



**AIR MOVEMENT AND CONTROL
ASSOCIATION INTERNATIONAL, INC.**

AMCA International Support Slides for Framework Document Public Hearing

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**Note: These slides present draft, work-in-progress information and positions of AMCA,
which may change when written comments are submitted.**

Equipment Classes

If forward curved fans were included in an Equipment Class of “Centrifugal – Clean air housed”, they will be eliminated as the minimum efficiency metric is raised.

Forward curved fans are an excellent solution for ducted fan applications with low pressures – resulting in low first cost & energy, compact size and low sound.

Typical applications of forward curved fans in commercial ventilation are bathroom exhaust fans, return and exhaust fans in air handling units and general exhaust fans.



Forward Curved



Centrifugal Airfoil

Equipment Classes

Low-pressure applications without outlet duct

35,000 CFM at 0.25" static pressure

<u>Fan Type</u>	<u>Rotor</u>	<u>Diameter</u>	<u>BHP</u>	<u>FEG</u>	<u>Cost</u>	<u>Weight</u>
Roof Prop Fan	Axial	54"	6.64	57	1	1,000 lbs
Utility Fan	Centr. AF	49"	10.35	85	2.43 X	2,000 lbs



Roof Propeller Fan



Utility Fan

Equipment Classes

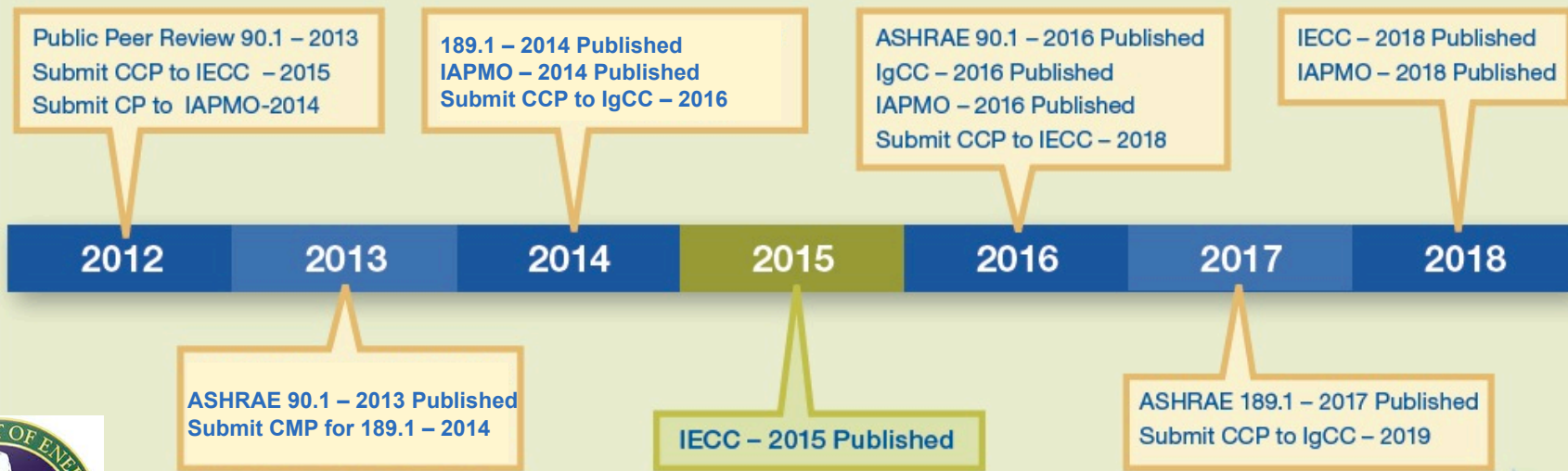
AMCA-proposed Equipment Classes

1. Vane Axial
2. Panel and Tube Axial
3. Housed Centr. – Backward Inclined
4. Housed Centr. – Forward Curved
5. Housed Centr. - Radial Bladed
6. Unhoused Centrifugal
7. Induced Flow Fans
8. Centrifugal Inline & Mixed Flow
9. Centrifugal Power Roof Ventilators
10. Axial Power Roof Ventilators
11. Circulation Fans – Exempt
12. Air Curtains (including cross flow)
– Exempt

Note: Centr. = Centrifugal

Efficiency Metrics

Integrated Timeline of National Codes and Standards for Energy Efficiency and Green Construction



U.S. Dept. of Energy development of fan-efficiency regulations.
Estimated date of start of enforcement is 2020, but could be as early as 2018.



Legend

CCP: Code change proposal (for I-codes).
Deadline in January, two years before
publication year.

CMP: Continuous maintenance proposal for
ASHRAE. Can be submitted at any time.

CP: Change proposal for IAPMO Green

Supplement to Uniform Mechanical Code and
Uniform Plumbing Code. Changes accepted
following publication of most-recent version.

