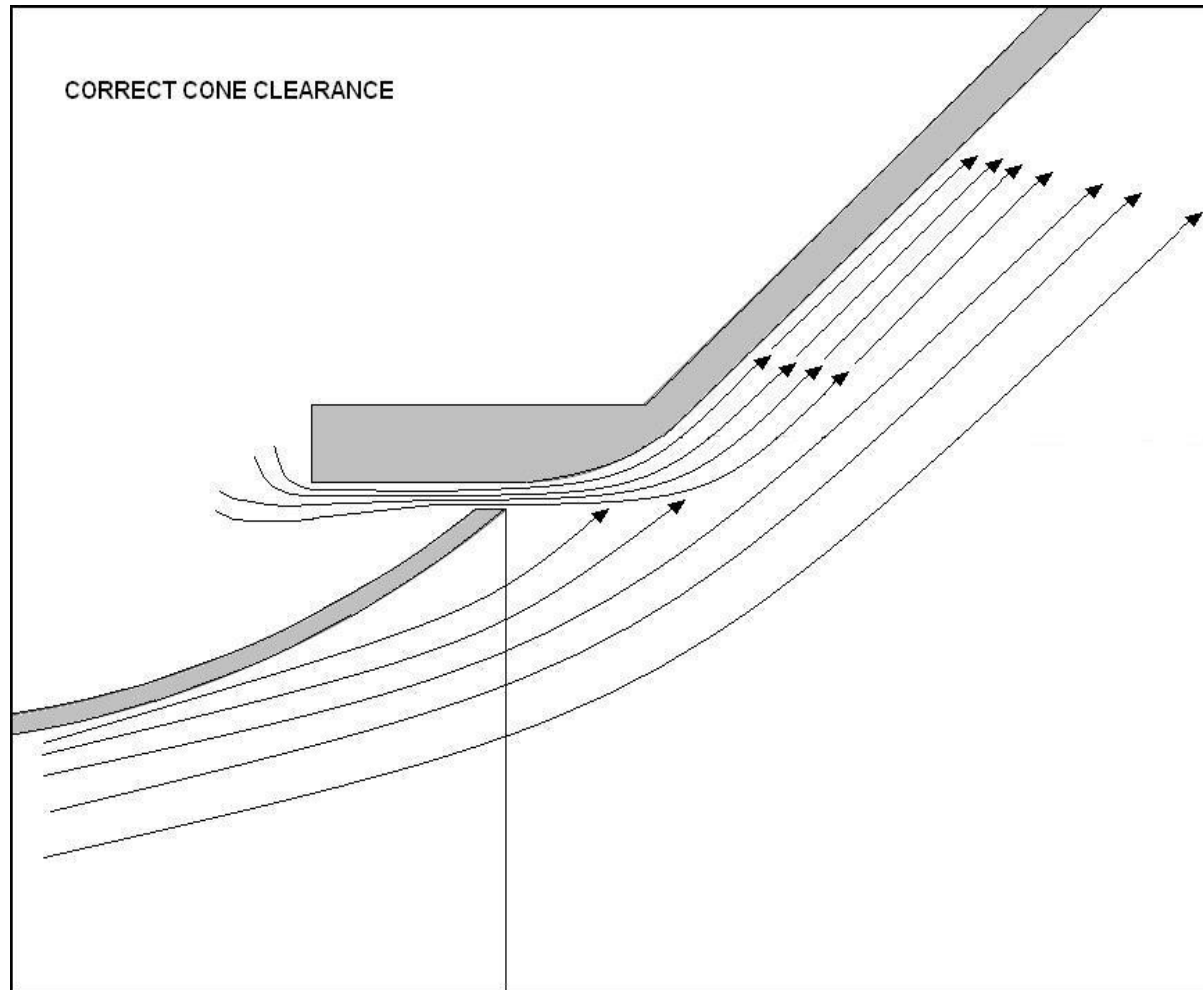


MANUFACTURING TOLERANCES

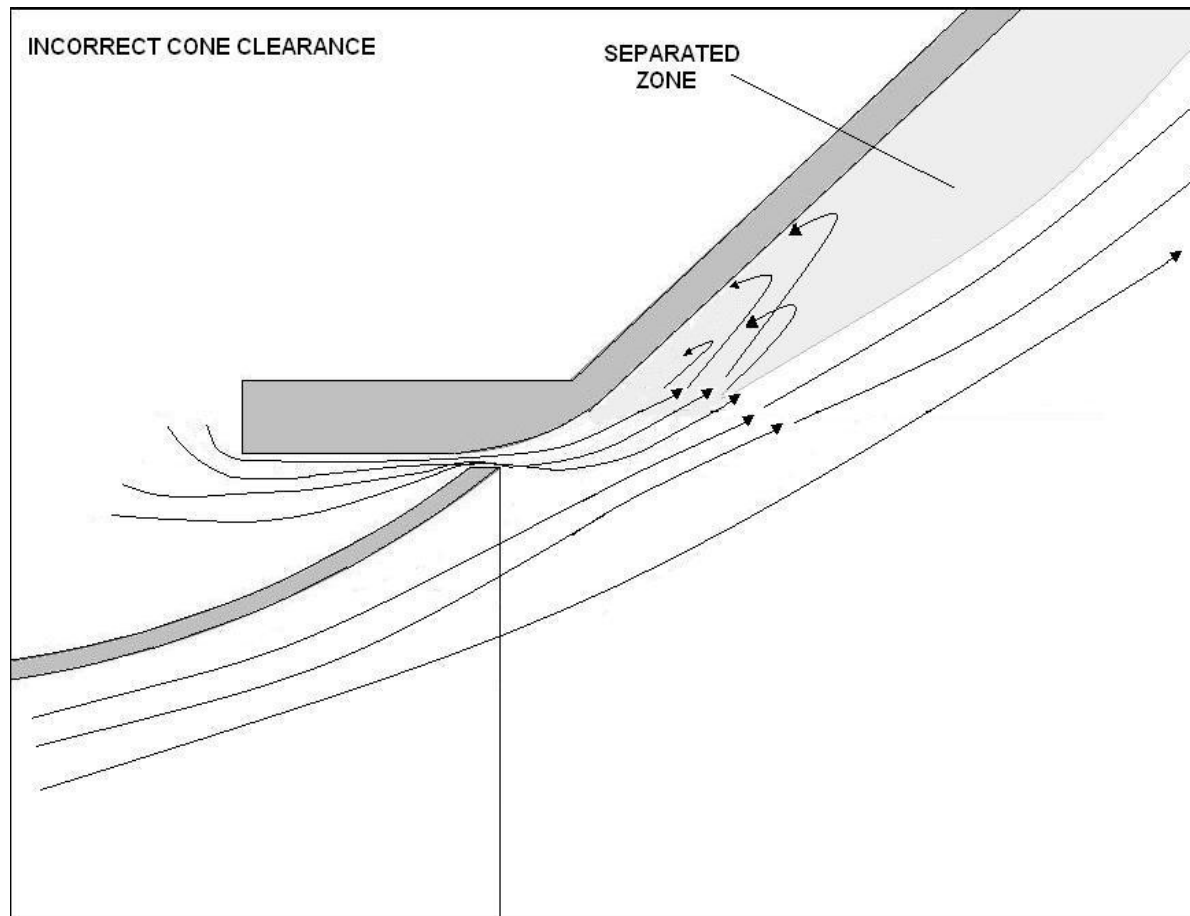
CENTRIFUGAL FANS:

1. **INCORRECT INLET CONE CLEARANCE AND PENETRATION.**
2. **INCORRECT INLET CONE GEOMETRY**
3. **INCORRECT POSITION OF IMPELLER INSIDE CASING.**
4. **INCORRECT IMPELLER GEOMETRY**

