



Systems approach to OBVP Requirements

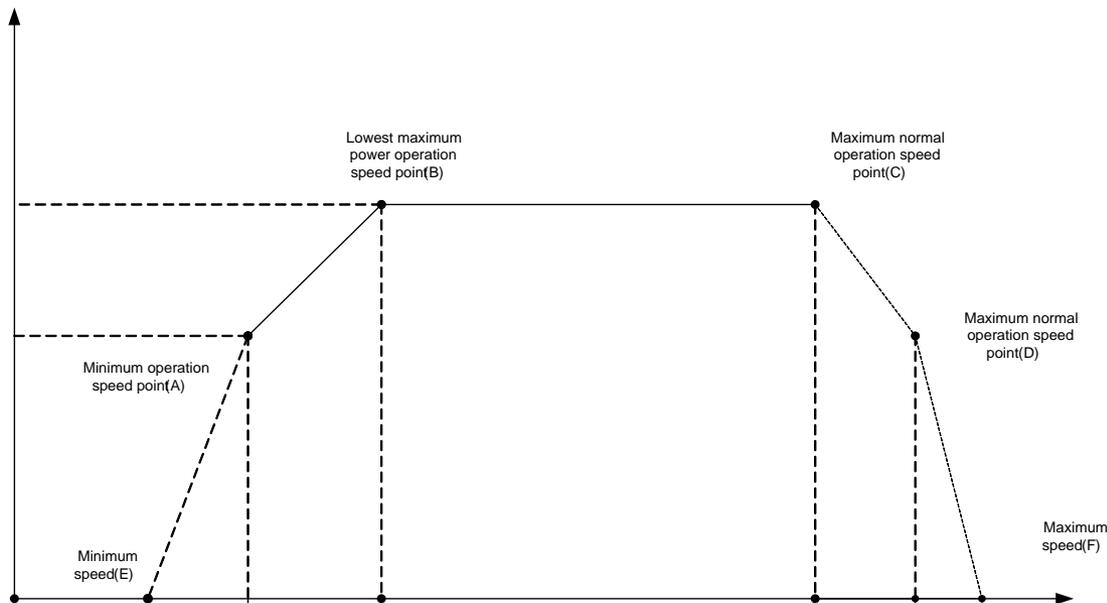


KOLLMORGEN
Because Motion Matters™

Systems approach to OBVP requirements

Topics

- Kollmorgen Background
- TARDEC FED Program
- OBVP Power requirements
- Example “working the HUMPBACK curve”





Custom Motors & Actuators



Motors & Drives



Generators & Power Electronics



Vehicle Automation Solutions

Traction Machines



Disruptive Innovation – for OBVP

The Need

- Military vehicles need more on board 28VDC electrical power – up to 30kW
- The needs exceed capabilities of existing low voltage alternators
- High Voltage systems (300VDC to 600VDC) are expensive, require significant package space, are heavy, and have safety concerns

Mine Resistant Protected Vehicles (MRAP)



Combat vehicles



Tactical Vehicles



More Electrical power needed for:

- Communications systems
- Computers
- Mine protection systems
- Threat detection
- Weapon stations

The Kollmorgen Solution

Generates 30kW at the voltage the military needs 28VDC

Platform approach that is Modular/flexible
Saves weight, space, cost and operates at safe voltage

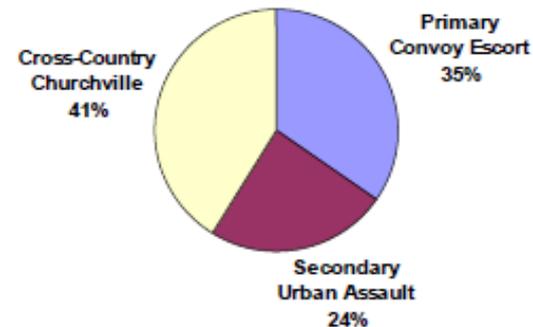
Leverages adjacent KM market technology (lift truck) electronics and KM expertise in motor design



- **Game Changer for OBVP**
High power (30kW) at low voltage (28VDC)
- Modularity: 20-60kW systems
- Belted, PTO, In-line generators with common power electronics/controller

TARDEC Fuel Efficiency Demonstrator (FED) Program

- Kollmorgen Generator and Generator Controller
- 150 lb weight savings
- 30kW 28 volt ISG



