KLINIK APOTHEKE

Universitätsklinikum Carl Gustav Carus
DIE DRESDNER.


# General introduction and the use of automated picking systems for packages and unit dose systems

**Thessaloniki, Dr. Knoth** **21/04/2012**

# University Hospital Dresden in numbers

1.320 beds

3.511 staff members

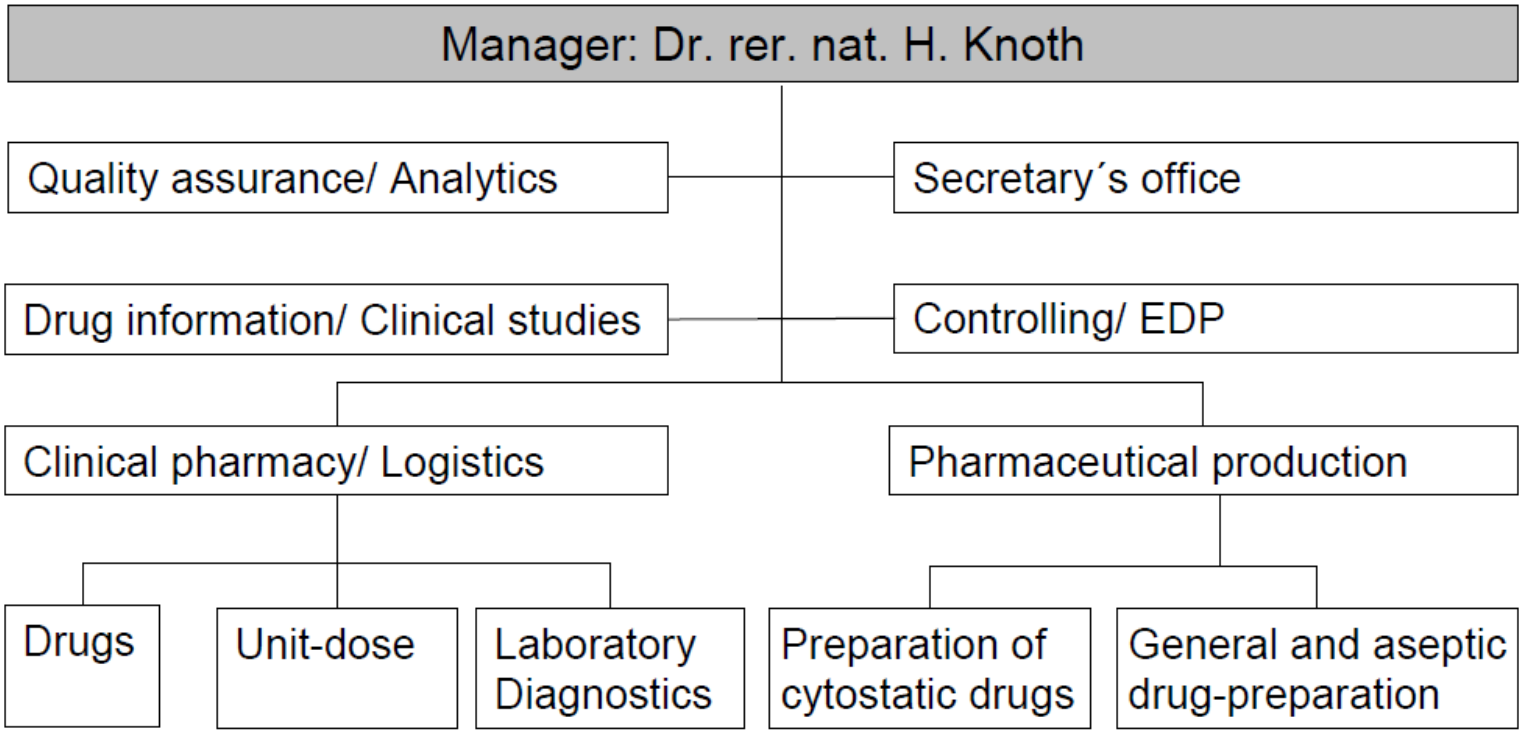
51.659 inpatients per year

165.231 outpatients per year

# Employed staff of the pharmacy at the University Hospital

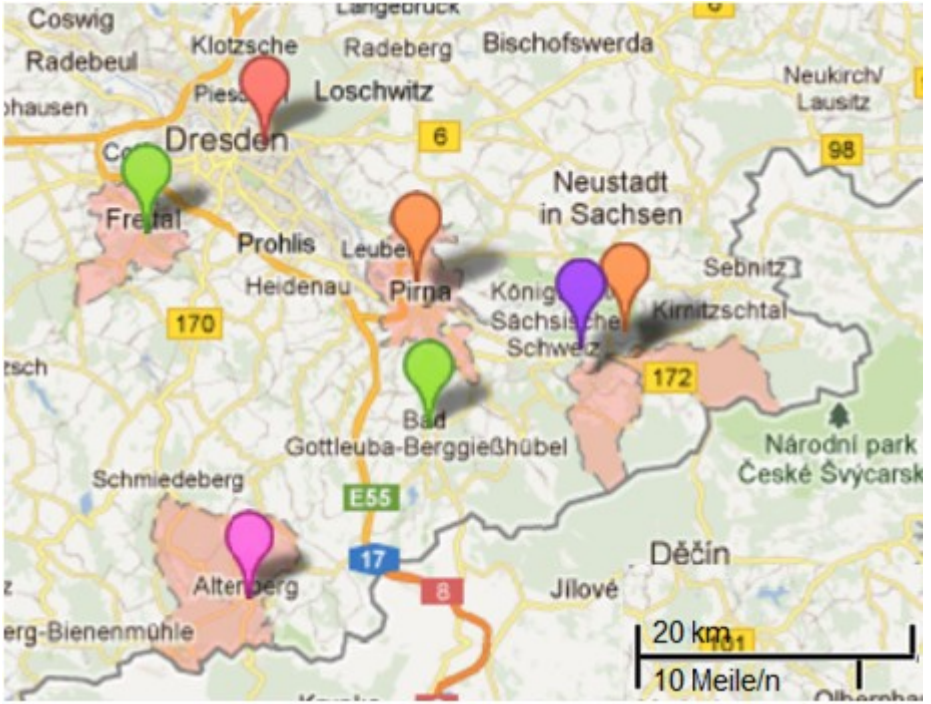
| profession | number |
|---|---|
| Pharmacists | 18 |
| Pharmacy engineers<br>Pharmacy technicians | 15 |
| Pharmaceutical-commercial assistants | 11 |
| System administrator | 1 |
| Economist | 1 |
| Unskilled employees | 6 |
| Apprentices | 6 |
| **Total** | **58** |

# Organisational chart



# Our performance (I)

- ensuring an effective supply with medical products
  - 1320 beds in UKD
  - 1900 beds in other hospitals
    - Pirna
    - Freital
    - Bad Berggießhübel
    - Bad Schandau
    - Gohrisch
    - Altenberg
    - Gut Gamig




http://maps.google.de/

# Our performance (II)

- Controlling
- Drug information service
- Preparation of parenterals and other medical products
- Supervision of projects in pharmacy and medical research
- Medication service for clinical trials
- Supply of narcotics and other controlled drugs
- Sourcing of international registered medicines (§73/ 3 AMG)
- Dispensing of OTC-products to employees of UKD

# Research topics

- electrochemical behavior of drugs (i.e. polarography)
- HPLC, plasma levels and stability of drugs
- filters for parenterals
- pharmacoepidemiology
- strategies for prevention of medication errors
- antimycotic drugs

# Medication service for clinical trials

- about 120 clinical trials conducted in our hospital every year
- special licence for the preparation of drugs used in clinical trials (§13 German drug law)
- products are used in the whole of Germany und Europe (IIT for special centres – KKS)
- special services for pharmaceutical manufacturers conducting small scale trials

# decision criteria for an automated system

- it depends on
  - legal regulations
  - available space
  - financial resources
  - number of supplied wards
  - sufficient members of staff
  - historic development of pharmacy services

Picture www.floridaipblog.com

# The “six rights” for medication administration

- right patient
- right medication
- right route
- right dose
- right time
- right documentation

Zukunftspapier des Bundesverbandes Deutscher Krankenhausapotheker (ADKA) e. V.