IAPMO: International Assoc. of Plumbing and
Mechanical Officials

IECC: International Energy Conservation Code,

published by ICC

IgCC: International Green Construction Code,
published by ICC

2015: Year that fan efficiency requirements likely
to be in all national model codes and standards for
energy efficiency and green construction.

Product Selection



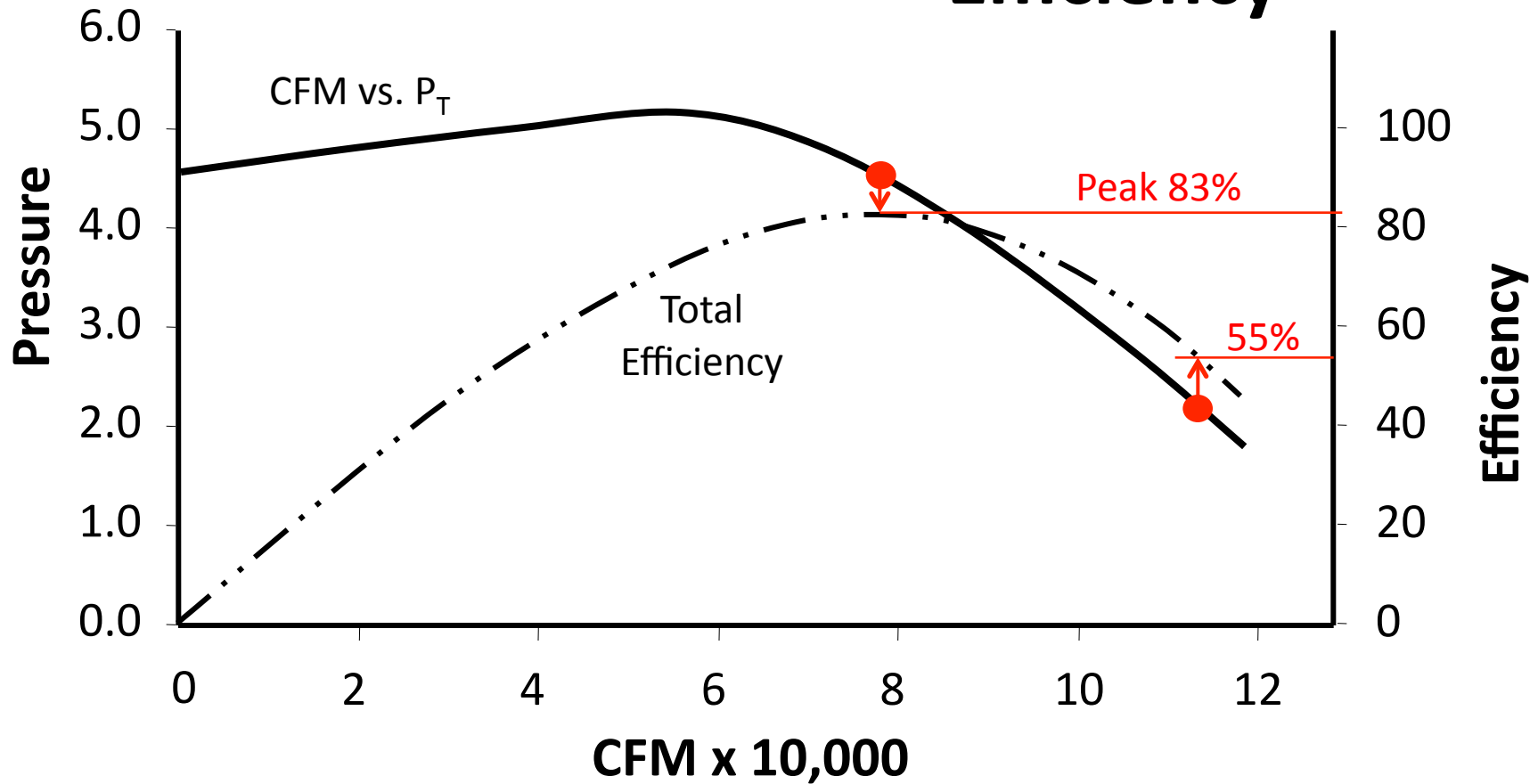
Operating Performance Data from Cookware v6.0 (Loren Cook Company)
 80,000 CFM
 3.0" SP

Model	FEG	Total Efficiency	Operating Power (HP)	Budget Price	Operating Cost/Yr	Weight
365CADWDI	85	56%	114	\$21,100	\$37,797	2330
402CADWDI	85	62%	90	\$16,100	\$29,939	2850
445CADWDI	85	68%	74	\$16,900	\$24,402	3570
490CADWDI	85	77%	60	\$17,600	\$19,926	4170
540CADWDI	85	78%	56	\$20,300	\$18,401	5200
600CADWDI	85	81%	51	\$23,800	\$16,976	6310
660CADWDI	85	81%	50	\$27,400	\$16,478	7490

