JISKOOT In-Line Blending Systems
Cameron’s JISKOOT™ brand is an internationally acknowledged leader in the field of in-line blending systems. With more than 40 years’ experience in the design, manufacture and supply of customized turnkey measurement systems, JISKOOT blending systems have been supplied to many of the world’s major oil companies and has a reputation for excellence and reliability. Our dedicated engineering team is able to select the best measurement and control equipment, and can design, manufacture, install and commission a turnkey blending system with a performance guarantee.

In-line blending is the controlled, continuous mixing of a number of components to produce a finished product of closely defined quality. The quality of the product is controlled as it is made. This is invaluable in continuous process industries because the final product can be blended, analyzed and loaded in a single process.

Batch blending is the main alternative to in-line blending. It involves sequentially introducing measured volumes of each component into a tank. The components are then mixed, analyzed for quality and any adjustments are made to the blend. This is time-consuming and makes storing both pre-blended and finished products necessary. Nevertheless, for small volumes and certain applications, this remains a cost-effective option.
In-line blending has many advantages over batch blending.

**Improved Quality**
The accuracy of an in-line blending system is governed by the individual component metering devices or any online analyzer used. Accuracy greater than 0.25% over the full metering range can easily be achieved.

**Faster Blending**
By analyzing and adjusting the blend ratio online, the time-consuming process of batch metering, tank mixing, product analysis and blend adjustment is eliminated. In-line blending greatly reduces process time and provides a higher throughput potential.

**Greater Flexibility**
Changes in shipping schedules and product specifications can be accommodated by selecting different recipes from the controller. As the blender operates in real time, configuring a new recipe is quick and easy compared to the planning and stock movement necessary with batch blending. This allows you to offer a wide range of products and can provide a valuable, competitive edge.
Reduced Storage and Capital Lock-Up
In-line blending produces a finished product almost instantaneously. It reduces the need for complicated production planning, and there is no need to hold stocks of blended product. An in-line blender can feed products directly into road, rail or ocean tankers for shipment.

Cost Optimization
The in-line blending system’s continuous metering, online analyzers, closed-loop control and higher accuracy provides better product dispersion, better quality control and can substantially reduce the give-away of expensive components and additives. Considerable savings can be achieved in plants with a relatively low annual throughput.

Reduced Operating Cost
Centralized control allows a single operator to manage several blending operations simultaneously. Once initiated, the blender will automatically produce the required final product.

Simplified Plant Layout
In-line blending simplifies plant layout. In existing plants, this can free tanks, pumps and pipelines for other duties. In new plants, the simplified layout can reduce capital costs considerably.
Field Equipment
Field equipment, such as valves, meters, analyzers, etc., enables the components to be metered simultaneously into the blend header to produce the final product. Products normally exit the blend header through a mixer and can be analyzed to allow quality trim to be performed. In refineries, the components can be taken directly to or from process units, avoiding or reducing intermediate storage.

Control System
The control system monitors field equipment outputs; performs calculations for meter linearization, temperature compensation, etc., and send the appropriate control signals to the field equipment to maintain the blending process within the required parameters (i.e., closed-loop control).

Blending control systems use either real-time or PLC (ladder logic) technology. The JISKOOT brand offers either technology, depending on the required application. While the cost, response times and control provided by PLC technology has a number of restrictions, JISKOOT products also include multitasking time-dedicated blending controllers for most applications.

Controllers can be designed for two- to forty-stream applications, and operate either as standalone devices or in conjunction with a dedicated SCADA system. They also can be integrated with a plant-wide control system (DCS). Controllers have a simple user interface with multilevel security, allowing access to recipe management, alarms, reports and batch information.

JISKOOT controllers can perform all the necessary linearization, mass volume and temperature computation and correction for accurate blending.
There are two main types of blending control systems: ratio control and quality trim. System selection depends upon the products being blended, the quality of feedstock, the final product specifications and the conditions under which the blender will operate. The control system and algorithms define the stability and performance of the blender and selection of the correct control system is crucial to success.

**Ratio Control**
Ratio control produces a product to an extremely accurate component ratio. The blender operates on either a fixed volumetric or mass ratio. This ratio is maintained by the closed-loop control between the flow signals from the field equipment and the control signals from the controller. The accuracy of a ratio control blender is determined by the measurement and control system.

