

**GOT A PRECOOLING NEED?  
TAKE IT TO THE...**

# ***MACS COOLER***™



**LET US SHOW YOU HOW A  
*MODULAR AUTOMATED COOLING SYSTEM*  
IS THE BEST SOLUTION FOR YOU**



## **MACS COOLER F.A.Q.'s**

### 1. What is a *MACS Cooler*?

**MACS** stands for **Modular Automated Cooling System**. It provides forced-air pre-cooling of palletized product in the same way as tarpred forced air pre-cooling tunnels (often called “pressure cooling” tunnels) only with several advantages.

### 2. How is it “Automated”?

After the pallets are placed on the infeed conveyor, they are automatically conveyed through the cooling zones in steps and when the final pulp temperature is reached, are deposited to an outfeed conveyor inside of a refrigerated building. The cooling time spent in each zone is automatically computed by sensing the amount of heat coming off the product in the first zone. Sensors constantly detect temperatures and pressures to keep the process on track.

### 3. What products will it cool?

Any products that can be cooled on a conventional forced-air tunnel can be cooled better and more economically on a *MACS Cooler*! Ideally, it would cool field packed-palletized cartons on 40” wide x 48” long pallets with load heights ranging from 54” to 83” for the “standard” *MACS* and 69” to 98” for the “tall load” *MACS*. Unusual load configurations can also be accommodated.

### 4. Are *MACS Coolers* expensive?

When considering the cost of the refrigerated building space required for conventional tunnels along with the equipment itself, *MACS Coolers* are actually less expensive to start out and continue to save operating costs every season.

### 5. Why doesn't everyone have a *MACS Cooler*?

Just give them time.

## **MACS**imize Productivity

A two Module *MACS Cooler* can precool more product in a 10 hour period than 6 conventional tunnels using 60% less labor!!

*(See page 3 for details)*

## **MACS**imize Cooler Floor Space

A *MACS Cooler* is installed outside of your refrigerated building, thus preserving that valuable space or reducing the need for additional space.

*(See page 4 for details)*

## **MACS**imize Energy Savings

*MACS Coolers* are a great way to “go green”. They use 40% less electricity than conventional tunnels.

*(See page 5 for details)*

## **MACS**imize Product Quality

*MACS Coolers* alternate the direction of airflow during the cooling cycle resulting in more even final temperatures than conventional one-way cooling.

*(See page 6 for details)*

## **MACS**imize Cooler Flexibility

How does a *MACS Cooler* increase flexibility?

- Runs a variety of different products
- Can be moved easily for seasonal or permanent relocation
- Faster solution for expansion needs