Operating cost based on 16 hrs/day, 250 days/year and \$0.10/kw-hr

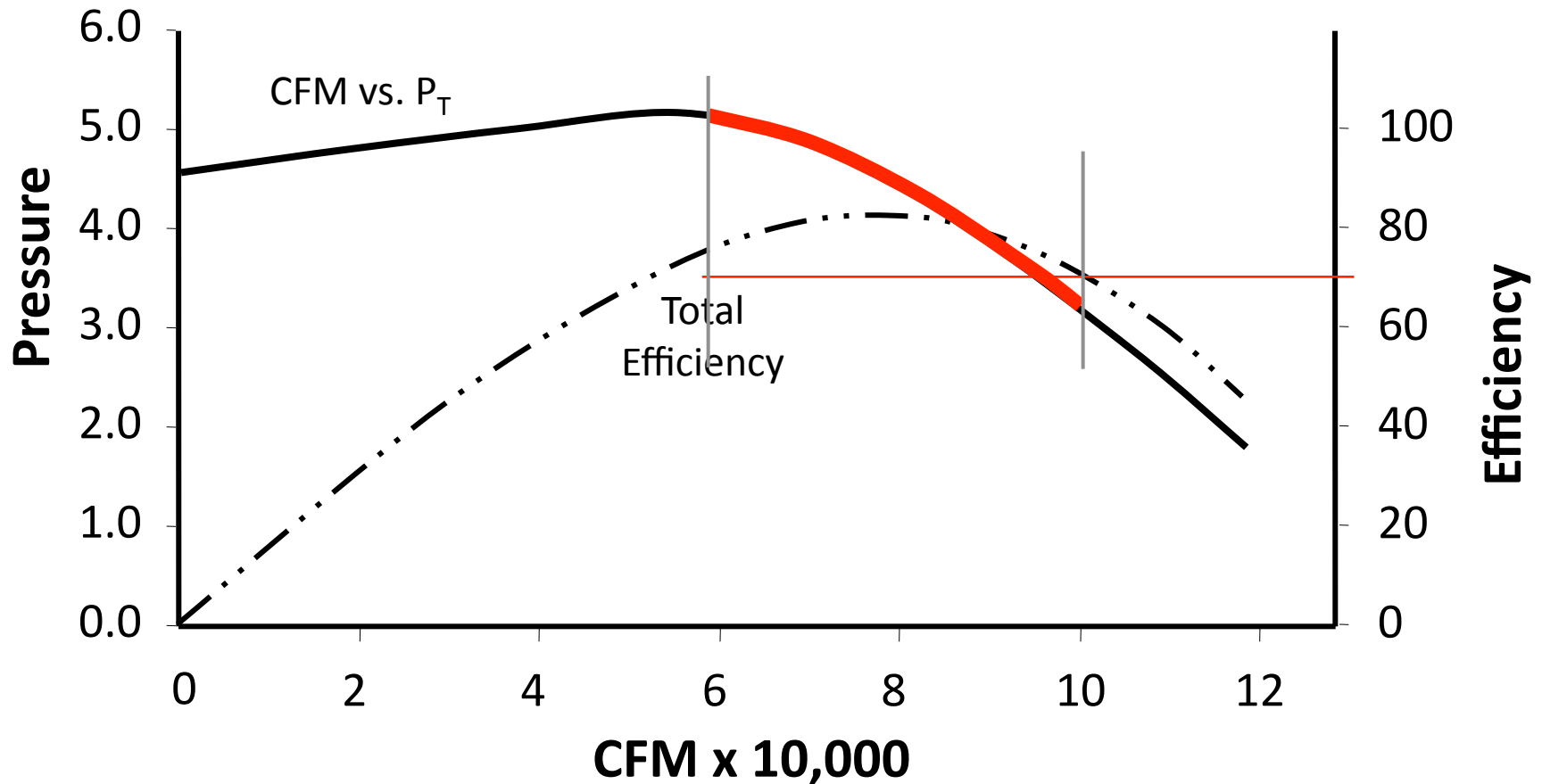
- **All sizes are FEG85** (represents the energy efficiency potential)
- **Actual efficiency at the operating point varies greatly** (larger sizes are operating close to peak efficiency)
- **This illustrates the impact proper selection has on energy efficiency**

