



Extrusion Machines and Services **for Advancing Your Materials**

ONECPM.COM



Components and
Service Offerings

EXTRUSION.SALES@CPM.NET

CONVEYING ELEMENTS

CPM is a supplier of more than 30 OEM brands ranging from 10mm through 410mm. We have screw elements for feeding solids, melt and viscous mediums with single, twin and triple flight design. We supply elements which exceed your expectations in terms of precision, appearance, durability, process requirements and ultimately price-performance-ratio.

1



CONVEYING ELEMENT, SINGLE-FLIGHT

Improved feeding behavior compared to two-flight elements | Improved pressure build-up with less energy input compared to two-flight element

2



CONVEYING ELEMENT, TWO-FLIGHT

Standard element for feeding, melt conveying on two-flight extruders

3



CONVEYING ELEMENT, TWO-FLIGHT WITH HIGH PITCH

Pitch can be optimized to maximize conveying rate | Reduced degree-of-fill for feeding, venting

4



CONVEYING ELEMENT, THREE-FLIGHT

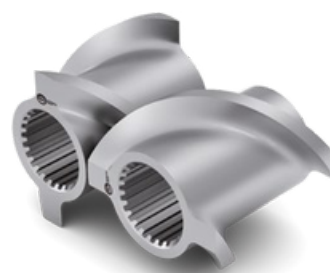
Exclusively for three-flight extruders | Shallow channel depth due to low do/di

5

**CONVEYING ELEMENT**

Single-flight design with reduced tip width | Not self-wiping | Dramatic increase in free volume for feeding low bulk density solids

6

**UNDERCUT CONVEYING ELEMENT, TYPE DSK**

Two-flight geometry | Increased free volume for feeding low bulk density solids | Undercut on both leading and trailing flight | Undercut areas not self-wiping

7

**REVERSE CONVEYING ELEMENT**

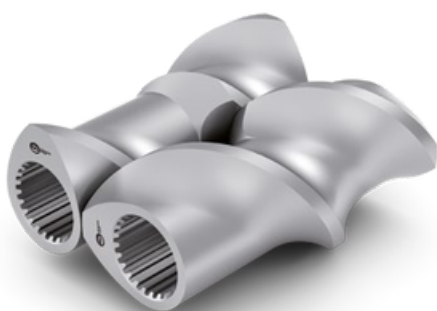
Generates flow restriction in melting or mixing zone | Available as single flight or twin-flight

8

**TRANSITION ELEMENT**

Creates transition between single-flight and two-flight (or three flight) elements while maintaining self-wiping characteristics | Requires unique element for left and right shaft

9

**TRANSITION ELEMENT**

Creates continuous transition between single-flight element with reduced tip width (type SE YY) and standard two-flight elements

10

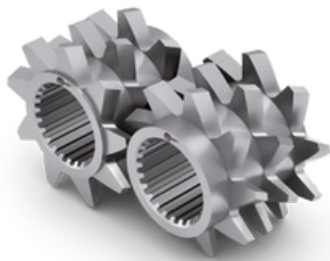
**UNDERCUT CONVEYING ELEMENT, TYPE SK**

Leading flight undercut with relatively large pitch | Available for two-flight and three-flight extruders | Increased free volume where passive flights are cleaned by neighboring elements (transition elements have the designation SKN)

KNEADING AND MIXING ELEMENTS

We have a wide portfolio of kneading and mixing elements. With our wide selection we enable our customers to maximize flexibility and productivity of their extruder. Additionally, our wide variety of construction materials and decades of metallurgical experience leads to an excellent durability and high service life time.

