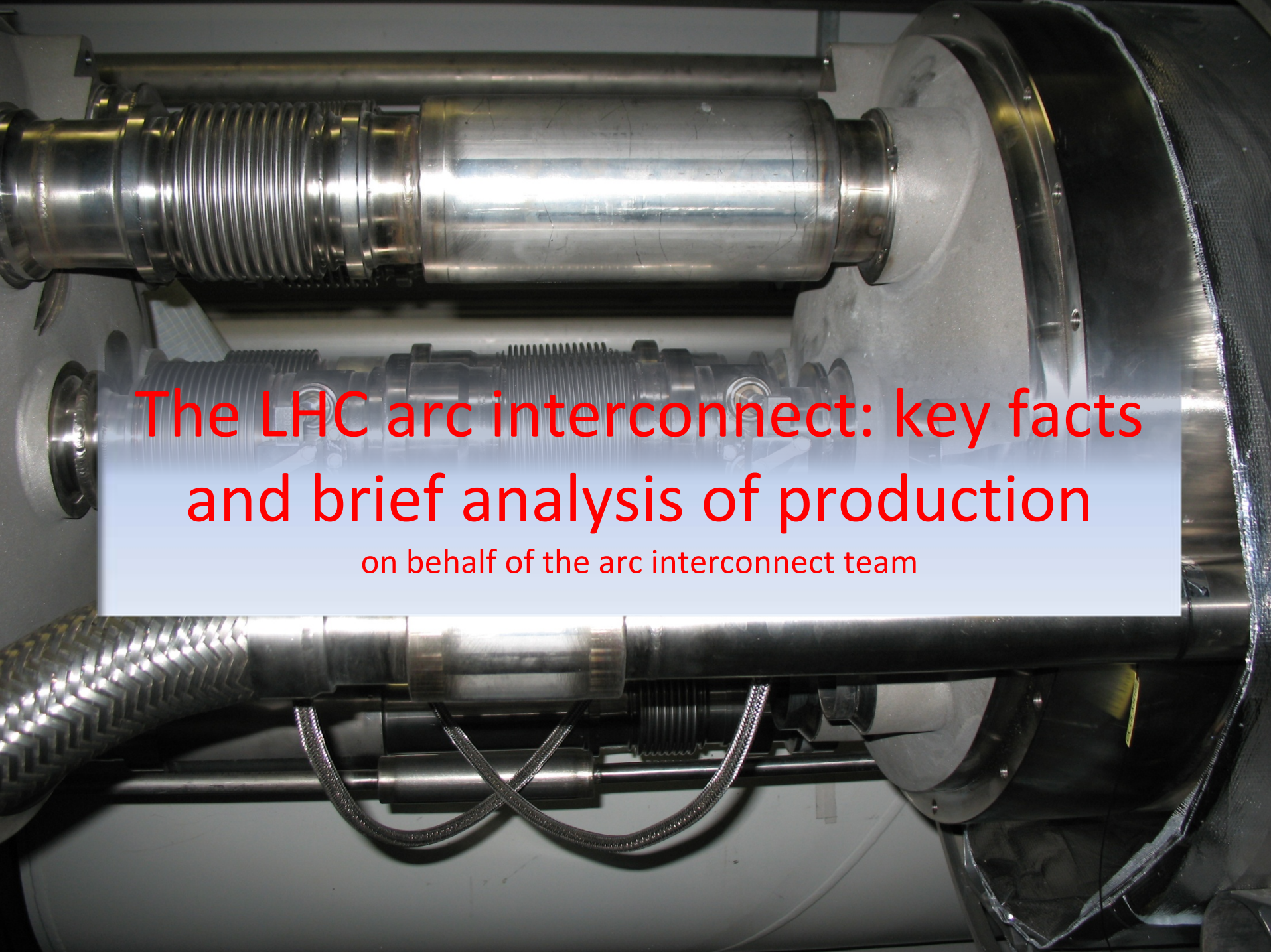


The LHC arc interconnect: key facts and brief analysis of production

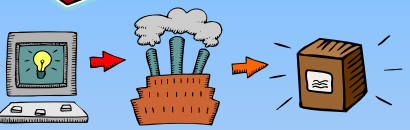
on behalf of the arc interconnect team

Summary

LHC arc interconnect:

few numbers

few facts



the workflow

general view analysis

weekly output and productivity for few key tasks

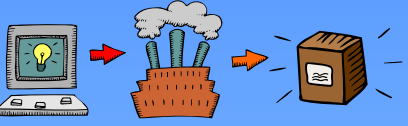
time losses of working hours

The LHC arc interconnection: few numbers

- 1695 interconnect magnet to magnet
- 224 interconnect magnet to QRL
- Each interconnect
  - 18 assembly actions divided in 9 interventions
  - 5 leak tightness check
  - 5 electrical tests
  - 1 RF test
- A sector
  - 1964 assembly interventions
  - 226 electrical tests on sub-assemblies
  - 70 vacuum tests on sub-assemblies
  - 14 RF test on sub-assemblies