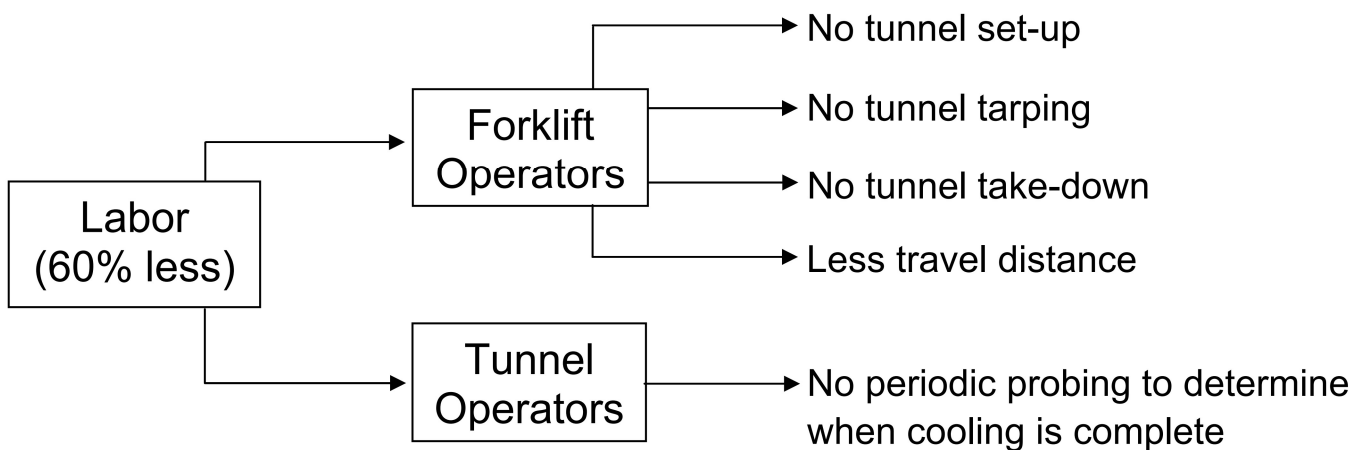
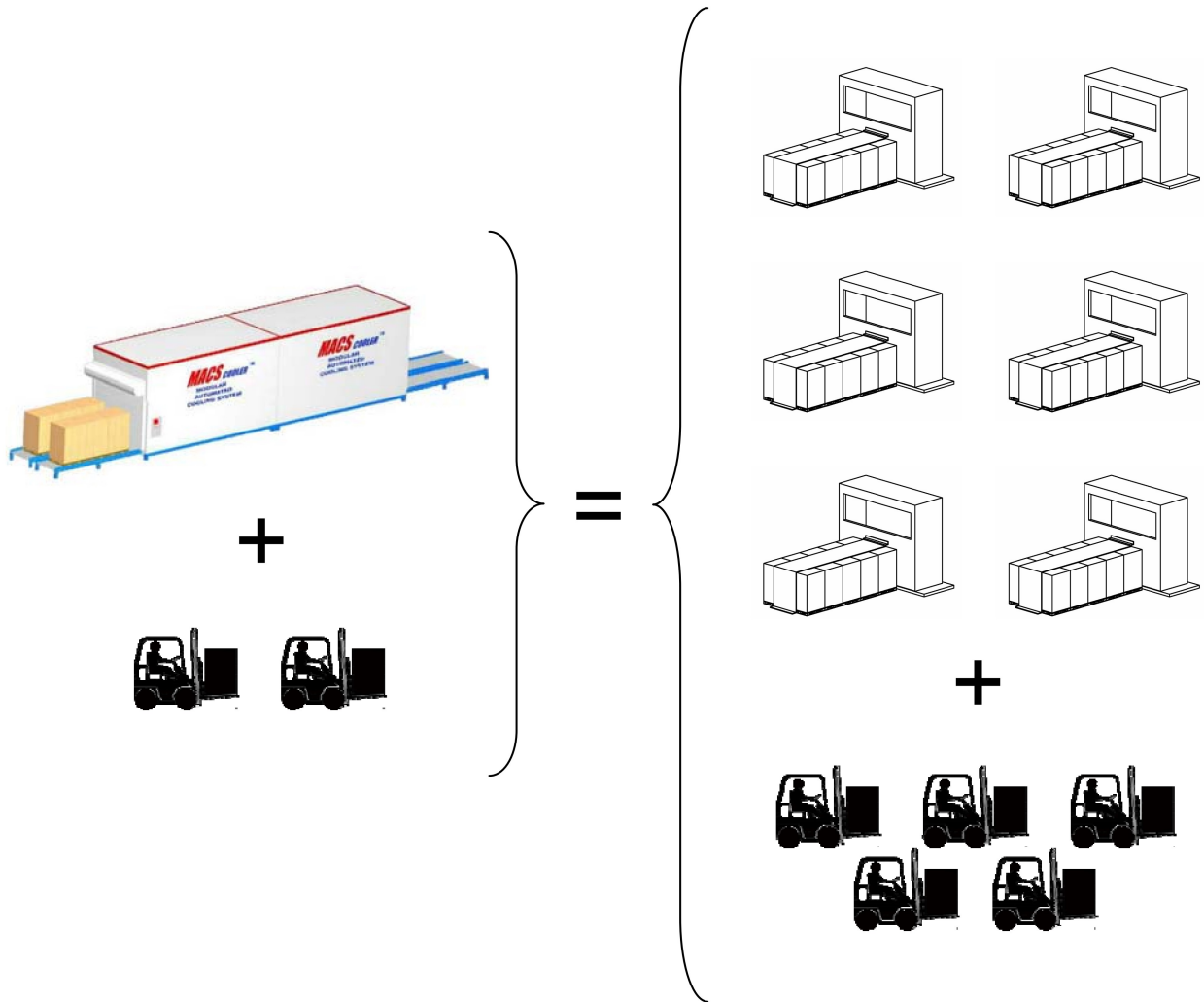
## **MACS**imize Bottom Line Profit

*MACS Coolers* save capital costs, reduce ongoing expenses and increase the value of your product, resulting in more profit for your business!