1



GEAR MIXER, TYPE ZB

Alternating gear rings on the left and right shaft | Variations available: number of gear rings, number of teeth, conveying direction (forward, neutral, reverse), gear tooth angle

2



GEAR MIXER, TYPE ZME

Single-flight intermeshing screw profile with reverse pitch | Intensive distributive mixing through frequent flow divisions

3



„IGEL“ ELEMENT

Two-flight right-hand and left-hand conveying elements superimposed | Neutral conveying behavior | High degree of distributive mixing, although not 100% self-wiping

4



SCREW MIXING ELEMENT, TYPE SME

Provides gentle distributive mixing | Requires downstream pressure to promote flow through slotted flights | Available for two-flight and three-flight extruders | Variations available: pitch, number of slots per revolution, slot pitch angle, conveying direction

5

**ECCECENTRIC TRANSITION KNEADING ELEMENT**

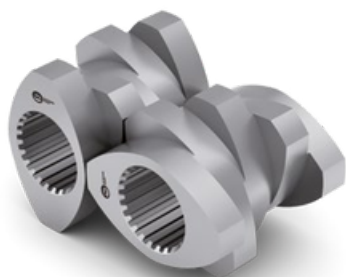
Forms a continuous transition for installation of eccentric three-flight kneading elements on two-flight extruders | Requires unique element for left and right shaft

6

**SHOULDER-KNEADING ELEMENT, TYPE KBS**

A proprietary development from CPM | Reduced disc width compared to standard kneading elements | Creates more homogeneous melting with reduced energy input

7

**CONVEYING KNEADING ELEMENT**

Standard element for mixing and/or melting | Variations available: offset angle, number of discs, disc width, number of flights

8

**ECCECENTRIC THREE-FLIGHT KNEADING ELEMENT, TYPE KBX**

Efficient melting and dispersive mixing for two-flight extruders due to reduced channel depth | Requires transition elements upstream and downstream

9

**NEUTRAL KNEADING ELEMENT**

Two-flight or three-flight designs available with tightly intermeshing kneading discs | Non-conveying behavior (e.g. flow restrictor)

10

**REVERSE KNEADING ELEMENT**

Flow restriction element creates local pressure upstream | Leads to a high energy input | Variations available: offset angle, number of discs and disc width

HIGH PERFORMANCE ELEMENTS

How can our High Performance (HP) Elements benefit you?

High levels of energy input and the resulting strong rise of local temperature are usually unwanted side effects of using kneading elements. Our HP Elements can lower the energy input into the product and do this with very high dispersive and distributive mixing action. Throughput and product quality can be increased many different levels. Through process analysis and screw design, our highly skilled process specialist team will figure out the improvement potential together with our customer and will make recommendations in terms of screw configuration or process set-up.

1



ONE PIECE COMBINATION-ELEMENT

Combination element (part conveying, part kneading or restriction element) | Distributes energy over a longer section of shaft resulting in improved mechanical integrity

2



SEGMENT SCREW CONVEYING, TYPE SG

Forward conveying screw segments offset at predetermined angles | Intensive distributive mixing while maintaining conveying efficiency | Mechanically stable geometry (versus offset individual elements) | Elimination of pressure/shear peaks associated with kneading elements | Promotes elongational flow

3



SEGMENT SCREW WITH REVERSE SECTION

Forward and reverse conveying segments offset at predetermined angles arranged in alternating order | Intensive mixing through open channels, reduction in shear stress from offsetting of reverse conveying screw segments | Restriction element creates 100% fill

4



BARRIER KNEADING SCREW, TYPE BKS

Kneading discs with large pitch angle offset in a forward conveying direction with barrier rings between discs to increase degree-of-fill | High degree of dispersive mixing

5

**BARRIER KNEADING BLOCK, TYPE BKB**

Standard two-flight kneading element with barrier rings between kneading discs | Increased degree-fill while maintaining forward conveying effect

6

**BARRIER SCREW, TYPE BS**

Primary feature is the frequent redirection of the product | Barrier discs between screw segments increases the degree-of-fill without use of restriction elements | Dispersive mixing as material is forced across barrier discs