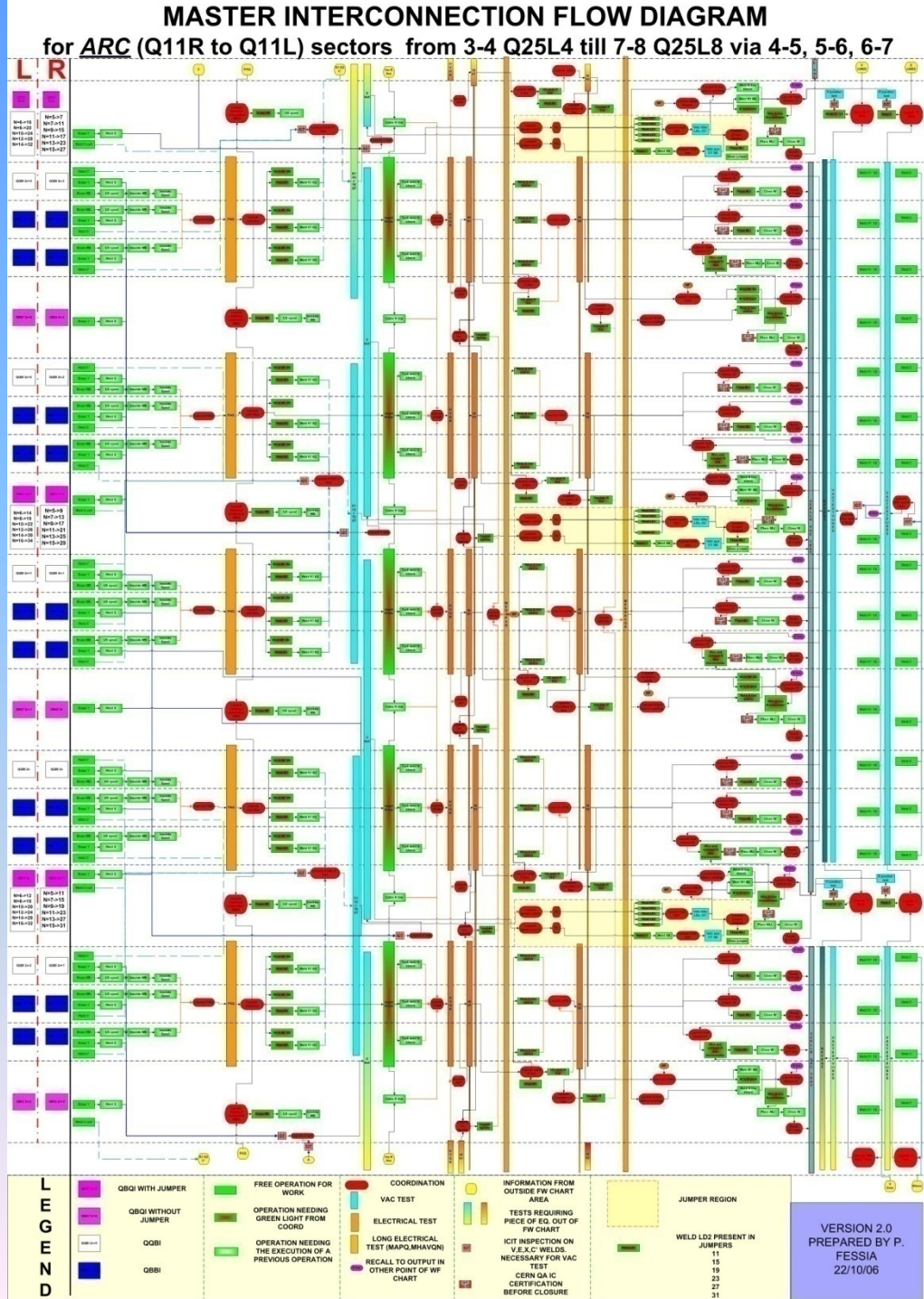
LHC arc interconnection timeline

03/05/2005	1st interconnect in 8-1
October 2005	Start of activities in 7-8
January 2006	Start of 3rd sector with 3rd team in 4-5
February 2006	Concentration of working time from 5 days into 4 days
March-April 2006	Proof of productivity in 4-5: 3 consecutive weeks with 8-10 IC/week in V+E line welding brazing and spools
April 2006	Commitment for 4th interconnection team
May 2006	Stop of 4-5, refocusing on 7-8 and partially 8-1, free access for installation of magnets in 4-5. Continuous interconnection continuous plan with 2 fronts moving from point 4 in the 2 directions
May to August 2006	Test of procedures in 7-8, improvements for better productivity
June 2006	Start of discussion for possible merge AT-CRI and AT-MAS
September 2006	Start of 4-5 with new organization of the worksite
October 2006	Fusion of CRI and MAS: new organization to deal with technical interventions and quality control
November 2006	Closing last IC in 7-8
November 2006	Introduction 4th team
April 2007	Start 1-2. Worksite in 7 different sectors
August 2007	Consolidation of 7-8, plug in module problem, redeployment of workforce
5th November 2007	Closing last IC in 1-2



