



The generation next co-rotating twin-screw extruder STEER OMEGA has over the years grown in stature due to its control over the amount of work done inside the extruder and its control over residence time. Continuing its thrust on leading technological innovations, STEER OMEGA H Class was launched in IPF 2008, and has since have become the talk of the industry for its enhanced mixing and melting capabilities.

omega H CLASS
TWIN-SCREW EXTRUDERS



OMEGA H CLASS EXTRUDERS ARE AVAILABLE IN

30, 40 & 50MM SIZES WITH
ENHANCED MELTING AND MIXING CAPABILITIES

Attention to every detail creates a new benchmark to maximize process control and produce 25% more. STEER OMEGA H Class extruders with their special features, revolutionizes efficiency in handling difficult to process materials and many other applications that need lower residence time and/or tightening of residence time distribution.

STEER OMEGA H Class Extruders have a proven 25% increase in volume with unmatched specifications for a co-rotating twin-screw extruder (for example: $Do/Di = 1.71$, Specific torque = 17.1 Nm/cm^3). The OMEGA H Class generates higher torque compared to established extruders. Superior in-house metallurgy provides for a significant increase in wear strength of the EPZ (Extruder Processing Zone). Available in lab, pilot and production lines; these extruders are highly suitable for various application areas, such as kneading, dispersive mixing, distributive mixing and reactive extrusion. Every customer requirement is met through a high level of customization depending upon the type of application and the versatility that the customer expects from the extruder.

FEATURES

- Optimal Energy Saving Screw Geometry
- Special materials & Specific Surface Treatments (For extended wear & corrosion protection)
- Unique Gearbox with low fatigue for extended life
- Modern Drive System & Electronics
- Safety & process control instrumentation
- State-of-the art automation
- User friendly configuration design software
- Application support

TRANSMISSION SECTION

Main Drive: Modern microprocessor based vector controlled variable speed drive with torque control.

Gearbox: Unique gearbox designed for extremely high torque capacity that reduces fatigue of rotating members.

PROCESSING SECTION

Materials: High performance tool steel with high wear & corrosion resistance with enhanced break strength & fracture toughness from STEER's own STEEL unit.

Treatment: STEER also employs in-house heat-treatment and surface engineering facility. STEER has in-house capability to conduct wear & corrosion tests and mechanical properties tests apart from sophisticated chemical characterization.

Manufacturing: Advanced Computer aided design and manufacturing using CNC facility. Materials management is using a "Toyota Production Management" system. Fool proofing of the assembly process and rigorous unit tests and final tests ensures a high quality product.

Geometry: The entire Extruder Processing Zone (EPZ) is based on the modular design concept. All the Barrels can be dis-assembled by means of the special quick clamp system. The Screw Shafts have been designed with split construction comprising of a safety shaft and adaptor and the "Continua" splined shaft. Continua Spline (Patent pending) avoids stress concentration in both Screw Shafts and Screw Elements, thereby increasing torque carrying capacity. STEER's patented Fractional Lobed Blocks are used for processing difficult materials. The mixing elements have multiple lobe geometry which is effective in creating uniform shear, hence intensifying the shearing effect.





ENHANCED MELTING AND MIXING CAPABILITIES

Quest for innovation and STEER's engineering excellence has led to the design an extruder that exhibits enhanced efficiency in difficult applications.

This hard-to-beat H Class Technology is truly the tomorrow's twin-screw extruder in performance, reliability and durability.