# different ways to accomplish these aims

| automated picking systems for packages | | patient-oriented picking systems | |
|---|---|---|---|
| **semiautomatic** | **fully automatic** | **picking in advance** | **patient individualised picking** |
| Kardex | Apostore | Swisslog | Baxter |
| Axon | Rowa | KRZ | Robotik |
| | | Pyxis | Dijkstra |


# automated picking systems for packages

# Stock flow

- gravity fed storage system
- combination of sloping trays and horizontal drawers
- wide range of modular components
- easily adapted for variations and changing requirements
- efficient storage
- ergonomic workbenches available
- convenient and accurate display of drugs
- “First-in First-out” principle
- basis for semiautomatic picking systems

# Kardex

- path-optimized picking
- Pick To Light Technology consists of four basic functions
  - Picking of a specific or active item.
  - Placing the item in an active order or location.
  - Communicating a message such as quantity, description, etc.
  - Completing the task and moving on to the next job.
- price about 50 000 €

# pick-to-light products

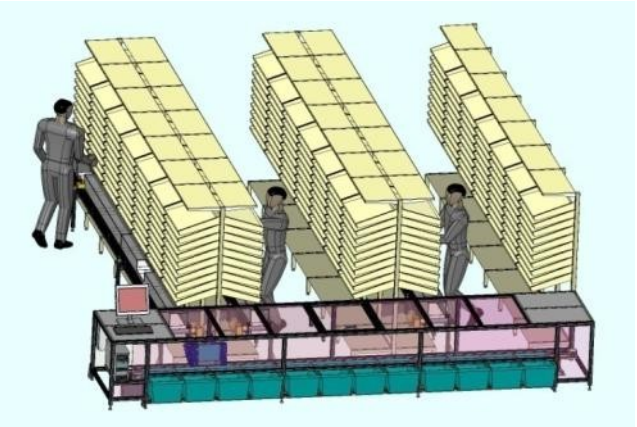
- **TIC (Transaction Information Center)**
  - discrete item identification (1/10 inch increments)
  - communicates descriptions, quantities and other messages
- **Light Tower**
  - consists of extruded columns and display modules
  - indicates the active carousel, shelf level, cell location and quantity to pick
  - often placed in between two carousels
- **Put Lights**
  - lights that direct an operator to “put” items in a specific location
  - indicate the quantity and description of items
  - ideal for consolidation, batch picking and sortation of applications

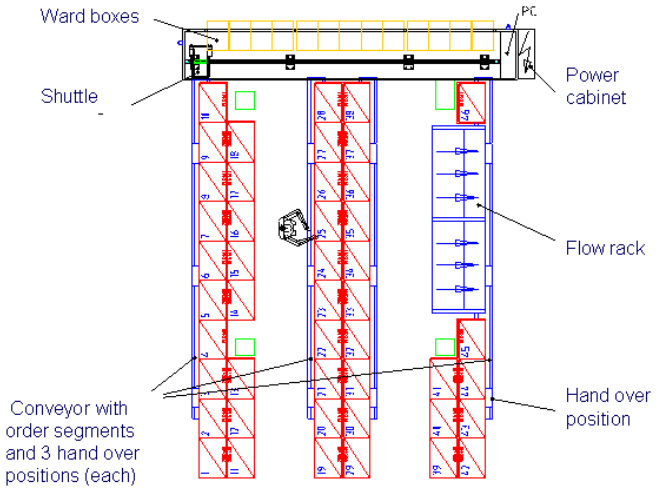
# Batch flow

- **work flow**
  - incoming orders are processed to one batch
  - manual picking of the packs (paperless)
  - transport on a conveyor belt to a sorter (splits back into original orders)
  - software-based scanning (end control)
  - filling of the assigned boxes and carts
- **effectiveness** depends on the performance of individual staff members ( 🧍 approx. 750 picks/hr; 🧍🧍🧍 2000 picks/hr; 🧍🧍 4000 packets in 2,5-3 hr)
- **advantages**
  - nearly every item can be processed
  - alphabetic storage can be maintained
  - in a way indifferent to IT-system and power failure
  - quick installation (4-5 days), short initial supervision (2 – 3 days)

