

TRANSITION TRAINING IN ADVANCED COCKPITS

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Traditional standards in transition training

At the end of the years 1960 a traditional standard in transition training for flight crew members was used by all the airlines and was coming from the entry into service of airplanes like B747, DC10, L1011 in the United States of America. This standard was imposed to Airbus Industrie for the Airbus A300 by all our customers and also in some way by the Airworthiness Authorities.

This standard was based on the concept of SBO "Spécific Behavioural Objectives". It was made of :

- Ground course, in classrooms with instructor using transparencies, slides ...
- Cockpit Procedures Trainer (CPT) in which was learned successively Normal, Abnormal, Emergency procedures
- Full Flight Simulator (FFS) with the same progression (normal, abnormal, emergency procedures)
- Flight on the aircraft in normal utilisation.

This concept was adapted correctly to the automation of the years 1960/1970, and acceptable (but at the limit) for airplanes like MD80, B757, B767, A310.

A new concept with Concorde

At the beginning of 1970 it has been obvious for Aeroformation that with Concorde this concept could not be applied ; the aircraft was more sophisticated than all the others, the systems were more complicated, the flight envelop was far much extended, and mainly more possible combinations were existing between the aircraft automation configuration and the different cases of flight (for instance use or no use of the flight director with a VOR/DME approach in Heading or Track mode).

This was yet true in normal operation, but more and more complicated when any malfunction was added.

So it became evident that the convenient method to train correctly the crew members in this context was to teach in first how to use the aircraft in normal conditions, with a judicious choice of different status of the automation associated to specific cases of flight, cases of use. It has so been necessary to make an initial selection between all the various possibilities offered by the automation.

After the perfect assimilation of the normal use of the aircraft by the trainees, the study of all abnormal, then emergency conditions, was introduced.

So for the Concorde the program of transition training was :

- Ground course and teaching of normal operation in CPT and FFS
- Study of abnormal, then emergency procedures in CPT and FFS
- Flights on the aircraft in normal conditions, and including a few demonstrations of abnormal conditions.

It was successful and it allowed to decrease the duration of the transition course from 13 weeks to 10 weeks.

We, Airbus/Aeroformation, have taken the benefit of this experience for the A320, in making a comprehensive choice between all the possibilities offered by the combination of the various states of automation, sometimes against our engineering people.

Then for the A340 we kept this choice and taking in account the experience of three years of use of the A320 course, we came back to the concept used for Concorde.

Now this method has been validated for A340 and A330 and retrofitted to all types of Airbus products A320, A310, A300-600, and finally A321 and A319.

Duration of the simulator sessions

For a long time we used like every training center in the world a duration of 4 hours for the simulator sessions ; a first part of 1h50', 20' of break, then again 1h50' of work. But after the break we noted a difficulty to resume, a loss of efficiency at the beginning of the second half of the session : at least 15' were necessary to obtain a good work from the

trainees (even for the instructors). Only 3h25' were efficient (instead of 3h40').

So we got advice from pedagogic and psychologist specialists and elected to implement simulator sessions of 3 hours in order to have a better didactic efficiency, and as a secondary effect to facilitate the schedule of the session.

The only problem was an increase of the apparent duration of the transition course, and this has been exploited from a commercial point of view by our competition in making comparison between for instance the duration of the transition course for B737 and A320 but without referring to the difference in didactic efficiency.

So we come back to 4 hours simulator sessions but with a complete new study of the syllabus of the sessions so that the discontinuity at the resumption be minimal.

The fine tuning of this process is on its way, as well on the psychological point of view than on the technical one, and with the preoccupation to avoid the overload of the trainees.

Implementation of human factors elements

From the beginning of the design of our transition courses, we have always insisted on the human factors side, giving to the new members very clear procedures in regard of task-sharing (who does what and when ?) of call-outs and acknowledgments, etc ... All that was clearly defined in the Flight Crew Operating Manual (FCOM) and Flight Crew Training Manual (FCTM).

Then as the concept of CRM (Cockpit then Crew Resource Management) was more and more spread in the aeronautical

community, but only in the airlines, we elected to be the first, far before any of our competitors, to implement a human factor education in our transition courses. To avoid any undue increase in the duration of the transition course but still preserving a good efficiency, we decided to implement this module into a 1 day workshop and in briefings, debriefings and exercises spread and integrated into 8 FBS and FFS sessions. During the 1 day workshop, we introduce the main concepts of CRM (situational awareness, error chain, communication, team work, etc...) and during the simulator sessions the instructors remind these concepts to the trainees and introduce other concepts such as decision making, stress management, etc, accompanied by some exercises.