7

**T-PROFILE SCREW, TYPE T6**

Alternating channel depth and tip clearance with each revolution | Only one flight tip scrapes the barrel and adjacent screw with close clearance through asymmetric profile | High degree of distributive mixing while maintaining conveying efficiency

8

**T-PROFILE SCREW, TYPE T3**

Increased screw/barrel tip clearance and channel depth compared to the T6 profile | Improved mixing capability while maintaining conveying efficiency | Potential benefits for degassing via surface renewal

9

**T-PROFILE KNEADING ELEMENT, TYPE T6KB**

Alternating channel depth and tip clearance with each revolution, same as T6 screw element | Geometrically self-cleaning, with asymmetric profile | Elimination of pressure/shear peaks associated with standard kneading elements

10

**T-PROFILE KNEADING ELEMENT, TYPE T3KB**

Larger channel depth and tip clearance variation than T6 kneading element | Provides high melting capacity and dispersive mixing while eliminating pressure/shear peaks associated with standard kneading elements – leading towards lower energy input and reduced melt temperature

SHAFTS

1



SINGLE KEY DESIGN

Round shaft with feather key | Rarely used due to low permissible torque

2



MULTI-KEY DESIGN

Round shaft with half-round slots | 2, 4 and 6 key designs to transfer torque | 6 key design utilizes integrated keys with screw element

3



HEXAGON SHAFT

Utilized in lower torque applications | Available in "double hex" design to increase flexibility of screw orientation

4



THREE PIECE SHAFT DESIGN

Drive end consists of separately machined pieces (including drive end & drive nut/ screw)

5



ONE PIECE SHAFT DESIGN

Drive end (including shoulder) machined from same piece of material as screw shaft

6



INVOLUTE SPLINE DESIGN

Utilize teeth which mesh with screw element internal spline | Current standard in shaft technology | Highest torque bearing liability

7



CPM DESIGN

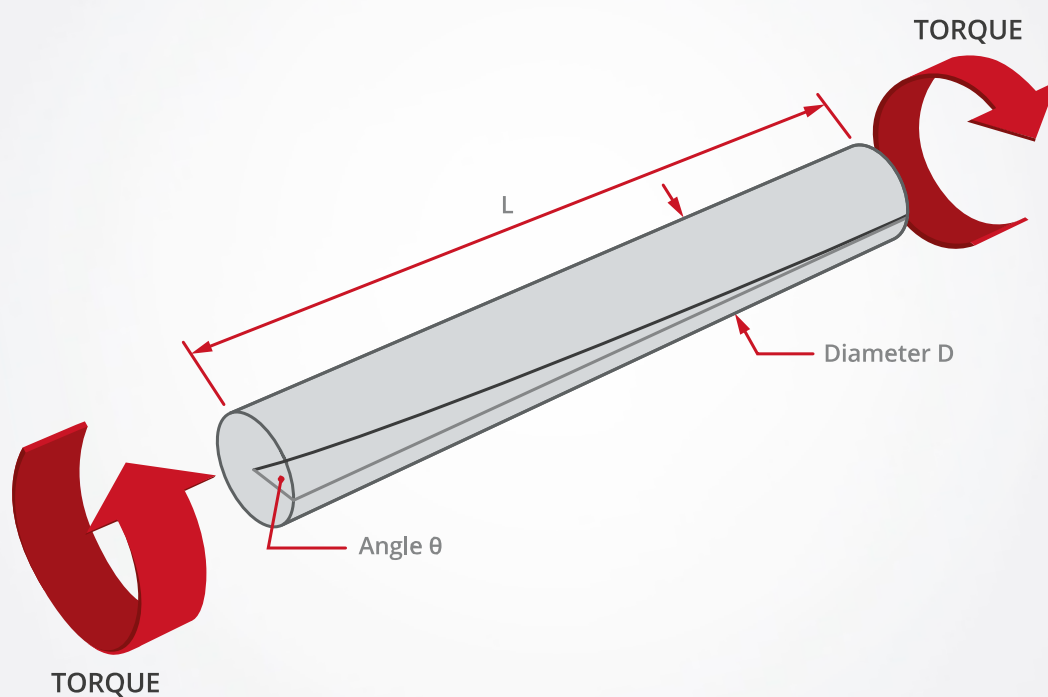
Connects the seal bushing permanently with the screw shaft without weakening the shaft