# Pharma-Flo-System

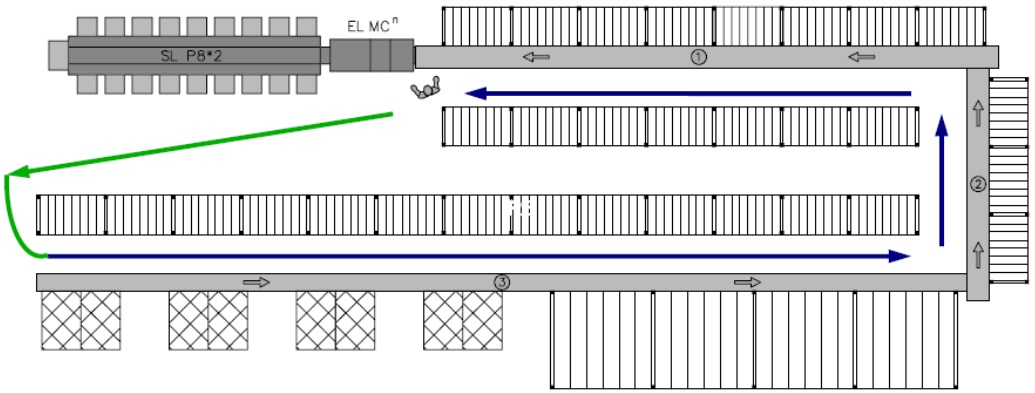
- stock flow storage
- manual picking on a conveyor belt into a box
- speed of the conveyor belt: 70 cm/sec
- performance 1 sec/pack
- four hour training session, while the system is put into operation
- full manual operation in case of an emergency (e.g. power loss)
- able to support the 2-D/GS1 standard
- picking of many products which cannot be picked by automated systems, but not suitable for all drugs (i.e. cool stored packs)
- producer: P@P Picking Systems
- price about 50 000 €





# Axon

- batch order picking
- order picking with handhelds
- optical classification in size, outlines and colours and also recognition of special features  like labels, icons and barcodes
- check point for outgoing goods and recording of incoming returned goods
- speed of transport: 0,5 m/sec
- throughput: 3 000 objects/hr
- recognition time: 1 sec
- price about 50 000 €



# Fully automated picking systems for packages

## Apostore 3000


- patient oriented dispensing
- average 2 packs per order line
- broken pack handling
- fully automated loading
- best degree on article handling

## Carryfix Pusher

- patient oriented dispensing
- ward box dispensing
- approx. 5 packs per order line
- limited article spectrum
- integrated material flow management

# Apostore 3000

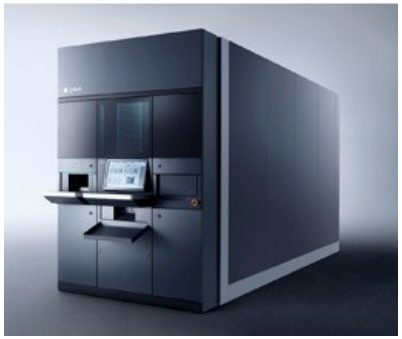
- Maximum Dimensions: 17,25 x 1,80 x 3,60 m (LxWxH)
- Pack´s capacity: up to 50.000 Packages
  up to 100.000 Packages with Capacity Extension Unit
- Pack´s Input: automatic loading with 450 packs/hr
- Output performance: 1 000 packs/hr based on average 2 packs per order line
- Reliable handling based on special gripper technique
- Wide range of packing sizes (15 x 15 x 35 mm – 120 x 140 x 240; weight: max. 1.200 g)
  approx. 98% of Rx products
- plenty accessories (conveyors, elevators, spiral chutes, falling towers, funnels etc.)
- Price about 300 000 €

# Carryfix Pusher

- Maximum Dimension: 12,00 x 2,50 x 3,20 m (LxWxH) one-liner
  12,00 x 5,00 x 3,20 m (LxWxH) two-liner
- Pack´s capacity: up to 40.000 Packs in one-liner
  up to 80.000 Packs in two-liner
- Pack´s input: Automatic operation
  1.000 Packs/hr for one-liner
  1.500 Packs/hr for two-liner
- Dispensing performance: (for 3 items/order line)
  1.500 Packs/hr for one-liner
  2.250 Packs/hr for two-liner
- Degree of article handling: approx. 85% of hospital pharmacy article
- Less staff needed
- Automatic Stock and dynamic storage channel control
- Integrated manual dispensing from different stock areas
- Integrated box control system
- Price about 500 000€

