Conception and development of a mega center of sterilization for public hospitals in Lyon - France
Lyon, second urban area in France

- Lyon urban area:
  - 1.6 million inhabitants
  - 19 public hospitals
    (5,313 beds and 23,000 personnels for the Hospices Civils de Lyon, 41 operating theaters, 123 rooms of intervention, 84,000 surgical interventions / year)
  - 1 military hospital
  - 39 clinics or private hospitals
Lyon: the good eating, good drinking (Beaujolais), and Guignol city...
A long epic with numerous very implied partners

- The Executive Management of the HCL
- The Group Sterilization Project
- The Management of the Technical Affairs
- The Department of the Biomedical Techniques
- The Management of the Economic Affairs
- The Management of Information systems
- The technical assistance experts
In 2001, the sterilization of medical devices in the hospitals of Lyon was

- 11 establishments are concerned
- 54 sites (except ICU) are concerned by the cleaning and/or the sterilization
- 31 sites in which the sterilization of m.d. is implemented
- centralization of the activities totally or partially : 7 sites
- 50 steam sterilizers, among which 28 in CSSD or Pharmacies
- 51 washing machines (5 in CSSD, and 46 in operating theaters, I.CU. or consultations)
- 3 steam / formalin sterilizers (CHEMICLAVE)
- 7 EO sterilizers
- 1 hydrogen peroxide and plasma sterilizer (Sterrad ®)
But it was not all the same that ...
Then came Lucky-Luke…

It is going to need to centralize!

Yes, we think that one Sterilization by group of hospitals would be necessary (safety)

No way ! The only one will be enough !
Progress of the operations – 1st project

- 2002: preliminary studies
- 2003: writing the final detailed technical project
- Technical Assistance
- Call for tenders gained by
- Planned construction
  on a ground of the East Group of hospitals (Bron)
- Building permit
  waited in 2005 and 2006,
  refused by Mrs mayor
  of Bron in 2006 …
Find temporary solutions in emergency on 3 spots (≈6M€)
2nd project: main lines

- it is a public hospital service
- development of the process in snail shape and not in shelf space, without step backward
- delivery of the instruments within 24 hours
- functioning from 6:30 am till 9:30 pm, reduced on Saturdays (6:30 am - 4:00 pm), closure on Sundays
- this engagement required the upgrade of instruments in o.t. (purchases of instruments for a rough value of 3 M€)
- versatility of the staff
- social support of the staff in three sites in the course of functioning
- search for ergonomics and natural light
- work in tense thread from the collections to the deliveries of the instruments
Chronology

- **Detailed Technical Project** (end of 2007)
- **Call for tenders for the conception - realization** launched in 2008
  - On three candidates, the GCC company gained it for a projected **budget of 10,6 M€** not including the process equipments of sterilization.
- **Building permit** obtained in 2009 for a construction in **suburbs of Lyon**, close to the motorway network (Saint Priest)
- **Start of the construction** January, 2010
- **End** in February, 2011
- All the **validations** performed in March, 2011
- **Opening** on April 19th, 2011
- In this meanwhile, **composition of the lists of instruments, trays, containers...**
The realization

Surfaces:

Floor space: 2 448 m²

Reception/wash zone: 559 m²
Packaging zone: 545 m²
Unloading autoclaves zone: 509 m²
Administrative zone: 194 m²
Technical zones: 641 m²
By night or with snow
Costs

- Purchase of the ground St Priest = 825 200 €
- Operation of conception / realization = 9,6 M €
- New bio-medical equipments = 1 850 000 €
- Equipments of processes transferred from other plants = 880 000 €
- Moving of equipments process from other plants = 29 500 €
- Functional equipments = 500 000 € (conveyor included in the market of conception / realization)
- Functional equipments transferred by the former sterilizations (not evaluated)
- Computerization (software and equipments) = 217 500 €
- Upgradating the park of instruments = 2,5 M €
- Arrangement of the sites of reception/departure in hospitals = evaluated at 2 M €

≈18 405 000 €
Activity

• 650-700 containers / day

• 1500 units in bags / day

• Number of customers: 34 o.t., 154 medical units and I.C.U. and consultations on 14 sites

• Number of containers (1 to 3 trays in them) in our o.t.: 6600, including 2700 different composition
Equipment

- 5 wash cabins GETINGE (2 validated for instruments, 3 for trolleys and boxes)
- 11 washer-disinfectors 15 baskets BELIMED and MIELE HD
- 255 baskets at the hour
- 9 steam sterilizers BELIMED 12 STU
- 108 STU / 1,5 hours, = 6 m3 / 1,5 hour
- 2 hydrogen peroxide and plasma sterilizers Sterrad® 100S and 200S
- 11 sealing machines
- 1 conveyor for containers between 14 workstations
- 6 workstations for reception and 3 blocks for wash
## Consumptions and daily costs