ALL STEER EXTRUDERS FEATURE
CONTINUA SPLINE PROFILE
WITH SHAFTS THAT ARE
**PROOF TESTED AT
125% RATED TORQUE.**

APPLICATIONS

- Long Fiber Reinforced Thermoplastics (LF RTP)
- Color Masterbatch
- Halogen Free Flame Retardant Compounds
- Natural Fiber (Jute) Filled Composites
- Compounds of all Engineering Polymers: PA, PC, PEEK, PEK, PSU, PU, PES, PEI
- Bio Polymers
- Impact modified PP
- XLPE
- Polymer Blends
- Difficult to process materials & many other applications that need residence time to be as low as possible
- Halogenated PVC
- Highly metal ceramic filled polymer
- Devolatilization or degassing
- Shear sensitive polymers
- TPO, TPVs
- WPC
- Automotive Compounds

SPECIFICATIONS

DESIGNATION	OMEGA 30H	OMEGA 40H	OMEGA 50H
Screw Diameter (mm)	29.7	39.7	49.7
Diameter Ratio (Do/Di)	1.71	1.71	1.71
Flight Depth (mm)	6.2	8.2	10.2
Barrel to Screw Clearance (mm)	0.15	0.15	0.15
Screw to Screw Clearance (mm)	0.50	0.50	0.50
Max. Drive Power (kW)	50.0	138.0	270.0
Max. Screw Speed (rpm)	1200	1200	1200
Specified Nominal Torque/shaft (Nm)	200	550	1075
Specific Torque (Nm/cm ³)	14.5	16.8	16.8
Throughput (kg/h)	50-100	300-600	500-1000



SHOVEL ELEMENTS (SFV)



SHOVEL ELEMENTS (RFV)



GEARBOX



CONTINUA SPLINE



SIDE FEEDER



SAFETY SHAFT ADAPTOR



SCREEN CHANGER



STRAND DIE

Disclaimer 1: The information in this brochure does not constitute an offer of sale of the equipment listed. Certain configurations of diameter ratio, screw speed and torque may not be available in all geographic locations due to legal restrictions. Please contact your local STEER Sales Office for a full quotation of equipment configured to meet your specific needs.

Disclaimer 2: Due to continuous development actual values / parameters may differ from those mentioned in this list.

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DESIGN AND TECHNOLOGY

STEER has set a new benchmark in Co-Rotating Twin-Screw Technology with the OMEGA H-Class. The 1.71 Do/Di of OMEGA H Extruders have larger free volume compared to that of extruders with the same center distance and 1.55 Do/Di. This coupled with a high specific torque of 17.1 Nm/cm³ makes OMEGA H a versatile equipment for processing both feed limited and torque limited applications. For applications limited by torque, OMEGA H can process over 25% higher throughput compared to earlier generation Co-Rotating Twin-Screw Extruders.

omega H-CLASS
TWIN-SCREW EXTRUDERS

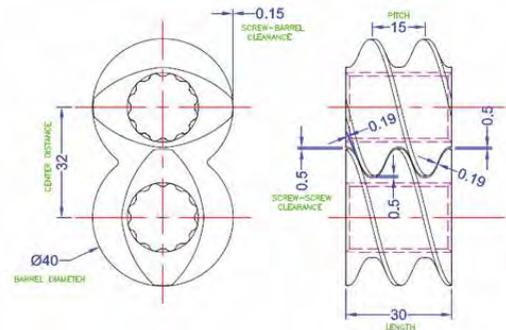


BEYOND COMPARE

OMEGA H benefits applications that need control over the residence time. The biggest OMEGA advantage certainly is the “elongational mixing ability” with its extra free volume.

With a screw to screw gap (as small as 0.20 mm in a 40 dia. extruder) similar to the screw to barrel gap, the OMEGA provides control over the process in terms of the nature of work done on the material and the specific energy input.

The fully wiping nature of the OMEGA elements and the special patented elements in an OMEGA extruder allow for a wider processing window. This permits difficult applications to be run successfully.



Screw to Screw Gap: The screw to screw gap is similar to the screw to barrel gap allowing for operation at high speeds and ensuring fully wiping nature of the screw elements. This has led to an increase in the mean shear rate.

Patented special elements that perform the right amount of work at the right place and control over residence time helps in reduction of peak shear and enhance efficiency in an OMEGA H. Combined with higher screw speeds, this feature is advantageous for increasing the volumetric capacity of OMEGA H, while maintaining the mixing rates.