# MACSimize Productivity

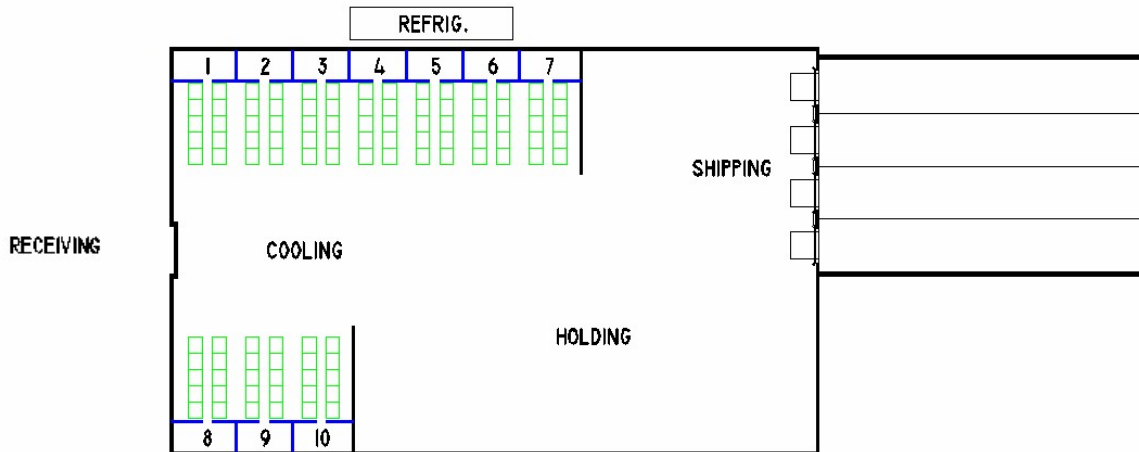
A two Module *MACS Cooler* will cool as much as six conventional tarped tunnels with 60% less forklift labor.



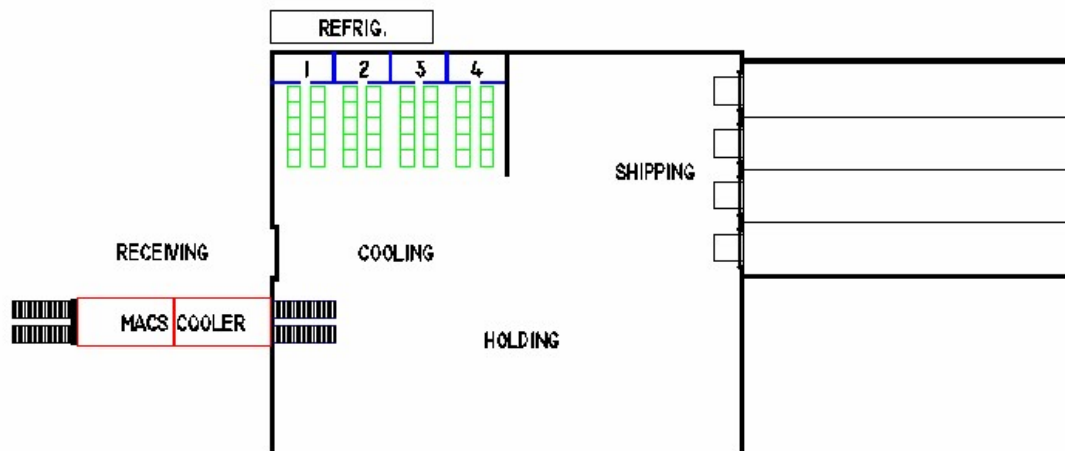
# **MACS**imize Cooler Floor Space

**Compare** the building size requirement of a conventional cooling facility vs. one equipped with a *MACS Cooler*.

This facility can cool, hold and ship 50,000 crates of strawberries per day.