Fan Curve and Fan Efficiency



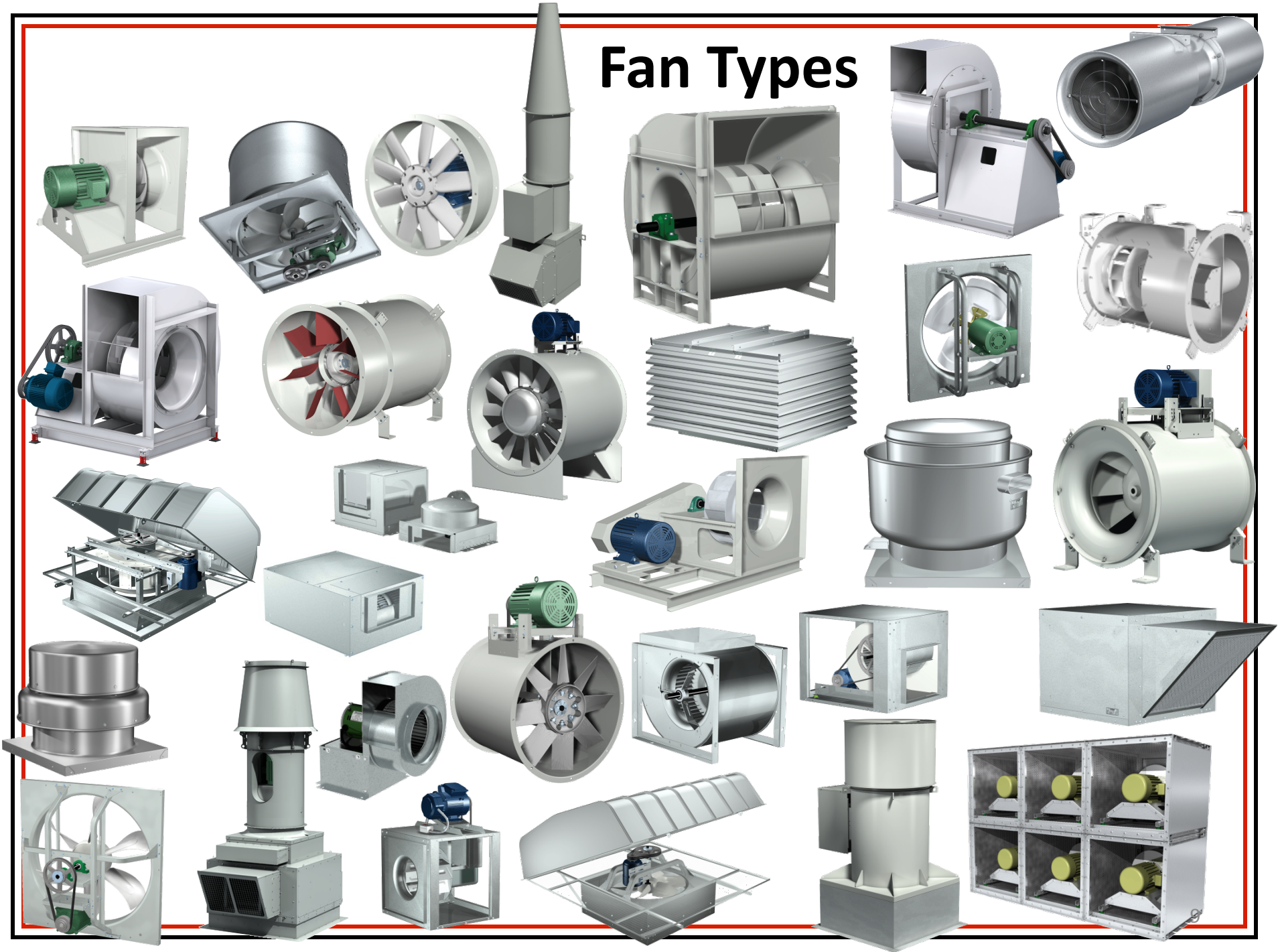
- Fans have a peak operating efficiency at one point
- The dome-shaped efficiency curve illustrates the great range of fan efficiency

Fan Curve and Fan Efficiency



- The bold red line indicates the selection range for efficient and stable fan selection

Fan Types



Each fan type is available in many model sizes



Each model size has numerous motor & drive variations



20" Impeller

Many motor sizes



3/4 hp



1 hp



1 1/2 hp



2 hp



3 hp



5 hp



7 1/2 hp

Many motor enclosures

- Open drip proof
- TE fan cooled
- TE air over
- Explosion resistant
- Two speed

Standard and Premium Efficiency motors



Many belt and pulley combinations for each model size



Fan-Motor-Drive Permutations – Conservative Estimate

Direct Drive Fans

Fan models	400	(40 fan types; average 10 sizes per type)
Motors per model	<u>x 5</u>	(ranges from 1 to 50 motors per model)
Total Variations	2,000	

Belt Drive Fans

Fan models	960	(60 fan types; average 16 sizes per type)
Motors per model	x 30	(6 motor sizes and 5 enclosure types)
Drives per motor	<u>x 7</u>	(3 for adjustable; 20 for fixed)
Total Variations	201,600	

Variations due to motor manufacturer and drive manufacturer differences?