# Rowa $V_{max}$

- dimension: 3 -15 m length, 1.30-1.60 m width, different heights
- storage capacity: up to 60.000 packs
- fully automated input of up to 900 packages/hr
- output speed up to 2,000 packs/hr
- recording of batches and expiry dates
- different certifications
- noise pressure level of 48.3 dB(A)
- refrigerated unit, second belt etc. also available
- price about 300 000 €



# disadvantages and advantages

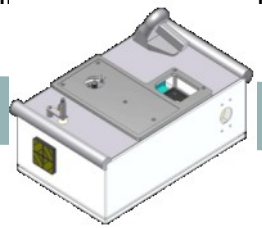
- occasionally low input speed (especially semiautomatic systems)
- time-consuming control of expiry dates
- legal accreditation by the responsible authority
- time and effort  for data management, supervision and service of the machine
- further training of the staff required

- significant error rate reduction
- decreased picking time
- optimized utilization of the available space

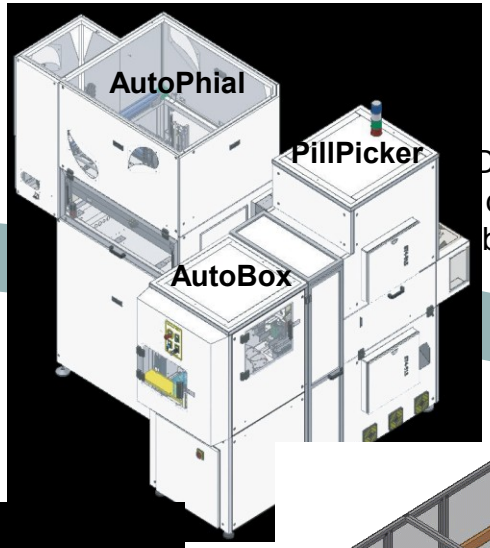

# patient-oriented picking systems

# Swisslog PillPick System

**BoxStation**
Filling/recording station

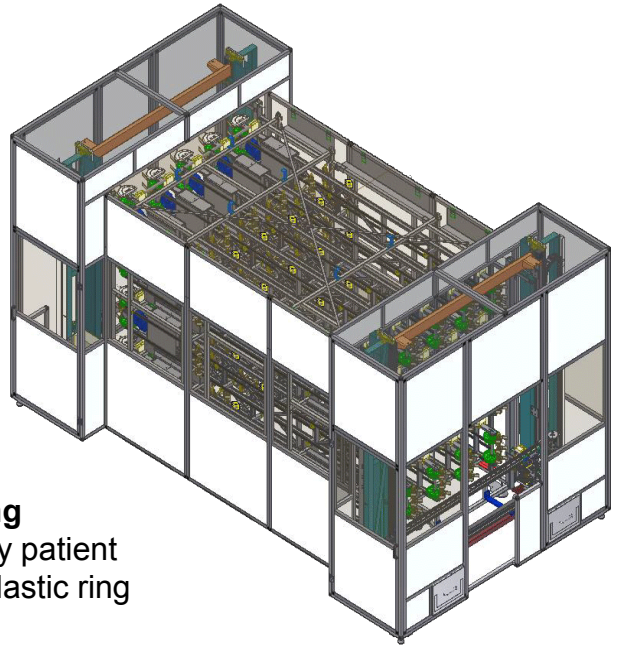


**PillBox / PhialBox**
Locked canisters for loading of medications into packaging station

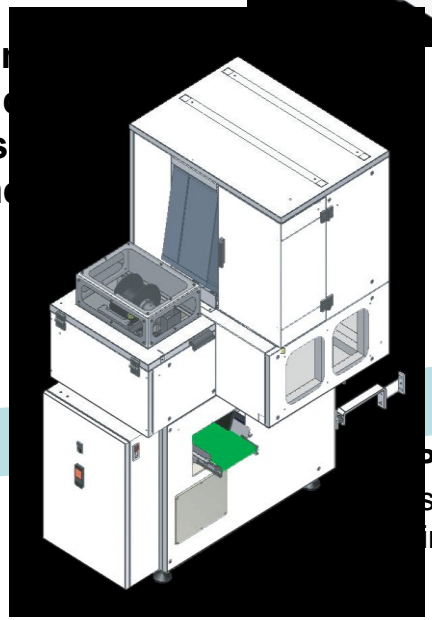



**Packaging station**
Drugs are packaged in unit dose bags, with a printed barcode containing all the drug information

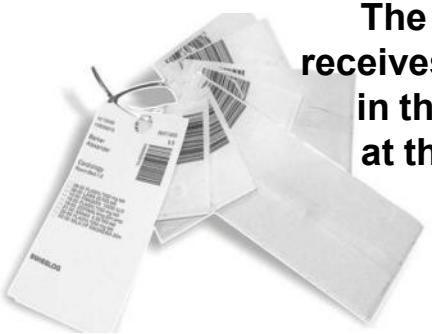
mated
coded



**PickRing**
ses daily patient
into a plastic ring



**The right patie**
**receives the right**
**in the right dos**
**at the right tim**



## BoxStation

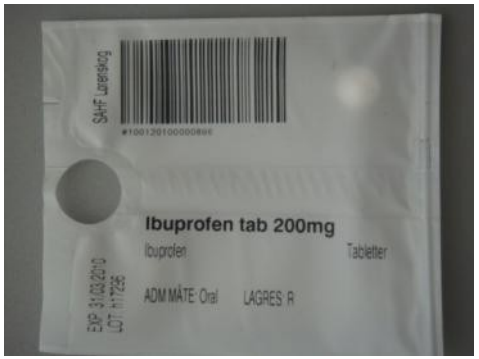
- to fill canister with drugs, register the drug information to the canister chip (TAG) and print sticker labels for visual identification of canisters content


## PillBox and PhialBox

- for medication in bulks (PillBox), blisters, vials, syringes etc.
- content is recorded with the RFID tag

## PillPicker

- able to produce single doses
- different dimensions of the bags (modifying the length according to the assorted drug)