TRANSMISSION SECTION



HITORQ GEARBOX (17.1 NM/CM³)

STEER HITORQ gearboxes are a perfect match for new generation twin-screw extruders. With torque output equal to 17.1 Nm/cm³, this product helps in processing any tough material and at the same time maximizing the output. This is a unique gearbox designed for extremely high torque capacity that reduces fatigue of rotating members. The engineering excellence of STEER gearbox is the result of powerful structure members inside the equipment.

STEER uses the same manufacturing approach to its elements in the design and manufacture of its HITORQ gearboxes. The tighter clearances in the extruder have been made possible due to STEER gearboxes that have minimal axial play, minimum backlash and equal angular deflection for both output shafts.



SAFETY SHAFT ADAPTOR

To address the issues of torque imbalance, STEER has developed the shaft safety adaptor. This ensures that the shaft and the screw elements remain unaffected in the event of shaft failure.

PROCESSING SECTION



IN-HOUSE METALLURGY

In Co-Rotating TSEs wear is proportional to the output. Higher production rates imply higher wear rates. The new development at STEER brings down the wear by more than three times.

STEER has developed microgenic technology that was learnt from particle morphology in plastics. Generally the carbide particles in the alloy matrix that are around 10 micron in size give wear resistance. With microgenic technology, micro particles are added to increase the micron particle size in the matrix. This results in increased wear resistant properties for the material.

Similar to the fact that a compound is far superior to compacted particles, microgenic technology that compounds the steel is far superior to powder metallurgy.

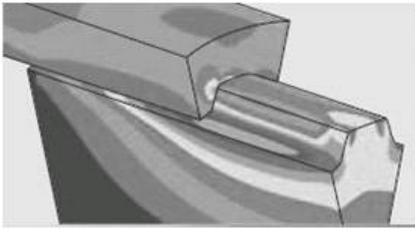
Use of superior in-house metallurgy provides for significant increase in wear strength of the EPZ (Extruder Processing Zone).



STRAND DIE

STEER has designed a strand die with high accuracy, in addition to quick disconnect hinged bolts securing the die manifold and die plate. Upon loosening each bolt, the entire hinge bolt assembly is designed to open by simply turning a common shaft rod that is connected to each hinge bolt. The STEER die is heated via heater cartridges and the entire die assembly is fastened to the extruder via a quick release Jiffy-clamp.

Another key feature of STEER's Die Assembly is its high accuracy. It has chemically heat treated surfaces to overcome the forces of adhesion.



CONTINUA SPLINE SHAFT

As a result of significant research and development, STEER has invented a new shaft design that overcomes the limitations of the involute tooth spline shaft due to high stress concentrations. A unique spline profile was developed which greatly reduces stress concentrations common with the involute profile.

STEER has aptly named the patent applied for design, "Continua". The design is based on a cycloidal displacement curve and results in a two-fold increase over the breaking torque of a comparable involute spline shaft. The end result is the world's best performing screw shaft available today.



STEER performed FMEA (failure mode and effects analysis) procedures during the development stage of the Continua shaft. A special test apparatus was used to compare the conventional involute tooth shaft with the new Continua splined shaft. Test specimens of shaft and bushings for both standard involute spline and Continua spline were fabricated using the same raw material and identical manufacturing method. The test device allowed for the test pieces to be twisted until failure. A load cell was used to measure the torsional force applied to the specimens.

Experimentally observed results showed that the Continua splined bushing and screw shaft, outperformed the involute bushing and screw shaft. It is evident that the stress concentration factor in the involute splines resulted in a lower torque capacity compared to that of the Continua splines.

PATENTED EXTRUDER PARTS IN A OMEGA H EXTRUDER

Use of STEER patented intake screw elements SFV & RFV have contributed to overcoming feed limitation in processing low bulk dense material and these elements are a standard in the OMEGA H extruder. The tighter screw to screw gap and the patented STEER Special Elements offer superior mixing and melting due to enhanced smearing, stretching and stirring effects.