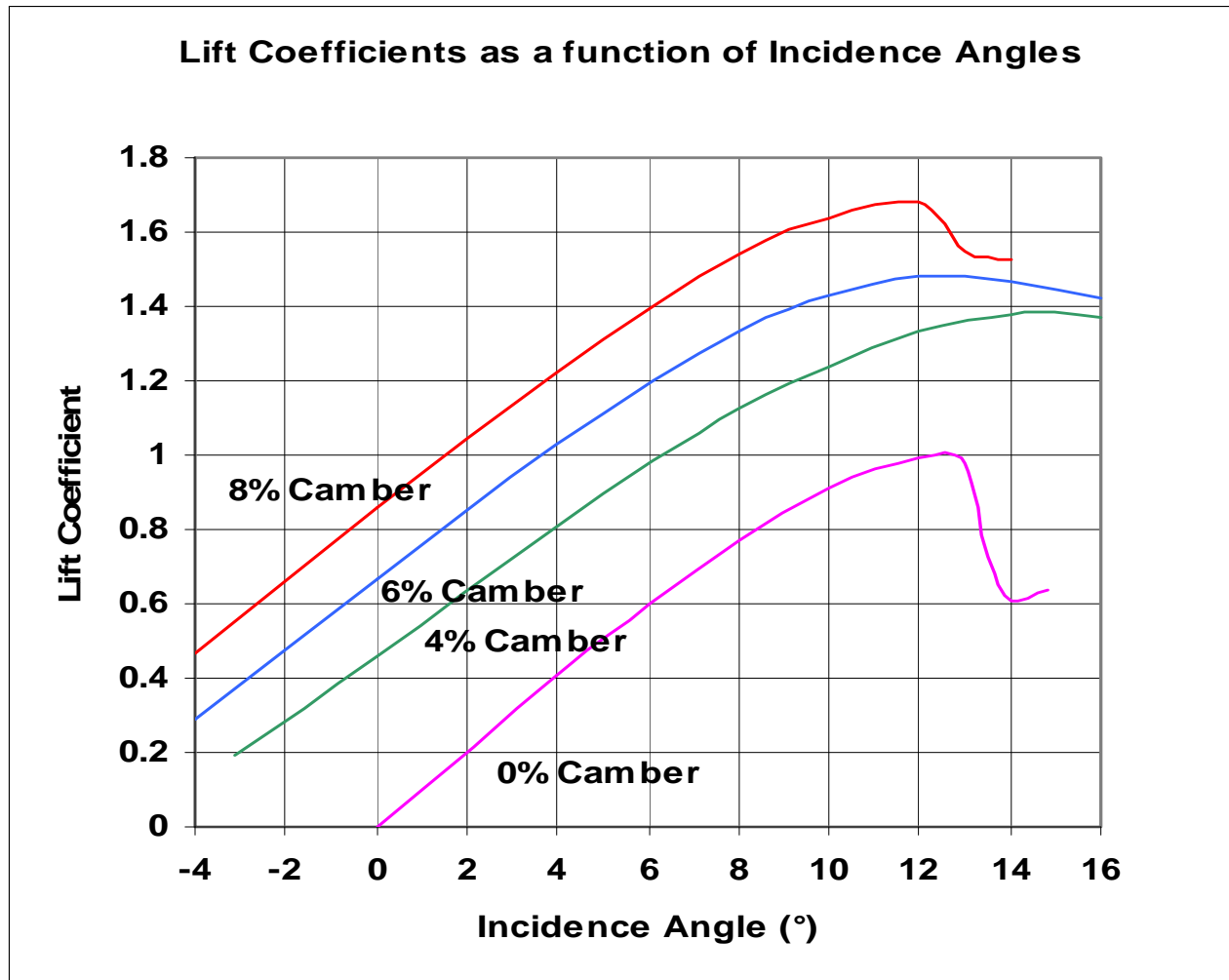
CORRECT CENTRIFUGAL FAN GEOMETRY AND SET-UP



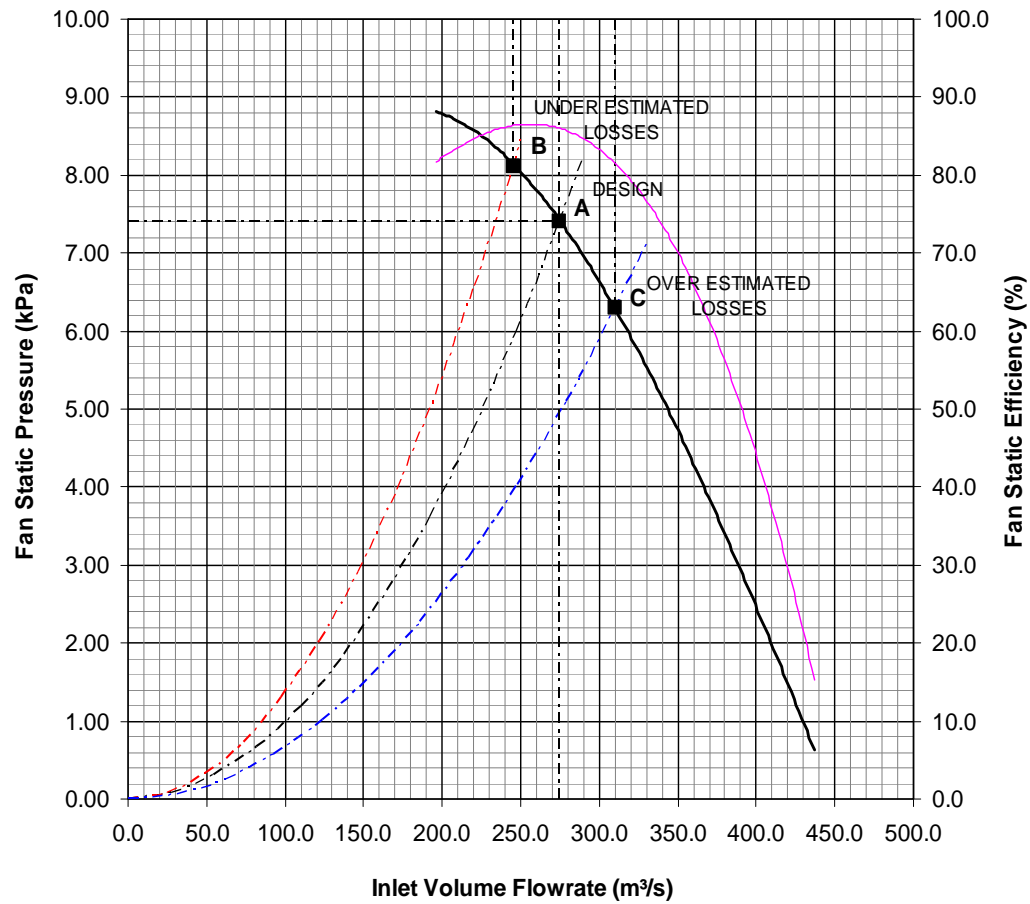
INCORRECT CENTRIFUGAL FAN GEOMETRY AND SET-UP