- bags have unique barcode and information about medication printed on them

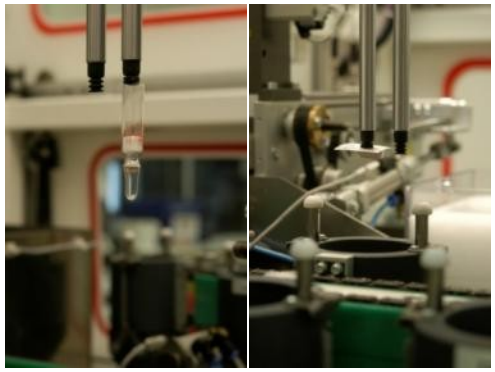


## PillPicker Consumables

- 250-meters-long polypropylene roll to produce 2500 bags
- thermal transfer of an ink ribbon (200 meters long and follows film consumption)

## AutoPhial

- automatic loading of vials, ampoules, blisters, cups, suppositories
- optional blister cutter for automated loading and cutting of multidose blisters



## AutoBox

- buffer for up to 12 PillBoxes to be loaded into PillPicker
- PillBoxes are automatically transferred from AutoBox to PillPicker if it is required
- PillBoxes are automatically expelled when the production is finished

## DrugNest

- automated “multifunction” storage system for bags produced by PillPicker
- 4 different types of DrugNest to be part of a complete PillPick System
- double loading- and unloading robot
- 8-to-24 conveyor belt sizes; a maximum of ten bags are stored on one pin
- each conveyor has 3 “levels”, 2 for short bags, 1 for long bags
- DrugNest with typical dimensions can store up to 5 – 7 days of stock
- re-load into DrugNest through return window is possible

| Model | Pins quantity (drug types number) | Theorical storage capacity | Real Storage capacity (based on 65% occupancy) |
|---|---|---|---|
| 19L20 | 2.640 | 26.400 | 17.160 |
| 19L24 | 3.168 | 31.680 | 20.592 |
| 33L20 | 4.440 | 44.400 | 28.860 |
| 33L24 | 5.328 | 53.280 | 34.632 |

- **PickRing**
  - collects all the single dose bags for one patient and binds them together with a plastic ring
  - number of bags per plastic ring depends on the therapy order and the dimension of the drugs
  - pre-perforated label (patient data and drug list) is attached to the ring as well as the drugs
  - plastic cord to produce rings (200 meter long roll can produce about 800 rings)
  - patient labels come in rolls of 450
  - to print patient labels the same ribbon is used as for the PillPicker