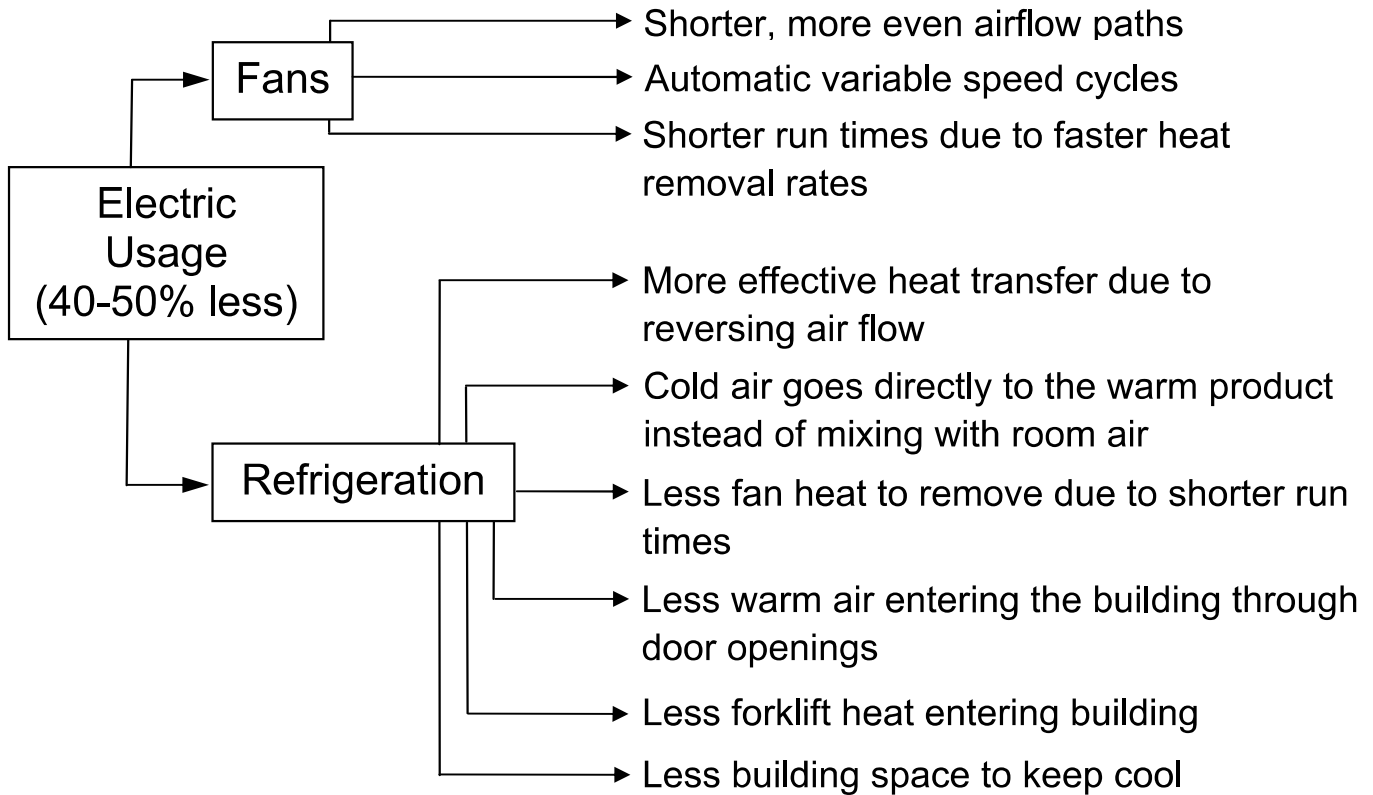
So can this one....but with 4500 square feet less building!



Conclusion: Capital cost is reduced, expansion is easier, depreciation rates are better!

# MACSimize Energy Savings

MACS Coolers use less energy than conventional tunnels.



*Saving energy is environmentally responsible.*

## Typical Energy Savings Rebate Analysis (abbreviated)

	6 Conventional Cooling Tunnels	2-Module <b>MACS Cooler</b>	
Total kWh/Pallet	14.13	7.39	
Estimated Annual Pallets	22800	22800	
Total kWh/Year	322164	168492	
Assumed Average \$/kWh	\$0.18	\$0.18	Est. \$ Savings
Electrical Cost/Year	\$57,990	\$30,329	<b>\$27,661</b>