	(hr)	(min)	(sec)
Moving	14	840	50400
Idle	6	360	21600
Total Hours	20	1200	72000

Figure 2: Usage cycle defined for the Fuel Efficient Demonstrator Program



Kollmorgen Low Voltage Platform- Flexible for multiple Vehicle Platforms



One common
controller
architecture



28VDC



20 kW belted



30 kW ISG



30 kW belted

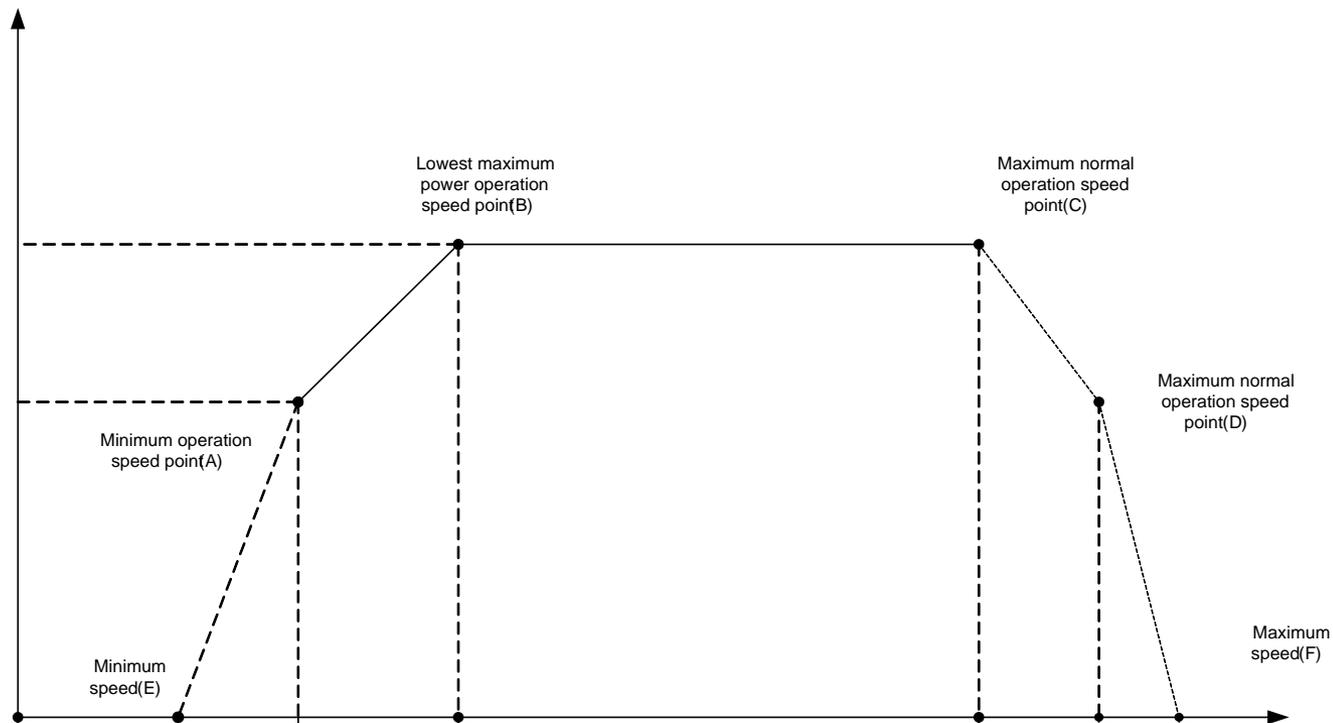


50 kW ISG

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Vehicle Electrical Power

Initial Question – I need more OBVP.....

What Power is requested?

What Engine Speed Range?

What Voltage (28VDC, 300VDC, 600VDC, Multiple voltages)?

What type of Generator/Motor (IG, Belt driven, PTO, water/air cooled,.....)?