8



INTEGRATED COUPLING DESIGN

Coupling toward the gearbox serves as axial stop and sealing element at the same time



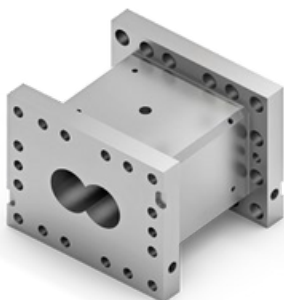
ULTRA-HIGH STRENGTH SHAFT SOLUTION

- As the compounding industry trends towards demanding more throughput, the demand for high torque density twin-screw extruders has never been higher.
- The CPM MAR steel cold formed splined shafts are the industry's best choice for high torque applications and reliability:
- MAR = Maraging = "Martensitic Aging" steels are known for possessing superior strength and toughness.
- Offered in C-250 and C-300 grades for torque densities up to 18.
- Maintains shaft torque rating at very high process temperatures (i.e. > 350 deg. C).
- Composition is high in Nickel and Cobalt.

BARRELS / LINERS

CPM offers the industry's widest portfolio of extruder barrels. We provide standard and special designs for nearly every OEM brand on the market. By maintaining a focus on experience and advanced wear solutions, CPM high performance barrels are unmatched in the industry.

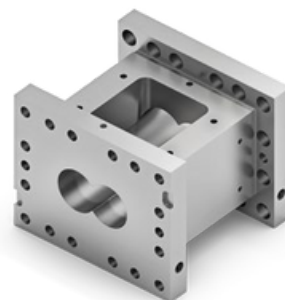
1



CLOSED BARREL

Commonly heated electrically and cooled with water through pulsed cooling

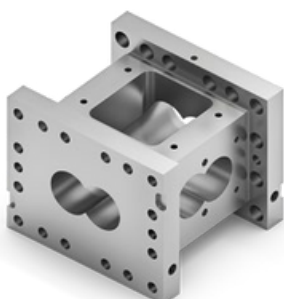
2



OPEN BARREL

Round or square opening on the top | Used for either feeding or venting

3



COMBI BARREL

Both top and side opening | Available alternatives are block type or with lateral opening only

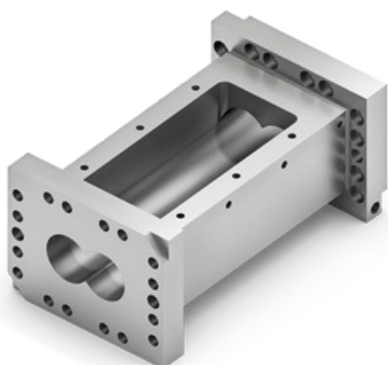
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SPACER PLATE

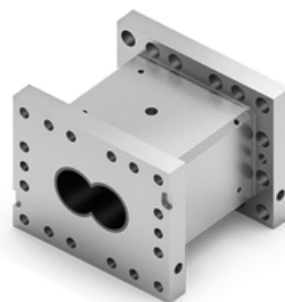
Used to support process section and for measuring purposes | Possibility to provide a port for injection valves in adapter plate openings

5

**LONG DEGASSING BARREL**

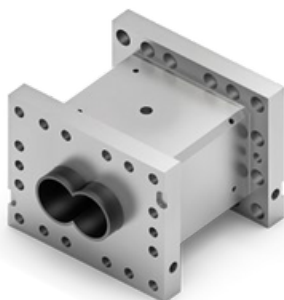
Used for degassing tasks with especially high volatile content