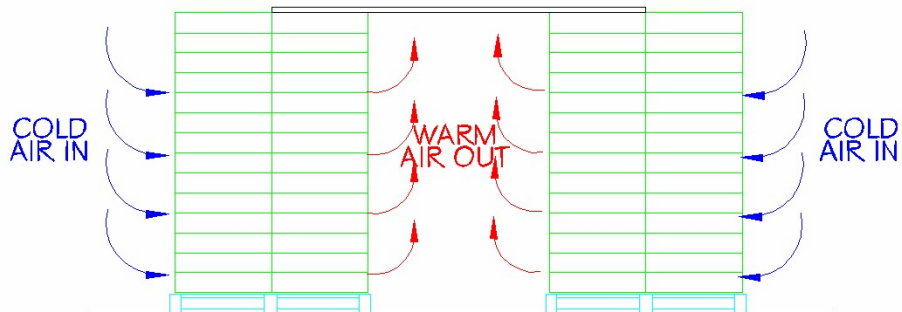
48%

<i>kW Summary</i>	<i>Baseline</i>	<i>MACS Coolers</i>	kWh Savings
Total kWh/Year	322,164	168,492	153,672
		Rebate \$/kWh	\$0.14
		Potential Rebate	<b>\$21,514</b>

(See page 9 for more detail)

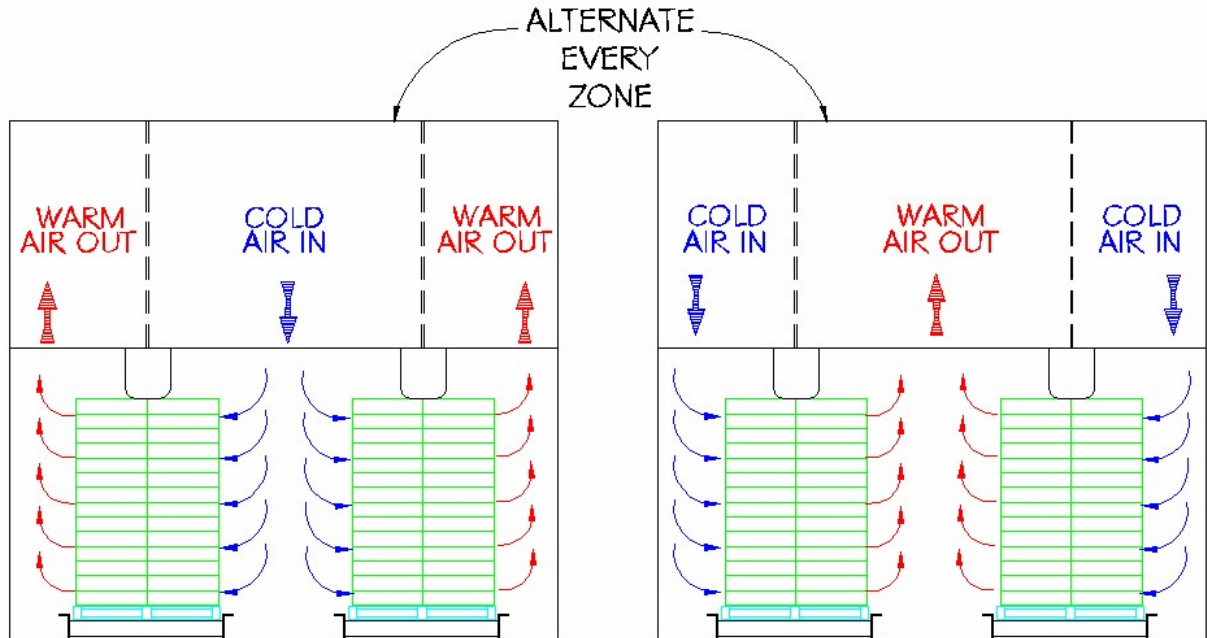
# **MACS**imize Product Quality

Conventional tarped tunnels cool in only 1 direction.



Single direction cooling causes the outside product to cool quickly while the inside cools slowly and less evenly. This often leaves “hot spots” that can severely reduce the product shelf life.