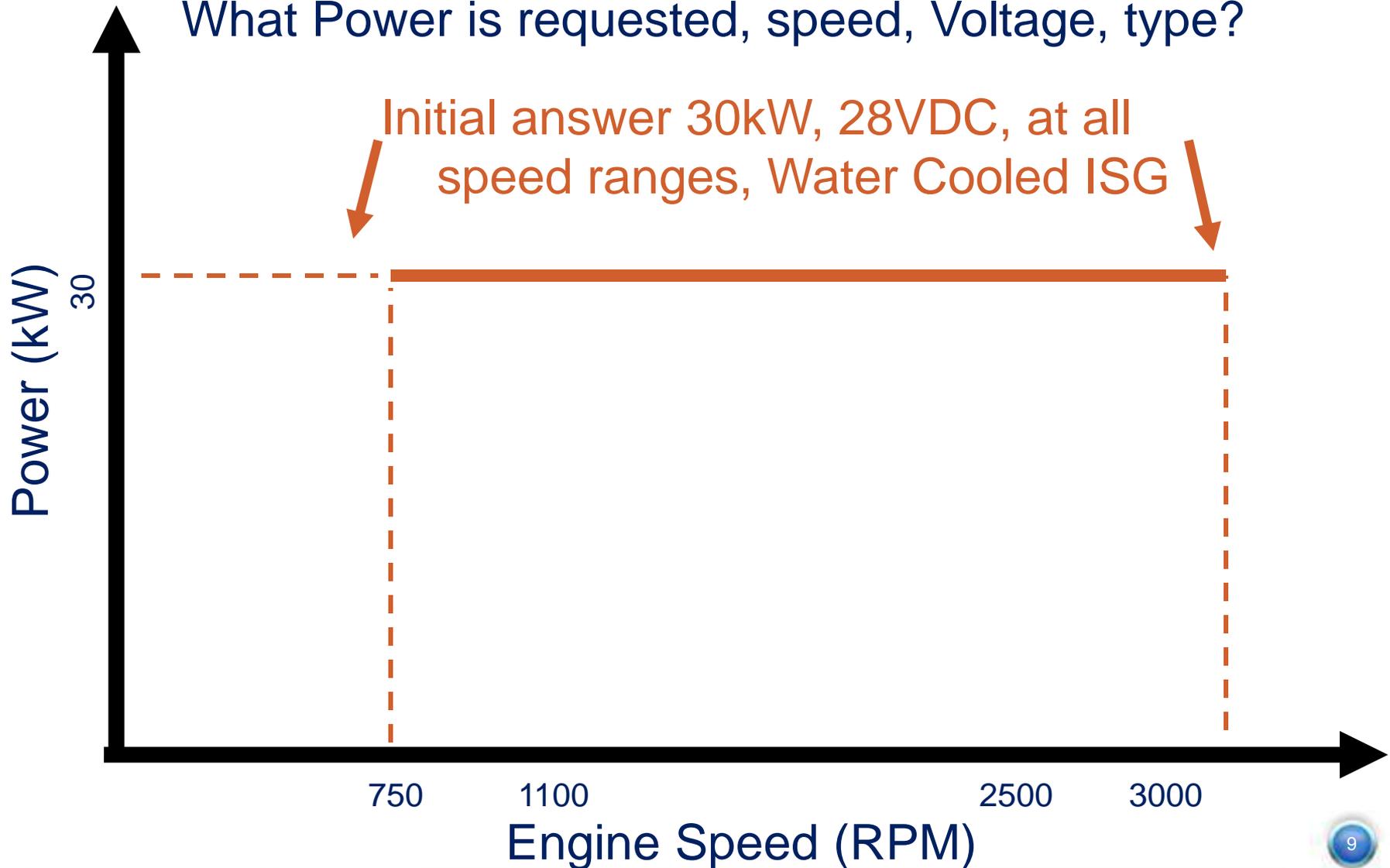
Power (kW)

Engine Speed (RPM)

Vehicle Electrical Power

What Power is requested, speed, Voltage, type?

Initial answer 30kW, 28VDC, at all speed ranges, Water Cooled ISG



Vehicle Electrical Power

What Power is requested, speed, Voltage, type?

Initial answer 30kW, 28VDC, at all speed ranges, ISG Water cooled.

Power (kW)

30

Next Questions

Can the engine deliver at the low speeds?

Where does the engine operate?

Where are the shift points?

Continuous or peak demands?

Where do you want peak efficiency?