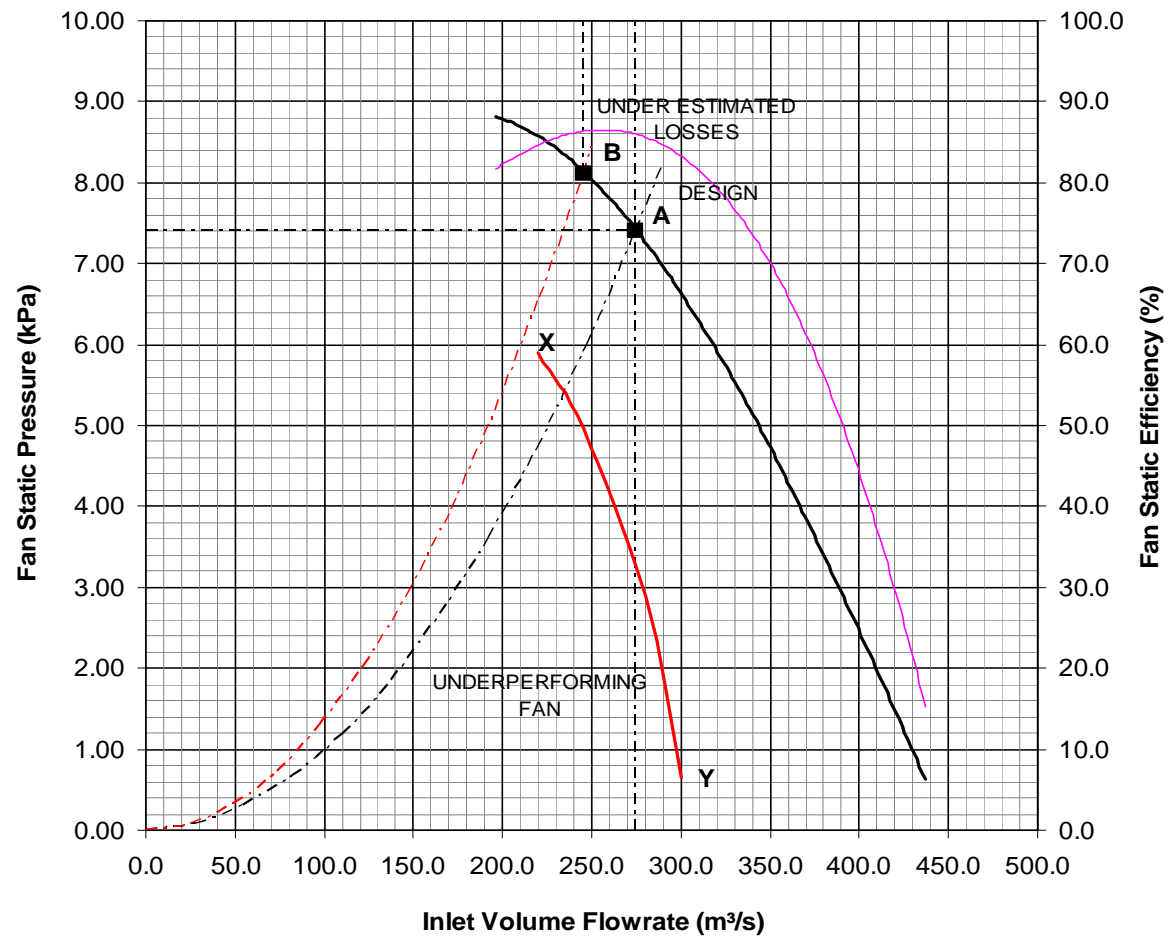
INSTALLATION EFFECT - SENSITIVITY TO VARIATIONS IN INCIDENCE ANGLE



EFFECT OF SYSTEM LOSS ESTIMATES



LOSS OF PERFORMANCE



SYSTEM STABILITY