Organization of work also thanks to

1) Master interconnection flow diagram (one common language among the actors)
2) Follow up file with automatic work release (reliability and flexibility)
3) Organize teams on the field to reduce co-activity

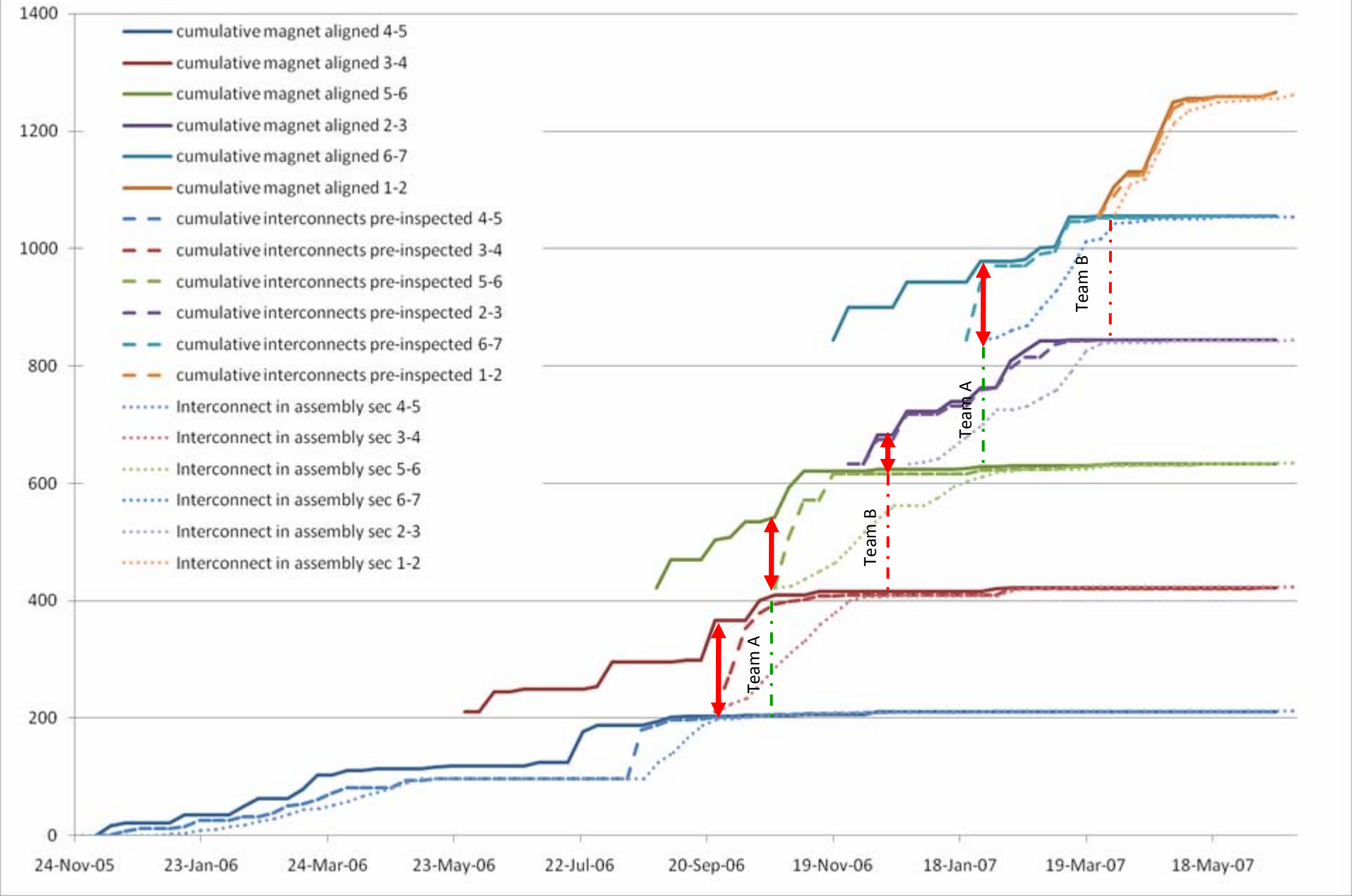


LHC arc interconnect worksite general view

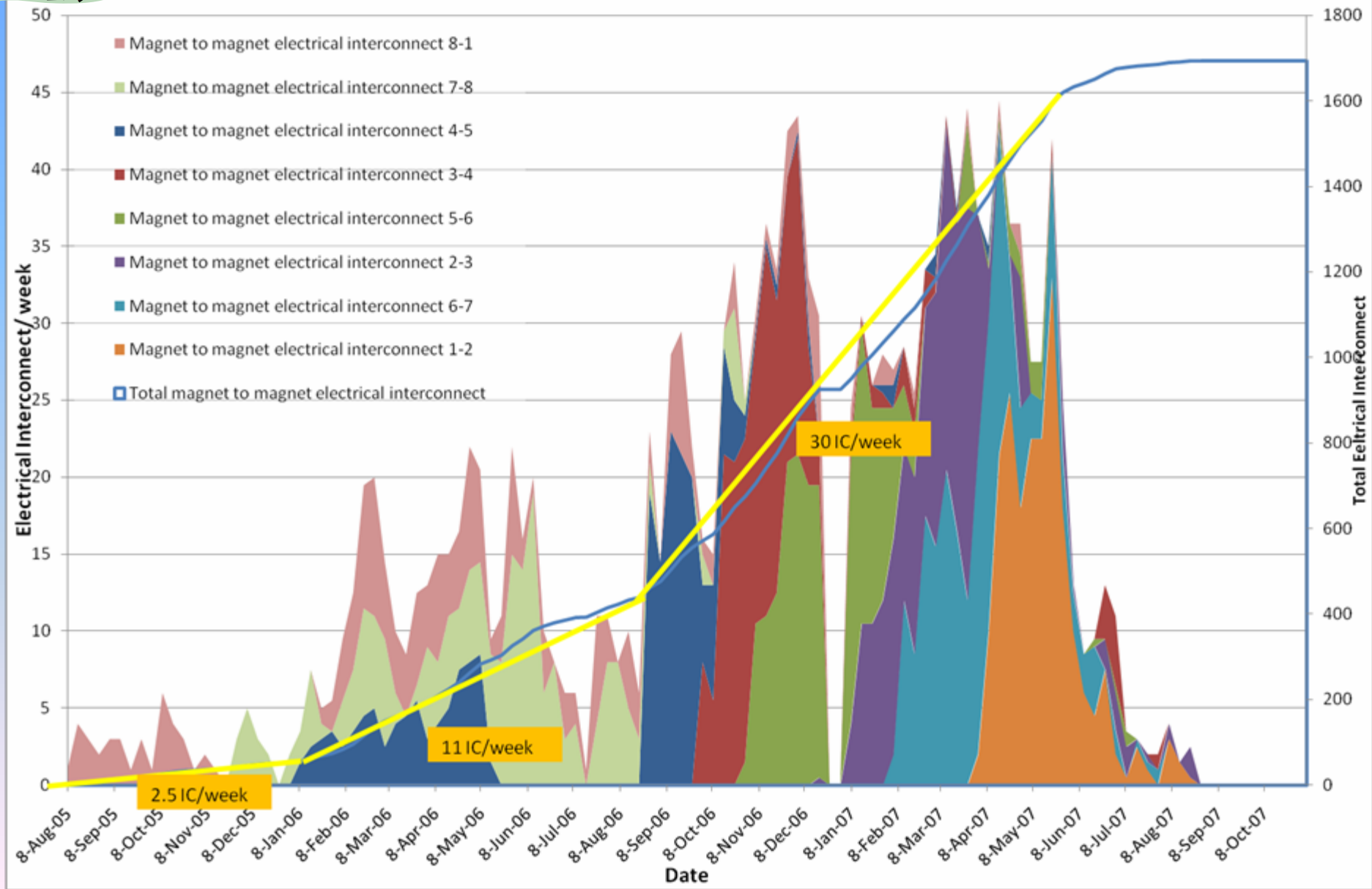
Close interconnect 1-2
Start interconnect 1-2
Pre inspection 1-2
Alignement 1-2
Close interconnect 6-7
Start interconnect 6-7
Pre inspection 6-7
Alignement 6-7
Close interconnect 2-3
Start interconnect 2-3
Pre inspection 2-3
Alignement 2-3
Close interconnect 5-6
Start interconnect 5-6
Pre inspection 5-6
Alignement 5-6
Close interconnect 3-4
Start interconnect 3-4
Pre inspection 3-4
Alignement 3-4
Close interconnect 4-5
Start interconnect 4-5
Pre inspection 4-5
Alignement 4-5
Close interconnect 7-8
Start interconnect 7-8
Pre inspection 7-8
Alignement 7-8
Close interconnect 8-1
Start interconnect 8-1
Pre inspection 8-1
Alignement 8-1

08/04/2005 07/07/2005 05/10/2005 03/01/2006 03/04/2006 02/07/2006 30/09/2006 29/12/2006 29/03/2007 27/06/2007 25/09/2007