750

1100

2500

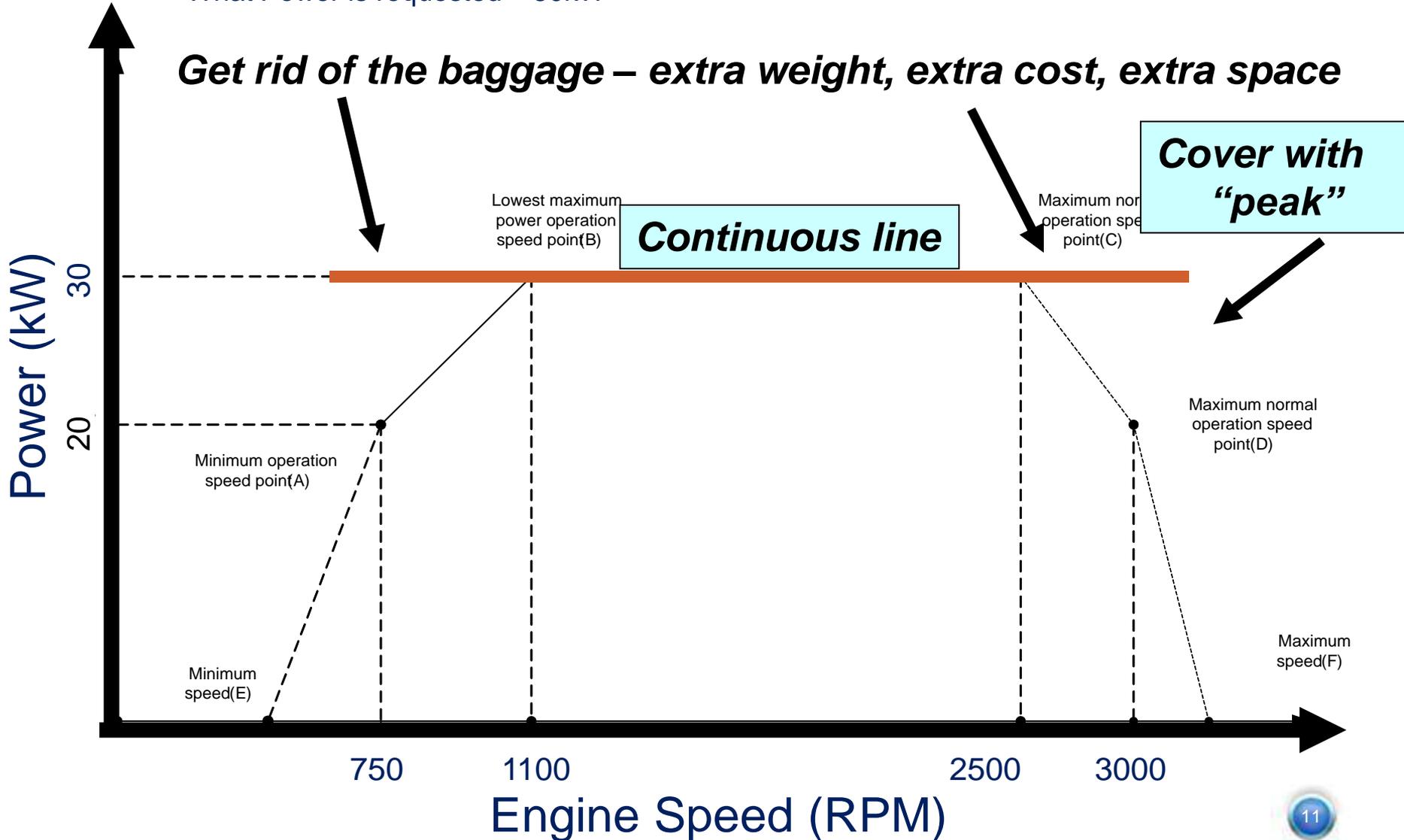
3000

Engine Speed (RPM)