FME Elements for EFFICIENT MIXING PATENTED - Ref. No.6783270 B1

Fractional Mixing Element – The FME elements offer the ability to avoid the effects of meta radial shear stresses. The mixing elements have multiple lobe geometry which is effective in creating uniform shear, hence intensifying the shearing effect.



Shovel Elements (SFV*) for HIGHER INTAKE

Single Flight Shovel Element – These elements are capable of achieving intake capacity (in starve feed) of over 300 per cent compared to normal elements.

Converts feed-limited to torque-limited; utilizing the machine to a great extent.

Improves efficiency of processing by lowering specific energy.



Shovel Elements (RFV*) for HIGHER INTAKE

Regular Flight Shovel Element – Shovel Conveying Element. Suitable for both intake and side feed zone. Increased conveying efficiency.



FKB Elements for ENHANCED MELTING PATENTED Ref. No.6783270

Fractional Lobe Kneading Block – High melting efficiency. Induced melt-mixing, uniform and intense shear, increased overall process efficiency.

*Patent Pending

SIDE FEEDER

STEER's design is based on sound understanding of the bulk materials that are fed into the extruder. STEER feeders assure optimized feeding of the materials ranging from highly cohesive to interlocking fibers. A key advantage is that the feeders are noiseless and pollution free.



VACUUM STUFFER

- 240 rpm gearbox with vertically mounted motor
- Worm & wheel gears used for high reduction ratio
- Victaulic toggle clamps used for barrels
- Barrel provided with 6 axial cooling holes
- Combination of RH & LH screw elements for effective sealing
- Vacuum stuffer on a pedestal, mounted to extruder base
- Trolley provided for carting the vacuum stuffer away when not required.



Description	SF-30	SF-40	SF-50
Barrel Diameter (mm)	30.7	41	51.5
Center Distance (mm)	24	32	40
Screw speed (rpm)	600	600	600
Motor rating	0.75	1.5	3.0
Capacity (kg/hr)	240	430	800

The screws of the STEER side feeder and vacuum vent side stuffer borrow from the extruder's segmented element and shaft design. The screws are decoupled from the gearbox output shafts via a connecting zone in the same manner as the extruder. This approach provides the ultimate degree of process flexibility, allowing for specialized configuration of the screw elements. The STEER side feeder and side vacuum vent stuffer are fitted with high performance gearboxes with thrust bearing assemblies which provides the highest level of reliability and service life expectancy. The devices are available in two mounting configurations: extruder frame mounted support or a



CONTROL PANELS

The drive and PLC components come in two separate IP54 enclosures. "Plug and Play" system is used for routing the cables from control panels to the Extruder.



HMI

The Human Machine Interface (HMI) is the central point for visualization, controlling and monitoring the extruder and peripherals through suitable communication links and protocol. With an HMI system, the drive is controlled from the touch screen of the HMI (Multi Panels or PCs with appropriate pointing devices), which operates through Programmable Logic Controllers (PLCs).

STEER allows for customization of the HMI screens, integration of peripherals, other plant utilities and material system to achieve complete plant automation. The software used by STEER is highly reputed (for example, Siemens Pro Tool/Pro and WinCC or equivalent).

The essential features of the Automation system are recipe management, fail-safe interlocking and data-logging. Recipe management allows for storage of all important process parameters for each product. Interlocks are programmed to provide a safe operation and alarms are generated to alert the operator to take corrective actions.

Data-logging allows recording of long or short-term trends and reports can be generated on a daily, weekly or monthly basis based on stored production data.



CE CERTIFICATION

OMEGA H and its ancillary units meet the European standards and comply with all the CE directives. It meets the stringent safety guidelines and directives as listed by EU.

All the controls circuits, operating interface, motors and associated components, technical documents have been manufactured as per the CE standards.