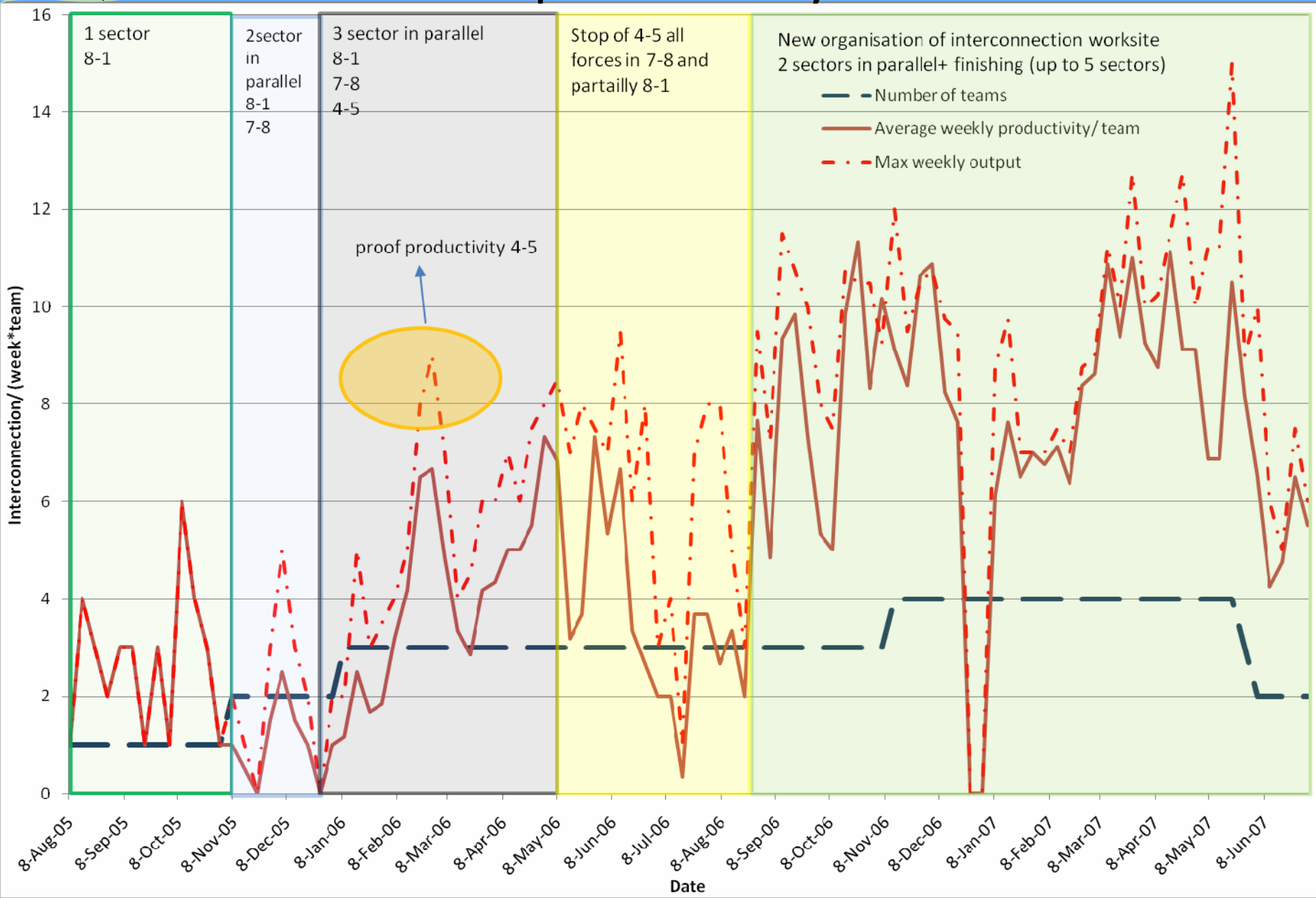
Alignment, inspection and start of interconnection