6

**SOLID BARREL WITH PERMANENTLY JOINED WEAR PROTECTION COAT**

Applicable through hot-isostatic pressing, flame spraying or other coating processes

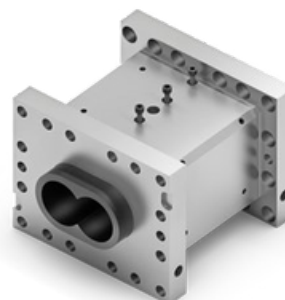
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**BARREL WITH EXCHANGEABLE WELDED SLEEVE**

Thin-walled wear protection liners called Thinliner®

| Liner is exchangeable | Possibility of arranging cooling channels very close to the process room

8

**BARREL HOUSING WITH REPLACEABLE OVAL LINER**

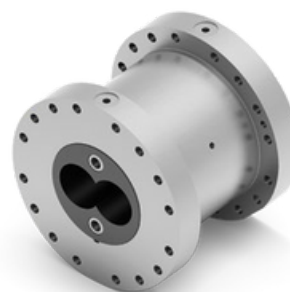
Standard solution for high wear protection | Liner is exchangeable and can be manufactured from a large bandwidth of materials

9

**BLOCK BARREL WITH TIE-ROD DESIGN**

Various available designs, e.g. square flange barrels | Likewise braced with tie-rods or clamping flanges

10

**ROUND BARREL WITH ROUND LINER**

Removable liner | Can often be supplied with wear protection inserts

ACCESSORIES

We can supply additional supporting components and equipment such as:

- Gearboxes
- Motors
- Injectors
- Heaters
- Retrofits/upgrades/conversions
- Screw Couplings
- Screw tips
- Vent ports
- Vent plugs
- Barrels nuts and bolts
- 8-0 transition pieces
- Barrel nuts
- Liquid injection port adaptors
- Side feed plugs
- Vent stack

PROCESSING SECTION MATERIALS

> ELEMENTS

| Material number | Description | Hardness | Abrasion | Corrosion |
|-----------------|----------------------------------|-----------|----------|-----------|
| V60 | PM bonded HIP bi-metal material* | 63-67 HRC | ■■■■■■■ | ■■■■■■■ |
| V25 | PM bonded HIP bi-metal material* | 55-60 HRC | ■■■■■■■ | ■■■■■■■ |
| V35 | PM bonded HIP bi-metal material* | 55-60 HRC | ■■■■■■■ | ■■■■■■■ |
| V18 | PM bonded HIP bi-metal material* | 57-62 HRC | ■■■■■■■ | ■■■■■■■ |
| V15 | PM bonded HIP bi-metal material* | 60-65 HRC | ■■■■■■■ | ■■■■■■■ |
| V10 | PM bonded HIP bi-metal material* | 59-64 HRC | ■■■■■■■ | ■■■■■■■ |
| 068 | Through hardened tool-steel | 55-59 HRC | ■■■■■■■ | ■■■■■■■ |
| 225 | Through hardened chromium-steel | 55-57 HRC | ■■■■■■■ | ■■■■■■■ |
| 4PH | Tempered chromium-nickel steel | 35-38 HRC | ■■■■■■■ | ■■■■■■■ |
| 112 | Through hardened chromium-steel | 54-58 HRC | ■■■■■■■ | ■■■■■■■ |
| 005 | Through hardened chromium-steel | 47-50 HRC | ■■■■■■■ | ■■■■■■■ |
| 179 | Through hardened tool-steel | 54-60 HRC | ■■■■■■■ | ■■■■■■■ |
| 000 | Tempered and nitrided steel | >950 HV | ■■■■■■■ | ■■■■■■■ |