**Quality Trim**
A quality trim blender produces a final product defined by a component ratio. One or more analyzers mounted at the exit of the blend header are used to trim the quality of the final product by adjusting the component ratio. Product quality is continuously measured by the analyzer(s), and the final product can be adjusted for parameters such as viscosity, density and octane. The accuracy of a quality trim blender also is determined by the analyzer(s).

**Which to Use?**
Where the ratio and accuracy of each component stream is crucial, and the quality of the components is consistent and unlikely to vary, ratio control is the preferred option. Quality trim should be used in applications where there is a possibility of variations in the specification or quality of the component products supplied to the blender.
Cameron has supplied hundreds of JISKOOT blenders, ranging from small, two-stream fuel oil blenders to large multi-stream systems with analyzer trim and SCADA control. JISKOOT blenders are supplied skid-mounted, piped, wired, tested, ready for installation at your site and guaranteed to perform to your specifications. Every blending application is unique, and while the basic control principles remain the same, the configuration, selection of components and design varies for each application.

**Crude Oil Blending**
Low-grade crude oils can be blended with a higher grade oil for refining or export purposes. Often, the blender uses an analyzer to optimize the blended product for a specific component such as API gravity, viscosity or sulfur content.

**Diesel Blending**
Higher specification, lower cost diesel can be produced by in-line blending. Blenders can take major components directly from process units to reduce intermediate tank storage. Using analyzers for sulfur and cetane, the blended diesel can be produced to an exact environmental specification.

**Ethanol Blending**
Ethanol is used in a wide range of industries. Ethanol typically is denaturized before being dispatched from a bonded plant. This is achieved by blending a variety of denaturants with the ethanol. Contamination of sequential loads with different denaturants must be avoided by incorporating a flush cycle in each batch.
Fuel Oil/Bunker Blending
Fuel oil (or bunkers) is blended globally. Blenders can be trailer-mounted, mounted on fuel barge decks or shore-mounted. They enable operators to produce any type of fuel oil within very close viscosity and volumetric tolerances from as few as two base components, normally HFO and MDO.

LPG Blending
The demand for propane, butane and blends of these products has increased significantly. The search for CFC-free propellants and the growth in liquid gas fuel production has given rise to the need for propane/butane blenders. Many systems use a densitometer mounted in the blend header to provide a signal to the blend controller, which trims the blend to a specified density.

Bitumen Blending
Bitumen blending is an arduous duty. The bitumen has to be heated and kept moving, and local hot spots must be avoided to eliminate coking and meter damage. Cameron’s JISKOOT products were the first to use a double-case meter in a recycle loop. In addition, Bitumen blenders need flushing facilities to avoid solidification after blending.

Lube Oil Blending and Dehydration
Lube oil is one of the most demanding blending applications, so considerable expertise is needed to produce a closely specified product from a wide range of ingredients without contamination. The patented JISKOOT lube oil dehydration system is unique and often employed to dry wet stocks to a specified crackle-test level prior to blending.
Cameron is an internationally acknowledged in-line blending specialist because of JISKOOT products. We do not manufacture any flow components, and therefore, are able to independently select and use the best field equipment for every application.

Our JISKOOT systems are designed and manufactured to the highest standard by engineers with years of practical experience.

JISKOOT products are ISO 9000 accredited, and all design and manufacturing is done in strict accordance with ISO procedures.

Cameron also offers a turnkey service, which includes:

- The design, manufacture and supply of instrumentation and terminals tested under simulated operating conditions.
- Selection, sizing, procurement, inspection and supply of all system equipment such as flow meters, control valves, pumps, etc.
- Design and supply of completely self-contained piped and wired skids.
- Supply of site termination drawings, wiring diagrams and operation/maintenance manuals.
- Certification to site electrical/pneumatic/piping specifications.
- Technical supervision of installation teams.
- Commissioning services and maintenance contracts.
- Factory/onsite training of operating personnel.

Cameron also can provide a consultancy service for the evaluation of blending projects and applications.
HSSE Policy Statement
At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.