

## BELT IN OIL TECHNOLOGY



## BELT IN OIL DRIVE SYSTEM



Recent events highlighting the effects of so-called greenhouse gases on global warming have led to the introduction of increased legislation regarding emissions from vehicles. This, in turn, has forced engine designers and manufacturers to maximise energy efficiency. It has been well documented by various sources that engine primary drive systems incorporating a synchronous belt have clear advantages over those having a chain drive in respect of reduction in frictional losses thereby increasing fuel efficiency and reducing CO<sub>2</sub> emissions.

Gates has been manufacturing Belt in Oil drives since the early 1990's for industrial application on generator, lawn mower and water pumps. This technology has progressed to allow the systems to be used in automotive engines, driving camshafts, fuel pumps and oil pumps in the traditional chain environment inside of the engine.

### PRODUCT ADVANTAGES COMPARED TO ALTERNATIVE DRIVE SYSTEMS

	Drive System Cost	Friction Losses	System Complexity	Durability	Timing Accuracy	Package Engine Length	Ease of Access	Weight	Noise
Optimised Belt	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline
Optimised Chain	=	-	-	=	-	+	-	-	-

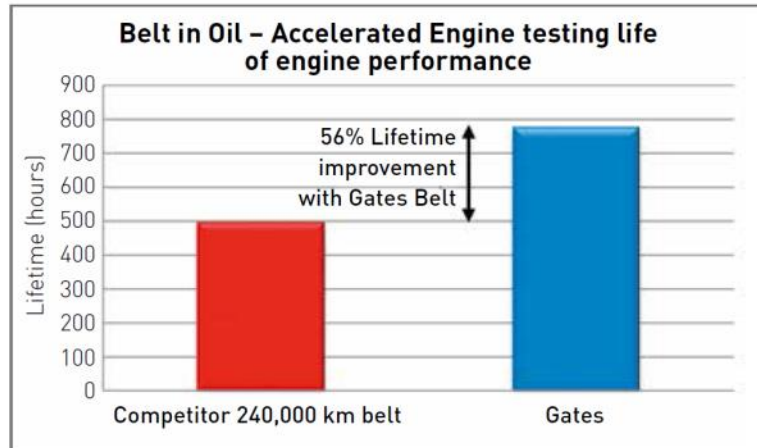
### PRODUCT BENEFITS

- › Improved fuel economy / reduced CO<sub>2</sub> emissions
- › Reduced cost of engine sealing
- › No camshaft sealing, reducing friction
- › System NVH reduction
- › Package equivalent to a chain system
- › Maintains timing accuracy over lifetime
- › Meets Life of Engine targets, normally 240,000 km / 15 yrs in Europe
- › System designed, developed and validated based on engine dynamics
- › Single source for all drive components: belt, tensioner, idler, Eco sprocket

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## GATES GEN2 PF BELT

Based on empirical data, Gates GEN2 belt construction has life of engine capability in traditional chain environment, within chain package envelope.



## CHEMICAL MAPPING – BELT AGEING EFFECT ON PHYSICAL PROPERTIES

### Mineral/Synthetic base oil

- > Oil additives
  - > Fuels components & additives
  - > Mineral acids
  - > Other engine fluids
- Over 60 chemicals tested**

### Test regime

- > Static testing to 1000hrs
- > Dynamic testing to 1200hrs
- > Max oil temperature 150°C

### Test parameters

- > Belt dimensions
- > Volume & weight change
- > Rubber hardness
- > Tensile strength
- > Tooth shear

**Gates GEN2 Belt has demonstrated excellent resistance to oils and contaminants.**

Gates Chemical Mapping investigates the effects on belt materials of chemicals which are present in new and aged oils, synthetic and semi-synthetic, including contaminants such as fuel, soot, acids and other chemicals resulting from combustion and engine wear.



Pressure vessel for chemical mapping

### For more information:

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