- Price about 1 000 000 €

# KRZ Multiblist

- horizontal packer
- pre cut blister packer, big sizes
- packaging of the medication treatment
- packaging of cut medication and multiple specialities
- hermetic sealing
- speed: 2.500 units/hr
- low maintenance
- direct printing on the terminal film (integrated icons and forms possible)
- consumables: two rolls (thermal aluminium and colour)
- price about 15 000 €


pictures www.krz.es

# Pyxis MedStation ES

- automated dispensing system for a decentralized medication management
- one system formulary through integration of the Pyxis into the Pharmacy Information System
- access to comprehensive medication and patient information is located in one place
- barcode scanning
- prevents loading of wrong medication
- active alerts for high risk medication
- Price: 20.000 € (MedStation 3500)

Picture http://www.carefusion.com

# Three generations of Baxter Unit Dose systems

1987 - 2000: ATC 212 SYSTEM

2000 - 2010: FDS 330/520 SYSTEM

Since 2010 : FDS II PROUD 260/336 SYSTEM

# Technical data FDS 330-/520 systems

| | |
|---|---|
| Producer | YUYAMA (JAPAN) |
| Capacity | 330 or 520 cassettes |
| Dispensing speed | 40-45 packs/minute |
| Printing mode | Thermal Printing |
| Dispensing of less used tablets | DTA-Tray |
| life expectancy | Min. 15 years |
| Price about | 200 000 € |

# FDS II PROUD 260/336 systems

- different facilities with 260 or 260 + 76 cassettes slots available
- identification of cassettes and medication through RFID
- refill of cassettes on a scanable drawer and scanable medication packaging
- easily accessible row of cassettes and funnels
- dispensing of unit dose and/or multi dose possible
- price about 170 000 €

# DTA-Tray

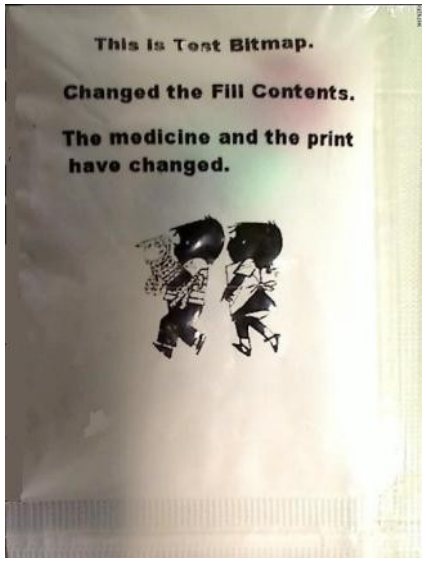
- special way for picking less used medication (i.e. divided or effervescent tablets)
- 63 slots per tray, but infinite trays per order
- faster processing with new types of DTA-Trays
- theoretical dispensing speed: 60 packs/min
- net dispensing speed: 30-35 packs/min

# Cassettes

- individually produced and calibrated for each drug (more than one cassette can be calibrated for the same drug)
- matching of drawers and cassettes through individual barcodes
- available in different sizes


# Packs

- Multi Dose, Combi Dose or Unit Dose possible
- Different packaging sizes
  (60, 70, (76), 80, 90 mm)
- Length of the roll 420 meters
- Environmental friendly and hygienic material
- Ribbon (Cartridge-cassettes)
- Printing of barcodes etc.
- Text is sent as bitmap file
- Quality certificates exist (GMP)

