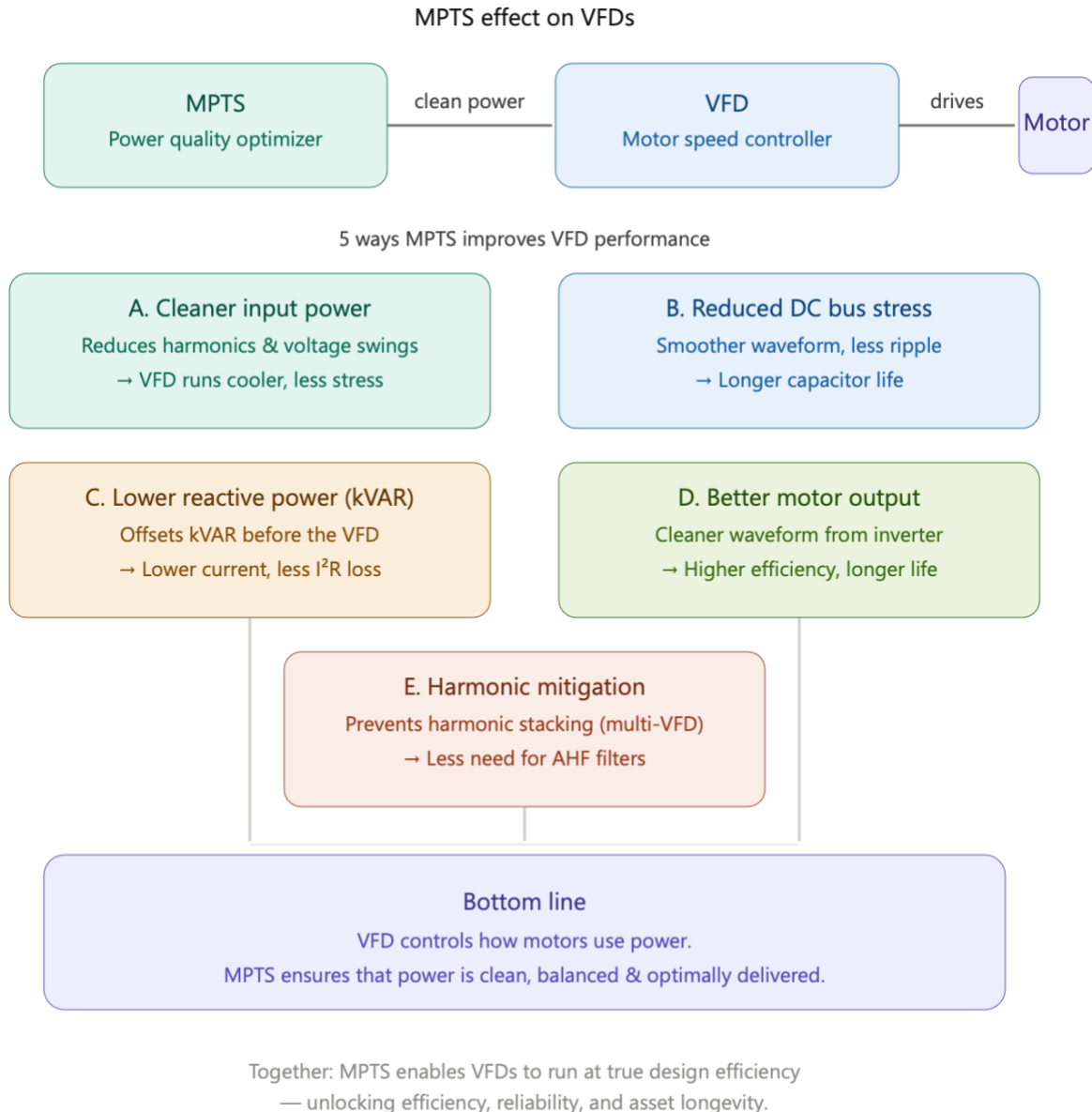


# The MPTS Effect on Variable Frequency Drives (VFD)

MPTS and VFDs are complementary. MPTS cleans up the power *before* it reaches the VFD, so the VFD can operate at full efficiency rather than fighting poor power quality.

## A Summary:



## The Detail:

### 1) Variable Frequency Drive (VFD) Functionality

A Variable Frequency Drive (VFD) controls the speed and torque of an AC motor by adjusting the frequency and voltage of the electrical supply.

#### What it does:

# The MPTS Effect on Variable Frequency Drives (VFD)

- Converts incoming AC → DC (rectifier stage)
- Smooths DC via a DC bus
- Inverts DC back to variable-frequency AC
- Matches motor speed to load demand

## Core purpose:

- Reduce energy consumption
- Improve process control (pumps, fans, conveyors)
- Minimize mechanical stress during startup

VFD controls how the motor uses power, but not the quality of the power itself.

## 2) Maximum Power Transfer Solution (MPTS) Functionality

A Maximum Power Transfer Solution (MPTS) is a real-time Power Management Control System (PMCS) that dynamically optimizes how power is delivered to loads.

### What it does:

- Continuously measures voltage, current, phase angle, and harmonics
- Dynamically adjusts system impedance (via patented algorithms)
- Aligns voltage and current waveforms, balances loads in real time
- Reduces reactive power (kVAR) and harmonic distortion (THD)
- Stabilizes voltage and power surges under changing load conditions

### Core purpose:

- Minimize apparent power (kVA) and maximize true power transfer (kW)
- Minimize wasted energy (kVAR, heat, distortion)
- Improve overall electrical system efficiency and stability

MPTS controls the quality and efficiency of power delivered to all loads.

## 3) Effect of MPTS on VFD Performance

When an MPTS is installed upstream of VFDs, it fundamentally improves how the VFD operates:

### A. Cleaner Input Power

- Reduces harmonic distortion feeding the VFD
- Stabilizes voltage swings
- Improves rectifier performance

**Result:** VFD runs cooler, more efficiently, and with less stress.

### B. Reduced DC Bus Stress

- Smoother incoming waveform → cleaner DC conversion
- Less ripple and fewer transient spikes

**Result:**

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- Longer capacitor life
- Reduced failure rates

## C. Lower Reactive Power Demand

- MPTS offsets kVAR before it reaches the VFD

### Result:

- Lower input current for the same output work
- Reduced I<sup>2</sup>R losses upstream and within the drive

## D. Improved Motor Output Efficiency

- Better waveform quality from the inverter stage
- Reduced torque ripple and motor heating

### Result:

- Higher mechanical efficiency
- Extended motor life

## E. Harmonic Interaction Mitigation

- Prevents harmonic “stacking” from multiple VFDs

### Result:

- Less need for oversized filters or AHF systems
- Improved system-wide stability

## Bottom-Line Relationship

- VFD = Controls motor behavior
- MPTS = Optimizes the power feeding the VFD

**Together:** MPTS enables VFDs to operate at true design efficiency, rather than fighting poor power conditions.

*“A VFD controls how motors use power; MPTS ensures the power they receive is clean, balanced, and optimally delivered, unlocking efficiency, reliability, and asset longevity.”*