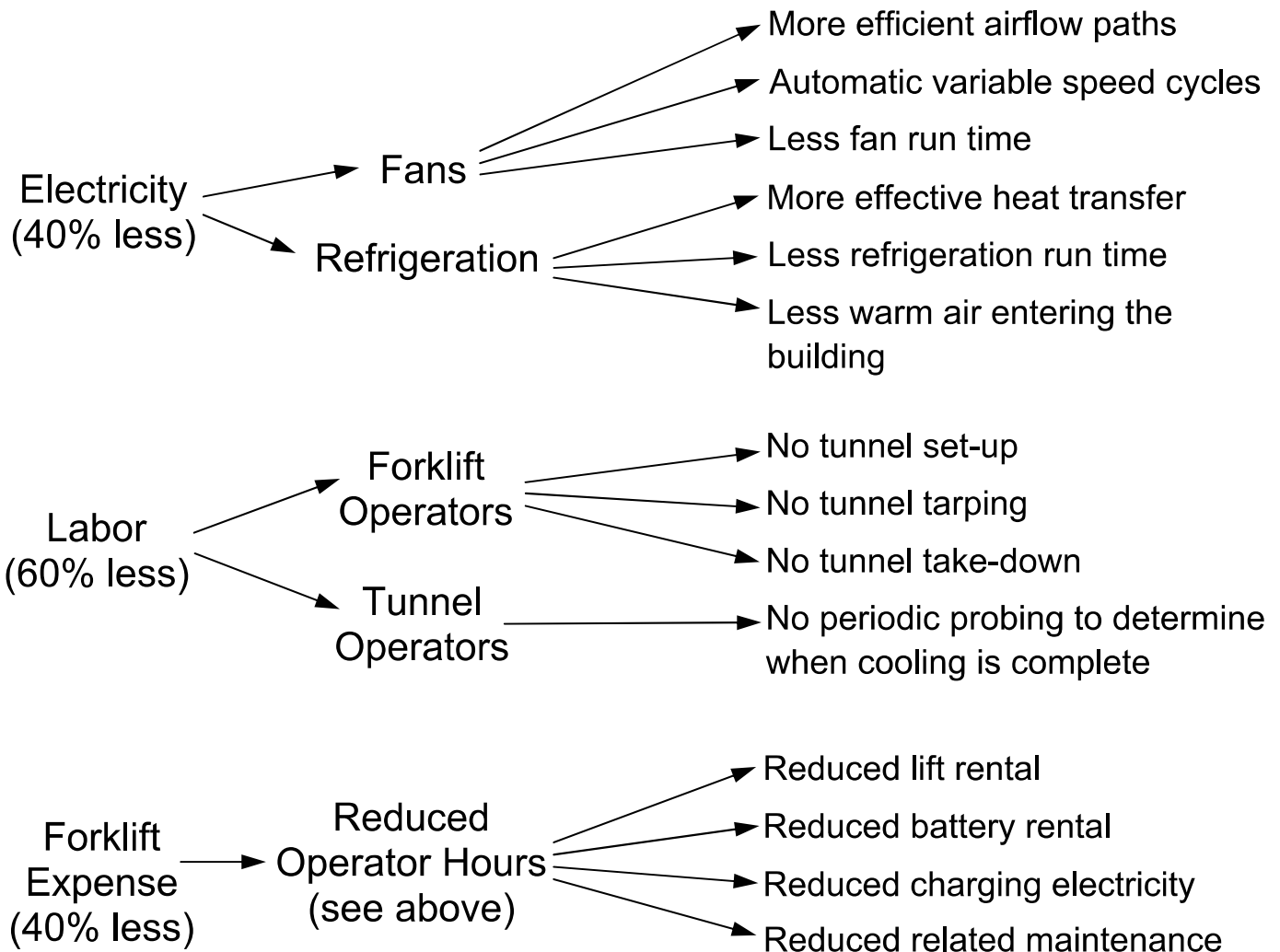
MACS Coolers cool in both directions.



Bi-directional cooling insures all of the cartons are cooled quickly and evenly. This increases shelf life and customer satisfaction.

# \$AVINGS SUMMARY

## How Will a **MACS COOLER** Reduce Your Cooling Costs?



(See page 10 for a more in-depth analysis)



# Tunnel Design Comparisons

The following compares the fans and cooling capacities of various conventional tunnel systems to the **MACS Cooler**. It is based on 108 cartons/pallet, 8 lbs strawberries/carton, 65° start, 33° finish.

Conventional Tunnel Design	Fan Data				Pallets Cooled	Cooling Time (min.)	Fan Hp-Hr per Pallet
	Type	Qty.	Hp ea.	Hp Tot.			
A	Prop.	2	7.5	25	8	120	6.25
	Prop.	1	10				
B	Prop.	2	15	50	10	70	5.83
	Prop.	1	20				
C	Prop.	5	15	75	32	120	4.69
D	Cent.	1	30	30	10	110	5.50
E	40" AF	1	15	15	8	110	3.44
F	44" AF	1	20	20	10	100	3.33
Average Conventional Tunnel Data				25	9	105	<b>4.84</b>

MACS Cooler	40" AF	4	15	60	24	44	<b>1.83</b>
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# Electrical Usage Comparison

The following is based on 108 cartons/pallet, 8 lbs strawberries/carton, 65° start, 33° finish and uses the average conventional tunnel data from the previous page.

