



New Developments



Capsules

Drug Delivery

Nutrient Delivery

Wound Healing

Cosmetic

Specialty Films in Pharmaceutical and Cosmetic Applications

A review of new product developments, applications and current research.

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The Manufacture of Specialty Films

Watson has manufactured specialty films for over 40 years. Our films are currently used in the food, pharmaceutical and health care industries.



Quality Systems from Start to Finish

Watson is a manufacturer of ingredients for medical foods, nutritional supplements and pharmaceuticals. We are also a registered medical device manufacturer. Our warehouses and production facilities exceed cGMP standards.

All of Watson's raw materials are sampled and tested upon receipt at our West Haven facilities. After QC approval, materials are released to our 2,000 pallet space production warehouse.

Watson's two drying lines are engineered with the latest microprocessor technology to provide highly accurate control of all processing parameters. To ensure consistent quality in all finished products, Watson's lines are equipped to provide on-line measurement of film thickness

and moisture levels. After production is completed, Watson's in-house analytical laboratory performs testing of physical and chemical characteristics. Our modern analytical laboratory is fully equipped with the latest technology including HPLC, ICP, ICP Mass Spectrophotometry and Instron. Watson's laboratory is staffed with degreed analytical and film chemists who generate Certificates of Analysis on each production lot to ensure the final product meets customer specifications.

Registered Drug Establishment (reg. # 2410528),
Labeler Code Assignment # 65901.

Registered Medical Device Establishment (reg. # 2410528)

Our Equipment

Watson maintains one of the largest and most varied ranges of processing equipment in the industry. Our list of processing equipment includes dry and wet grinding equipment, capable of producing particles in sizes down to the submicron range. Watson's wet and dry mixers include three high-shear mixers utilized for pre-dispersing liquids onto solids, with mixing capacities ranging from 2 kg to 4,000 kg. Watson's film lines are supported by two solution rooms, which are isolated to prevent cross contamination and each is equipped with independent environmental control system. In our solution rooms, Watson's selection of reactors allows for flexibility in solution batch sizes, ranging in volume from lab bench up to 3,000 gallons.

Watson produces films on two stainless steel drying lines



Mills rolls of Watson film ready to be slit to customer specifications.

equipped with 316 grade stainless steel belts. Each drying line is approximately 100 feet in length and their combined production capacity totals over 1 million pounds per year. Hepa-filtered drying air is temperature and volume controlled. The lines are divided into seven heating sections, each of which can be independently temperature-controlled to within 0.2 degrees Fahrenheit. This level of control is ideal in circumstances which require the drying of temperature-sensitive active ingredients. Belt speed is another variable which can be accurately controlled.



Pharmaceutical grade water can be provided based on formulation requirements.

Our expertise in film technologies, our commitment to quality and our range of processing equipment are unmatched in the industry.

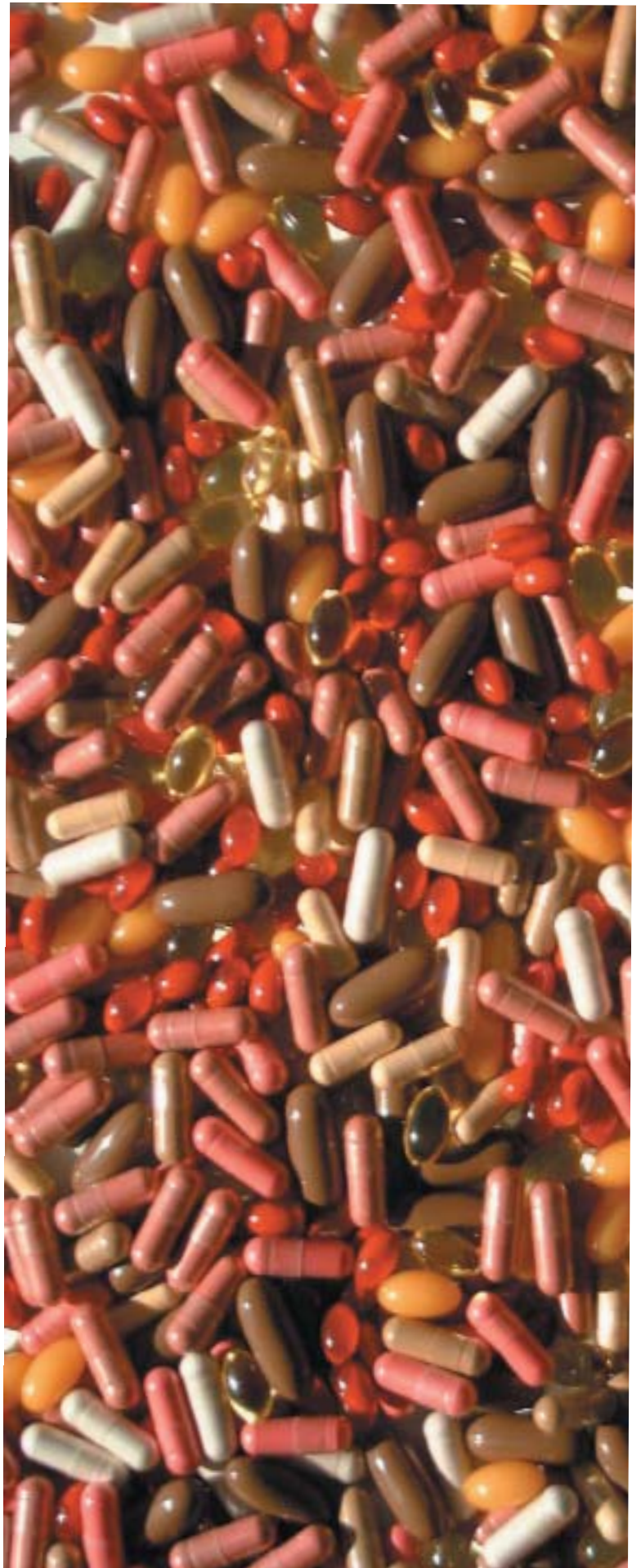
Watson's Films for soft and hard capsules