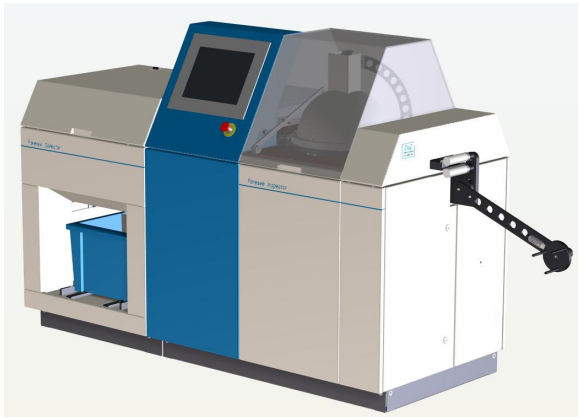



# Which kind of information can you print on the packs?

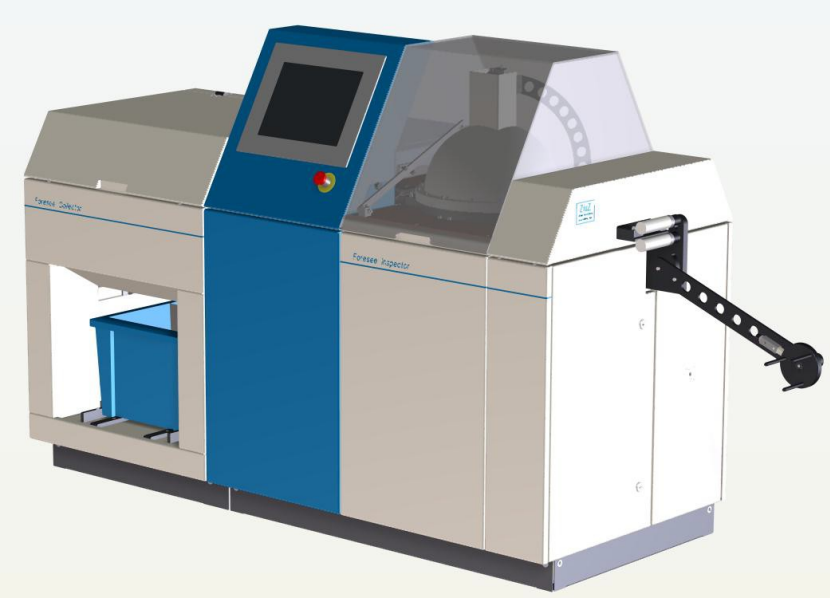
- Patient name or number
- Patient picture (optional)
- Date of birth
- Hospital ward, room number
- Time of administration
- Medication  and dosage
- Name of the drug/ means of identification
- Directions of use
- Lot number und expiring date
- Barcode (Scan for Safety)
- Emblem of the pharmacy

# ZiuZ Foresee Inspector

- optic control element
- counts and identifies dispensed medication
- picture of the front and backside of the pack (two cameras)
- automatic matching of taken picture (identity and amount) with master image (calibration required)
- image can be saved  for documentation
- error statistic can be evaluated
- processing speed equivalent to the output of 2 FDS machines



- problems we are facing at the moment
  - a lot of false error messages
  - time consuming
  - technical limits of identification (limited picture definition)



# Robotik 5000

| | |
|---|---|
| Capacity (fixed + variable canisters bases) | 500 (440 + 60) |
| Dispensing speed | Maximum 60 packs/min |
| Printing mode | Thermal Printing - Printing service for selected contents (Specified Form) |
| Dispensing of less used tablets | FSP (Free Shape Packing System) or MDU (Manual Device Unit) FSP: 3 bowl / MDU: 24 cells |
| Dimensions | 1098(W) * 1080 (D) * 2040 (H) |
| System weight | About 850 kg |
| Environment | Temperature : 10-40° C/ Humidity 10-80% |
| Noise standards | < 85 db (5 Aeration fans) |
| Price about | 150 000 € |

Picture www.robotiktechnology.com

# Dijkstra

- compatible with all commonly used hospital and pharmacy information systems, patient management as well as warehouse and accounting systems
- automatic cassette recognition system for time-saving changing of medicines
  (cassettes can be replaced on every drawer)
- photo-optic and fully automated checking of the pre-packed rations for compliance with the prescription plus reporting in the form of pictures and text (optional)
- authorization system RFID operating on the basis of magnetic cards and reporting of the accesses which occurred

# Dijkstra

| | |
|---|---|
| Cassette capacity | up to 500 |
| Dimensions W x D x H | up to 1087 x 1207 x 2317 |
| Weight (without cassettes) | up to 1,160 kg |
| Pouch sizes (in mm) | 70 x 75 / 70 x 55 / 70 x 45 |
| Maximum working rate | Single dose: 60 packs/min<br>multi-dose: 50 packs/min |
| Printing system | Thermal transfer system |
| Dispensing of less used tablets | DTA |
| Manual STS capacity | 60 doses/1 tray |
| Price about | 150 000 € |

# Florence on the Elbe



# Thank you for your attention

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