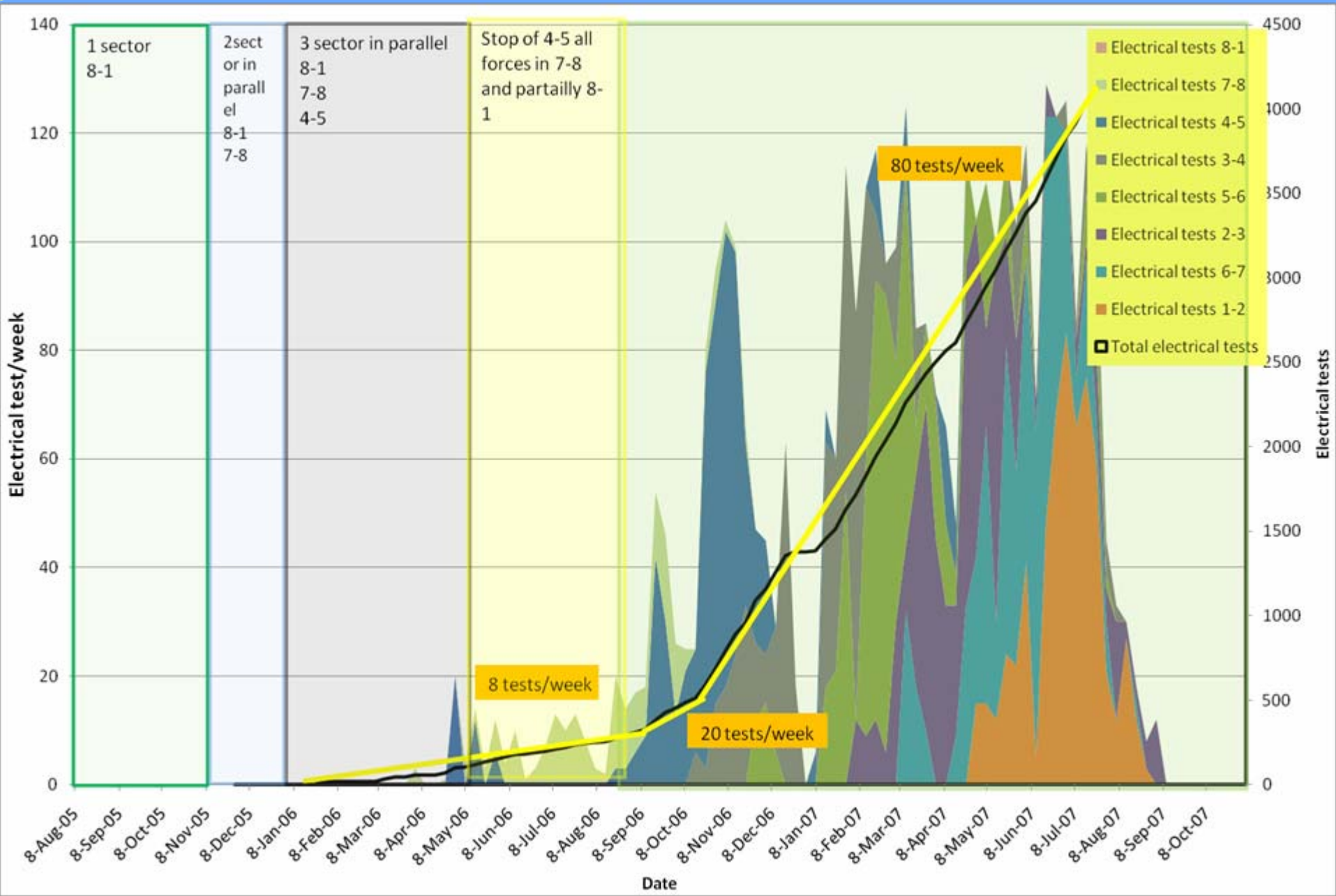
Magnet to magnet electrical interconnection: production analysis



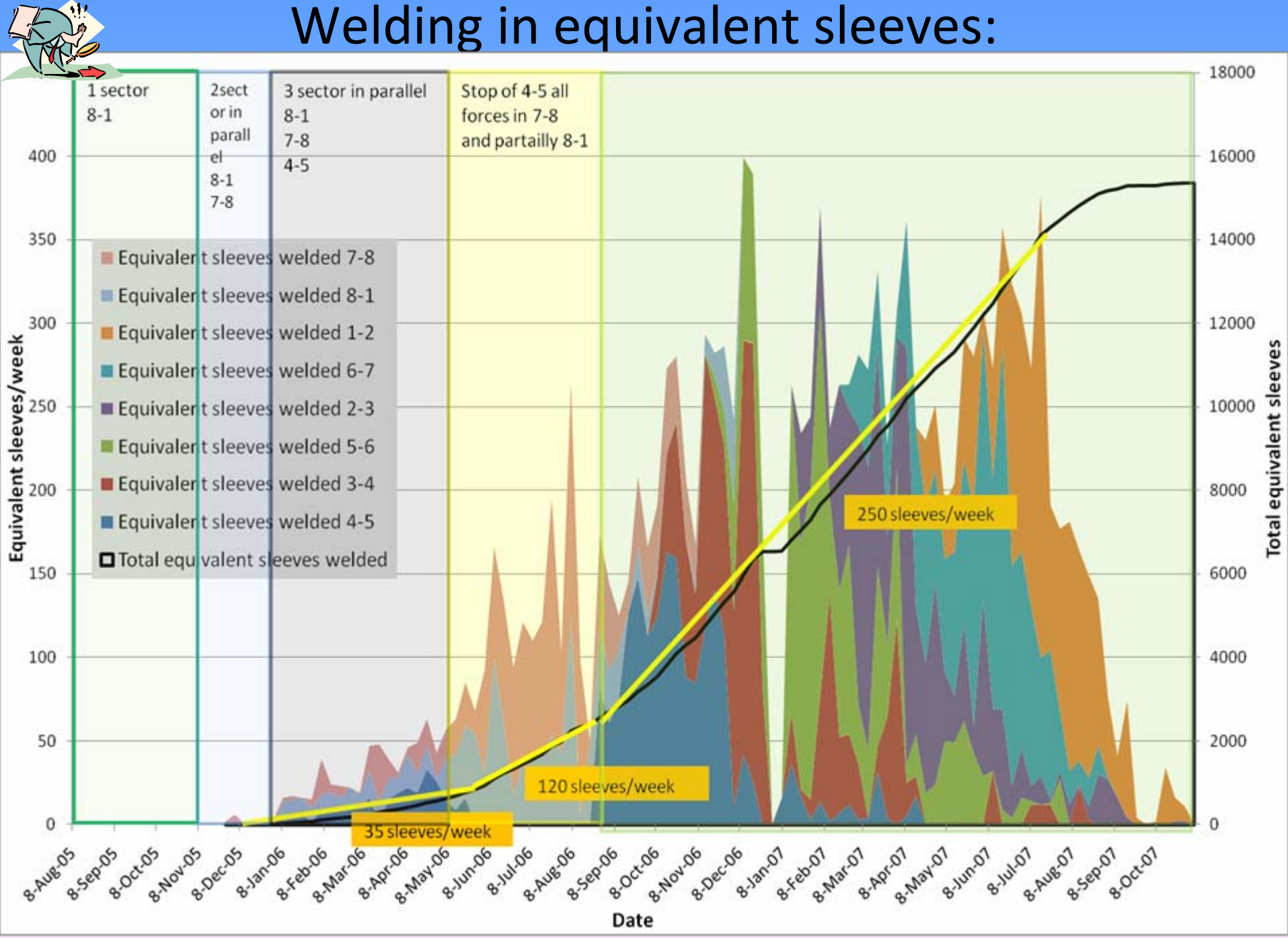
Magnet to magnet electrical interconnection productivity



