PART 5b: Hangar M2, Airport Mošnov, Czech Republic

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1 GENERAL INFORMATION

Client:
CCA a.s.

Architect:
Hutni projekt Ostrava

Structural design:
Excon, a.s.

Executive company:
Vitkovice, a.s.

Fire protection expertise:
KBK-fire, s.r.o.

Processing time:
2006 – 2007

Kind of building:
One floor hall for aircraft maintenance and repairs

Total height:
34 m

Ground plan:
146 x 80 m

2 INTRODUCTION

This hangar is situated at Mošnov Airport near Ostrava town. It consists of the main hangar building for aircraft maintenance / repairs and service building. The actual structural fire design is based on traditional system. It was prepared according to Czech and European fire standards. The alternative fire design with target to find more exact and economical solution is under preparation in this time.

View on Hangar M2 with a main gate

3 STRUCTURE

The Mošnov hangar consists of the main hangar building of the rectangular floor plan 146 x 80 m and light height 21 m and adjacent 5-storey service building.

The roof of the main hangar consists of 7 bowstring lattice trusses, with the rise of arch 12 m, pinned on the top of 21,5 m high cantilevered columns. Bottom chords consist of twins of tendons, steel S520. There are no purlins in the structure. Horizontal roof bracing in the level of upper chords is created by tubular profiles, in the level of bottom chords there is a X-shaped horizontal bracing of tendons of steel S460. Columns are designed as lattice cantilevers of rectangular shape 2 x 2,5 m with box legs and tubular bracing.

The steel structure of the roof was designed to be pre-assembled on the ground, furnished by cladding and equipment and heavy lifted to the final position on top of columns (+21 m). Such

erection process was used first time in the Czech Republic.

Service building is designed as 5-storey frame steel structure of ground plan 146 x 9 m, along the longer hangar side. It is divided by an concrete fire partition wall from the main hangar. Both buildings are statically independent.

Internal room with lattice steel structure

Openings for smoke and heat venting system

4 FIRE SAFETY STUDY

The fire design was prepared in the traditional way according to Czech standards (CSN), all the hangar volume is one fire compartment with fire safety degree I (local leak of fire dangerous liquid). The requirement for fire resistance is R15.
Fire resistance of steel structure of roof was calculated according to ENV1993-1-2. Result of this calculation is the possibility of non-protected roof steel structure under condition that the room temperature under roof doesn't arise above 350 °C. For fulfilling of this condition the system of smoke and heat venting was designed (acc. to prCEN/TR12 101-5).
The hangar area was divided into 6 equal smoke zones (each 1950 m2). Every zone is provided by 8 fire fans and in fire case it is protected by 2 m high draft and smoke curtains on its perimeter. All this equipment is switched on automatically in the fire case, as well as the self-closing of main hangar gate.

4 ALTERNATIVE FIRE DESIGN

The alternative fire study of the steel structure is under preparation in this time. This study will use advanced approach based on FE method with assumption of local fire in one of smoke zones and its time related spreading into all structure. The target of this study is to establish the behaviour of a large steel structure under local fire and to decide, if the smoke and heat venting system is really necessary or if the resistance R15 could be reached by more economical solution (light protected or even non-protected steel).
This alternative fire study is subject of Ph.D. thesis at Czech Technical University in Prague and it should be finished in 2009-2010.

REFERENCES

1. Shell and Spatial Structures, IASS, Venice, Italy, 2007
2. Steel Structure Symposium , Hustopece, CZ, 2007
3. Ocelové konstrukce 4/2007, Steel Structure of Hangar at the Airport Ostrava-Mošnov