<table>
<thead>
<tr>
<th>FLUID</th>
<th>CONSUMPTION/DAY</th>
<th>COST €/DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAW WATER</td>
<td>86 m³</td>
<td>200</td>
</tr>
<tr>
<td>includ. osmosed water</td>
<td>9 m³</td>
<td></td>
</tr>
<tr>
<td>includ. cold softened water</td>
<td>55 m³</td>
<td></td>
</tr>
<tr>
<td>includ. Hot softened water</td>
<td>22 m³</td>
<td></td>
</tr>
<tr>
<td>ELECTRICITY</td>
<td>8 436 kWh</td>
<td>740</td>
</tr>
<tr>
<td>GAS for production of hot water</td>
<td>1 816 kWh</td>
<td>104</td>
</tr>
<tr>
<td>FUEL</td>
<td>10 L</td>
<td>8.5</td>
</tr>
</tbody>
</table>
Maintenance and costs

- **Internal maintenance**: 2.5 actions/day for 274 €
- **External maintenance**: 616 €/day
  - For the process equipment: 400 €/day
  - For the technical equipment: 216 €/day
- **Total/day**: 890 €
Process Zone
Technical zone

Generator
1,7 MW
Ergonomics

- Conveyor to bring containers to the loading zone of autoclaves
- Tables at adjustable height, comfortable seats and footrest
- Glazed surfaces
- Automatic loading and unloading of the washers and the autoclaves
Computerization/Traceability

- Purchase of the software Advance – evolution
- For the moment, only the traceability of the process is performed, and only some specific instruments.
Categories of staff

- 3 pharmacists
- 2 internal students
- 4 executives
- 0,5 secretary

- 7.5 Nurses and O.T. Nurses,
- 67 APS (versatile agents)
- 17 agents for help and maintenance
- 1 engineer of production
- 4 team leaders
- (shared) equip with 8 maintenance technicians

= 106 employees
8 Modules of 3,5 hours taught total duration: 28 hours

- E1: generalities on sterilization
- E2: surgical instrumentation
- E3: assembly of containers and operating trays
- E4: washing - Packaging
- E5: authorization for driving autoclaves
- E6: controls of sterilization
- E7: hygiene, rules of dressing and biocleaning
- E8: role of the operating theatre in the process of sterilization

Knowledge of the o.t. and the use of instruments
Duration: 4 half-days in various o.t., according to the possibilities of the service

Apprenticeship during approximately 46 days with a guardian
Organization of work

Functioning schedules

– Functioning in the week (on Monday to Friday)
  • in two equips in the morning-evening 6:30 / 2:20 pm
    14:00 / 9:30 pm with schedules in 7:30
  • 2 versatile agents and 1 help : 5:30 / 1:20
  • For nurses and help pharmacists : three teams (in the daytime : 10:00-5:05 pm)

– Saturday and holiday Monday :
  Functioning in a team of 10 hours : 6:30-4:30 : 2 nurses, 10 versatile agents, 2 helps

– Closed on Sunday and at night
Logistics

- **Deliveries / collection stations / CSSD**
  - 4 circuits (= 4 groups of hospitals)
  - 3 turns/d by circuit
  By private carrier

- **Internal organization of the collection / delivery**
  By internal teams
Load increase

- Opening on April 19\textsuperscript{th}, 2011: 2 hospitals, 180 containers / day, 44,5 agents
- One year later: 7 hospitals, 470 containers / day, 77 agents
- Mid 2013: 9 hospitals, 628 containers / day, 106 agents
- Will remain to take in charge: 2 departments of orthopaedic surgery and the Central Consultation for dental Treatments (600 hand pieces / d)
Taking into consideration of the industrial dimension of the production

- By recruitment of an engineer of production and 4 team leaders (optimization of the flow and check of the correct addressing of the trolleys, containers and individual instruments)

- Quality control of the inspection and assembly of instruments in trays, by qualitative daily controls in the hazard (minimum 5/day) and quantitative by comparison of the number of instruments incomers and number of the outgoing instruments

- situation considerably improved on all the plans
Challenges

• **Logistics**: it is double, extra-hospitals and intra-hospitals. The latter is a very delicate point.

• **Complete IT traceability** of the process and of some varieties of instruments: very time-consuming operation for its implementation. At the end of 2013, 65% of the park of containers is traced.

• **Contact with operating theatres**: difficult to maintain at a high level because of the distances between the Central Sterilization and the “customers”. Between 17 – 35 km distances.
Key points

- **New premises** "planned for" and not old premises to make with "
- **Extended natural light**
- **Ergonomics**
- **Economy estimated in staff**: 4 agents / 3 sites of sterilization (31 in 2001)
Weak points

- Distances from the customers
- Risk management
- Too big, too small...

*A real jewel, but not to begin again!*