Consumer Benefits Include:

- Eliminates Kosher issues associated with gelatins.
- Eliminates concerns surrounding transmission of Bovine diseases.
- Allows Vegetarian and Vegan claims.

Manufacturing Benefits Include:

- Shortening production time required to manufacture capsules.
- Eliminating drying steps.
- Ensuring consistency.
- Minimizing microbiological concerns.
- Reducing clean up time through elimination of messy solutions.
- Allowing for a range of colors for use in both soft and hard shell capsules.



Bioadhesive Film for Intraoral Delivery

Watson's Bioadhesive Film can be used as an Intraoral delivery system for a variety of drugs, as well as for nutrients (vitamins and minerals) and phytochemicals. Pharmaceutical companies can provide drugs that may be incorporated into the film in carefully controlled quantities. In addition, Watson Foods custom blends vitamin and mineral premixes, as well as more complex blends containing phytochemicals. These premixes can then be incorporated directly into Watson's Intraoral Film. Flavors and colors may also be incorporated into the film to enhance patient/consumer appeal. The film effectively encapsulates the ingredients and stabilizes them to maintain potency and to ensure accurate dosage.

Watson's Intraoral Film is easily applied to the ventral surface of the tongue (the underside) or the buccal surface (inside of cheek). Once applied, it will adhere to the mucosa, to prevent shifting or swallowing. As the film slowly dissolves, the drug or nutrients pass through the oral mucosa and go directly into the blood stream for systemic circulation.

Delivery Applications:

Watson's Trans-Mucosal Controlled Release Delivery System can be used in three main applications for delivery of drugs and nutrients via the membranes of the oral cavity:

■ Buccal Delivery:

Administration via the interior lining of the cheek (Buccal Mucosa) to systemic circulation.

■ Sublingual Delivery:

Administration via the membrane of the ventral surface of the tongue and the floor of the mouth (Sublingual Mucosa) to the systemic circulation.

■ Local Delivery: For the treatment of conditions of the oral cavity such as periodontal disease, aphthous ulcers and oral fungal conditions.

Advantages of Sublingual & Buccal Delivery, as compared to Traditional methods:

■ Sublingual and buccal routes are systemic rather than portal, therefore hepatic first pass elimination can be avoided.

■ Sublingual and buccal routes offer potential for more rapid absorption and quicker onset of drug action.

■ Avoids the problems of gastrointestinal incompatibility of certain drugs and liver uptake of the drug.

■ Increased control of drug or nutrient availability.

■ In some cases, may be as effective as intravenous, providing a safer and more

comfortable alternative for the patient.

■ Permits the use of pharmacologically potent drugs with short biological half lives.

■ Convenience: Easy to apply and localize, no special skills required (as with injections), safe, no discomfort.

■ Improved bioavailability of drugs or nutrients.

■ Reduction of peaks and valleys in plasma concentration.

■ More effective drug/nutrient action can be achieved.

■ Dosage levels can often be reduced.

■ In many cases, there is a reduction or elimination of side effects normally associated with the drug.

■ Decreased costs may be achieved.

Intraoral delivery in many cases is as effective as intravenous dosage. In these cases, Intraoral delivery provides a safer alternative as well as less discomfort for the patient. Compared to intravenous delivery, Intraoral delivery requires no special training and can be easily applied.

Intraoral delivery is particularly beneficial to patients with special needs who are unable to tolerate traditional oral (enteral/through the GI track) administration due to nausea, vomiting or dysphagia, or parenteral administration because of decreased venous

access, emaciation or coagulation defects.

For nutrients, Intraoral delivery is especially beneficial for patients with conditions as described above, as well as children or adults who have difficulty swallowing pills and capsules. Watson's Intraoral film effectively encapsulates the nutrients to prevent loss of potency and is therefore more effective than alternative dosage forms, such as liquid vitamins.

Studies conducted on oral absorption of drugs show that the absorption is independent of concentration. Thus, most dosing requirements could be met through sublingual administration in a relatively short period.