*Not all sizes feasible for construction in bi-metal material

> SHAFTS

| Material number | Description | Torque | Corrosion |
|-----------------|---|---------|-----------|
| 300 | Age hardenable (maraging) iron nickel stainless steel | ■■■■■■■ | ■■■■■■■ |
| 4PH | Hardened and tempered chromium-nickel steel | ■■■■■■■ | ■■■■■■■ |
| 143 | Hot working tool steel | ■■■■■■■ | ■■■■■■■ |
| 144 | Hot working tool steel | ■■■■■■■ | ■■■■■■■ |
| 165 | Heat treatable and nitrideable alloy steel | ■■■■■■■ | ■■■■■■■ |

> BARRELS & LINERS

| Material number | Description | Hardness | Abrasion | Corrosion |
|-----------------|---|-----------|----------|-----------|
| 777 | 65% tungsten carbide in a nickel matrix | 62-68 HRC | ■■■■■■■ | ■■■■■■■ |
| RX3 | 50% tungsten carbide in a nickel matrix | 62-68 HRC | ■■■■■■■ | ■■■■■■■ |
| RX2 | PM bonded HIP nickel based material | 58-62 HRC | ■■■■■■■ | ■■■■■■■ |
| 025 | PM solid | 58-60 HRC | ■■■■■■■ | ■■■■■■■ |
| 042 | PM solid | 59-63 HRC | ■■■■■■■ | ■■■■■■■ |
| 015 | PM solid | 58-62 HRC | ■■■■■■■ | ■■■■■■■ |
| 179 | Through hardened tool-steel | 54-60 HRC | ■■■■■■■ | ■■■■■■■ |
| RX1 | PM bonded HIP molybdenum and vanadium | 60-62 HRC | ■■■■■■■ | ■■■■■■■ |
| 090 | PM bonded molybdenum and vanadium | 58-62 HRC | ■■■■■■■ | ■■■■■■■ |
| 119 | Tempered and nitrided steel | >850 HV | ■■■■■■■ | ■■■■■■■ |
| 000 | Tempered and nitrided steel | >950 HV | ■■■■■■■ | ■■■■■■■ |

OVERVIEW OF SERVICES

The most expensive item for a company is downtime. CPM has a solution. The aftermarket service team provides customers with a comprehensive assessment of their extruders. Our audit includes full visual inspection, barrel mapping, bore measurements using capacitive sensor technology along with high-resolution imaging and video of the internal barrel bores. The summary report presents measurement data and wear analysis along with our recommendations. Images captured with our borescope are also included as part of the report.

EXCEPTIONAL SERVICE OFFERINGS

SERVICE AND MAINTENANCE FOR TWIN- SCREW EXTRUDERS AND EXTRUSION SYSTEMS

The CPM is the leading supplier of extrusion machines, systems, spare parts and after sales services with locations in the US, Europe and Asia.

Our global service team is your source for all questions regarding machine installation and startup, system operations and maintenance, operator training, as well as process optimization. This service is not only for our own machinery but with a specific focus on other OEMs as well.

Our comprehensive scope of services is the best choice for keeping your machine in optimal condition. We accompany you throughout the entire life cycle of your extruder, starting with commissioning, ordering of spare parts, as well as the modernization of outdated systems.

SERVICE CONTACT

extrusion.service@cpm.net



TRAINING & WEBINARS

CPM is the leader for twin-screw extrusion training offerings. We offer free monthly webinars, process consulting, workshops, and onsite trainings.

Would you like to scale-up, improve your process, or optimize your screw design? Are you in need for a twin-screw training for your new hires? We have multiple types of training on hand for you.

Our Online Knowledge Center is an online library containing more than fifty (50) one-hour training webinars. Take one of our monthly trainings free and online.

Would you prefer a personalized training on a certain topic? Just ask us.

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SYSTEM COMMISSIONING & REMOTE SERVICES

PROFESSIONAL SUPPORT

Modern high-performance extruders require trained and confident operators to achieve the most efficient and high-quality results.

Our experience with customized machines and extrusion systems for complex extrusion processes is the perfect foundation for our successful project management and execution. Starting with sketches of ideas to the commissioning of your system, our support team will remain by your side for the entire process.