	Typical Conventional Tunnel	MACS Cooler Zone
Fan Horsepower	25	15
Pallets per Turn	9	6
Cooling Time, minutes	105	44
Transition Time, minutes	30	3
Pallets Cooled per 10 hr day	40	77

Product Heat, Refrigeration Ton-hrs/Pallet	2.8	2.8
Fan Run Time, hrs/day	8.9	9.8
Fan Heat, Refrigeration Ton-hrs/Pallet	1.6	0.6
Bldg. Space for Cooling, s.f./tunnel	726	144
Space Cooling Load, Ton-hrs/Pallet	0.9	0.1
Refrigeration Ton-hrs/pallet, Total	5.3	3.4

Fan kWh/Pallet	5.6	1.9
Refrigeration kWh/Pallet	8.5	5.5
Total kWh/Pallet	14.1	7.4

<b>Electrical Savings</b>	<b>48%</b>
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# Cooling Expense Comparison

The following is based on per pallet costs (cooling only) for a typical strawberry cooler running 8 lb/carton, 108 cartons/pallet, 300 pallets/day, 30,000 pallets/year.

Cooling Expense Item	6 Conventional Tunnels	1 Two Module MACS Cooler	\$ Saved per Pallet	\$ Saved per Year
1) Electrical Energy	\$ 2.12	\$ 1.11	\$ 1.01	\$ 30,150
2) Cooler Forklift Driver Labor	\$ 6.25	\$ 2.50	\$ 3.75	\$ 112,500
3) Cleaning and Maintenance	\$ 0.15	\$ 0.33	\$ (0.18)	\$ (5,484)
4) Forklift Expense	\$ 1.09	\$ 0.65	\$ 0.44	\$ 13,088
<b>Total Expense</b>	<b>\$ 9.61</b>	<b>\$ 4.60</b>	<b>\$ 5.01</b>	<b>\$ 150,254</b>

**52% Savings**

# Capital Cost Comparison

The following is based on expanding the cooling capacity of an existing facility by 300 pallets of strawberries per day.

Capital Cost Item	6 Conventional Precooling Tunnels	1 Two Module MACS Cooler
1) Pre-Cooling Equipment	\$ 420,000	\$ 780,000
2) Evaporator Valve Groups	\$ 60,000	\$ 40,000
3) Electrical Connections and Controls	\$ 36,000	\$ 8,000
4) Refrigeration High-Side Addition	\$ 300,000	\$ 300,000
5) Refrigerated Building Cost (new and/or retrofit)	\$ 585,000 *	\$ 33,500 **
<b>Total Project Cost</b>	<b>\$ 1,401,000</b>	<b>\$ 1,161,500</b>

**17% Savings**

\* 4500 sq ft (tunnel area required) x 130

\*\* Concrete pad and wall opening

### Additional Savings and Advantages

- Reduce cooling expenses (see "Cooling Expense Comparison" sheet)
- Steadier refrigeration load
- Accelerated asset depreciation
- Lower property taxes
- Lower permitting cost
- Faster project implementation

MACS Coolers are **faster**, more **economical**, and **easier to use** than traditional precooling methods. MACS Cooler are more **energy-efficient** and take up **less space**.