Vehicle Electrical Power

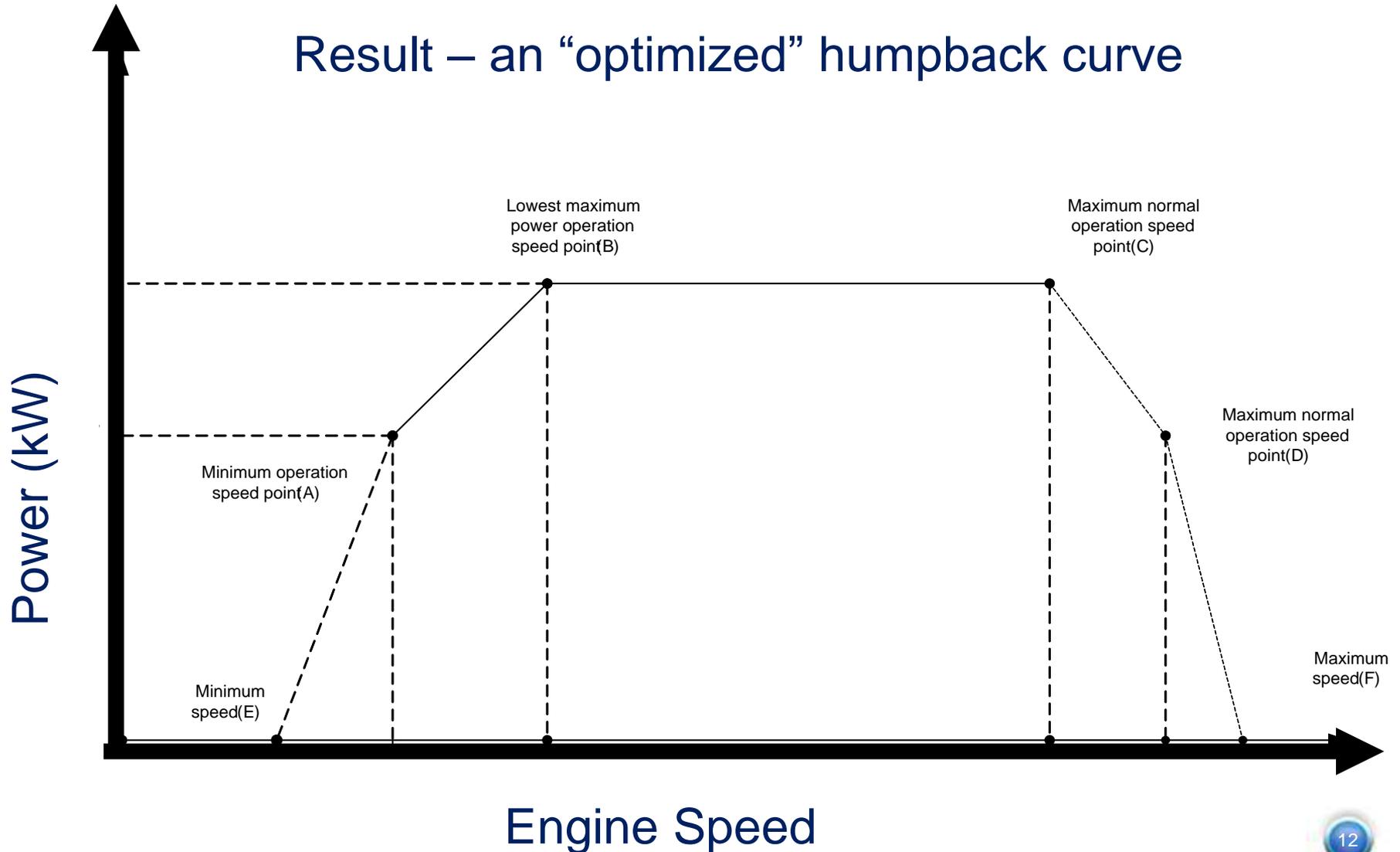
What Power is requested – 30kW

Get rid of the baggage – extra weight, extra cost, extra space



Power diagram result

Result – an “optimized” humpback curve

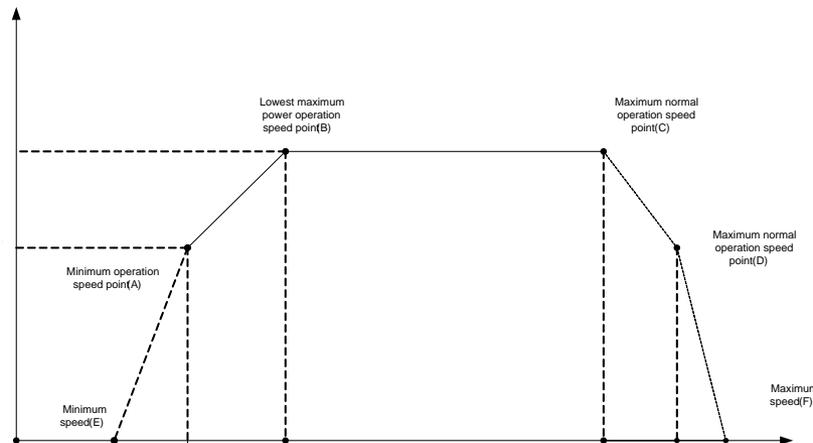


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Take Aways

- Systems approach – generate the power at the voltage the consumer needs – 28VDC may be the most efficient approach (less than 50kW)
- OBVP Requirement – more than just a stated kW – multiple points



Thank you -

Because Motion Matters™

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