In vitro performance studies show that drug plasma levels can be maintained at or above Minimum Effective Concentration (MEC) following oral absorption and thus can eliminate the troughs and valleys of drug plasma profiles associated with conventional multiple dosing.

A variety of drugs have already been shown to be readily absorbed by the mucosal epithelium of the oral cavity via the buccal or sublingual mucosa.

Novel Drug Delivery Systems (NDDS) Provide the Following Opportunities:

- Provides new uses for established drugs
- May provide opportunities for new patents

for drugs currently off patent

- Allows for increased revenue and market share
- Enhanced flexibility



The Advantages of Watson's Trans-Oral Delivery System

Watson's delivery system has many advantages over other oral delivery systems currently available, such as quick dissolving tablets, buccal adhesive tablets, oral gels, sublingual capsules and sublingual liquids.

Watson's bioadhesive film readily adheres to the underside of the tongue (sublingual mucosa) or the inside of the cheek (buccal mucosa), unlike quick dissolving tablets and sublingual capsules that are often difficult to keep under the tongue.

Unlike oral gels, sublingual

liquids or oral sprays, which are quickly cleared from the oral cavity when the patient or consumer

Easy to use patches allows patient to use it anytime.

swallows, Watson's bioadhesive film provides controlled and sustained release by remaining attached to the delivery site during administration.

Unlike adhesive plastic or paper disks or patches, which must be removed by the patient after administration, Watson's oral adhesive film dissolves completely, leaving nothing to be later removed or disposed of. Watson's oral adhesive film provides the same secure adhesion as buccal adhesive tablets, but has the advantage of being a thin, flat smooth surface which offers no discomfort to the patient. Because the film is thin, it is less effected by soft tissue movement, which can cause the erosion and unpredictable absorption associated with buccal adhesive tablets.

Watson's Films for Nutrient Delivery

Watson's Films for Wound Healing

External Dermal Adhesion - Benefits for wound care:

- Active ingredients to promote healing and prevent scarring can be incorporated directly into the film.
- Watson's film will adhere readily to lightly moistened skin.
- The film is gas permeable, for better healing.
- Bandages composed of Watson's Speciality films are easy to remove. Just wash the badge away. This characteristic makes film bandages ideal for children who want to avoid the "ouch" of traditional adhesive bandages.
- Unlike traditional bandages, which may reopen a wound when removed, film bandages simply wash away without disturbing the healing process.

Healing in the Oral Cavity - Benefits:

- Buccal Adhesive: Watson's Film adheres well to the oral mucosa (lining inside the cheek).
- Watson's Films can be used to cover painful canker sores, protecting the open sore from acidic foods while promoting healing.
- Applications are also possible for treatment of oral funguses and gum diseases.
- Films containing active ingredients to promote the temporary relief of pain could be applied directly to the gums for relief of teething pain and toothache.



Film patches can be formulated to contain active ingredients to promote healing of wounds, burns or reduction of the appearance of scars.

Watson's Films for Cosmetic Applications

Films for Health and Beauty Aids

- Films can be used for trans-dermal delivery of vitamin C, recently found to diminish the signs of aging. Similarly, vitamin E could be administered via the film to reduce the appearance of scars.
- Films can be used to whiten teeth. Bleaching agents would be incorporated into film strips which would be applied to teeth and then rinsed away after use.
- Films can be used to freshen breath. Flavors and menthol can be incorporated into sheets which are placed on the tongue. Films will dissolve almost instantly or can be formulated to dissolve more slowly for longer resonance inside the oral cavity.



A transdermal delivery of vitamins for cosmetic applications. Patch is rinsed away after a 5 minute application.

Specialty Films...

Capsules

Films to replace soft and hard gelatin capsules.

NDDS

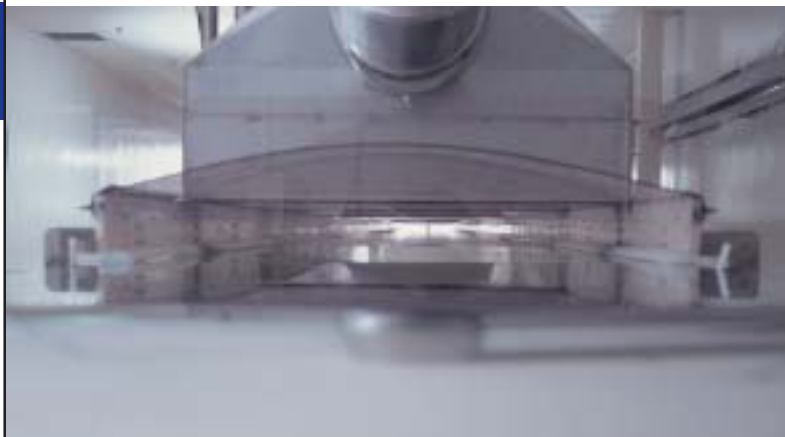
Films for Novel Drug Delivery Systems and for trans-mucosal delivery of Nutrients.

Wound Healing

Films to be used as bandages for wound healing.

Cosmetic

Films to be used in many cosmetic applications.



View down the drying belt.



Watson's line #2

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