To obtain the better efficiency of this course, we spent a long time to train a good number of facilitators for the workshop, and to train all our instructors in this area of human factors and psychology.

We began to introduce this module in the A320 transition course in order to test it and fine tune it and now it is a part of all our transition courses for any type of Airbus, and it is a big success.

Every time it is necessary we adapt it to specific needs, like, e.g., our chinese customers.

We call this integrated education module AIM (Aircrew Integrated Management)

LOFT : Line Oriented Flight Training

We have always included in our syllabii a session devoted to a simulation of a line flight, in order to familiarize the trainees with a "continuous" flight, not

cut in several exercises, as it is in general the case for a training session.

Now we have extended this concept to a full real LOFT, just before the check session, so that the trainees are able to use their "aircraft" without any intervention of the instructor, in a complete trip, and using video recording, so that they are able to make their own debriefing, related to technical aspects as well as to the behavioural, human factors aspect.

Computer Based Training (CBT) and system trainers

As soon as possible we have introduced CBT in our transition courses in order to allow the trainees to study at their own pace ; all along the years we have improved this CBT up to its actual state of VACBI (Visual Audio Computerized Based Instruction) very interactive and very powerful, in fact introducing a first step of simulation in the ground course. It is completed by FBS sessions, and in fact it is a mixing of CBT and FBS. We are working hard on the evolution towards a new type of ground course, based on a CBT course fully integrated in Flight Training Devices (FTD). We begin to accumulate experience in this area with our FMGS trainer, which is a combination of System Trainer and CBT, with a teaching either "tutored" or "free play", this being far less expensive than a FBS to learn this difficult part of all modern airplanes.

Advanced Qualification Program (AQP) and Cross Crew Qualification (CCO)

When the FAA introduced the concept of AQP in the aeronautical community, it has been very well welcomed by Airbus

Industrie, as we yet used this concept with the A310 in regard of task sharing, crew coordination, and performance rating as rigorous for PNF than for PF. The introduction of AIM was also directly in the concepts of AQP.

Our work to comply with the requirements of AQP is also very close to the work we have yet made on task analysis and behavioural markers, respectively with A310 and AIM, in the implementation of our Cross Crew Qualification of our Fly by Wire family.

All the airplanes of this family have the same cockpit, with minor differences mainly related to the number of engines (2 or 4), and a very close handling, even with the difference of size, weight and again number of engines.

To achieve this goal of CCQ we have analyzed during the flights, from gate to gate, what the crew members must know, what they have to do. This led to a certain number of training objectives, and the knowledge of what to teach and with what device, to obtain a difference course.

Historically we began by the most difficult one, the difference course from the A320 qualification to an A340 qualification, and we have continued with all the possible combinations inside the family.

As an example, a standard transition course for a pilot coming from any type of airplane to A340 is 29 working days ; if he comes from an A320 it is only 13 working days. The shorter transition course is to go from A340 to A330, only 2 to 3 working days.

Again this remarkable result is due to the fact that all the Airbus cockpits have the same configuration enabling to group the failures in a very limited number of families on which we concentrate to teach how to react to problems, with the help of

our intelligent system of ECAM (Electronic Centralized Aircraft Monitoring) which is a real "plus" compared to less sophisticated systems.

Zero Flight Time (ZFT)

For many years now the ZFT concept is widely used in transition training, based on the high similarity between aircraft and FFS. This allows the trainees to be type rated on a new type of aircraft without flying the real aircraft. Of course all our FFS are capable of being granted for ZFT by the certification authorities, and they are approved every time that it is necessary.

However the concept of ZFT can only be applied to a very well known and homogeneous population of pilots. As we receive in our Centers mixed populations coming from very different origins, our standard programs have still a few minutes of actual flight, about half an hour for each pilot in order to better assess and confirm the results obtained during their checks in the FFS.

Conclusions

In conclusion we can say that thanks to a family of modern airplanes, having the same cockpit and the same handling, with minor differences, and thanks to a huge work of reflexion on the best adapted training method, now we are able to offer to our customers a very modern type of transition training in advanced cockpits.