Twin-screw extruders from the CPM are commissioned on site at our customers' plants. Our service technicians will accompany customers during the first production runs to ensure a smooth and safe start of the new system.

Kick off meetings held

Checklist for the preparation of the start-up

Inspection of the installation

Setting of optimized system processes

Test run

Commissioning protocol

Intensive training of the system supervisors

PROFESSIONAL CONSULTING

We have over 40 years of know-how and experience in building innovative turnkey extrusion systems, developing customized procedures and complex extrusion process solutions, all the while remaining focused on specific customer requirement. Our team of technicians and engineers are ready to assist with your questions.

Our team of engineers assists with even the most complicated procedures and processes

Diagnosis and consulting

Optimization of extrusion systems from screw to complete process

REMOTE MAINTENANCE, PROCESS OPTIMIZATION, AND COMMISSIONING

Remote access to machine controls is an indispensable advantage CPM offers.

We offer a hardware-based solution which provides our customers with improved operational reliability, error analysis, correction of configuration deficiencies or technical faults, and the implementation of software updates and functional extensions.

Data security is of utmost importance for us. Therefore, we utilize an encrypted VPN tunnel with additional protection through a separate fire wall. With our customers approval of remote access, a service call can be completed in a quick and cost-effective manner.

Remote inspections and process optimization

Remote commissioning

Smart Glasses



SMART REMOTE SERVICES

Through using smart glasses our customers can communicate with our service team both easily and bidirectionally via a secure VPN. The glasses contain a camera and a microphone for video and audio recordings as well as a display, allowing you to follow all instructions directly at the worksite. A lot of our services can be done remotely. Commissioning, remote maintenance, problem investigation, ... you name it. Ask about our experience.

MAINTENANCE AND INSPECTIONS

Wear and corrosion are a natural phenomenon of machine parts which are in daily use. Regular inspections of your equipment can ensure operational efficiency. CPM offers various audit packages as well as additional inspection and maintenance services that ensure long lasting machine life and a reduction in downtime.

Through regular inspections, our customers not only benefit from an efficiently running system, they also gain valuable insights and confidence often leading to system optimizations which result in significant cost savings. Consider playing it safe by entering into a service agreement with CPM. Reach out to us if you want further information on our customized service agreements.

ASK FOR YOUR PERSONALIZED

Regular inspections

Various audit models

Service agreements

WEAR INSPECTIONS AND MAINTENANCE SERVICES

You can make sure you are prepared for maintenance by initiating service audits at your site. We recommend that a first full maintenance

inspection is carried out 6-12 months after commissioning and once annually thereafter. Of course, this is based on our experience and can be implemented differently depending on your needs.

Barrel and screw wear inspections can help you identify parts which require replacing as well as data for analyses and predictive maintenance. High resolution videos and photos help identify any bore damage not discovered through measurement (i.e. metal to metal adhesive wear).



SCREW DISMANTLING

Interested in having somebody else dismantle your screws and shafts? The CPM disassembles the elements, cleans, inspects and reassembles them. Our trained service technicians perform these operations using safe and efficient techniques around your schedule. We ensure fast turnaround to minimize disruption of your production schedule.

MODERNIZATION AND REPAIR SERVICES

RETROFITS AND UPGRADES

It is not uncommon for production requirements of an extrusion system to change or for components of older machines to become obsolete. CPM is the ideal partner for your modernization project:

- Replacement of obsolete gearboxes
- Upgrading of your process section
- Replacement or addition of side feeder and degassing units
- Replacement of DC motor
- Updating/Expanding your control systems

REPAIR SERVICES

Experiencing worsening product quality, unstable processes, or decreasing throughput rates are usually results of wear on the screw elements or barrels. CPM is the expert to further investigate these issues. Consider sending us your used or damaged parts and we will refurbish and return them to you like new. Through this service, you will minimize your downtime and achieve considerable cost savings.

Screw element dismantling services

Repair services for barrels