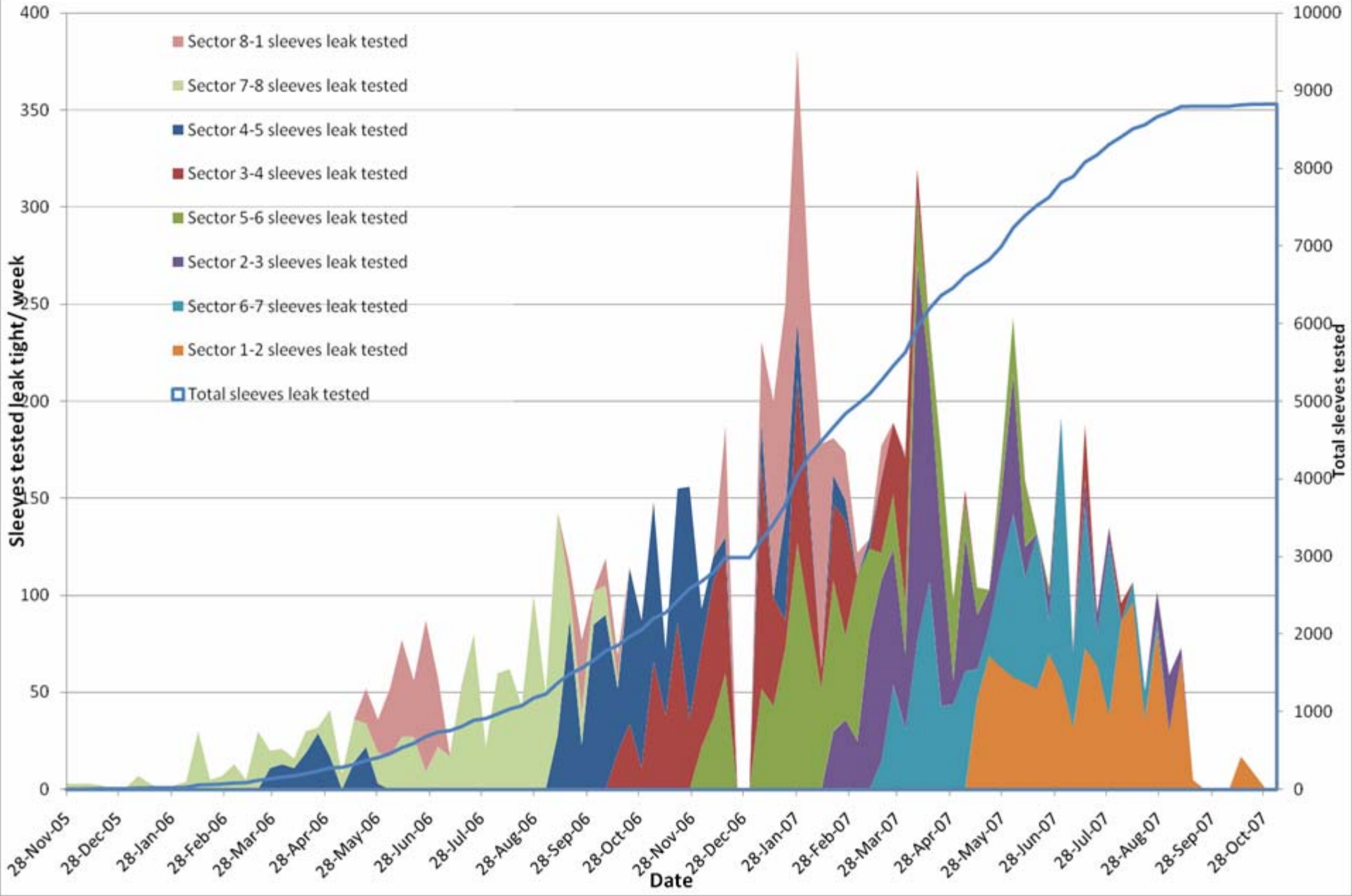
Electrical tests: production analysis



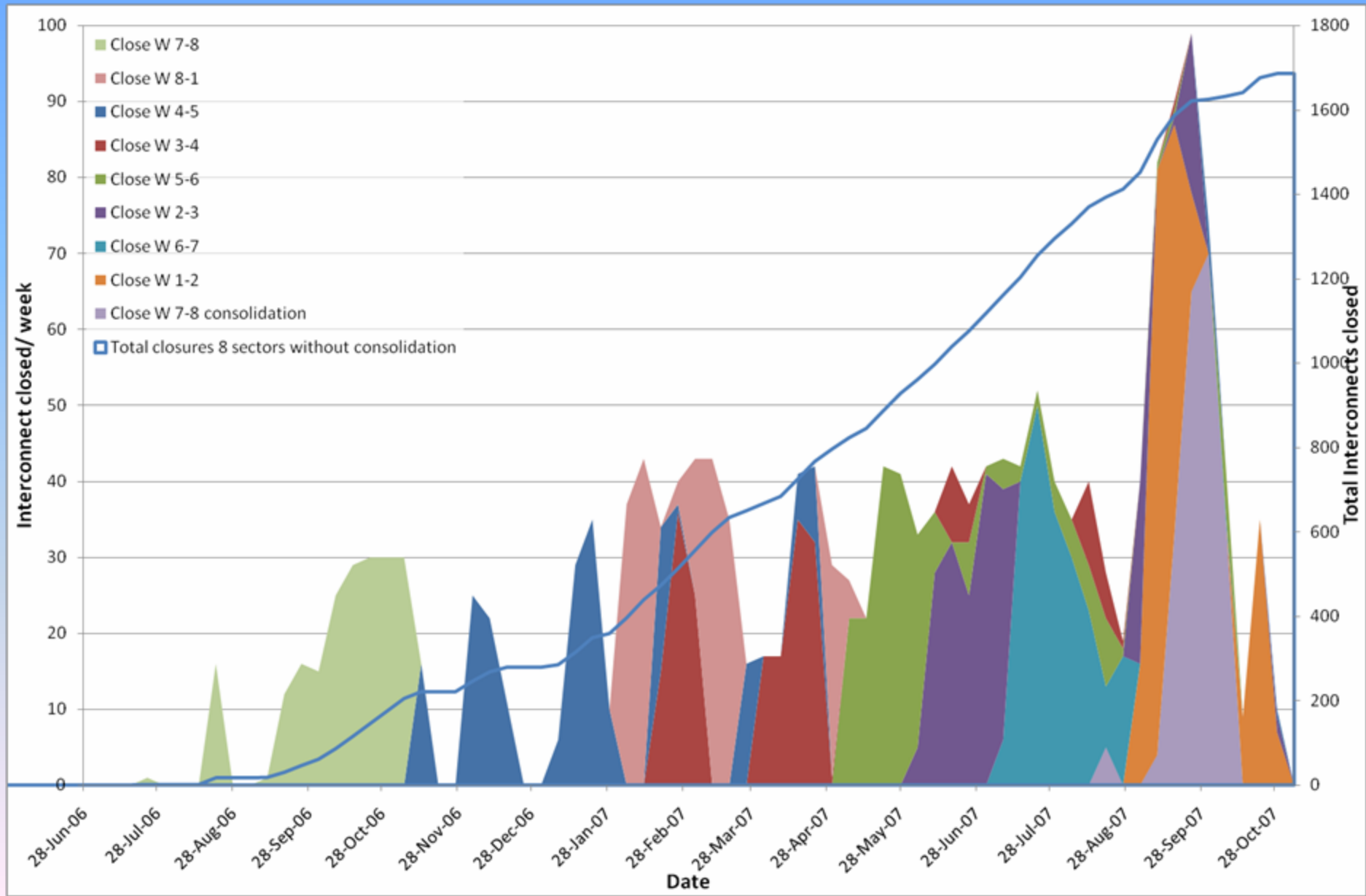
Welding in equivalent sleeves:



Leak testing (excluding vacuum sectors tests)



W closures


Close W 7-8
Close W 8-1
Close W 4-5
Close W 3-4
Close W 5-6
Close W 2-3
Close W 6-7
Close W 1-2
Close W 7-8 consolidation
Total closures 8 sectors without consolidation
Interconnect closed/ week
Total Interconnects closed
Date
0
10
20
30
40
50
60
70
80
90
100
200
400
600
800
1000
1200
1400
1600
1800
28-Jun-06
28-Jul-06
28-Aug-06
28-Sep-06
28-Oct-06
28-Nov-06
28-Dec-06
28-Jan-07
28-Feb-07
28-Mar-07
28-Apr-07
28-May-07
28-Jun-07
28-Jul-07
28-Aug-07
28-Sep-07
28-Oct-07

From November IEG deployed 15000 man hours/month