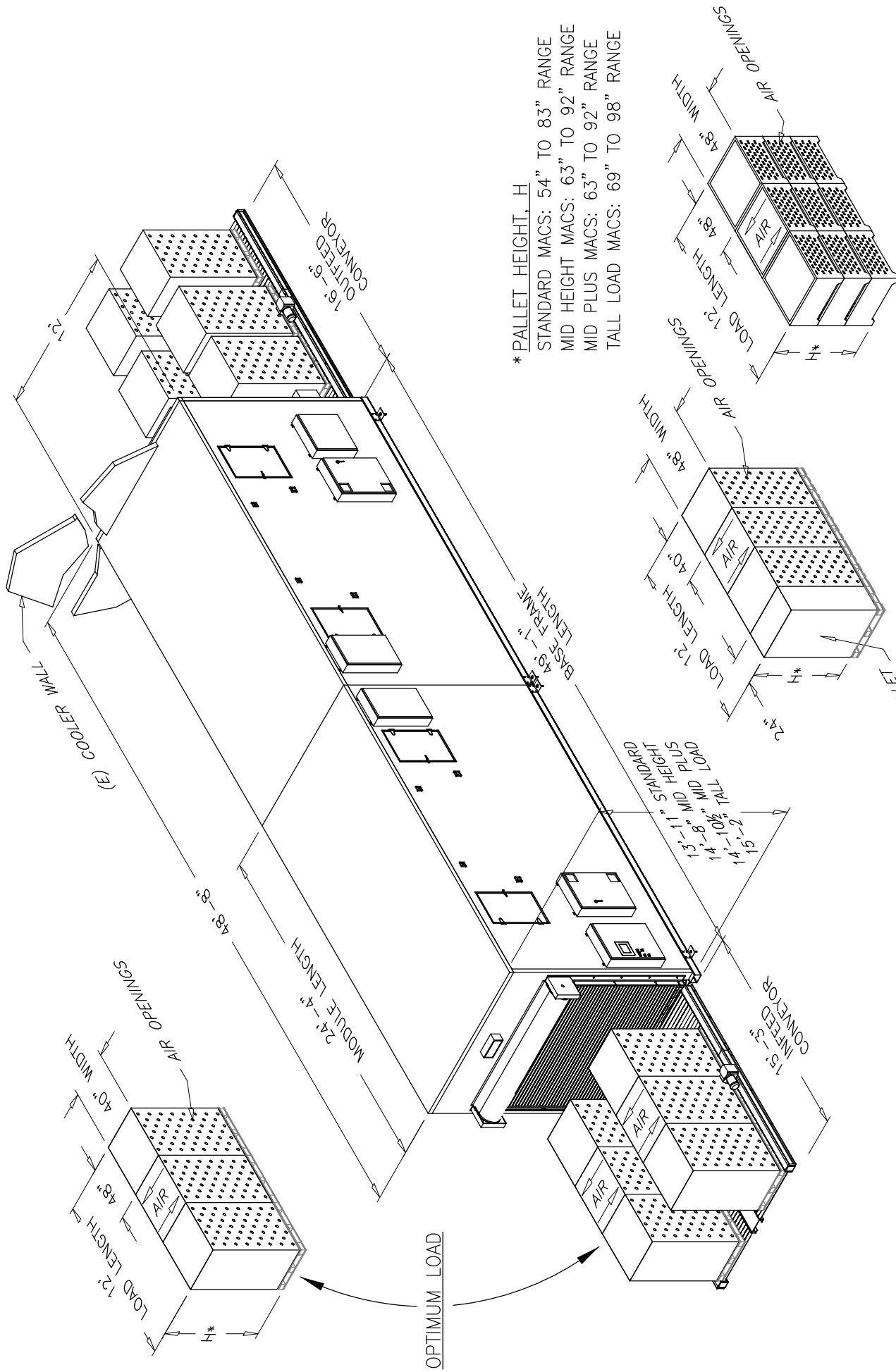
## Produce Commodities That Are Regularly (Or Can Be) Forced-Air Cooled

Apples  
Apricots  
Avocados  
Bell peppers  
Blueberries  
Boysenberries  
Broccoli  
Cantaloupe  
Cauliflower  
Chili peppers  
Cucumbers  
Figs  
Grapes, table  
Honeydew

Kiwifruit  
Leaf lettuce  
Mushrooms  
Nectarines  
Olives  
Peaches  
Pears  
Plums  
Raspberries  
Romaine lettuce  
Spinach  
Squash  
Strawberries  
Tomatoes

**Note:** Any commodity that can be forced-air cooled on a conventional tunnel can be cooled better and more economically on a **MACS Cooler**.





\* PALLET HEIGHT, H  
 STANDARD MACS: 54" TO 83" RANGE  
 MID HEIGHT MACS: 63" TO 92" RANGE  
 MID PLUS MACS: 63" TO 92" RANGE  
 TALL LOAD MACS: 69" TO 98" RANGE

**MACS COOLER**

Dimensional Data  
 2-Module Unit

ACCEPTABLE LOADS  
 (OTHER SPECIAL CONFIGURATIONS  
 CAN BE ACCOMMODATED)

U.S. PATENTS APPLY



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